

Analysis and improvement of freight transport using software products

M Ință¹, M Bădescu¹ and C Purcar¹

¹ “Lucian Blaga” University of Sibiu, Engineering Faculty, 4, Emil Cioran Street, Sibiu, 550025, Romania

E-mail: marinela.inta@ulbsibiu.ro

Abstract: The purpose of the paper is to provide certain solutions to improve freight operations within a company. Nowadays, information technology occupies an important place and computer programs facilitate work in all areas of activity.

With the help of these tools that record important data related to the company's activity and operations management clearly and concisely, the company's management easily obtains answers to essential questions. After a critical analysis of the main problems faced by the transport company, the four most important problems to be solved are selected. Based on these, the most suitable software is selected for the company after customized consultation for the best solutions of these problems. There are presented the structure of this software and also the advantages brought after its implementation in the company. Among the most important are improve communication within the company, cost reduction through efficient management of truck supplies and rigorous organization of space in trucks. The software can be tested and supplemented at any time with other suitable sections.

1. Introduction

According to Philip Kotler, logistics involves the planning, implementation and control of the physical flow of materials, finished products, information between the point of origin and the point of consumption, in order to meet customer needs and obtain an appropriate profit. In a modern conception, logistics considers not only the flow of goods from the producer to the customer, but also the flow of products from suppliers to producers [1].

Logistics involves, in fact, the management of the entire supply chain, built from the flows that contribute to the formation and addition of value by the participants in this chain. Under these conditions, the logistics activity involves the administration of the entire physical distribution system of the marketing channel, respectively the activity of suppliers, supply agents, market operators, channel members and customers. These activities include forecasting, procurement, production plans, order recording, inventory management, warehousing and transport organization, all of which are in fact components of logistics [2-3].

The efficiency of logistics implies the correlation of the three categories of activities carried out (supply, production support and transport), activities carried out both within the company and at the interface with the sequences downstream and upstream, within the distribution and purchasing channels. The integration of the three categories of logistics activities is possible through information flows over the supply chain.

At present, the importance and role of logistics, considered as a supply chain, is growing, due to at least four considerations [2-3]:

1. First of all, distribution is a key element in serving customers, in meeting their increasingly demanding requirements. Thus, efficient logistics focuses on attracting and retaining customers.
2. Secondly, logistics is a cost element in the activity of any company. Efficient logistics requires improving the efficiency of the distribution system, so as to visibly reduce costs, with positive implications for both the company and customers.
3. Thirdly, developments in the field of information technology have a decisive influence on logistics, helping to improve its processes.
4. Fourthly, the increase of the variety of products, of their assortment range imposed the need to improve the logistics activity.

Some of the main objectives of logistics are: to ensure the planned level of services at the lowest cost, to reduce the time and space distances between the supply and demand of goods and to reduce the costs of storage and distribution [4].

Since the 1960s, a paradigm shift has appeared in managerial thinking, the promoters of which have been the engineers from Toyota plants, respectively from producing as much as possible to produce only as much as needed [4-5]. This new organizational perspective concerns the quality in terms of operational activity and processes.

2. The importance of transport in the SCM

It can be said that transport is the "blood" of an economy through which the "oxygen" it needs to exist is transported. Transport is one of the major components of the logistics system, due to its contribution to the fulfilment of the logistics mission. The main decision-making issues addressed relate to the evaluation and selection of carriers, transport scheduling and route setting.

Thus, it can be said that transport is defined as the physical movement of persons and goods between two points [6]. Logistics services include a range of various activities. Of these, transport has a significant share both in terms of presence and especially in terms of costs. The company's options for transport are numerous, but different in implications: to have their own means of transport, to rent, to use specialized companies, to choose a certain mode of transport. All this must be analyzed in a specific context and no template solutions can be given in advance [7].

Transport can be defined as the activity by which goods are moved over different distances between different points. The main modes of transport are: road, sea, rail, air and pipeline. Of these, road transport is a flexible mode of transport in terms of route and period of operation. The goods can be delivered directly to the customers' premises or to a place designated by them. Its disadvantages of road transport include the fact that restrictions on customs controls (for international transport) can be time consuming. Also, long distances and the need to make water crossings reduce the attractiveness for road transport. In addition, in some parts of the world, especially in underdeveloped countries, road infrastructure is poor.

The limited perspective on space travel will lead to the choice of the carrier company that applies the lowest transport tariff. However, the user is interested in getting the desired services, in addition to the spatial movement at the best price. The user is interested in a transport company that will bring the goods safely and in terms of the contract. Each transport service user will select the service or combination of services that provides the most convenient quality-to-cost ratio. The selection of transport services is based on the cost and performance characteristics of the transport modes.

The most important features considered by specialists are the following [7-8, 11-13]:

- *Costs* - depending on the mode of transport there are differences in costs. According to studies conducted on the US market, road transport is on average 7 times more expensive than rail, and rail is about 4 times more expensive than water or pipeline, while air transport costs twice as much as the road.

- *Transit time / Speed* - is one of the most important features for users of transport services. Transit time is the average time required to reach the goods from origin to destination. This aspect is all the more relevant as the movement of goods involves the use of several modes of transport. A long transit time has as a direct effect a high level of costs with basic and safety stocks, to ensure business continuity.
- *Consistency* - refers to the ability of a mode of transport to maintain the duration of transit over time. Transit time variation is a measure of uncertainty about the performance of transport modes. A high degree of consistency means a potentially low variation in transit time.
- *Availability* - this characteristic refers to the ability of the mode of transport to move goods between any pair of points, consisting of a point of origin and a point of destination. Of all the means of transport, the road is characterized by the highest availability. The means of transport can move the goods directly from the source to the destination.
- *Flexibility* - reflects the ability of a mode of transport to meet the special requirements of users of transport services
- *Frequency* - indicates the number of scheduled deliveries in a certain time interval
- *Safety* - is one of the most important features of modes of transport. It refers to the ability to maintain the quality of products during transit and to avoid the loss and deterioration of products. A low degree of safety leads to increased costs. The main categories of costs they generate are the following: cost of lost goods, cost of replacement or repair of damaged products, cost of stopping the production process, due to lack of raw materials, materials, necessary components, cost of sales lost due to unavailability of products, administrative costs regulating the situation between the transport service user and the transport company, the cost of the necessary safety stocks, the cost of insurance.

3. Transport in global and local vision

Global business changes have forced many organizations to use strategic management, and one of the processes is, of course, transportation management. In order to survive in business and do business successfully, an organization must find a way to provide value-added products or services that differentiate it from the competition [6, 11].

One of the solutions that can meet the transport companies is the rapid development of information technology that allows the realization of the business strategy by improving the processes within it. Transport problems are part of every economy, especially if we followed the importance of the market in the modern economy [12]. Currently, there are numerous software packages that solve minor theoretical transport problems and highlight the advantages of computer-processed data in transport management.

Because transport connects production and consumption, transport taxes are a significant part of the price. The transport load is a special case of general load related to linear programming. Currently, this IT field belongs to operational research and has developed rapidly recently.

4. Analysis of freight transport within the company Transauto S.R.L.

4.1. Company presentation

Transauto SRL is a medium-sized company, with 72 employees, of which 26 drivers, 10 TESA employees, 1 manager, 1 unskilled worker and owns 30 cars for transporting goods and people. The company has the main activity of freight transport but also provides passenger transport services.

Within the company, the freight forwarding activity is performed according to the following flow chart (figure 1):

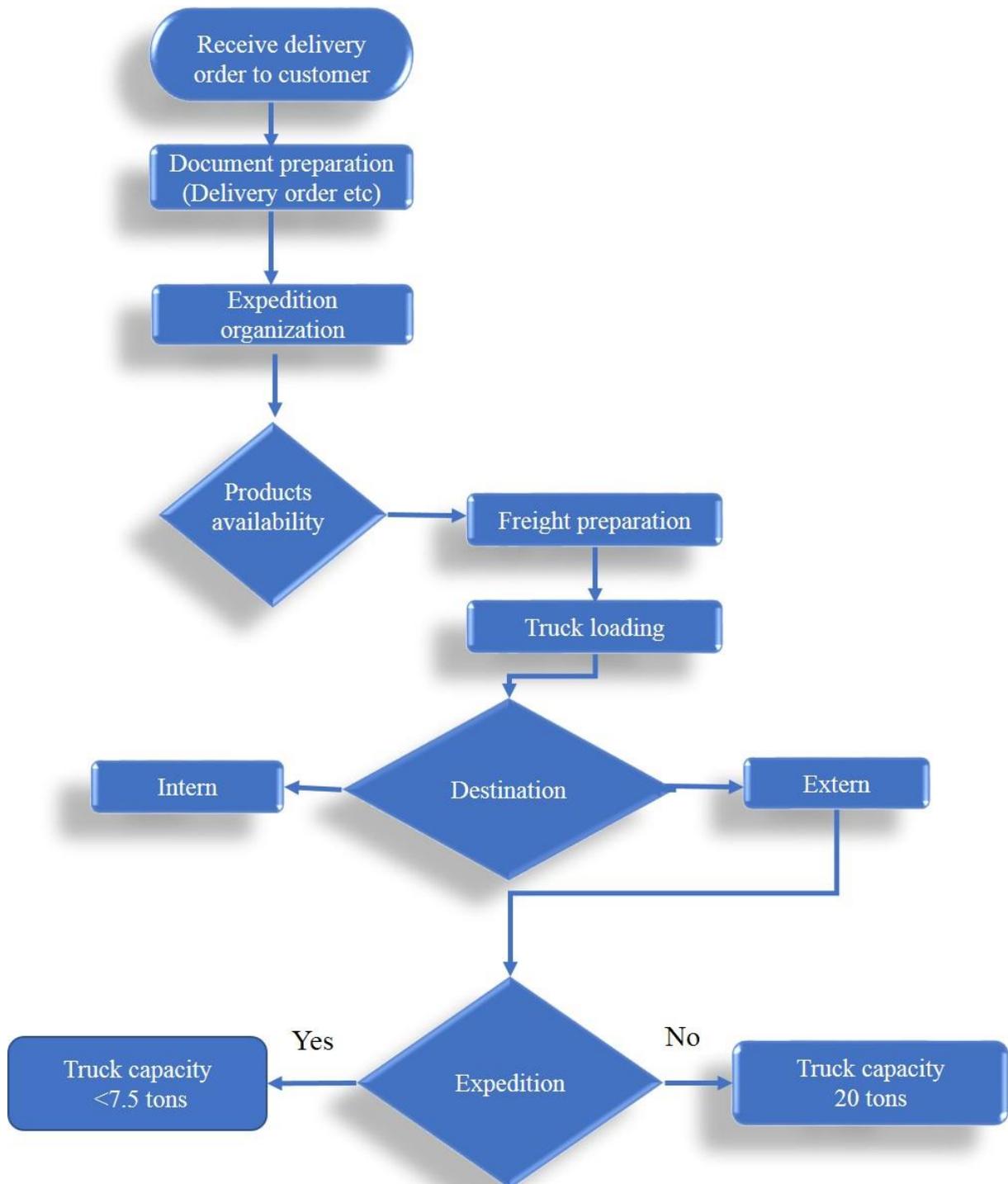


Figure 1. Flow chart of Transauto shipping business

Thus, the delivery order is received by Transauto staff 2-3 days before the shipment of the goods, either by mail or fax and includes information on the type of goods, length, width, weight and height of the goods and the place, the date and time from which the goods must be picked up. An important aspect is the exact date of delivery of the products to the final beneficiary, the delays meaning penalties for

Transauto in terms of existing contracts. After receiving the order, the optimal route in terms of costs and distance is established so that the goods reach the consignee in a timely manner. The main countries of destination of the products are: Czech Republic, Germany, Belgium and France; Transauto sends about 5 cars a week to these destinations (figure 2).



Figure 2. Map of the main destinations Transauto

4.2. Problems in freight transport

Following the analysis, several problems were identified in the transport of goods. A problem identified in the transport of goods is the delay in the delivery of products to the customer.

This problem has its cause in the deficient supply of raw materials but also in various unforeseen events such as: technical problems, calamities, long waiting in customs queues, etc.; thus, the supply is not made on time and the production department cannot finish the products on time. However, over 75% of delivery orders are honored on time.

Another problem identified is related to the impossibility of loading the parts in the truck due to some defective lifting installations.

In order to find a solution for solving the problems, a problem evaluation matrix was created to focus on the most important ones and on solving them.

The following criteria have been identified for the elaboration of the problem evaluation matrix:

- chronicity - the project must correct a problem that occurs frequently, not a recent one;
- duration - projects must have a duration of less than one year;
- urgency - the project is urgent if it addresses issues that make the organization vulnerable in relation to the external environment;
- possible resistance to change - we choose the project that will probably meet the lowest resistance;
- the problem must be measurable - the project does not start if the necessary data is not.

For the evaluation of the problems, scores will be given on a scale from 1 to 5 (table no. 2) where:

- 1 - unimportant problem;
- 5 - very important problem

The selection criteria are weighted according to importance available [14-15].

Table 1. Problem evaluation matrix

Identified Problems	Cronicity 30 %	Duration 20 %	Urgency 30 %	Possible resistance to change 10 %	The problem must be measurable 10 %	Total
Failure to meet the deadlines for delivery of products to customers	2	2	5	1	3	13
Transport costs too high	5	4	5	5	5	24
Truck load issues	2	2	3	3	3	13
The supplied products do not						
Lack of communication between departments	3	2	1	1	1	8

Following the completion of the evaluation matrix, it was concluded that the most serious problem is related to transport costs.

4.3. Implementation of Soft Transport software

In order to solve the problems identified after consulting with the company's staff, the aim was to find an optimal solution to improve the current situation. It was concluded that the problems that can be solved can be solved by implementing an innovative software product. After conducting a market study on the software products used by the transport companies, we chose to test the Soft-Transport software, specially designed for freight companies and which includes many elements to help management make the best decisions [16]. The program greatly facilitates the activity of dispatching. This software has been tested for 1 month within the company, observing over time the advantages of use. Soft-transport software (figure 3) includes several sections that allow the development of a database with valuable information for management.

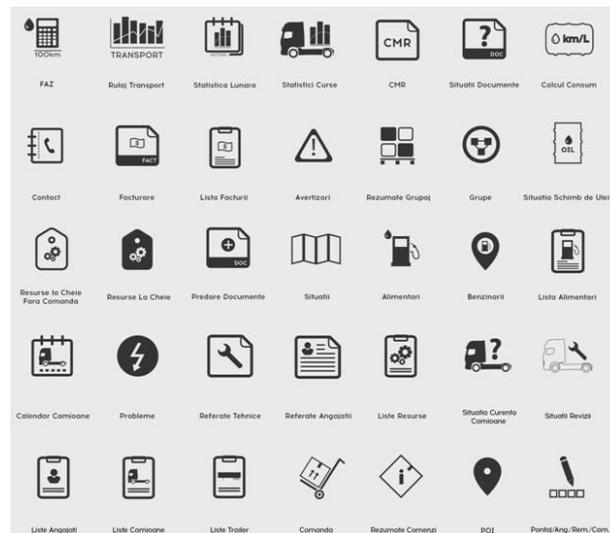


Figure 3. Sections of Soft Transport (Transport roll; Monthly statistics; Race statistic; CMR; Document situation; Consumption calcul; Contact; Billing; Invoice list; Warn; Group summaries; Groups; Oil change; Key resources without order; Key resources; Handling documents; Situation; Fuelling; Gas stations; Fuelling list; Truck calendar; Problems; Technical references; Referred employees; Resource list; Current track situation; Situation revisions; Situation revisions; Employees list; Truck list; Trailer list; Orders; Orders summary; PO; Clocking/ Employees/Commands

The main advantages of testing are:

- The **Current Trucks Situation Section** found the answers to the following questions:
 - What is the number of trucks working for a particular customer?
 - What is the situation of the truck with the number ...?
 - What is the city / country where the goods are to be unloaded?
- The **Unlocked Turnkey Resources** section was able to find out as soon as possible how many trucks are out of order.

Camion / Remorcă	Număr Camion 53 / Număr Remorcă 23	Șofer 1 / Șofer 2	Nume 47 Prenume 47
Cursă	REGIE PROPRIE (3080)	Data Comenzii	13/10/2014 - ..
Client	Client 9 (Code 9)	Contact	()
Tip Punct	Descărcare	Plecare	14/10/2014 08:57
Localitate	MARGHITA(415300) ROMANIA(RO)	Km Bord	109427
Dispecer	Utilizator 22 Telefon 22 22@st.ro	Observații	

Camion / Remorcă	Număr Camion 59 / Număr Remorcă 221	Șofer 1 / Șofer 2	Nume 57 Prenume 57
Cursă	Regie proprie (3051)	Data Comenzii	10/10/2014 - 13/10/2014
Client	Client 9 (Code 9)	Contact	()
Tip Punct	Descărcare	Plecare	12/10/2014 04:00
Localitate	MARGHITA(415300) ROMANIA(RO)	Km Bord	445390
Dispecer	Utilizator 21 Telefon 21 21@st.ro	Observații	

Figure 4. Soft Transport Sequence - Resources without command (Key resources without order; Problems; Order summaries; Current track situation; Truck calendar; Turnover transport)

- The exact record of the available trucks was kept (figure 5) and it was possible to find out in the shortest time if other orders can be honored, besides the already planned ones (figure 6). This tool has played an important role in meeting delivery deadlines to customers.

Dispecer	Client	Comandă	Camion	Remorcă	Nr. Șoferi	Șoferi	Oraș	Țara	ADR	Observații
Utilizator 19	Client 4	211 / IT / BH 38 BTR	Număr Camion 19	Număr Remorcă 83	1	Nume 131 Prenume 131	FREDERICIA 7000	DK	YES	WAIT TO UNLOAD
Utilizator 19	Client 4	95 / IT / BH 34 BOC	Număr Camion 16	Număr Remorcă 189	1	Nume 50 Prenume 50	CALVENZANO 24040	IT	YES	ON HIS WAY TO UNLOAD IN GIUSSANO/PAINA 20833 IT
Utilizator 19	Client 4	21 / IT / BH 46 BTR	Număr Camion 52	Număr Remorcă 96	1	Nume 87 Prenume 87	COMMUNAY 69360	FR	NO	ON HIS WAY TO UNLOAD IN VALENCIA 46014 ES
Utilizator 19	Client 4	14 / IT / BH 51 BTR	Număr Camion 75	Număr Remorcă 104	1	Nume 51 Prenume 51	GALGON 33133	FR	YES	WAIT TO LOAD
Utilizator 19	Client 4	181 / IT / BH 64 BOC	Număr Camion 18	Număr Remorcă 170	1	Nume 70 Prenume 70	CASTIGLIONE 26823	IT	YES	WAIT TO UNLOAD
Utilizator 19	Client 4	203 / IT / BH 95 BOS	Număr Camion 17	Număr Remorcă 222	1	Nume 10 Prenume 10	POZZUOLO MARTESANA 20060	IT	YES	WAIT TO UNLOAD
Utilizator 19	Client 4	202/ IT / BH 32 BTR	Număr Camion 71	Număr Remorcă 174	1	Nume 35 Prenume 35	UBOLDO 21040	IT	YES	WAIT TO UNLOAD
Utilizator 19	Client 4	183 / IT / BH 64 BOC	Număr Camion 23	Număr Remorcă 123	1	Nume 54 Prenume 54	HANNOVERSCH MUNDEN 34346	DE	YES	ON HIS WAY TO UNLOAD IN SAN GIUL MILANES 20098 IT
Utilizator 19	Client 4	75 / IT / BH 29 BTR	Număr Camion 14	Număr Remorcă 191	1	Nume 61 Prenume 61	GORINCHEM 4202	NL	YES	ON HIS WAY TO UNLOAD IN VILLADAN 24392 ES
Utilizator 19	Client 4	97 / IT / BH 85 BTR	Număr Camion 34	Număr Remorcă 57	1	Nume 138 Prenume 138	USSELOT 86560	FR	NO	WAIT TO LOAD
Utilizator 19	Client 4	179 / IT / BH 62 BOC	Număr Camion 33	Număr Remorcă 31	2	Nume 19 Prenume 19 / Nume 20 Prenume 20	MANZANARES 13200	ES	YES	WAIT TO LOAD

Figure 5. Truck situation (Key resources without order; Problems; Order summaries; Current track situation; Truck calendar; Turnover transport; Monthly statistics; Race statistic; Fuelling)

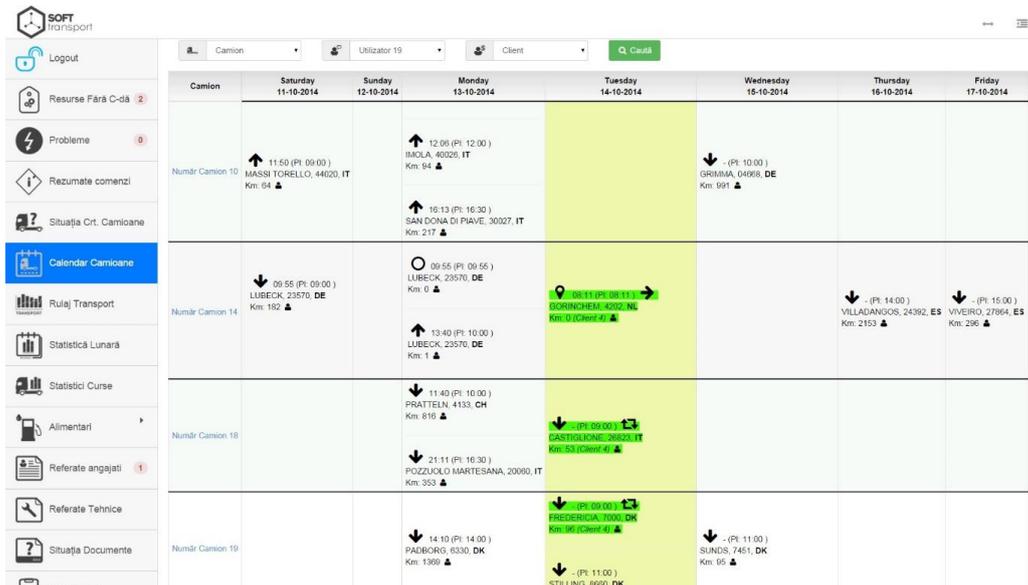


Figure 6. Truck Calendar (Key resources without order; Problems; Referred employees; Technical references; Document situation)

- Problems encountered during transport are also monitored in a special Problems section (figure 7). For example, the nature of the technical problem can be recorded - the tires, kilometers, etc., the observations related to the problem, but also if an order has been placed for a certain truck part.

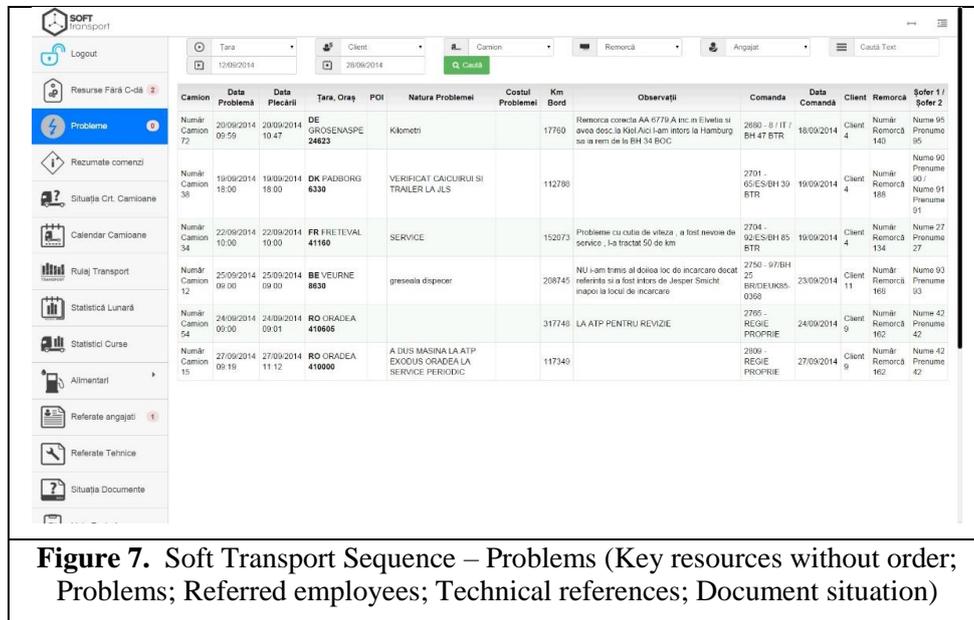


Figure 7. Soft Transport Sequence – Problems (Key resources without order; Problems; Referred employees; Technical references; Document situation)

- Or, the situation of the documents (figure 8) handed over can be followed in the section with the same name. Documents can also be uploaded here. This section also answers the questions: when and to whom were the transport documents handed over to the customer and what non-delivered documents are on board a truck.

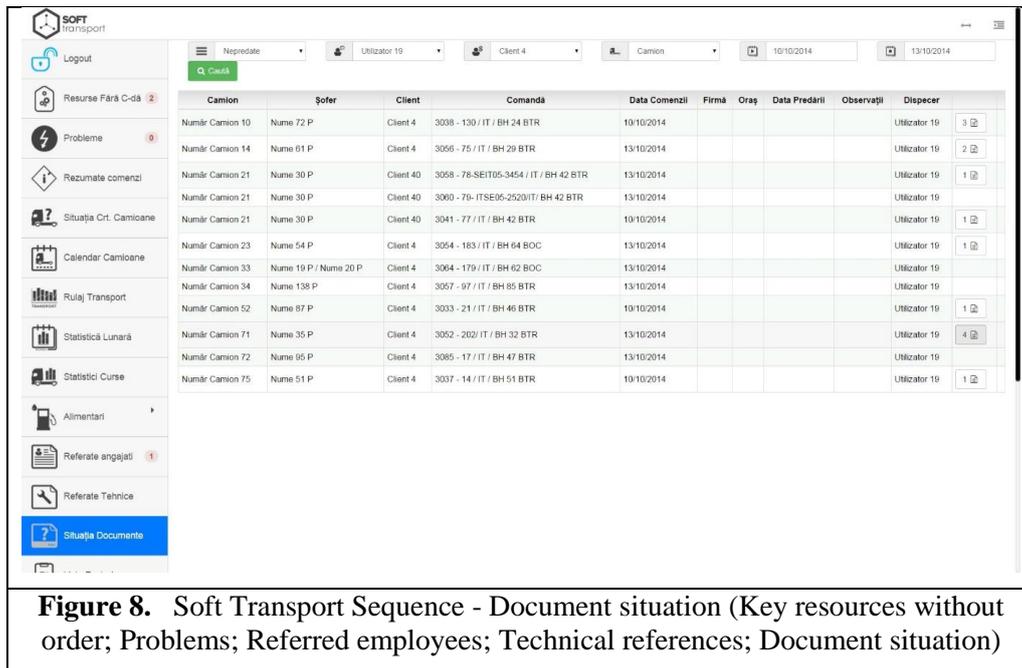


Figure 8. Soft Transport Sequence - Document situation (Key resources without order; Problems; Referred employees; Technical references; Document situation)

So, testing the software application brought many advantages to Transauto, namely (table no. 3):

- Strengthened control within the company;
- The problems in carrying out the transport activity were reduced by 20%;
- An 8% reduction in operating costs was observed;
- Documents and human resources have been managed more efficiently;
- Rigorous advance planning is also one of the control elements that helps to meet delivery deadlines to the customer.

After the acquisition and implementation of the software product within the Transauto company, an improvement of the entire transport activity is observed. (figure 9).

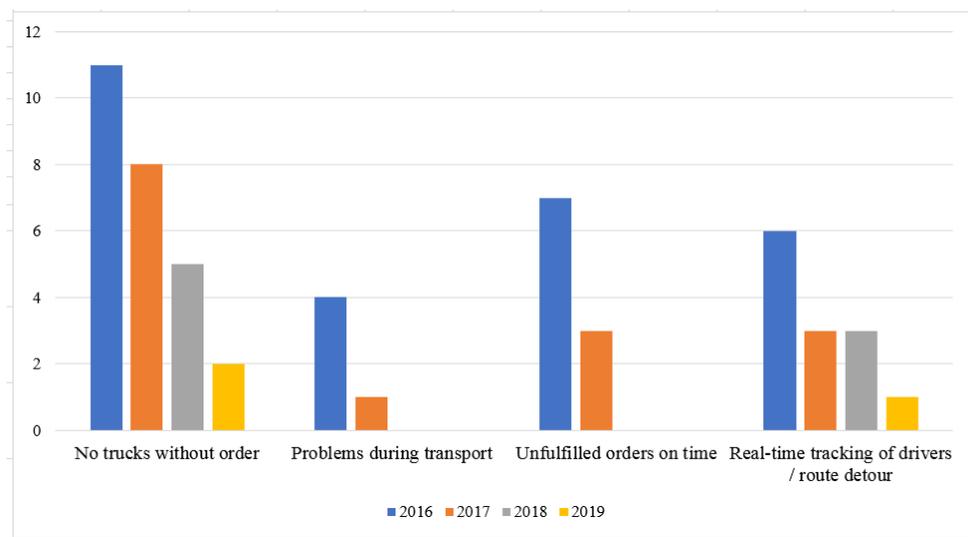


Figure 9. Comparative analysis in testing and after implementation

Even if testing Soft-Transport software has proven to be very useful, it could be improved or supplemented with other sections that bring even better control within the company. The directions that management should focus on after purchasing the Soft-Transport package are the following:

- Defining optimal routes for racing;
- Applications to help optimally arrange products in the truck.

5. Conclusions

In conclusion, logistics services comprise a range of diverse activities. Of these, transport has a significant share both in terms of presence and especially in terms of costs. Global business changes have forced many organizations to use strategic management, and one of the processes is, of course, transportation management. In order to survive in business and do business successfully, an organization must find a way to provide value-added products or services that differentiate it from the competition.

One of the solutions that can meet the transport companies is the rapid development of information technology that allows the realization of the business strategy by improving the processes within it.

Within Transauto SRL, the implementation of IT applications, namely Soft Transport, solved the problems encountered: non-compliance with product delivery deadlines, problems related to truck loads, poor communication within the company and cost reduction through efficient management of truck supplies and rigorous organization of space in trucks.

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