Journal of Sustainable Development of Transport and Logistics
journal home page: https://jsdtl.sciview.net

Riadh, H. (2018). Contribution of logistics diagnosis to cost minimization: The case of a subsidiary of the automotive industry. *Journal of Sustainable Development of Transport and Logistics, 3*(3), 55-68. doi:10.14254/jsdtl.2018.3-3.4.

ISSN 2520-2979

Contribution of logistics diagnosis to cost minimization: The case of a subsidiary of the automotive industry

Harizi Riadh

University of Bisha, College of Business, Department of Business Administration,
PO. Box 1113, BISHA, 61922, Saudi Arabia
Tunis University, GEF2A Laboratory

Article history:

Received: March 27, 2018
1st Revision: May 29, 2018
Accepted: November 29, 2018

DOI:
10.14254/jsdtl.2018.3-3.4

Abstract: This paper presents a diagnostic for the logistic activity of an industrial company in Tunisia. Our methodology is essentially based on the application of an Ishikawa diagram, the five Whys method, and the Logarithmic Mean Divisia Index for logistic costs. Our results show that the Coverage Rate of Logistics Costs is the determinant factor in the intensity of quarterly logistics costs, while the Economic Asset Turnover appears to be of secondary importance. The serious logistics costs are due to several problems currently detected. To reduce the growth of logistics costs, we must implement corrective actions, of three types: immediate operations, progressive operations, and projected operations. Thus, the improvement of the overall performance of the company must go with the reduction of logistics costs.

Keywords: diagnostic, logistic activity, Ishikawa diagram, 5 Whys Method, LMDI for logistics costs, sustainability

1. Introduction

The neoclassical view of the organization treats the organization as an instrument of profit maximization (Friedman et al., 1984). Thus, from this point of view, the performance will be typically financial, it must meet the requirements of financial profitability. From another point of view, in both directions, managers can act either on production costs or on logistics costs.

Competition and production crises force industrial companies to control their costs perfectly. In particular, in the automotive sector, competition is increasing from one day to another, it requires either a continuous improvement of the work processes, or a stain removal. Behind these imperatives lies a real reliance on managers to improve the competitiveness of their companies.

In terms of flows, the logistics function usually takes over from production. After manufacture of products, logistics handles customer distribution streams (internal or external) at the lowest cost in the timeliness and quality. The interests of the two functions are however distinct and sometimes opposed: whereas logistics are marked by the current concepts of just-in-time and minimization of the level of stocks, the production aims above all to optimize the production lines by limiting the downtime and avoiding too frequent range changes.

Corresponding author: *Harizi Riadh*
E-mail: rharizi@ub.edu.sa

This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.

Logistics represents a very popular theoretical concept. However, it has been adapted to the technical world, and the experts consider it as a primary source of success and development for companies. Logistics activities attempt to organize, coordinate, and optimize the flows of physical goods and information and around the enterprise; this implies that the logistics process can improve the performance of the company (Rushton et al., 2014; Ballou, 2013; Cao & Zhang, 2011; Thomas & Griffin, 1996).

On the other hand, logistics management endeavors to have the "right product" available in the "right quantity" at the "right place" and at the "right time" for the "right cost." It must therefore balance two basic objectives: the quality of service and minimal cost (Rushton et al., 2014; Ballou, 2013; Thompson & Taniguchi, 2001).

Indeed, this means there exists the cost, the quality of the service, flexibility, and in particular, motivation. Any shortage or incapacity is going to hinder the global performance of a company, so it must demonstrate a successful level of logistics because an important portion of performance results from the management of product flows in a timely fashion (Suhong et al., 2006).

In this respect, it is crucial to evaluate logistics performance and detect any sources of dysfunction, so the company's global performance is subsequently improved. To achieve this, we can carry out a diagnostic of this activity or perform an audit. However, what are the differences between these two approaches? We therefore examine definitions for these two often-used concepts in the literature to identify their differences and show how a logistic diagnostic could yield significant results in the case of our subject company.

There are certainly many differences between the above two disciplines. We believe that one such difference is that diagnosis can detect failures and their financial impact on a company's activity. Moreover, diagnosis will be used to summarize the components of an organization and determine the strengths and weaknesses of its operation, such as possible dysfunctions and their causes (Alexa et al., 2013).

Some papers have used e-procurement within industrial firms to establish the impact of these mechanisms on their approach to the supply market, using thematic parameters derived from the literature. Other research has diagnosed the markets to find explanations for the motivation of e-procurement and establish the impact of these mechanisms on their approach to the supply market (Smart, 2010).

Nevertheless, in order to balance the meeting of varying customer orders with the objective of optimally allocating limited logistical resources, some researchers have presented dynamic methodologies for the distribution of logistic resources based on a group of customers using the distribution operations of urban logistics on demand. Their diagnostic methods use several factors, such as grouping clients, specifying the attributes of the request, classifying consumer groups, allocating containers, and distributing vehicles (Souviron & Harrison, 2007).

Logistics encompasses a comprehensive set of activities dedicated to the transformation and distribution of goods, ranging from the sourcing of raw materials to distributing the final goods to the market, as well as the related information flows (Hesse & Rodrigue, 2004). Logistics investments involve allocating capital to improve the efficiency of freight delivery through better infrastructure (terminals, real estate, and telecommunications), operations (transport modes, equipment), and human resources related to labor, management, and governance, as well as research and development (Rodrigue, 2012).

At the operational level, many problems exist in logistics management, because not all the direct and indirect impacts of a specific decision do not appear in the corporate system. For example, changing the minimum order value may affect customer ordering patterns, possibly leading to additional costs. Similarly, changes to production schedules that aim to improve efficiency can result in fluctuations in the availability of finished stock, which in turn affects customer service (Rodrigue, 2012).

The purpose of this paper is to cover two areas, namely to present an overview and introduction to logistic diagnostics and provide insights on how to best minimize logistics costs. We therefore propose an approach for a logistic diagnostic. This approach applies two methods from management literature: the diagram of Ishikawa (1982) and the "*5 Whys*" method. Then we reinforce this method by analyzing the accounting data and decomposing the change in logistics costs into the potential factors. For this, we use a decomposition method.

The proposed approach will clarify the dysfunctions and the necessary corrections to facilitate an increase in the company's logistical performance.

2. Literature Review

Logistics costs are becoming increasingly important to industry. For businesses, in addition to mastering the production process, it is also necessary to minimize the logistical costs, especially when a large number of suppliers and customers is involved. By its very nature, logistics cut across traditional company organization and have a cost impact on most functions, but the problems associated with identifying the total system impact of distribution policies are immense.

For now, traditional accounting systems do not look at the impact of logistics costs on profitability, so it is important to carry out studies to address this. We believe the accounting and organizational diagnosis is a failed monitoring of assets. For all these reasons, we selected diagnosis after demonstrating the differences between a logistics diagnosis and a logistics audit.

2.1. Diagnostic or auditing of the company: What are the differences?

Plauchu and Tairou (2008) point out that "the diagnostic of the enterprise is a judgment concerned with the situation and dynamics of an organization according to its essential features and constraints of its environments." In the literature, we use the diagnosis in several ways according to the needs and implementation decisions of management systems. There are several categories for the diagnosis of a business, such as marketing and commercials, human resources, production, management, and logistics activity (Sohn et al., 2009; Bartunek & Moch, 1978).

From another point of view, the theoretical and empirical research shows that diagnosis and audit have differences. For example, ISO 19011 describes an audit as "a systematic process, independent and informed to obtain proofs of audit and estimates them in an objective way to determine in which measure the criteria of audit are satisfied."

Laurentie et al. (2013) present diagnosis as "a study of the performance of the company on its environment and an analysis of its situation at the strategic and operational level, it aims to improve the logistic performance." It therefore follows that enterprises that carry out a logistical diagnostic can possibly reduce their costs and improve productivity. Manufacturers often apply diagnostics to identify waste. It can be useful for a company, because it aims to find improvements (Kevin et al., 1988).

A second example appears with reference to the French Association of Logistics. This association develops its logistic reference table based on a model diagnostic that involves a "transversal tool" establishing the direct and indirect implications of the logistics of a company. This model is suitable for any kind of business. It considers the central processes of the supply chain, namely management, strategy and planning, conception and projects, production, storage, sales, returns, maintenance, indicators of piloting, and permanent progress. This is an auditing model where professional logisticians ask the questions. The above items represent a sort of checklist to provide an analysis of a company's logistical performance.

We consider diagnosis as a research undertaken to identify the causes and effects, while an audit is a process allowing a company to position itself. These two aspects (auditing and diagnosing) are not helpful in fact that when managers apply a course of actions to improve the logistical organization of the enterprise.

2.2. General approach to elaborate logistic diagnostic

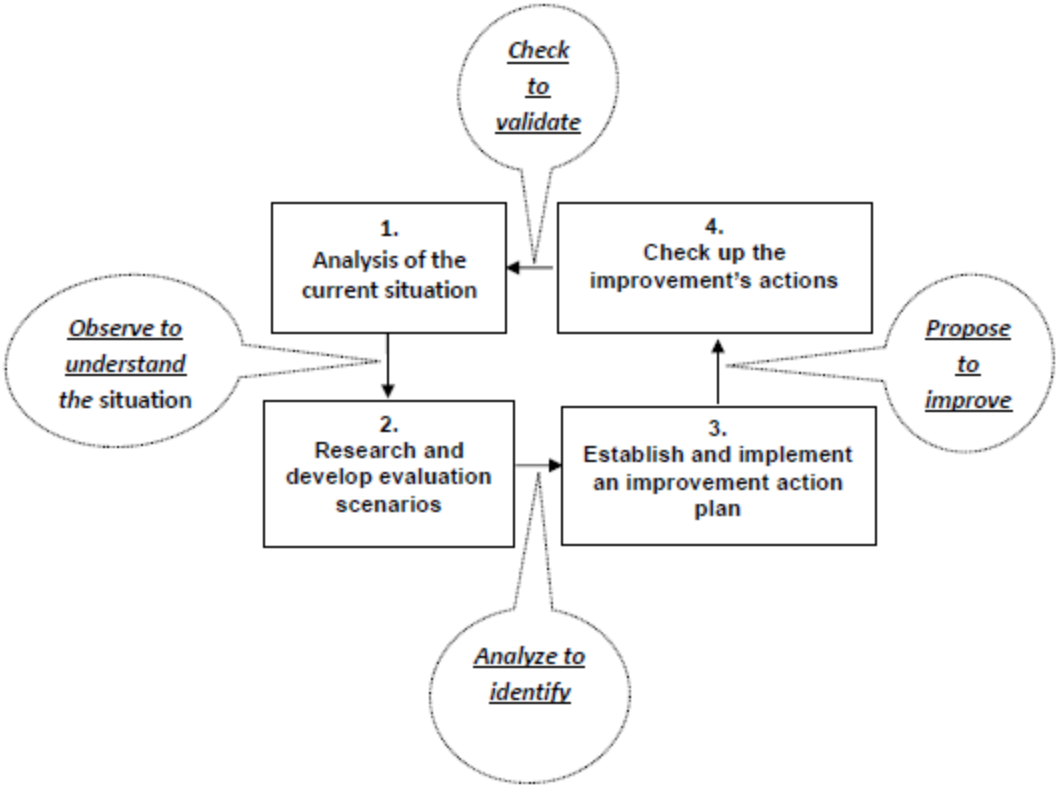
Lummus and Vokurka (1999) define the logistics chain as "all activities implied in the delivery of a product, since the stage of material up to the customer (supply of raw material and semi-finished goods, manufacturing and assembly, storing and the follow-up of stocks, management of the orders of production, distribution to all the channels, delivery to the consumer), and the information system allowing the follow-up of all these activities." This implies the possibility to summarize the logistics chain through three linked processes: supply, production, and distribution.

Our logistic diagnostic involves four successive stages (Fig. 1). It is essential that the person undertaking this diagnostic must be independent to avoid subjectively motivated results and support the legitimacy of the diagnostic. The first step is to observe and understand the general context of the company's logistics process. The second stage, meanwhile, is a matter of bringing the logistical problems

to light and identifying the sources of dysfunction and waste in order to ultimately specify all the modes of failure (i.e., we analyze to determine them). During the third stage, a plan of action is established.

It is then important to answer the following question: What are the solutions we can use to address the identified problems to improve things? The managers always consider three types of changes: immediate actions, progressive actions, and projected actions. Finally, we need to evaluate an improvement's effect. (i.e., we check it to validate it.) The literature shows that this critical step often has several implementation failures. It involves a system for following up on a proposed improvement's effects to ensure its success.

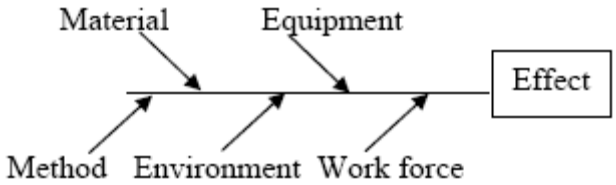
Figure. 1: Theoretical stages of the logistic diagnostic.



2.3. Tools for logistical diagnostics

Many tools are proposed in the literature, but perhaps the most famous examples are the diagram of Ishikawa and the "5 Whys" method. An Ishikawa diagram is a tool used to identify, in a graphic way, the possible causes for an observed effect, thus enabling the determination of a means to remedy it. Managers also called fishbone diagram or a cause-and-effect diagram. This diagram usually forms around the 5 Ms (machine, method, material, manpower, and measurement). These are represented as material (subject), equipment, methods, environment, and workforce in Fig. 2.

Figure 2: Schematic representation of Ishikawa's diagram.



The *five whys* method was proposed by Taiichi-Ohno (1988) and used as a basis for Toyota's scientific approach. It involves asking why at least five times in order to reach the root cause of a problem, at which point the solution becomes clear.

3. Methodology

The Leoni AG group was founded in 1917 in Nuremberg, Germany. It is involved in the production of cables for the automotive industry, with prominent customers including Mercedes Benz, Audi, Volkswagen, and BMW. Its subsidiary Leoni Tunisia (LTN) is an autonomous non-resident company that exports entirely for the field of automotive wiring. The logistics chain of LTN consists of the following linked processes: supply (MBM), production management (FST), import storage, export storage, and transit service.

3.1. Case study and data collection

LTN is the studied company. It includes three relays: LTN1, LTN3, and LTN4. It uses MRP software including a standard database from the FORS GB Company. Its logistics department provides five services:

- The FST (short for "Fertigung steuerung," meaning organization and planning) service uses information from production to translate it into the planning and ordering of manufacturing. This represents the central core of the company.
- The MBM service (the supply of raw materials) has the objective of ensuring that LTN's raw materials are of a good quality and available in sufficient quantities.
- The import storage involves receiving and storing of all the different types of raw materials used in the manufacturing of cables.
- The export store is used for the storage the finished products until the day of export (Tuesday, Thursday, and Saturday).
- The transit service has the primary task of preparing statements and making customs declarations for the import and export process using the SINDA 2000 V1.0 software.

3.2. Logistics diagnostic for the first link (Supply)

Firstly, every Saturday, the DISPOLAUF system, as a sub-system of the software FORS-GB, is used by all those responsible for the management of stock to calculate the movements having been made as items progress from the import store up to the export store, as well as recording any technical changes, delays, and new customer orders. Every Monday, the relevant mangers receive a statement of stock coverage from the FORS GB software. This includes the needs for immediate production and forecasts for the next few weeks. Those responsible then contacts the suppliers to ensure their needs are satisfied.

We then asked a question: "What's going on?" We can observe a lack of raw materials, but by using the *five Whys* method, we can identify the primary cause of this phenomenon that affects the logistic chain: *Why are there disturbances in supply? Why are some deliveries late?* To detect the root cause, we asked the following questions:

- Why is there a problem in the transfer of information?
- Why is lateness hindering the manufacturing chain?
- Why is there a shortage of stock?

We noticed that all these problems disturb the entire logistics chain, causing the "lack of stock." This has a negative effect on all stages of the logistics chain, as well as the strategy of the company (Fig. 3).

3.3. Logistics diagnostic for the import store (the second link)

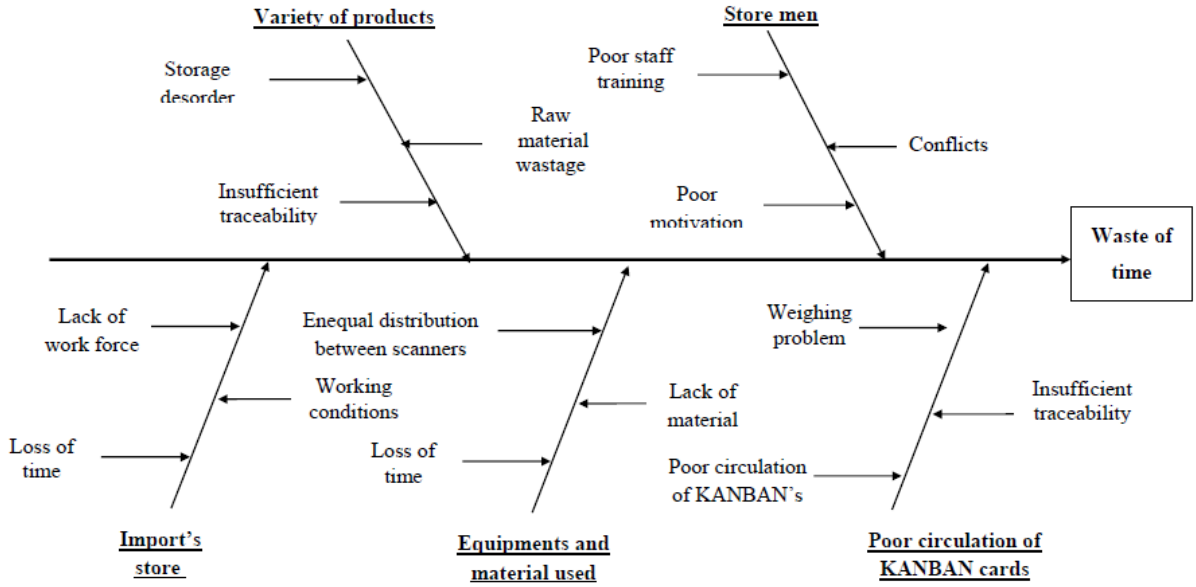
When initially considering the import store, we observed the following tasks: receiving raw materials, putting every article in its storage place, and updating the data on the FORS GB system to reflect any movement of stock.

At this level, we used an Ishikawa diagram to identify the following problems:

- There was a loss of raw materials and a lack of articles. Production sometimes required an item that was not immediately available in stock. This is a real problem for inventory control.

- There was a lack of qualification and inadequate training among the employees. We observed how they executed their tasks without understanding the working process, namely the *Kanban* system. In addition, some conflicts between the employees affected the working climate.
- There was a loss of time, because the Kanban cards were put directly in the scanner post to be scanned to the *store's KA* (a surface to store articles). The person appointed to this task needed to separate cards according to the type of storage, namely KA, WE (receiving raw materials), WK (storage of articles with low rotation). This work led to a significant waste of time.
- There was failure in the Kanban method in terms of items being reported as present on the system but being physically absent, thus disturbing the supply procedure and affecting the monitoring of stocks.
- There was a poor distribution of scanners, with some being more reliable and efficient than others. This presented a real problem for allocating material and human resources.

Figure. 3: Causes and effect diagram of the import's store of LEONI Tunisia.



3.4. Logistics diagnostic for the export store and FST service (third link)

In this subsidiary, the effective procedure is as follows:

- The FST service publishes the "Versand Vorchlage," which details customer orders, the organization of production, and treatment for the estimated consumption and proforma invoicing.
- The export store has the following tasks. According to the "Versand Vorshlage," the person in charge of the export store selects finished products according to customers' demands. Finally, this person orders adequate packaging and proceeds to the final control, where each costumer's delivery invoice (the "liefershein") is also created.

At this level, we noticed problems caused by an increase or decrease in customer demands, delivery lateness, unplanned technical changes, and a lack of cooperation with production.

4. Research results and Discussions

4.1. Results of the evaluation of the Company's Performance

Logistics performance reflects the ability to deliver sufficient products in good quality at the right time and place and therefore ensure customer satisfaction. This means mastering the processes

between the suppliers and the distributors. For this reason, LTN adapted JIT (just in time) production and the Kanban system to fulfil its objectives while decreasing its production costs.

4.1.1. Detection of logistical dysfunctions

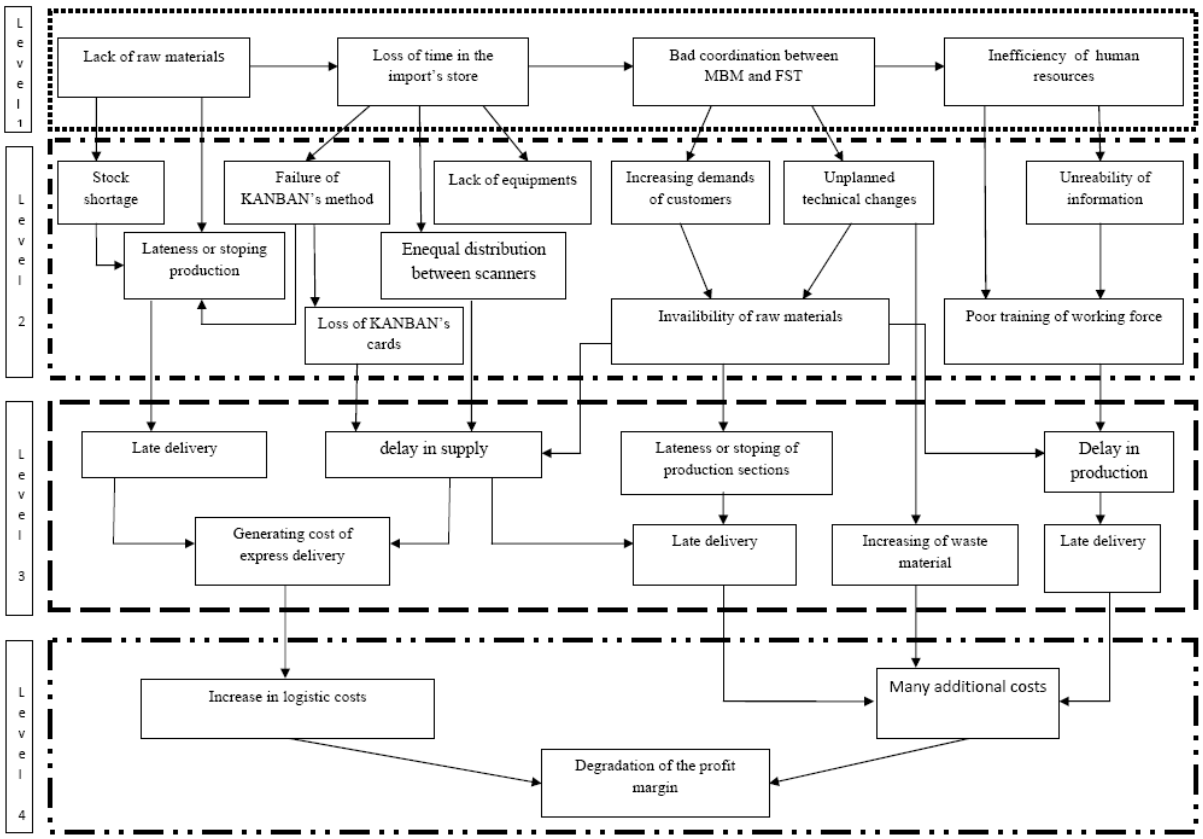
Our diagnostic found several sources of waste among the various services provided by the logistics department of LTN (stage 1 and stage 2). The most significant problems that drew our attention were:

(i) A waste of time in the import store;
(ii) A lack of raw materials;
(iii) A shortage of stock;
(iv) Poor synchronization between the MBM service and the FST service; and
(v) Incompetence among employees.

4.1.2. Mapping the dysfunctions

A mapping allows the positioning of dysfunctions at different levels, revealing how all the problems and waste are interconnected and causing logistic costs to increase (Fig. 4). The first level shows the most significant issue for each service of the logistics department. The second level presents the sub-problems arising from the first level. The third level represents the cause of the first level's problems. Finally, the fourth level indicates the results from studying the various wastes and dysfunctions. At this level, it is necessary to consult management to correct problems and deliver improvements to the logistics process.

Figure 4: Results decomposed by level



4.2. Results of the Logistics costs analysis

With a view to determining the direct contribution of the factors to the decreased profit due to logistics costs, we defined the Unitary Logistics Costs Intensity (ULCI). Next, we decomposed the change in logistics costs according to the potential factors. In the literature, several methods are suggested to decompose quotients and ratios, such as refined Laspeyres techniques (Lin et al., 2008), the Arithmetic Mean Divisia Index (AMDI), and the Logarithmic Mean Divisia Index (LMDI) (Yang & Chen, 2011; Hatzigeorgiou et al., 2008). Most of these techniques have been used in the environmental field (M'raïhi & Harizi, 2014; M'raïhi et al., 2014), but we use these methods in a similar manner for the fields of logistics and finance.

The Unitary Logistics Costs Intensity for the company in year (or period) *t* (*ULCIt*) can be expressed as follows in Equation 1:

$$ULCI_t = \left(\frac{TLC}{QS}\right)_t \tag{1}$$

Where *TLC* is the total logistics cost and *QS* is the quantity sold.

By referring to Figure 5 and analyzing the defined levels, we can decompose $ULCI_t$ into the factors that potentially affect it. Equation 2 is expressed as follows:

$$\left(\frac{TLC}{QS}\right)_t = \left(\frac{TLC}{S}\right)_t \times \left(\frac{S}{EA}\right)_t \times \left(\frac{EA}{QS}\right)_t \tag{2}$$

Where *S* is sales, *EA* is Economic Assets, and *QS* is the quantity produced and sold.

Equation 3 is then presented as follows:

$$\underbrace{ULC_t}_{\begin{pmatrix}\text{Unitary Logistics}\\ \text{Cost Intensity}\end{pmatrix}} = \underbrace{CRLC_t}_{\begin{pmatrix}\textit{Coverage Rate}\\ \textit{of Logistics Costs}\end{pmatrix}} \times \underbrace{EAT_t}_{\begin{pmatrix}\textit{Economic}\\ \textit{Asset Turnover}\end{pmatrix}} \times \underbrace{II_t}_{\begin{pmatrix}\textit{Investment}\\ \textit{Intensity}\end{pmatrix}} \tag{3}$$

The intensity is therefore divided over three factors: the Coverage Rate of Logistics Costs (CRLC), the Economic Asset Turnover (*EAT*), and the Investment Intensity (*II*). These factors correspond to the different levels of coupling and decoupling between the evolution of logistics costs and the dysfunctions in the company.

The change in Unitary Logistics Costs Intensity can be explained by changes in the direct factors. Any change in the $ULCI_t$ between two periods (T and 0) can therefore be attributed to effects of:

- A change in the Coverage Rate of Logistics Costs, which has the named effect $CRLC_{eff}$;
- A change in the Economic Asset Turnover ratio, with the named effect TEA_{eff}; and
- A change in Investment Intensity, with the effect referred to as II_{eff}.

Consequently, we reach the expression in Equation 4.

$$\Delta ULCI_t \equiv ULCI(T) - ULCI(0) \equiv CRLC_{eff} + EAT_{eff} + II_{eff} \tag{4}$$

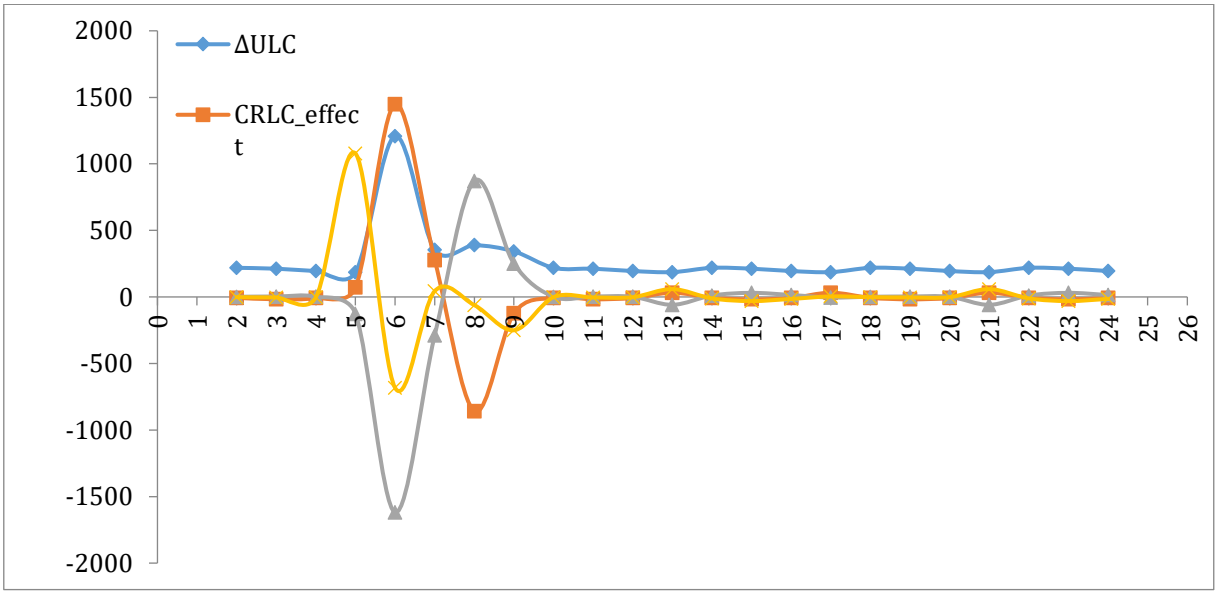
We used the LMDI method for this study. The effects could then be calculated for all factors as described in Equations 5 to 7.

$$CRLC_{eff} \equiv \left[ULCI(T) - ULCI(0)\right]\left\{\log\left[CRLC(T)/CRLC(0)\right]/\log\left[ULCI(T)/ULCI(0)\right]\right\} \tag{5}$$

$$EAT_{eff} \equiv \left[ULCI(T) - ULCI(0)\right]\left\{\log\left[EAT(T)/EAT(0)\right]/\log\left[ULCI(T)/ULCI(0)\right]\right\} \tag{6}$$

$$II_{eff} \equiv \left[ULCI(T) - ULCI(0)\right]\left\{\log\left[II(T)/II(0)\right]/\log\left[ULCI(T)/ULCI(0)\right]\right\} \quad (7)$$

Figure 5: Quarterly change in the intensity of logistics costs and its factors



Finally, the literature shows that the relationship between the dysfunction of the logistics process and its factors is possible through sensitivity to changes in direct factors.

Quarterly data for the six-year period from January 2010 to December 2015 was used. Table 1 and Figure 5 summarize the results of the additive decomposition of intensity change into changes in Unitary Logistics Costs Intensity and its driving factors for this period.

Table 1: Quarterly Logistics Costs Intensity change and it's driving factors (January 2010 - December 2015)

	ΔULC	CRLC_effect	EAT_effect	II_effect	Responsible factors
T1_2010					
T2_2010	218,890769	-6,56094467	1,40661157	-1,40661157	EAT
T3_2010	212,329825	-17,6484175	3,6128577	-3,6128577	EAT
T4_2010	194,681407	-8,02094192	1,55928295	-1,55928295	EAT
T1_2011	186,660465	71,3598434	-126,738728	1077,69492	CRLC, II
T2_2011	1208,9765	1448,51218	-1618,948	-683,534431	CRLC
T3_2011	355,00625	277,185794	-287,56646	44,3659658	CRLC, II
T4_2011	388,991549	-857,424279	872,061609	-61,3895943	CRLC
T1_2012	342,239286	-123,348516	250,41702	-250,41702	CRLC
T2_2012	218,890769	-6,56094467	1,40661157	-1,40661157	CRLC
T3_2012	212,329825	-17,6484175	3,6128577	-3,6128577	CRLC
T4_2012	194,681407	-8,02094192	1,55928295	-1,55928295	CRLC
T1_2013	186,660465	32,2303041	-59,0442315	59,0442315	CRLC, II
T2_2013	218,890769	-6,56094467	10,9921623	-10,9921623	CRLC
T3_2013	212,329825	-17,6484175	30,8404993	-30,8404993	CRLC
T4_2013	194,681407	-8,02094192	14,7430196	-14,7430196	CRLC
T1_2014	186,660465	32,2303041	-4,17488993	4,17488993	CRLC, II
T2_2014	218,890769	-6,56094467	1,40661157	-1,40661157	CRLC
T3_2014	212,329825	-17,6484175	3,6128577	-3,6128577	EAT
T4_2014	194,681407	-8,02094192	1,55928295	-1,55928295	EAT
T1_2015	186,660465	32,2303041	-59,0442315	59,0442315	CRLC, II
T2_2015	218,890769	-6,56094467	10,9921623	-10,9921623	EAT
T3_2015	212,329825	-17,6484175	30,8404993	-30,8404993	EAT
T4_2015	194,681407	-8,02094192	14,7430196	-14,7430196	EAT
Average Effect	**32,6880178**	**-39,1369691**	**-0,22397449**		

Note: Responsible factors are in the same direction as ULC change.

We conclude that the Coverage Rate of Logistics Costs is the critical factor for the quarterly logistics cost intensity during the sample period, with the Economic Asset Turnover factor appearing to be of secondary importance.

In contrast, Investment Intensity seems to be the least critical factor, with it only manifesting in five of the 24 quarters studied (20.83%). It only becomes an important factor when paired with the Coverage Rate of Logistics Costs. This relationship likely stems from the accounting attachment between the two ratios, because the two variables are both based on the number of units sold, but the first rate is expressed in monetary terms, while the second ratio is expressed quantitatively. Moreover, companies make investments on a regular basis, so that their effects on logistics costs are generally rapid. Empirically, the impact of investment only manifests when the firm renews its equipment or undertakes new investments (Barret, 1982; Cooper & Kaplan, 1991; Srivastava et al., 1998).

In essence, the logistics cost per unit sold are significant, because costs decrease as sales increase and vice versa (i.e., costs increase when sales fall). Therefore, the logistics cost per unit sold (or the Coverage Rate of Logistics Costs) significantly influence the evolution of the Logistics Cost Intensity.

4.3. Challenges and limitations

The results of the Ishikawa diagram, the 5 Whys method, and the LMDI method are relevant to logistics costs. We can then use the obtained results to formulate an action plan for improvement with corrective measures. This includes three types of actions: immediate actions, progressive actions, and projected actions.

Generally, studies using an audit only use interviews with key people in the company, based on this audit, evaluators look for strengths and weaknesses or malfunctions. This paper has highlighted the difference between logistics audit and logistics diagnosis, integrating the financial aspect of logistics into the diagnostic process.

We set the key factors to simulate their contributions to lower profits, or otherwise upward logistics costs. Our methodology is inspired by studies interested in the field of the environment. However, these techniques are now adapted to solve the financial aspects of logistical problems. Here appears our main contribution to science.

Thus, the financial indicators used are developed scientifically and respect the laws of finance, their calculations and breakdowns is based on quarterly data rarely found in this kind of business. We have proved to managers the usefulness of owning quarterly logistical data, currently, the managers use these quarterly indicators to monitor and correct logistical dysfunctions in the company's production chain.

From now on, logistic over-costs are detected at several levels of the company and on the basis of these results, it becomes easy for managers to carry out actions improving overall performance.

5. Recommendations for Action at the Three Levels

5.1. Immediate actions

These are simple modifications that can achieve savings with a minimal investment. At this level, we suggest:

- A new classification for all articles and a reorganization of the storage area to solve the problem of lost pieces;
- The creation of a daily card to follow up on all the scanners. This is intended to address the issue of the inadequate resource allocation, but is the issue about human or material resources? Only a proposed index card will enable us to answer this question, because it will enable the following of the various transfers made immediately at every scanner, ultimately enabling us to discover the root cause of this problem (Table 2);
- Checking up on physical stocks and permanent inventories to avoid inconsistencies between physical stock and the reported stock;
- Transferring some jobs and redefining some responsibilities to organize the tasks in the import's store and minimize conflicts between workers in this warehouse;

- Holding daily meetings between the people in charge of the import store, the MBM service, and the FST service, so problems can be resolved immediately;
- Modernizing the rolling equipment, because this is the primary cause of wasted time, so we propose its modernization or renewal.

Table 2: Practical model of the daily card to follow up all the scanners

Scanner's number	Name of the store man	Date and time of use	Number of transfers	Served segment
Sc P. 03	Xsavier Vittori	13-02-2011- 10h37	06	Ch. 55
…	…	…	…	…

Source: Developed by the author.

5.2. Progressive operations

These are plans over the medium term, and such actions generally require a short study and implementation period. At this level, we propose:

- Reducing delays to address the major problem of wasted time, which is an essential challenge for the logistics process;
- Motivating the suppliers and encouraging them to be loyal. We can drive suppliers by requiring them, for example, to make productivity gains, which will then motivate them to improve their offerings under better conditions;
- Improving a sample group of approved suppliers to address the problem of late delivery by suppliers. It will be necessary to develop a procedure for selecting and evaluating new suppliers with an emphasis on those who offer services with better quality and sufficient quantity and those with the same management system as the company;
- Motivating and training the warehouse employees, because the company needs to resolve the problem of incompetence in the workforce through organized training courses. In addition, the workforce should be multitalented to allow workers to work in other roles. Improved motivation could be achieved through financial enticements;
- Creating a register of procedure for following up, tracing articles, and checking up on procurement. This can alleviate the problem of wasted time. The proposed register will be a book of procedures that lists the stages of execution for tasks, and the way to proceed, with the identity and role of the main actors being protected.

5.3. Projected actions

These activities can only be realized over the long term. They must be accounted for in the company's budget and cannot be implemented with just the agreement of general management. They aim to improve the quality and the transmission speed of the information by:

- Setting up new WMS (Warehouse Management System) software. Warehouse management systems have demonstrated their efficiency in most companies, and such a system will permit better management of the stock at the company;
- Setting up a CPFR (collaboration, planning, forecasting, and replenishment) scheme to ensure close collaboration with the suppliers of the company;
- Setting up an RFID (Radio Frequency Identification) system to enhance the traceability and follow-up of products, which will be helpful when the company manages numerous production sites. Following the Tunisian revolution of January 14, 2011, Leoni Tunisia met the Tunisian government's appeal to establish two new sites in the west and the southwest of Tunisia.

A logistics diagnostic is a real "decision-making tool." The decisions coming from a logistics diagnostic are long term-decisions that can improve profitability and create a competitive advantage over competitors.

The proposed solutions should be in accordance with the strategy of the company. To improve performance, minimize delays, and still increase quality of service are all actionable levels of a logistics

diagnostic. Therefore, any approach to a logistics diagnostic must aim to improve the profitability of the company's logistic processes.

In small and medium-sized enterprises, a diagnostic of the logistics activity has a strategic component, and the implied direction favors this idea. The purpose of this suggestion is to inquire about the company's objectives.

6. Conclusions

In this article, we first tried to answer an imperative question: How is a logistics diagnostic different from a logistics audit, and what are their contributions? We answered by saying that the former is a critical study of the key points and weaknesses of a company's logistic system. Next, we attempted to practice a methodology for a logistics diagnostic in an industrial company.

The use of the three diagnostic techniques (an Ishikawa diagram, the 5 Whys, and the LMDI method) was found to yield significant results.

The potential for reducing operating costs through logistics is considerable, because a large portion of a typical business's expenses stem from logistics decisions and the quality of the logistical process. It is therefore unsurprising that in the search for enhanced margins, many companies look for dysfunctions in their logistical procedures and their internal logistics costs. However, it is not just the transportation, storage, handling, and order processing costs that a business needs to consider. It should also take account of the costs by fully integrating the logistical costs for logistics activities by incorporating the costs for several services (organization and planning, the supply of raw material, import, export, and transit services), as we did for this company.

We have shown how the logistics cost per unit sold significantly influences the Logistics Cost Intensity. Logistic costs per unit sold are significant because costs decrease as sales increase and increase when sales fall. The factor of Economic Asset Turnover appears to be the second most important position, because it significantly influences the Logistics Cost Intensity. Finally, Investment Intensity is the least critical factor, with it only being significant when paired with the Coverage Rate of Logistics Costs. This apparent relationship results from a simple accounting attachment between the two variables. They are both based on the number of units sold, but their units of measurement are different (monetary and quantitative forms).

The effect of investment on the variability of logistics costs is always punctual. Indeed, investment decisions not made on a daily, monthly, or even quarterly basis. They are spread over the medium-to-long term. For this reason, the effect is less significant than with other variables.

This methodology has the purpose of achieving competitive and efficient logistics processes, but this implies the implementation of several actions. Some of these—such as setting up a WMS, creating a CPFR scheme, or installing RFID technology—will be expensive, but they will make useful contributions to the logistics activities and ultimately the company's profitability.

We recommend that management perform a cost-advantage analysis to justify the investment their setting-up financially needed. Our study is restricted in some areas, but it can produce results that will help management make good decisions.

In conclusion, we believe that a logistics diagnostic is a method that must be approached with great care. Its results, and especially the proposed solutions, will depend on the intentions of managers and the dimension of "future expenses."

Citation information

Riadh, H. (2018). Contribution of logistics diagnosis to cost minimization: The case of a subsidiary of the automotive industry. *Journal of Sustainable Development of Transport and Logistics, 3*(3), 55-68. doi:10.14254/jsdtl.2018.3-3.4

References

Alexa, V., Kiss, I., & Ratiu, S. (2013). Diagnostic analysis - tool in research and Innovation. *Annals of Faculty Engineering Hunedoara- International Journal of Engineering*, *XI*(4), 321–324. doi: http://annals.fih.upt.ro/pdf-full/2013/ANNALS-2013-4-53.pdf.

Ballou, H.R. (2013). *Business Logistics: Supply Chain Management*', 5th Edition, Upper Saddle River: Pearson Prentice Hall.

Barrett, T. (1982). Mission Costing: A New Approach to Logistics Analysis. *International Journal of Physical Distribution and Materials Management*, *12*(7), 3-27. doi: https://doi.org/10.1108/eb014549.

Bartunek, J.M., & Moch, M.K. (1987). First Order, Second Order and Third Order Change and OD Interventions: A cognitive Approach. *The Journal of Applied Behavioural Science*, *22*(4), 483-500. doi: https://doi.org/10.1177/002188638702300404.

Cao, M., & Zhang, Q. (2011). Supply Chain collaboration: Impact on collaborative advantage and firm performance. *Journal of Operations Management*, *29*(3), 163-180. doi: http://dx.doi.org/10.1016/j.jom.2010.12.008.

Cooper, R., & Kaplan, R.S. (1991). Profit Priorities from Activity-Based Costing. *Harvard Business Review*, May–June, 130-135. http://host.uniroma3.it/facolta/economia/db/materiali/insegnamenti/588_3931.pdf.

Friedman D., Harrison G., & Salmon J.W. (1984). The Informational Efficiency of Experimental Asset Markets. *Journal of Political Economy, 92*(3), 349-408. Retrieved from https://www.journals.uchicago.edu/doi/pdfplus/10.1086/261233.

Hatzigeorgiou, E., Polatidis, H., & Haralambopoulos, D. (2008). Energy CO_2 Emissions for 1990–2020: A Decomposition Analysis for EU-25 and Greece. *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects, 32*(20), 1908-1917. doi: 10.1080/15567030902937101.

Hesse, M., & Rodrigue, J.P. (2004). The Transport Geography of Logistics and Freight Distribution. *Journal of Transport Geography*, *12*(3), 171–184. doi: https://doi.org/10.1016/j.jtrangeo.2003.12.004.

Ishikawa, K. (1982). *Guide to quality control*. Revised 2nd ed. 1996. Tokyo: Asian Productivity Organization.

Kevin, C., Cain, & Norman, E.B., (1988). Logistic regression analysis and efficient design for two-stage studies. *American Journal of Epidemiology*, *128*(6), 1198-1206. doi: https://doi.org/10.1093/oxfordjournals.aje.a115074.

Laurentie, J., Berthélemy, F., Gregoire, L., & Terrier, C. (2013). *Processus et méthodes logistiques*., *Supply Chain Management*, Paris: afnor éditions.

Lin, J., Zhou, N., Levine, M., & Fridley, D. (2008). Taking out 1 billion ton of CO2: the magic of China's 11th five-year plan. *Energy Policy*, *36*(3), 954-970. doi: https://doi.org/10.1016/j.enpol.2007.10.033.

Lummus, R.R., Vokurka, R.J. (1999). Definiting supply chain management: A historical perspective and practical guidelines. *Industrial Management & Data Systems*, *99*(1), 11-17. doi: https://doi.org/10.1108/02635579910243851.

M'raïhi, R., & Harizi, R. (2014). Road freight transport and carbon dioxide emissions: Policy options for Tunisia. *Energy and Environment, 1*(25), 79-92. doi: http://journals.sagepub.com/doi/abs/10.1260/0958-305X.25.1.79.

M'raïhi, R., Harizi, R., & Alaouia, S. (2014). Sustainability of Tunisia's road transport: is there an environmental Kuznets curve for negative externalities? *International Journal of Business Performance and Supply Chain Modelling, 6*(3/4), 298–314. doi: https://doi.org/10.1504/IJBPSCM.2014.065272.

Plauchu, V., & Tairau, A. (2008). *Méthodologie du diagnostic d'entreprise*. Paris: Edition l'Harmatton.

Rodrigue, J.P. (2012). *The Benefits of Logistics Investments: Opportunities for Latin America and the Caribbean*. Inter-American Development Bank, Department of Infrastructure and Environment, Technical Notes IDB-TN-395. URL: https://publications.iadb.org/bitstream/handle/11319/5436/thebenefitsoflogisticsinvestments:opportunitiesforlatinamericaandthecaribbean.pdf?sequence=1.

Rushton, A., Croucker P., & Baker P. (2014). *The handbook of logistics & distribution management: Understanding the Supply Chain*. 5th Edition, New Delhi, India: Replika Press (eds) Pvt Ldt.

Smart, A.F. (2010). E-procurement and its impact on supply management evidence from industrial case studies. *International Journal of Logistics: Research and Applications, 13*(6), 423-440. doi: https://doi.org/10.1080/13675567.2010.486760.

Sohn, H., Minion, J., Albert H, Dheda K, & Pai, M. (2009). TB diagnostic tests: how do we figure out their costs?' *Expert Review Anti Infection Theory,* 7(6), 723-733. Retrieved from https://www.tandfonline.com/doi/pdf/10.1586/eri.09.52.

Souviron M.K., & Harrison, A. (2007). Buyer–supplier relationships in inter- and intra organisational supply contexts: the unobtrusive yet pervasive human resource picture. *International Journal of Logistics Research and Applications,* 9(1), 75-94. doi: 10.1080/13675560500405667.

Srivastava, R.K., Tasadduq, A.S., & Liam, F. (1998). Market-Based Assets and Shareholder Value: A Framework for Analysis. *Journal of Marketing*, *62*(1), 2-18. Retrieved from https://pdfs.semanticscholar.org/10e6/7924be61034e54ba6dedb559b03ee8c2c7e3.pdf.

Suhong, L., Bhanu, R.N., Ragu-Nathanb, T.S., & Subba, R.S. (2006). The impact of supply chain management practices on competitive advantage and organizational performance. *Omega*, 34, 107–124. Retrieved from http://mcu.edu.tw/~hyu/paper/4.pdf.

Taiichi-Ohno, (1988). *Toyota production system: beyond large-scale production*. *Portland, Or: Productivity Press*, foreword by Norman Bodek.

Thomas, D.J., & Griffin, P.M. (1996). Cordinated supply chain management. *European Journal of Operational Research*, *94*(1), 1–15. doi: https://doi.org/10.1016/0377-2217(96)00098-7.

Thompson, R.G., & Taniguchi, E. (2001). City logistics and freight transport. In A.M. Brewer, K.J. Button and D.A. Hensher (eds.), *Handbook of Logistics and Supply Chain Management* (393-405). Uk: Elsevier Science Ltd.

Yang, J., & Chen, B. (2011). Using LMDI method to analyze the change of industrial CO_2 emission from energy use in Chongqing. *Frontiers of Earth Science, 5*(1), 103-109. doi: 10.1007/s11707-011-0172-3.

© 2016-2018, Journal of Sustainable Development of Transport and Logistics. All rights reserved.
This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.
You are free to:
Share – copy and redistribute the material in any medium or format Adapt – remix, transform, and build upon the material for any purpose, even commercially.
The licensor cannot revoke these freedoms as long as you follow the license terms.
Under the following terms:
Attribution – You must give appropriate credit, provide a link to the license, and indicate if changes were made.
You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.
No additional restrictions
You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

Journal of Sustainable Development of Transport and Logistics (ISSN: 2520-2979) is published by **Scientific Publishing House "CSR", Poland, EU** and **Scientific Publishing House "SciView", Poland, EU**
Publishing with JSDTL ensures:
• Immediate, universal access to your article on publication
• High visibility and discoverability via the JSDTL website
• Rapid publication
• Guaranteed legacy preservation of your article
• Discounts and waivers for authors in developing regions
Submit your manuscript to a JSDTL at https://jsdtl.sciview.net/ or submit.jsdtl@sciview.net