# Flow Management Tools and Techniques for Logistics Performance: An Application to the Logistics Service Sector in Cameroon

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**Abstract.** The outsourcing of logistics by Cameroonian industrialists is a reality. Thus, the use of Logistics Service Providers (LSPs) experienced a meteoric rise and therefore, the question of the evaluation of their logistics performance is relevant. This to the extent that, their logistics performance influences not only that of their client, but also that of all the logistics chains of which they are an integral part. To this end, the objective of our study is to assess the impact of certain flow management tools and techniques implemented by Logistics Service Providers (LSPs), on their logistical performance. Based on a sample of 52 cameroonian LSPs, the results show that the application of new solutions and the investment in recruiting and training qualified personnel have a positive impact on thier logistical performance.

**Keywords:** Logistics Service Providers (LSPs) · Logistics performance · Cameroon

## 1 Introduction

Since the early 1990s, logistics outsourcing practices have increased over time. The use of Logistics Service Providers (LSPs) by companies has thus grown rapidly. In Cameroon, the logistics sector is highly diversified and competitive, offering a wide range of services. The market is shared between large multinationals (Bollore Transport Logistics Group, DHL, DAMCO or Transimex) and small and medium enterprises like Global Lines Services, Littoral Logistics, HLogistics, etc. By entrusting their logistics activities to a specialist in the field, shippers want to reduce their costs, focus on their core business, increase their productivity, have a better quality of service, to improve their performance and strengthen their competitive advantage (Barthelemy 2004; Boissinot and Kacioui-Maurin 2009).

Despite these expectations expressed by shippers, Cameroon's LSP are performing poorly in the field of commercial logistics. Indeed, in successive reports of the World Bank's biennial "***Connecting to compete: Trade Logistics in the Global Economy»***"


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(2014; 2016 et 2018)[1], Cameroon is among the lowest performing countries in logistics at both the global and regional levels. For example, in the 2018 edition of this report, Cameroon ranks 125th out of 167 countries globally. Regionally, it ranks 18th out of 43 African countries. Nevertheless, in the Cemac sub-region, Cameroon comes at the top of the list, surpassing the Republic of Congo (2nd), Chad (3rd), the Central African Republic (4th), Equatorial Guinea (5th) and Gabon (6th).

Thus, it seems interesting to identify the tools and techniques for managing flows likely to improve the logistics performance of LSPs, in a developing country like Cameroon. Research on the determinants of the logistics performance of LSPs has attracted great interest from researchers, particularly in countries in Southeast Asia such as the Philippines, Singapore, Thailand and even Vietnam. Overall, it emerges from these studies that two categories of factors have a significant influence on the logistics performance of LSPs: resources and logistical capacities (Lai et al. 2002; Lai 2004; Lai et al. 2008; Karia et al. 2012; Karia and Wong 2013; Alkhatib et al. 2015; Karia et al. 2015; Zawawi et al. 2016; Zawawi et al. 2017).

In the African continent in general, the field of explanatory research on this theme is still very little explored. Two studies to our knowledge have been conducted by Sohail et al. (2004) in Ghana and the other in South Africa by Ittman (2018). In Cameroon more specifically, research in logistics management is quite rare (Eyenga 2010; Tsapi and Assene 2014) and more particularly that relating to LSPs (Gouanlong and Bidisse 2017). It is therefore in response to these various concerns that we deemed relevant, to highlight the important role that flow management tools and techniques play in improving the logistics performance of LSPs.

Thus, this research is based on the following main question: do the flow management tools and techniques used by the LSPs in Cameroon, allow them to achieve their objectives in terms of costs and quality of service? To answer this question, we present in a first part the literature review, describing the theories that we have mobilized, before presenting our research hypotheses. A second part will be devoted to the methodological approach adopted, for the collection and analysis of the data collected from the 52 LSPs surveyed. A third and final part will be dedicated to the presentation and discussion of our results.

1. Logistics performance: conceptual and theoretical framework, research hypotheses.

In this part, we first present the outlines of the concept of logistics performance of LSPs (Sect. 1.1). Then, we expose the different theoretical currents likely to explain this logistic performance (Sect. 1.2). Finally, we proceed to formulate our research hypotheses (Sect. 1.3).

[1] Based on surveys conducted with professionals in the logistics sector, a Logistics Performance Index (LPI) is established in order to highlight the most competitive countries in terms of logistic performance. The determination of this index is based on the effectiveness of border control procedures, the quality of trade and transport infrastructure, international price competitiveness, the competence and quality of the logistical services, the ability to monitor the goods and finally the ability to ensure that deliveries are made on time.

### 1.1 The Concept of Logistics Performance

Several authors consider logistics performance as a multidimensional concept that must be analyzed across several facets (Boubker and Chafik 2015). Wang et al. (2010) point out that the concept of LSPs performance translates into quality, flexibility and on-time delivery. Neely et al. (1995) for their part, assimilate the logistics performance of LSPs through 4 components: costs, quality, deadlines and flexibility, which influence shippers in the choice of their service providers. For other authors, notably Dehler[2] (2001, p. 208) and Huo et al. (2008), the logistics performance of LSPs is fundamentally built on two major dimensions, logistics costs and the level of logistics services. Within the framework of this study, we define the logistics performance of the LSPs as being its ability to deliver a quality service (ensuring the availability of products on time, in the best conditions of safety and in good condition) and to less to the customer. In other words, it refers to the ability of the LSP to create added value for itself as well as for all of its stakeholders (customers, other business partners, etc.). To grasp the concept of LSP logistics performance, researchers in logistics management mainly use two theoretical approaches, namely resource theory and that based on dynamic capabilities.

### 1.2 The Theory of Resources

The "Resource based-view" (RBV) is now the most dominant current in explaining the firm's performance (Barney 1991). This theory focuses on the relationship between the firm's internal characteristics and its performance. In fact, the resources held by the company can give it all the competitive strength it needs, thanks to its competitive advantage.

As with all other firms, resource theory is also considered in the LSP study. This is due to the fact that the main activity of LSP is to satisfy customers with a variety of resources to carry out transport, delivery, storage, … and whose performance relies heavily on how these resources are distributed (Karia and Wong 2013). Thus, the theory of resources has gradually become part of the logistic litterature. A number of research projects have identified and analysed strategic resources for LSP, as well as their effects on their logistical performance (Panayides 2007; Karia et al. 2012, 2015; Karia and Wong 2013; Zawawi et al. 2016, 2017).

Indeed, in the complex and competitive logistics sector, it is essential for LSP to have access and to be able to transform the right logistics resources into superior logistics performance. Drawing on the work of RBV, Karia and Wong (2013) developed a theoretical model of LSP's logistical resources and capabilities, which they called ***Resource-Based Logistics*** **(RBL),** which determine the logistical performance of the LSP. According to the categorization by Alkhatib et al. (2015), logistical resources can be subdivided into groups of tangible and intangible resources (Table 1).

[2] Dehler M. (2001), Entwicklungsstand der Logistik, Wiesbaden: DUV cité par Zawawi et al. (2017).

**Table 1.** Logistical resources

| | |
|---|---|
| Tangible logistical resources | • *Physical resources:* they represent the LSP's ability to acquire, use and retain logistics vehicles, machinery, tools and equipment |
| | • *Technological resources:* they help the LSP to manage, control and improve logistics operations such as computers and network platforms, RFID, GPS, the Internet |
| Intangible logistical resources | •*Human Resources:* it represents the art of recruiting, training, paying and motivating staff (skills, learning, knowledge, training) |
| | • *Relational resources:* they concern the ability of the LSP to create and maintain healthy long-term relationships with other members of the supply chain, its willingness to share the right information at the right time |
| | • *Organizational resources:* they refer to the shared values, principles and philosophy of the LSP on different themes such as trust, openness, participation and interaction, total quality management and sustainability. It includes state-of-the-art software and database (EDI), LSP's image and reputation, standards and practices |

Source: Alkhatib et al. (2015).

### 1.3 The Theory of Dynamic Capabilities

In fast-changing environments, the key to a company's success is its ability to acquire or develop new ways of configuring and using its resources as quickly as possible (Acquier and Dalmasso 2009). For example, the concept of dynamic capabilities was introduced by Teece et al. (1997) to highlight the positive link between the firm's dynamic capabilities and its competitive advantage. For Teece et al. (1997), the theory of dynamic capabilities is a new approach of the firm complementary to that of resources, presenting dynamic capabilities as unique combinations of resources, difficult to imitate and can give the company a certain competitive advantage. However, these dynamic capabilities are specific to each firm because they depend on its history.

Many studies have focused on the logistical capabilities of LSPs, in improving their performance and competitiveness (Panayides 2007; Karia et al. 2012; Karia and Wong 2013; Zawawi et al. 2016, 2017). Logistical capabilities are seen as the ability of LSPs to generate and deploy resources, in order to satisfy their customers and improve their logistical performance. Conduct logistics operations flexibly, seek innovative logistics solutions, achieve economies of scale, are essential capabilities for the competitiveness of LSPs and the creation of their competitive advantage.

These two theoretical approaches highlight the fact that the logistics resources and capacities of the LSPs constitute determinants of its strategic behavior and the improvement of its logistics performance. Thus, what gives LSP a competitive advantage are its assets (resources and capacities) as well as its ability to combine them to produce superior performance. Indeed, to respond to the wishes expressed by their customers, PSLs must provide for a dual requirement in their service offer: (i) make the best use of the resources acquired over time to serve customers, while (ii) exploring new ways of improving their performance and that of their customers (Quelin 2003),

since "*within industrial and commercial supply chains, logistics providers are playing an increasingly central role: guarantors of good coordination of goods and information flows. Their performance directly conditions, both their competitive advantage but also that of their customers and more broadly that of the supply chains in which they are integrated*"(Brulhart and Claye-Puaux 2009, p.1). These two theoretical approaches allowed us to formulate our research hypotheses.

## 1.4 Research Hypotheses

### 1.4.1 Application of New Solutions

Globalization has led to increased competition in all sectors of activity, leading companies to develop their creativity (Poulis et al. 2013). Also, in a highly competitive sector such as logistics service, the introduction of new procedures and forms of work organisation, as well as the use of modern technologies (ICT, EDI) by LSPs to provide new services, are levers for differentiation and improvement of the quality of service provided (Selviaridis and Spring 2007). For these authors, the ability to be more creative in carrying out their daily tasks is often identified as a core competency held by a successful company. Innovative solutions are needed for effective communication, transmission and processing of information to support logistics operations and better serve customers.

Thus, it is essential for LSPs not only to have access to the right resources, but to be open-minded, proactively in consolidating their resources to improve their position towards their competitors. This ability to innovate is important in differentiating logistics activities provided to clients (Zawawi et al. 2016, 2017). It promotes better service, faster responses to customers, more customized logistics solutions and a higher level of service. It can therefore be deduced that the more the carrier invests in new innovative services and logistics processes, the greater the quality of the service offered and its competitiveness. To this end, we formulate the following hypothesis:

*Hypothesis 1(H1): More LSPs apply new solutions in the management of flows, the greater the quality of their service.*

### 1.4.2 Investment in Recruitment and Training of Qualified Personnel

The staff of a company is a set of interdependent individuals, gathered to carry out an activity. They share knowledge and are responsible for the results obtained (Cohen and Bailey 1997). These authors recognize that implementing a management and knowledge sharing policy within the supply chain, requires more hiring and training of qualified personnel. A real work team that masters the techniques of logistics flow management is essential. For Lhomme and Massy (2010), firms that are able to foster the development of human capital specific to them are better able to gain a sustainable competitive advantage. The current context in which LSPs are evolving, is attracting an ever increasing interest in human resources. To increase its productivity in the supply chain, the LSPs must invest in the acquisition of experts and technicians able to handle innovative technologies in logistics management, including the use of equipment (computer equipment, handling, transport vehicles) which requires some expertise. The company must also retrain its staff to match the requirements necessary to maintain the competitive advantage, in terms of efficiency at the workstation, customer relationship

management, which determines the performance of services offered and the achievement of economies of scale. Thus, these two types of investment, can reduce logistics costs, particularly through (Lauras et al. 2003) the increase of skills in the management of logistics operations, the risk management which consists in identifying and trying to reduce the probability of the occurrence of disruptive events and the creation of value which makes it possible to reduce the costs of production and transaction between the actors of the supply chain. All this leads us to advance the following hypothesis:

*Hypothesis 2 (H2): More LSPs invest in the recruitment and training of qualified personnel, the lower their logistics costs.*

## 2 Research Methodology

### 2.1 Sample and Data Collection

Our study sample was created from two sources of information: the website of the Chamber of Commerce, Industries, Mines and Crafts (CCIMA) and the General Census of Enterprises (GCE) of the Cameroon, which we consulted on February 16, 2019. Of the 66 LSPs initially identified, 52 of them agreed to participate in this research by providing the information sought, i.e. a response rate of 78.8%. To this end, a questionnaire was administered to the leaders of the LSPs companies in 3 cities in the country (Bertoua, Douala and Ngaoundere). The Statistical Package for Social Sciences data analysis software (SPSS version 21) allowed us to process the data collected.

### 2.2 Measuring Variables

For this work, the two explanatory variables in our research hypotheses were measured by a 5-point Likert scale drawn from the literature, ranging from (1: strongly disagree …. 5: quite agree). In the particular case of logistic performance, the variables concerning the quality of the logistic service and the reduction of logistics costs were measured positively and negatively respectively using a Likert scale with 5 modalities (1: never … 5: very often), and from an inverted Likert scale (1: very often … 5: never).

For the concept of application of new solutions, we referred to the work of Karia and Wong (2013), Karia et al. (2015), Zawawi et al. (2016), and we selected 4 items. To measure the concept of investment in the recruitment and training of qualified personnel, we mobilized the work of Lhomme and Massy (2010), Karia and Wong (2013), Zawawi et al. (2017). We have selected 5 measurement items. As for the two indicators of logistic performance, namely the quality of the logistic service and the reduction of logistics costs, we relied on the work of Domingues et al. (2015). We were able to select 9 measurement items of which respectively, 6 items for the first logistic performance indicator and 3 items for the second.

### 2.3 Factor Analyses

All of our search variables were subjected to principal component factor analysis (PCA) in accordance with the recommendations of Evrard et al. (2003). The variable application of new solutions generated a unique factor, after the only PCA that we realized. The initial scale being the same as the final scale, has a KMO index = 0, 806 and a Bartlett sphericity test of 89.187 which is significant at p = 0.000. This unique factor yields 70.109% of the total variance explained, and its cronbach alpha coefficient is 0.858. As for the variable investment in the recruitment and training of qualified personnel, the 5 starting items were definitively retained after the PCA. Thus, this unique PCA indicates a KMO of 0.674 and a Bartlett sphericity test of 99.898 significant at p = 0.000. Two factors emerge, accounting for 79.945% of the total sample variance. Their alphas cronbach coefficients are 0.842 for factor 1 and 0.830 for factor 2.

The first factor is called "Hiring Logistic Personnel (HLP)" and the second "Personnel Upgrade (PU)". The quality variable of the logistic service retained the 6 measurement items initially set. The KMO index is equal to 0.666 with a Bartlett sphericity test of 261, 988 significant at p = 0.000. This unique factor restores 70.569% of the total variance and gives a cronbach alpha of 0.898. Finally, the logistics cost reduction variable achieved a KMO of 0.644. The observation of Bartlett's sphericity test indicates a value of 72.270 at the p = 0.000. Only one factor was retained after the analysis. This factor restores 73.210% of the original information, and the coefficient alpha of internal coherence of the scale is high (0,811).

## 3 Findings

### 3.1 Descriptive Analysis of the Sample

In general, the vast majority of LSPs surveyed (76.9%) are small and medium-sized enterprises, with a workforce of between 6 and 100 employees. 35% offer as a logistics service the transportation of goods both inside the country and in the CEMAC sub-region, 28.8% deliver the handling service, 23.8% the storage service, 10% the packaging products and 2.5% offer other types of additional services to their customers such as the clearance of goods (notably because they have the status of Authorized Customs Agent). Most managed flows are containerized goods, that is, goods that are transported in a container. Indeed, the containers are more and more used by the Cameroonian's LSP because they improve the security of the goods and facilitate the intermodal transport. For respondents within these structures, 82.7% are men aged 41 to 50 and 32.7% of them are General Managers.

### 3.2 Hypothesis Testing and Discussion

To test our research hypotheses, we performed linear regressions between the flow management tools and techniques, we selected for this study, and logistic performance.

### 3.2.1 Relationship Between the Application of New Solutions and the Quality of the Logistics Service

Hypothesis 1 (H1) argued that the more LSP apply new solutions (ANS) in flow management, the greater the quality of their service. The results of the simple regression we performed, are summarized in Table 2 below.

**Table 2.** Results of the regression between the application of new solutions and the quality of the logistic service

| R | $R^2$ | | | | Coefficients | | | |
|---|---|---|---|---|---|---|---|---|
| | | d.f. | F | Sign. | | Beta | t | Sign. |
| 0,762 | 0,581 | 1, 50 | 69,323 | 0,000 | ANS | 0,762 | 8,326 | 0,000 |

Source: Our analyzes.

With regard to these results, it appears that the correlation coefficient R is 0.762. This coefficient reflects the existence of a positive relationship between the strengthening of innovation capacities and the quality of the logistics service. The $R^2$ of a value of 58.1% allows us to say that this explanatory variable contributes 58.1% to the variation in the quality of the logistic service. The value of Student (t) which is 8,326 is significant at p = 0,000. The Fisher (F) coefficient of 69.323 is also significant at p = 0.000. There is therefore a statistically significant relationship between the application of new solutions and the quality of the logistics service. The H1 hypothesis is therefore validated.

### 3.2.2 Relationship Between Investment in Recruitment and Training of Qualified Personnel and Cost Reduction

Hypothesis 2 (H2) stated that the more PSLs invest in the recruitment and training of qualified personnel, the lower their logistics costs. The results of the multiple regression between the dimensions of investment in the recruitment and training of qualified personnel (IRTQP) and the reduction of logistical costs, are presented in Table 3 below.

**Table 3.** Results of the regression between the IRTQP and the reduction of logistics costs

| R | $R^2$ | | | | Coefficients | | | |
|---|---|---|---|---|---|---|---|---|
| | | d.f | F | Sign. | | Beta | t | Sign. |
| 0,785 | 0,616 | 2, 49 | 39,222 | 0,000 | HLP | 0,455 | 2,871 | 0,006 |
| | | | | | PU | 0,365 | 2,304 | 0,026 |

Source: Our analyzes.

In the case of Table 3 above, the value of F is 39.222 at p = 0.000. The statistical relationship between the IRFPQ and the reduction of logistics costs is therefore significant. The correlation coefficient R is 0.785. This coefficient allows us to say that there is a positive relationship between the IFFPQ and the reduction of logistics costs.

$R^2$ is 61.6% and shows that variations in the IRTQP dimensions account for 61.6% of the variations in the reduction of logistics costs. The explanatory coefficients (beta) are 0.455 and 0.365. In addition, the value of the student's (t) is 2,871 at p = 0.006 for the first factor, while that of the second factor is 2.304 at p = 0.026. Overall, based on the results previously obtained, hypothesis H2 is validated.

### 3.3 Discussion and Conclusion

The purpose of this research was to analyze the impact of certain flow management tools and techniques put in place by Logistics Service Providers (LSPs) on their logistics performance. In fact, the application of new solutions and the investment in the acquisition and training of qualified personnel favor the logistics performance of LSPs. The results obtained after the test of our hypotheses confirm the previous work done by many authors in other contexts (Lhomme and Massy 2010, Karia and Wong 2013, Karia et al. 2012, 2015; Zawawi et al. 2016, 2017). These results also make it possible to confirm, in the Cameroonian context, the different theoretical currents that we have mobilized to advance our research hypotheses. Thus, the ability of LSPs to constantly seek new ideas and new ways of doing things is a source of competitive advantage and performance. A LSP is able to reach the highest level of its logistics performance, provided that it constantly develops new processes for managing the supply chain. In addition, the LSP's ability to recruit and train qualified personnel to carry out logistics activities makes it possible to offer a satisfactory level of service at a lower cost for itself and for its client. This promotes the deployment of "best logistics practices" within the LSP business, as Halley (2004) points out. Concretely, a set of capacities and skills acquired by the LSP enables it to produce superior performance.

This study brings a double contribution both theoretically and practically. On the theoretical level, this research highlights the importance of flow management tools and techniques on the logistic performance of LSP in a developing country like Cameroon. From a managerial point of view, this research work enables LSPs to understand that certain provisions, like the absence of a competent staff, the lack of innovative spirit, are likely to generate errors during the execution of tasks, lengthen delivery times and thus generate higher costs. To this end, they should give greater importance to putting in place certain devices in order to better manage the logistical flows that pass through it.

The main limitation of our study is related to the size and constitution of our sample. This one was obtained thanks to the non-probabilistic method known as convenience. The study sample is not totally representative of the population studied since it includes only a few number of LSPs from the 3 cities surveyed. This does not allow to generalize the results obtained. However, we can not conclude this study without highlighting the future directions that will serve as research perspectives in a new future. Thus, it would be interesting to interview a larger number of LSPs, in order to be able to generalize the results obtained. In our research hypotheses, only two resources and capabilities (technological and human) were considered. Future research would benefit from examining the effects of other logistics resources and capabilities on logistics performance. Moreover, it would be interesting to analyze, for example, the effects of mediation of relational and organizational resources on the logistics performance of LSPs, based on a model of structural equations in other developing countries such as Cameroon.

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