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Determinants of logistics outsourcing performance among small and medium enterprises

Authors:

1. Joash Mageto^a; Email: jnmageto@gmail.com.
2. Gerrie Prinsloo^b; Email: gerriep@uj.ac.za.
3. Rose Luke^c; Email: rluke@uj.ac.za.

Authors' affiliation:

^{abc}Department of Transport and Supply Chain Management, University of Johannesburg, APK Campus, P. O. Box 524, Auckland Park, 2006. Affiliation: Department of Transport and Supply Chain Management at the University of Johannesburg.

Corresponding author: Joash Mageto; Email: jnmageto@gmail.com

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Abstract

The purpose of this study is to establish determinants of logistics outsourcing performance and their relationship with logistics performance among manufacturing small and medium enterprises (SMEs). The increasing use and challenge of logistics outsourcing require that SMEs establish relationship factors that determine high outsourcing performance to enhance overall logistics performance. Data was collected from 406 SMEs using a structured questionnaire. Factor analysis was applied and four constructs were extracted; three were found to be determinants. Partial least squares structural equation modelling was performed to determine the associations among the constructs. Communication-trust, innovation and cooperation between the manufacturing SMEs and logistics service providers were identified as key determinants of logistics outsourcing performance. Strong associations were validated between communication-trust, innovation and cooperation. Only communication-trust was positively associated with logistics performance. The results guide SME managers to promote communication-trust in logistics outsourcing relationships.

Key words: Logistics outsourcing performance; SMEs; factor analysis; logistics service providers; structural equation modelling; logistics performance; communication; trust; innovation; cooperation

1. Introduction

Logistics forms an important part of supply chain management (SCM) as it links suppliers, manufacturers and consumers (Bartolacci, LeBlanc, Kayikci and Grossman, 2012; Yang, Zhao, Yeung and Liu, 2016). Without an effective logistics system, manufacturers would have limited raw materials, and ultimate consumers are likely to experience supply shortages (Domingues, Reis and Macário, 2015). Thus, the proper control and coordination of logistics is critical to achieving high logistics performance (Ansari and Modarress, 2010; Zhu, Ng, Wang and Zhao, 2017). The use of logistics service providers (LSPs), also known as logistics outsourcing, is a strategy that can be used to manage logistics and achieve high logistics performance (Ansari and Modarress, 2010; Mageto, Prinsloo and Luke, 2018a). Reasons to outsource logistics services include improvement in operational efficiency and effectiveness (Zailani, Shaharudin, Razmi and Iranmanesh, 2017). In addition, logistics outsourcing firms are likely to accrue benefits such as reduction in fixed costs, reduced investments in inventory, reduced logistics costs, improved customer service levels (for example, reduced lead times and increased fill rates) and access to the latest information technologies to increase exchange of information and create operational flexibility (Ansari and Modarress, 2010; Mageto et al., 2018a). Despite the general view that logistics outsourcing can result in high logistics efficiencies and effectiveness, SMEs have not fully reaped the benefits of using 3PLs compared to large enterprises (Solakivi, Töyli, Engblom and Ojala, 2011). This could be due to the limited research on the specific factors that SMEs should focus on to achieve high logistics outsourcing performance upon engaging 3PLs. Furthermore, the likely relationship between logistics outsourcing performance and logistics performance has not been adequately addressed in logistics literature.

There are a number of challenges that prevent SMEs from achieving high logistics outsourcing performance; including opportunistic tendencies (Hofer, 2015; Tsai, Lai, Lloyd and Lin, 2012),

ineffective exchange of information and lack of 3PL innovativeness (Liu, Huo, Liu and Zhao, 2015). Prior research indicates that some logistics outsourcing firms overcome these challenges and reap most of the benefits while others end up in logistics outsourcing failure (Barthélemy and Adsit, 2003; Tsai et al., 2012). This study thus sought to investigate the determinants of logistics outsourcing performance.

Furthermore, the influence of logistics outsourcing performance on logistics performance of SMEs has not received adequate attention in research. Therefore, the following specific research questions helped investigate the determinants of logistics outsourcing performance as well as its influence on logistics performance. The following research questions are addressed in this study:

RQ1. What are the determinants of logistics outsourcing performance (LOP)?

RQ2. What are the inter-relationships among selected determinants of LOP?

RQ3. What is the relationship between communication-trust and logistics performance?

RQ4. What is the influence of cooperation on logistics performance?

RQ5. What is the influence of innovation on logistics performance?

The rest of this paper covers the literature review, methodology, results, discussion, conclusion, managerial implications, limitations and future research directions.

2. Literature review

This section presents a literature review on SMEs, logistics service providers, logistics performance as well as study conceptualisation and determinants of logistics outsourcing performance.

2.1 Small and medium-sized manufacturing enterprises

A small and medium-sized manufacturing enterprise transforms raw materials, components or parts into items of greater value, employs 11 to 100 employees and has an annual turnover not exceeding US\$ 10 million (OECD, 2005; GOK, 2007; Groover, 2010). Although manufacturing SMEs serve a small market and generally use basic production equipment, they play a major role in transforming the livelihoods of the local communities in which they operate (Chege, Ngui and Kimuyu, 2016). The transformation refers to the creation of job opportunities and improvement of living standards (Lan and Wu, 2010; Zalk, 2014). To effectively serve their customers, the manufacturing SMEs should manage their logistics diligently given that it is the single most costly non-core function (Sople, 2012). However, given that the enterprises face a myriad of challenges, particularly with regard to having limited resources and capabilities, it is difficult to invest adequately in logistics (Murphy, Wu, Welsch, Heiser, Young and Jiang, 2012). As such, a number of studies have claimed that manufacturing SMEs are likely to achieve optimal logistics performance by adopting a logistics outsourcing strategy (Langley and Capgemini, 2016; Solakivi, et al., 2011; Waugh and Luke, 2011; Rezaei, Ortt and Trott, 2018).

Solakivi et al. (2011) however argued that just adopting a logistics outsourcing strategy does not guarantee that a firm would accrue the benefits typically associated with outsourcing. Similarly,

Waugh and Luke (2011) claimed that logistics outsourcing success requires diligent management from the shipper as well as the LSPs. SMEs cannot afford logistics outsourcing failure as it may lead to total enterprise collapse owing to resource limitation challenges. As such, SMEs should focus on how to achieve high LOP through logistics outsourcing by identifying its determinants, as discussed later in this section. However, research on what determines high logistics outsourcing performance among SMEs is limited, hence managers lack guidance on which factors to promote internally and jointly with LSPs to achieve high LOP as well as high logistics performance. The next subsection presents literature review on logistics service providers.

2.2 Logistics service providers

LSPs are specialised entities that perform upstream and downstream supply chain activities to meet end user requirements in an effective and efficient manner (Sahu, Datta and Mahapatra, 2015). Green, Turner, Roberts, Nagendra and Winingner (2008) explained that a LSP is a third-party firm, which performs functions first party (shipper) and second party (customer) do not desire to perform or cannot perform as effectively as the LSP. Green et al. (2008:9) highlight further that LSPs can perform either part or all logistics functions on behalf of a shipper.

Selection of the right LSPs is central to the success of a logistics outsourcing relationship (Bandeira, Maçada and Mello, 2015; Mageto, Prinsloo and Luke, 2018b; Sahu et al., 2015). In fact, Barthélemy and Adsit (2003) and O'Byrne (2015) argued that selecting a wrong LSP is one of the sins of logistics outsourcing. This could imply that selecting the right LSP should be management's key consideration in achieving high logistics outsourcing performance. LSPs are usually selected based on their ability to lower costs, improve service quality, and being reliable, flexible, responsive and financially stable (Neely, Gregory and Platts, 2005; Selviaridis and Spring, 2007; Banomyong and Supatn, 2011). In addition, Alkhatib, Darlington and Nguyen (2015) highlighted that effective LSPs should also have the capabilities to maintain relationships with shippers through the sharing of relevant information.

Using LSPs enables firms (that is, shippers) to acquire logistics resources externally to enhance their logistics capabilities and consequently improve their performance (Langley and Capgemini, 2016; Mageto et al., 2018b). Firms contract LSPs so that they can concentrate on core activities, achieve cost efficiencies and improve their customer satisfaction levels as well as access to capabilities that are lacking in-house (Modarress, Ansari and Lockwood, 2009; Qureshi, Kumar and Kumar, 2008; Sahu et al., 2015). Alkhatib et al. (2015) claimed that manufacturing firms can avoid high fixed costs and capital investments in logistics facilities, such as modern warehousing, fleets of trucks, track and trace technologies, inventory management technologies and experienced staff by outsourcing to LSPs. This frees up some funds for allocation to core activities (Bandeira et al., 2015; Hsiao, Kemp, Van der Vorst and Omta, 2010). Therefore, firms that lack sufficient logistics capabilities internally (especially SMEs) can use LSPs to expand their market coverage, improve customer service levels and increase operational flexibility (Holter, Grant, Ritchie and Shaw, 2008; Soinio, Tanskanen and Finne, 2012).

LSPs are expected to offer a range of logistics activities to meet the requirements of both large enterprises and SMEs as well as some specific needs of shippers, as described by Talib, Hamid, Zulfakar and Chin (2015). Some of the services offered by LSPs include transportation, warehousing, fleet management, product track and trace, order management, inventory

management, logistics information systems, clearing and forwarding and packaging (Langley and Capgemini, 2016).

2.3 Logistics performance

Logistics performance is a necessary measure that SMEs should undertake to evaluate how well the outsourced LSPs are performing logistics services such as transportation, warehousing, packaging, inventory management, procurement and order management (Taschner, 2016). High logistics performance can be as a result of high customer service levels and reduced operating costs as well increased logistics flexibility among the SMEs (Taschner, 2016). Therefore, the objective of every business enterprise is to identify the factors that are likely to improve logistics performance and promote them internally and amongst their suppliers, especially LSPs.

According to Mageto et al. (2018b), factors that enhance logistics outsourcing performance such as communication, trust, innovation and cooperation can influence logistics performance positively. Similarly, Aharonovitz et al. (2018) argued that relationship factors such as open communication and sharing of relevant information greatly influence logistics performance. This is because effective communication builds trust and encourages cooperation, which results in good coordination between the shipper and LSP to create a responsive logistics network (Aharonovitz et al., 2018). Aharonovitz et al (2018) argue further that the presence of trust in a logistics outsourcing relationship creates an assurance to the shipper that the LSPs will perform the outsourced functions satisfactorily. Therefore, SMEs should promote effective communication, and build trust and close cooperation with the outsourced LSPs to achieve high quality logistics performance.

Hemamala, Banerji and Sahay (2017) claimed that logistics performance can be measured by evaluating service quality measures such as consistent deliveries and accuracy; flexibility measures such as ability to respond quickly to unexpected orders as well as shortened order cycle times. Logistics performance can generally be measured in terms of time, quality, flexibility and cost (Johansson and Pålsson, 2009; Neely et al., 2005), as is illustrated in Table 1.

Table 1: Measures of logistics performance

Measure	Metrics	Sources
Time	Cycle-time reduction and meeting delivery times	Keebler and Plank (2009)
Quality	Accuracy of records, consistency, quality of goods and services, waste elimination/reduction	Johansson and Pålsson (2009); Hemamala et al. (2017)
Flexibility	Handling of special orders, modification of size, volume or composition (responsiveness), co-ordination of upstream and downstream flows	Hemamala et al. (2017); Johansson and Pålsson (2009)
Cost	Reduction in costs of transport, storage, handling, inventory management, logistics IT and logistics activities	Neely et al. (2005); Johansson and Pålsson (2009); Keebler and Plank (2009)

2.4 Study conceptualisation

Logistics outsourcing can be explained by the resource-based view theory (RBV), which posits that an enterprise with ideocratic resources and capabilities at its disposal is likely to perform better and vice versa (Olavarrieta and Ellinger, 1997). Additionally, Tate, Ellram and Dooley

(2014) argued that SMEs are likely to adopt logistics outsourcing, if the overall cost of acquiring logistics resources and capabilities in-house can be minimized as per the transaction cost economics (TCE) theory. This implies that contracted LSPs should have the required resources and capabilities to achieve high logistics performance to assist the SMEs in meeting their customers' needs at minimal cost. Therefore SMEs, being resource constrained, should identify determinants of logistics outsourcing performance (LOP) that can be influenced internally to improve logistics performance. Figure 1 illustrates the conceptualization of this study. Figure 1 presents a path model developed to illustrate the hypotheses and relationships between the variables. Based on existing theory, communication-trust was modelled to predict logistics performance. Cooperation and innovation were modelled as endogenous and exogenous variables to communication-trust and logistics performance respectively. The relationships between the latent variables and their indicators were modelled as reflective, that is, relationship arrows moving from latent variable to manifest variable (Davcik, 2014).

2.5 Determinants of logistics outsourcing performance and hypotheses

Knemeyer and Murphy (2004:39) claimed that logistics outsourcing performance (LOP) refers to "perceived performance improvements" that LSPs deliver, such as cost reductions and improved customer service levels. Yang et al. (2016) asserted that LOP involves a perception-based evaluation, conducted by an outsourcing firm, on the quality of the services delivered by its LSP. Soinio et al. (2012) argued that LSPs need to offer value-added services to their customers if they are to be considered as high performers. Križman and Ogorelc (2010) claimed that LOP is determined by how well the in-house logistics processes interact with the outsourced processes to meet the set goals. Previous studies have observed that LOP can be determined by the operational, cost and relationship performance of the LSPs, as measured from the shippers' perspective (Dath, Rajendran and Narashiman, 2009; Stank, Keller and Daugherty, 2001; Knemeyer and Murphy, 2004). It is therefore evident that outsourced LSPs could deliver logistics efficiencies and effectiveness that lead to high LOP and consequently improved logistics performance if they maintain a close relationship with shippers (Hofer, Smith and Murphy, 2014; Knemeyer and Murphy, 2004). However, there are a variety of determinants of LOP such as LSP reputation, trust, communication, LSP experience (Knemeyer and Murphy, 2004), assurance, cooperation (Stank, Goldsby, Vickery and Savitskie, 2003; Verstrepen, Cools, Cruijssen and Dullaert, 2009) and innovation (Deepen, Goldsby, Knemeyer and Wallenburg, 2008). Deepen et al. (2008) argued that LOP is best determined by the factors that influence the achievement of outsourcing goals agreed upon *ex ante*, for example, high trust levels and quality communication between the parties (that is, shipper and LSP). Therefore, this study focuses on a few determinants of LOP that SME managers can promote internally to achieve high logistics performance, taking into consideration resource limitations in these enterprises. Specifically, the study focuses on innovation, cooperation, communication and trust as determinants of LOP. These factors are discussed in the following paragraphs and corresponding hypotheses are listed. The hypothesised relationships in this study are illustrated in Figure 2.

Innovation. Innovation is defined as "an idea, practice or object that is perceived as new by an individual or other unit of adoption" (Rogers, 1995:11), as cited in Deepen et al. (2008). Additionally, Weeks and Fenny (2008) claimed that innovation can refer to the enhancement of a firm's products for its existing market or entering a new market through outsourcing. According to Oshri, Kotlersky and Gerbasi (2015), shippers engage LSPs on the expectation that innovative

solutions to logistics problem such as delayed deliveries can be offered. This is because outsourcing firms tend to focus on strategic gains, as well as cost efficiency, from the LSPs' (Whitley and Willcocks, 2011). Similarly, Deepen et al. (2008) claimed that innovative LSPs provide value-added services and are perceived to perform better than non-innovative ones. As such, logistics innovation contributes to the enhancement of business processes by improving logistics operations (Bulsara, Qureshi and Patel, 2014; Weeks and Fenny, 2008), delivery time improvements (Oshri et al., 2015) and customer satisfaction (Deepen et al., 2008) and thus boosting LOP as well as logistics performance (Rezaei et al., 2018). Therefore, it is hypothesised that:

H1: Innovation has a positive association with logistics performance in a logistics outsourcing relationship

Cooperation. Anderson and Narus (1990:45) defined cooperation as “complementary, coordinated actions taken by firms in an interdependent relationship to achieve mutual outcomes or singular outcomes with expected reciprocation over time.” Pratap (2014) and Handley (2012) posited that relational factors such as cooperation are important in determining logistics outsourcing performance, as in some cases legal contracts do not cover every aspect of the relationship. Li, Wei and Liu (2010) advised that LSPs should be selected on the basis of the anticipated cooperative objectives with the client firm. Huo, Liu, Kang and Zhao (2015b) argued that a close cooperative relationship promotes mutuality between the partners and is a good predictor of a long-term relationship. Hofer, Knemeyer and Dresner (2009) claimed that this close association is possible because the client firm depends on the LSP's resources and capabilities to improve its logistics performance. Therefore, a cooperative relationship in logistics outsourcing is usually performance-based, while sustainability implies a high degree of LOP (Hofer et al., 2009). Specifically, Hofer et al. (2009) and Dhone and Kamble (2015) argued that cooperation between a LSP and its client firm enhances logistics performance through logistics cost savings, shortened lead-times and increases in service levels, as both parties focus on common goals (for example, logistics operational efficiencies). Finally, Deepen et al. (2008:89) posited that cooperation is a strong predictor of LOP as it positively influences the attainment or surpassing of agreed upon goals. Mandal, Bhattacharya, Korasiga and Sarathy (2017) argued that innovation is positively influenced by cooperation efforts between parties in a logistics outsourcing relationship by aligning external and internal interests of the parties. Additionally, Deepen et al. (2008) established a strong influence of cooperation on innovation. Thus, the study posits that:

H2: Cooperation has a positive association with logistics performance

H3: Cooperation has a positive association with innovation

Communication. Communication is defined as “...sharing of meaningful and timely information between firms” (Anderson and Narus, 1984), as cited in Anderson and Narus (1990:44). Liu et al. (2015) argued that in a robust communication system, the LSPs' relationship with shippers is critical for enhancing cooperative ventures and delivering logistics outsourcing success. Quality communication is crucial for boosting LSPs' customer service levels, understanding LSP service offerings and making informed selections, and improving visibility across the logistics network (Zacharia, Sanders and Nix, 2011; Liu et al., 2015). Deepen et al. (2008) claimed that communication influences LOP at a subtler and motivational level. This implies that when there is quality communication between a shipper and a LSP, the likelihood of high LOP is much

greater. In addition, Liu et al. (2015) claimed that logistics efficiency is enhanced when there is an exchange of relevant and actionable information between shipper and LSPs. Qureshi, Kumar and Kumar (2007) concluded that the exchange of quality information between manufacturing SMEs and LSPs boosts LOP, as it encourages the parties to cooperate in achieving the expected goals, which include high logistics performance.

Trust. Trust which refers to the confidence exhibited by partners in a relationship, positively influences LOP (Hosie, Sundarakani, Tan and Koźlak, 2012; Knemeyer and Murphy, 2004; Kwon and Suh, 2004). This means that where there is a high level of trust, the outsourced LSP performs well by delivering a high-quality service (Križman and Ogorelc, 2010; Huo, Ye and Zhao, 2015a). Conversely, a lack of trust would make it necessary for every transaction to be scrutinised, leading to increased transaction costs and, invariably, poor performance on the part of the LSP (Kwon and Suh, 2004). In addition, a lack of trust forces management to spend a considerable amount of time analysing each party's credibility and reliability, rather than focusing on how to improve performance of the outsourced logistics activities (Hosie et al., 2012). As such, trust increases transparency through open communication, coordination and the alignment of mutual benefits (Huo et al., 2015a). Trust is measured by examination of the LSP's dependability, honesty, transparency and reliability, and whether there is evidence of shared interests, reciprocity and dedication to operational efficiency in pursuing set goals (Kwon and Suh, 2004; Selviaridis, 2016; Tian, Lai and Daniel, 2008).

This study examined previous studies that have studied communication and trust in logistics outsourcing relationships (such as Aharonovitz et al., 2018; Knemeyer and Murphy, 2004; Deepen et al. 2008; Tian et al. 2008) and conceptualised that the two co-exist to determine LOP as well as to influence logistics performance. A healthy shipper-LSP relationship thrives on quality communication and high levels of trust and is important for continuous innovation as well as high logistics performance levels (Aharonovitz et al., 2018; Bulsara et al., 2014; Lacity, Khan, Yan and Willcocks, 2010; Mol, 2005). Huo et al. (2015b) asserted that cooperation in a logistics outsourcing relationship is the result of a high degree of trust between the LSP and its client; thus, trust and cooperation drive LSPs to deliver a high-quality performance and achieve set goals. Therefore, we hypothesise that:

H4: Communication-trust associates positively with logistics performance in a logistics outsourcing relationship

H5: Communication-trust associates positively with innovation

H6: Communication-trust associate positively with cooperation

3. Methodology

Research design

This study is based on a positivism philosophical orientation because it involved predetermined and structured data collection techniques (Saunders, Lewis and Thornhill, 2015). Positivism is associated with generating factual knowledge from quantifiable observations that are analysed statistically (Saunders et al., 2015). In addition, Crowther and Lancaster (2008) argued that studies based on the positivism philosophical orientation follow a deductive approach to theory development.

In line with positivism, this study followed a quantitative research design. Creswell (2014) argued that the quantitative approach can be used to find relationships between variables, has standards of validity and reliability and allows for statistical analysis and interpretation of data. Specifically, this study followed a survey design to collect data from the sampled respondents. A survey refers to an investigation of opinions of a sampled population by collecting numerical data (Saunders et al., 2015). The research process followed in this study is summarised as illustrated in Figure 3.

Because there is no government-maintained database on SMEs in Kenya, to establish the study population and sample for this study, business licenses were relied on. SMEs must be licensed (i.e. obtain a yearly business permit) by the county governments within which they operate. Therefore, to select the study population and sample, a list of all licensed manufacturing SMEs within Nairobi City County as at 1st March 2015 was obtained from the licensing department. A population of 406 enterprises was identified and selected as the sample for this study. The list included only the manufacturing SMEs with between 11 and 100 employees, and this was also confirmed during the actual data collection.

Data collection

The data for this study was collected between October 2015 and February 2016. The respondents drawn from the 406 manufacturing SMEs included logistics managers, directors, SME owners or their equivalents who were involved in the day to day logistics operations of their enterprises. Data were collected from all 406 enterprises. Data were collected using a structured questionnaire using a seven-point Likert-type scale. Data regarding innovation (four items), communication (five items), trust (six items), cooperation (four items) and logistics performance (nine items) were collected. In addition, demographic data were collected from the manufacturing SMEs. The measurement items were adapted from previous studies, for example, those for innovation (Oshri et al., 2015; Deepen et al., 2008); cooperation (Križman and Ogorelc, 2010; Deepen et al., 2008); communication (Qureshi et al., 2008), trust (Križman and Ogorelc, 2010; Kwon and Suh, 2004) and logistics performance (Keebler and Plank, 2009; Johansson and Pålsson, 2009) and is shown in the questionnaire contained in the Appendix. The questionnaire was piloted among ten randomly selected manufacturing SME managers from the neighbouring county and were not included in the actual data collection. Piloting resulted in re-wording and modifications on some items to achieve clarity.

During the actual data collection, the questionnaires were hand delivered to the respondent firms and picked later after filling. However, in some cases the questionnaires were filled immediately. Observation method was used to confirm that the specific SMEs were involved in actual manufacturing, otherwise they were excluded.

Data analysis

The returned questionnaires were checked for completeness and it yielded 163 valid responses, which provided a response rate of 40.2 percent. Non-response bias was tested using communication-trust as a test variable according to Armstrong and Overton's (1977) criteria. The responses were divided into two categories according to whether it was collected early or towards the end of the data collection period. Early responses accounted for 87.2 percent of the

valid responses. Non-response bias was ruled out as there was no statistically significant differences in the results between early and late responders (Table 2).

Table 2: Independent samples t-test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Communication_Trust	Equal variances assumed	.160	.690	-.259	161	.796	-.07422	.28635	-.63972	.49127
	Equal variances not assumed			-.242	25.167	.811	-.07422	.30678	-.70583	.55739

Factor analysis was performed on all the items to establish the determinants of logistics outsourcing performance. Confirmatory factor analysis (CFA) was performed using partial least squares structural equation modelling (PLS-SEM) in Smartpls 3. In estimating a path model in PLS-SEM, Hair et al. (2014) asserted that it should be done in two stages (that is, stage 1 involves evaluating the measurement model and stage 2 is the assessment of the structural model's fitness). As such, the reliability and validity of the measurement model was evaluated using composite reliability and average variance extracted (AVE) respectively. The goodness-of-fit of the structural model was assessed by examining the coefficient of determination (R^2), predictive relevance (Q^2), and the size and significance of the path coefficients to test the hypotheses. The results are presented below. The next section discusses the ethical considerations of this study.

Ethical considerations

This study did not pose any potential harm to the respondents or the environment. To ensure that all ethical issues were considered, appropriate permission was sought from the university ethics committee to conduct the research. Furthermore, no personal information was collected from the respondents. The responses received for the purpose of this research were kept confidential.

4. Results

Demographics of respondents and enterprises

The mean age of enterprises since incorporation was 14 years with most of them considered to be mature enterprises; having been in operation for over 10 years. The majority of enterprises had between 11 to 50 employees with only 20 percent having 51 to 100 employees. The manufacturing SMEs represented diverse manufacturing categories, that is, chemicals and plastics producers (39.3%), metal products processors (25.1%), wood and paper products producers (16.6%), food processors (12.3%) and textile manufacturers (6.7%).

The suitability of the data and strength of the inter-correlations among the indicators for factor analysis was tested using Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (Kaiser, 1974) and Bartlett's test of sphericity (Bartlett, 1954). The data yielded a KMO value of 0.902 (Table 3), which was adequate given that the minimum cut-off is 0.6 (Davcik, 2014). The Bartlett's test was statistically significant (p -value=0.000), thus supporting the factorability of the correlation matrix (Tabachnick and Fidell, 2007; Pallant, 2010). After performing factor analysis, four factors were extracted using principal component analysis (PCA), explaining 59.7 percent of the total variance based on an eigenvalue equal to or greater than 1.0, as per Kaiser (1974). The factors were identified as communication-trust, innovation, cooperation and logistics performance.

Table 3: KMO and Bartlett's test measures

Test measures		Values
1. Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.902
2. Bartlett's Test of Sphericity	Approx. Chi-Square	3362.354
	df	378
	Sig.	.000

Confirmatory factor analysis

Confirmatory factor analysis was performed in PLS-SEM application – Smartpls (Ringle, Wende and Becker, 2015). The measurement model was assessed by evaluating its internal consistency through examination of composite reliability and Cronbach's alpha values. Composite reliability and Cronbach's alpha measures yielded values greater than the acceptable minimum value of 0.7 for each of the latent variables (that is, communication-trust, innovation, cooperation and logistics performance) as illustrated in Table 4. The value of the composite reliability and Cronbach's alpha values (>0.7) imply that the scale items had high reliability (Pallant, 2010). The standard loadings per scale item were also examined to evaluate reliability and all were found to have acceptable values (> 0.7) as required except three which were retained for theoretical reasons, as advised in Hair et al. (2014). For instance, the item LOPC3 refers to joint problem solving in a cooperative relationship (Appendix). The item was retained because removing it was likely to impoverish the scale regarding cooperation. The other two items under logistics performance scale, that is, reducing order-cycle time and elimination of operational waste were retained to improve the quality of the scale.

Validity of the measurement model was assessed through convergent validity and discriminant validity, as advised by Davcik (2014). Convergent validity value was satisfactory as all the average variance extracted (AVE) values were above 0.5 (Table 4), suggesting that over 50 percent of the variance in each construct was explained by the model (Pallant, 2010).

Table 4: Measurement model results

Latent variables	Indicators	Standard loadings	Cronbach's alpha	Composite reliability	AVE
Communication-trust	LOPCO1	0.844	0.805	0.951	0.684
	LOPCO2	0.875			

	LOPCO3	0.872			
	LOPCO4	0.805			
	LOPCO5	0.865			
	LOPT3	0.722			
	LOPT4	0.838			
	LOPT5	0.785			
	LOPT6	0.825			
Innovation	LOPI1	0.859			
	LOPI2	0.857			
	LOPI3	0.835	0.878	0.916	0.731
	LOPI4	0.87			
Cooperation	LOPC1	0.84			
	LOPC2	0.836			
	LOPC3	0.676	0.942	0.871	0.629
	LOPC4	0.81			
Logistics performance	LP1	0.697			
	LP2	0.752			
	LP3	0.692			
	LP4	0.737			
	LP5	0.774	0.901	0.919	0.557
	LP6	0.754			
	LP7	0.774			
	LP8	0.736			
	LP9	0.796			

Model validity was also assessed through discriminant validity, which determines the uniqueness of each construct in the model (Hair et al., 2014). Discriminant validity was measured by comparing the square root of the AVE values and construct correlations (Fornell and Lacker, 1981). A model's validity is acceptable if the square root of AVE values is greater than the highest correlation for each construct (Davcik, 2014). As illustrated in Table 5, each of the four constructs was unique because the square root of the AVE values (that is, 0.827, 0.793, 0.855 and 0.746) are all greater than the highest correlations for the associated constructs, thus the model was considered to be satisfactory. Indicator outer loadings were also observed and revealed strong loadings only to one factor, indicating adequate discriminant validity value of the measurement model.

Table 5: Square root of AVE and construct correlations

Factors	Communication-trust	Cooperation	Innovation	Logistics performance
Communication-trust	0.827			
Cooperation	0.647	0.793		
Innovation	0.755	0.643	0.855	
Logistics performance	0.460	0.406	0.407	0.746

Notes: Bold and diagonal= $\sqrt{(AVE)}$

The fit indices illustrated in Table 4 and Table 5 assessed the reliability and validity for the measurement model and were found to be acceptable. An acceptable measurement model allows for the evaluation of the structural model.

Stage 2 of PLS-SEM model evaluation involves assessment of the structural model. The criteria for assessing the structural model includes examination of collinearity, coefficient of determination, predictive relevance and the size and significance of the path coefficients (Hair et al., 2014). The coefficient of determination (R^2) was examined to establish the predictive accuracy of the model. Table 6 illustrates the R-square values and their interpretations. In evaluating R-square values, critical values of 0.63, 0.33 and 0.19 for substantial, moderate and weak predictive accuracy of the model are used (Chin, 1998). As such, the values in Table 6 imply that communication-trust had substantial, moderate, and weak predictive accuracy on innovation, cooperation and logistics performance respectively. Predictive relevance of the model was established as the Q^2 values for each cooperation, innovation and logistics performance were greater than zero.

Table 6: Coefficient of determination (R-square)

Construct	R-square value	Interpretation
Comm-trust	0.000	-
Innovation	0.612	Substantial
Cooperation	0.419	Moderate
Log performance	0.234	weak

Assessment of the structural model was also done by performing a bootstrapping to determine the significance of the path coefficients and help evaluate the hypotheses. The results are illustrated in Table 7. As per Table 7, hypotheses *H3*, *H4*, *H5* and *H6* (with T statistics >1.96) were supported, while *H1* and *H2* were not supported (T statistics <1.96).

Table 7: Summary of hypotheses testing

	Hypotheses	Standard estimates	T Statistics	Result
<i>H1</i>	Innovation -> Logistics performance	0.081	0.644	Reject
<i>H2</i>	Cooperation -> Logistics performance	0.165	1.650	Reject
<i>H3</i>	Cooperation -> Innovation	0.265*	3.377	Accept
<i>H4</i>	Communication-trust -> Logistics performance	0.293*	2.787	Accept
<i>H5</i>	Communication-trust -> Innovation	0.584*	8.009	Accept
<i>H6</i>	Communication-trust -> Cooperation	0.647*	10.707	Accept

Notes: * $p < 0.05$ significance

The structural model is illustrated in Figure 4 showing the statistically significant (*) and non-significant (ns) path coefficients. The coefficient of determination (R^2) values for each construct are also illustrated in Figure 4 and enclosed in brackets.

The path coefficients results show that communication-trust positively influences (1) the logistics performance of the manufacturing SMEs (*H4*), (2) cooperation between the SME and LSPs (*H6*) and (3) innovation capabilities of the LSPs (*H5*) in a logistics outsourcing relationship. Cooperation between the SME and LSP was found to positively enhance the

innovation capabilities of the LSP (*H3*), although it did not yield a statistically significant influence on logistics performance. Surprisingly, the impact of cooperation and innovation on logistics performance was not supported, as per (*H2*) and (*H1*) respectively. Finally, only the direct positive relationship between communication-trust and logistics performance is significant. The indirect relationships through cooperation and innovation were not supported. Similarly, innovation did not improve the indirect relationship between cooperation and logistics performance, as illustrated in Figure 4.

5. Discussion

Determinants of logistics outsourcing performance

In this study, three determinants of logistics outsourcing performance were identified as (1) communication-trust and (2) innovation and (3) cooperation. The factor analysis showed that communication and trust factors co-exist in a logistics outsourcing relationship to promote high LOP. This is consistent with Dent's (2006) study which observed that there is no outsourcing relationship that can hold without nurturing quality communication and high trust levels. Dent (2006) explained further that trust can only exist where there is free communication and that quality communication cannot take place if there is no trust between the parties. The finding also confirmed Deepen et al. (2008) and Hartmann and De Grahl's (2012) studies which claimed that communication should be timely, reliable and relevant to help in planning as well as promotion of high LOP. Trust has been identified as a critical predictor of performance in logistics outsourcing relationships (Križman and Ogorelc, 2010; Capaldo and Giannoccaro, 2015) as it reduces transaction costs and information uncertainty. Thus, trust can determine success or failure in logistics outsourcing relationships (Yang, Marlow and Lu, 2009; Capaldo and Giannoccaro, 2015). Identification of the three determinants of LOP could imply that there must be an exchange of good quality information that builds trust between the manufacturing SMEs and LSPs so that high LOP is achieved (Aharonovitz et al., 2018; Tian et al., 2008).

Identification of innovation capabilities of the outsourced LSPs as a determinant of LOP confirms the findings by Oshri et al. (2015) and Bulsara et al. (2014) who identified effective communication and innovation as important measures of the strength of a supply chain relationship. This implied that the SMEs should create an environment in which the LSP's innovations can assist in achieving high LOP. Establishing cooperation as a determinant of LOP confirmed the works of Križman and Ogorelc (2010) and Deepen et al. (2008). Cooperation ensures that the SME and LSPs focus on common goals by providing an environment where the outsourced relationship will thrive through achievement of agreed upon goals (Deepen et al., 2008). Therefore, SMEs and LSPs in a logistics outsourcing relationship should promote communication-trust, innovation and cooperation to achieve high LOP. This study is unique because it has identified LOP determinants in a developing country context. The identification of communication and trust as a single factor in LOP determination also makes a significant contribution to logistics outsourcing theory.

Communication-trust, innovation and cooperation

The second research question required the establishment of the relationships between communication-trust, innovation and cooperation. Communication-trust strongly influences cooperation between the parties in a logistics outsourcing relationship. This ensures that the

parties align their interests by creating proper communication channels and building trust so as to achieve high LOP. The result suggests that cooperation is enhanced only if there is communication-trust between the parties (Johnston, McCutcheon, Stuart and Kerwood, 2004; Križman and Ogorelc, 2010; Huo et al., 2015a). In addition, Deepen et al. (2008) argued that cooperation is an effective determinant of LOP, with communication as its prerequisite, thus, confirming the criticality of communication-trust's influence on cooperation.

A strong positive influence of communication-trust on innovation was found, in contrast to Deepen et al.'s (2008) findings, which indicated no influence of communication on proactive improvement (or innovation). This finding suggests that the combination of trust and communication factors in a logistics outsourcing relationship between the SME and LSPs gives the LSP the confidence to dedicate resources to innovative practices. Cooperation between SME and LSPs was also found to significantly influence innovation of the LSPs to promote high LOP. The finding confirms the findings of the Dhone and Kamble (2015) study which argued that logistics outsourcing can be a source of innovation, if effective communication channels are established to enhance cooperation between the partners. Therefore, the strong positive associations between the determinants of LOP advance an understanding that communication-trust eliminates uncertainties in the relationship so that cooperation as well innovation capabilities can be developed between the parties in the outsourcing relationship.

Communication-trust and logistics performance

Communication-trust positively influences logistics performance in a logistics outsourcing relationship. The finding supports the arguments that quality communication can result in high customer service levels, shipper's clear understanding of the LSP's service offerings, selection of the right LSP and improved visibility across the logistics network, leading to high logistics performance (Zacharia et al., 2011; Liu et al., 2015). In addition, the finding supports the claims that trust can reduce transaction costs through increased transparency and identification of shared interests resulting in high logistics performance (Tian et al., 2008). The finding might imply that once the SMEs and outsourced LSPs share quality information consistently and build trust they are likely to achieve consistent deliveries, accuracy of orders, flexibility and reduced cycle times to improve overall logistics performance (Hemamala et al., 2017). Thus, although operational efficiencies advanced by LSPs may result in improved logistics performance (Hsiao et al., 2010), in this study it is established that relational factors such as communication-trust can also lead to high logistics performance.

Unexpectedly, cooperation and innovation could not significantly influence logistics performance, contradicting the strong positive link established by Deepen et al. (2008). This result could imply that SMEs in a logistics outsourcing relationship are focussed on logistics efficiencies and effectiveness promised by the LSP. The SMEs could thus be averse to pursuing extended cooperative and innovative objectives to improve logistics performance. Unsupported associations between cooperation-logistics performance and innovation-logistics performance could also imply that the SMEs outsource basic logistics services that are transactional in nature and do not necessarily need to develop relationships with the LSPs.

6. Conclusion

The study advances an understanding that the determinants of LOP include the relational factors such as communication-trust, innovation and cooperation. The identification of these factors suggests SMEs and LSPs in a logistics outsourcing relationship should attempt to promote quality communication and trust, close cooperation and enhanced innovation to achieve success in the relationship. This finding makes a contribution to logistics outsourcing literature through the identification of the three factors as well as the establishment that communication and trust coexist to promote high LOP.

The communication-trust factor positively influenced innovation and cooperation among SMEs in a logistics outsourcing relationship in this study. In addition, cooperation influenced innovation significantly. The strong relationships between the determinants of LOP (communication-trust, innovation and cooperation) further emphasizes the need for SMEs to nurture a relationship with their LSPs, characterised by quality communication-trust, high innovation capabilities and close cooperation. The finding also contributes to logistics outsourcing literature.

Finally, it is observed in this study that communication-trust has a significant positive influence on logistics performance among SMEs. The finding could imply that SMEs and LSPs should create the right communication channels which will advance quick, transparent and accurate sharing of information, as well as adopt management strategies that promote high trust levels. This finding also contributes to logistics outsourcing literature. Unlike a prior study which tested a relationship between communication, cooperation, proactive improvement and goal achievement and exceedance (Deepen et al., 2008), this study tested the relationship between communication-trust, innovation, cooperation and logistics performance, making the contributions unique.

7. Managerial implications

The objective of SMEs in outsourcing logistics is to achieve logistics efficiencies and effectiveness at minimal cost. To achieve high efficiencies and effectiveness, SME managers are advised to promote quality communication with their chosen LSPs. SME managers should also advance business practices that will enhance the building of high trust levels with LSPs to achieve high logistics performance. In addition, SME managers should advance quality communication together with high trust levels to achieve significant improvements in logistics performance. Managers should be cognizant of the factors within their control that promote high logistics outsourcing performance such as communication, trust, cooperation and innovation. As such, the findings can be used to guide SME managers to nurture communication-trust, innovation and cooperation with the LSPs for success in logistics outsourcing relationships. The findings can guide LSPs to identify relational factors to be promoted and advanced in the contract so as to improve outsourcing performance, as well as the SME's logistics performance.

8. Limitations and future research directions

This study was limited to manufacturing SMEs that practice logistics outsourcing, thus excluding those not using LSPs. This also means that all trading SMEs were excluded. Future research can consider testing the model in a wider context including trading SMEs as well as larger enterprises in an outsourcing arrangement.

The sampled respondents are SME managers in charge of logistics in Kenya. Cultural differences and general biases of opinion on logistics outsourcing performance cannot be ruled out. A probable future research direction would be to compare these results with those from other emerging as well as developed economies.

The determinants of LOP in this study were limited to allow for a focussed analysis. More factors that influence LOP among SMEs such as ownership structure, length of outsourcing contract, and trading versus manufacturing (that is, type of business) can be included in future studies.



Figure 1: Study conceptualisation

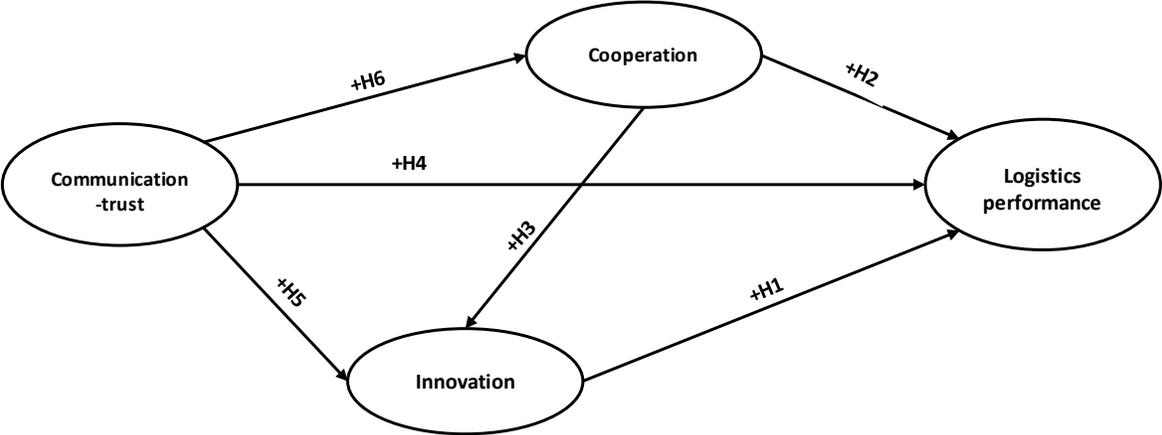


Figure 2: Hypothesised relationships

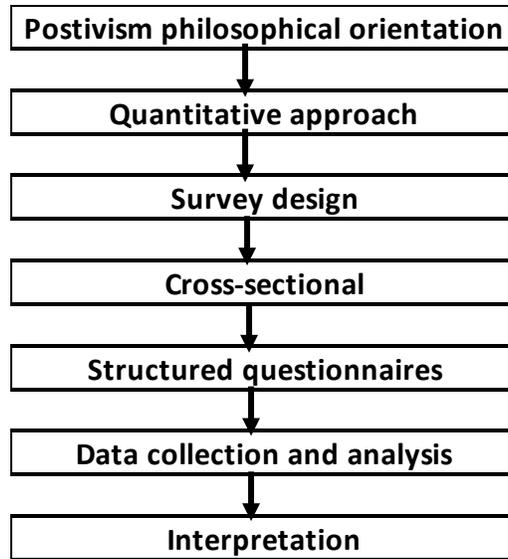


Figure 3: Research process

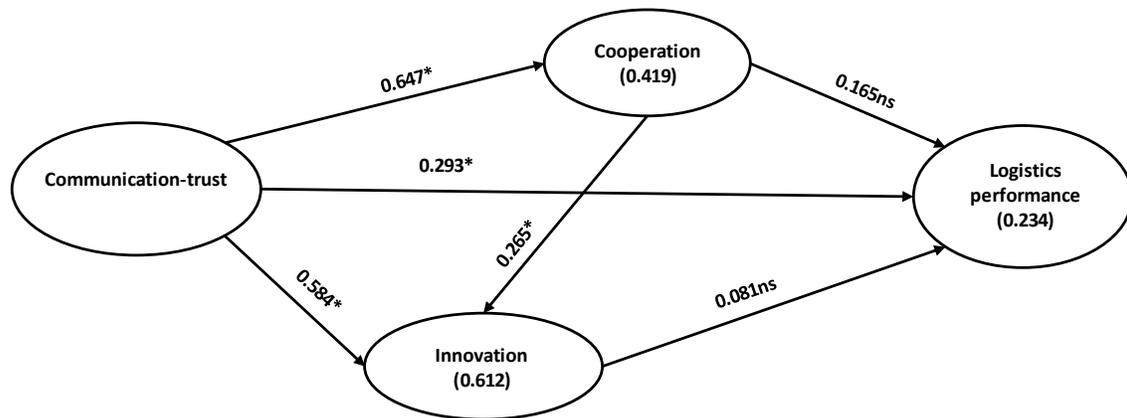


Figure 4: Structural model illustrating significant (*) path coefficients and R-square values (in brackets)

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Appendix

	Questionnaire items	Sources
	Kindly indicate to what extent you agree with the following statements on relationship factors between your enterprise and logistics service provider (LSP). Use a scale of 1 to 7. Where 1=Strongly disagree and 7=Strongly agree.	
LOPC1	Logistics service providers (LSPs) share our business philosophy (e.g. we all endeavor to be cost efficient)	Deepen et al. (2008); Križman and Ogorelc, 2010
LOPC2	The LSPs and our company collaborate to achieve common goals	
LOPC3	There is a joint problem-solving approach between LSPs and our company	
LOPC4	There is mutual respect between our enterprise and outsourced LSPs	
LOPCO1	There is mutual exchange of information between our company and LSPs.	Deepen et al. (2008); Qureshi et al., 2007
LOPCO2	Information is shared between parties in a timely manner (e.g. no delays)	
LOPCO3	The information received by either side is complete (e.g. no loose ends)	
LOPCO4	The information shared between our enterprise and LSPs is accurate (e.g. straight forward)	
LOPCO5	The information shared between our enterprise and LSPs is clear	
LOPT3	LSPs take objectives of my enterprise into consideration when making decisions that will affect our business	Kwon and Suh (2004);
LOPT4	LSPs are dedicated to improving quality	Tian et al. (2008);
LOPT5	LSPs are dedicated to eliminating waste/non-value adding processes	Križman and Ogorelc, 2010
LOPT6	Our organization can count on the LSPs to be honest during contracting (e.g. not withhold relevant information)	
LOPI1	LSPs always provides practical solutions to problems within its area of engagement	Deepen et al. (2008); Oshri et al. (2015)
LOPI2	LSPs usually modifies performance of logistics activities and processes to adapt to changing environment	
LOPI3	LSPs advise management on improvement of activities in areas outside their direct responsibility.	
LOPI4	LSPs sustain vibrant networks to deliver valued service to our enterprise	
	Kindly rate the current performance of the logistics function in your enterprise as per the following logistics performance measures. Use a scale of 1 to 7. Where 1=very poor and 7=excellent.	
LP1	Continually reduce order-cycle-time is...	Keebler and Plank, (2009);
LP2	Meet delivery dates on a consistent basis is...	Johansson and Pålsson (2009)
LP3	Eliminate waste within logistics processes is...	
LP4	Reduce cost of performing logistics activities is...	
LP5	Maintain accurate records is...	
LP6	Consistently deliver quality goods and/or services is...	
LP7	Handle special orders is...	
LP8	Modify order size, volume or composition during a logistics operation is...	
LP9	Maintain seamless upstream and downstream flow of goods is...	