

CONCEPT OF IMPROVING SHIPPING PROCESSES ON A SELECTED EXAMPLE

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Summary

The aim of the article is to analyze and develop a concept for improving selected forwarding processes, using a shipping company, as an example through the use of the available modern technologies. In the first part of the work, the processes requiring improvement were identified. For this purpose, process maps have been developed. Then, based on the data from the company, the average time for the implementation of selected processes by an employee was calculated. The following section presents a proposal to improve the analyzed processes. Based on the company's data and assumptions for calculations, a forecast for the improvement of the selected processes is prepared. It has been shown that the proposed solutions may contribute to shortening the employee's working time by approx. 2 hours, which will translate into an increase in the employee's efficiency by approx. 40%.

Key words

forwarding processes, tracking, forecasting

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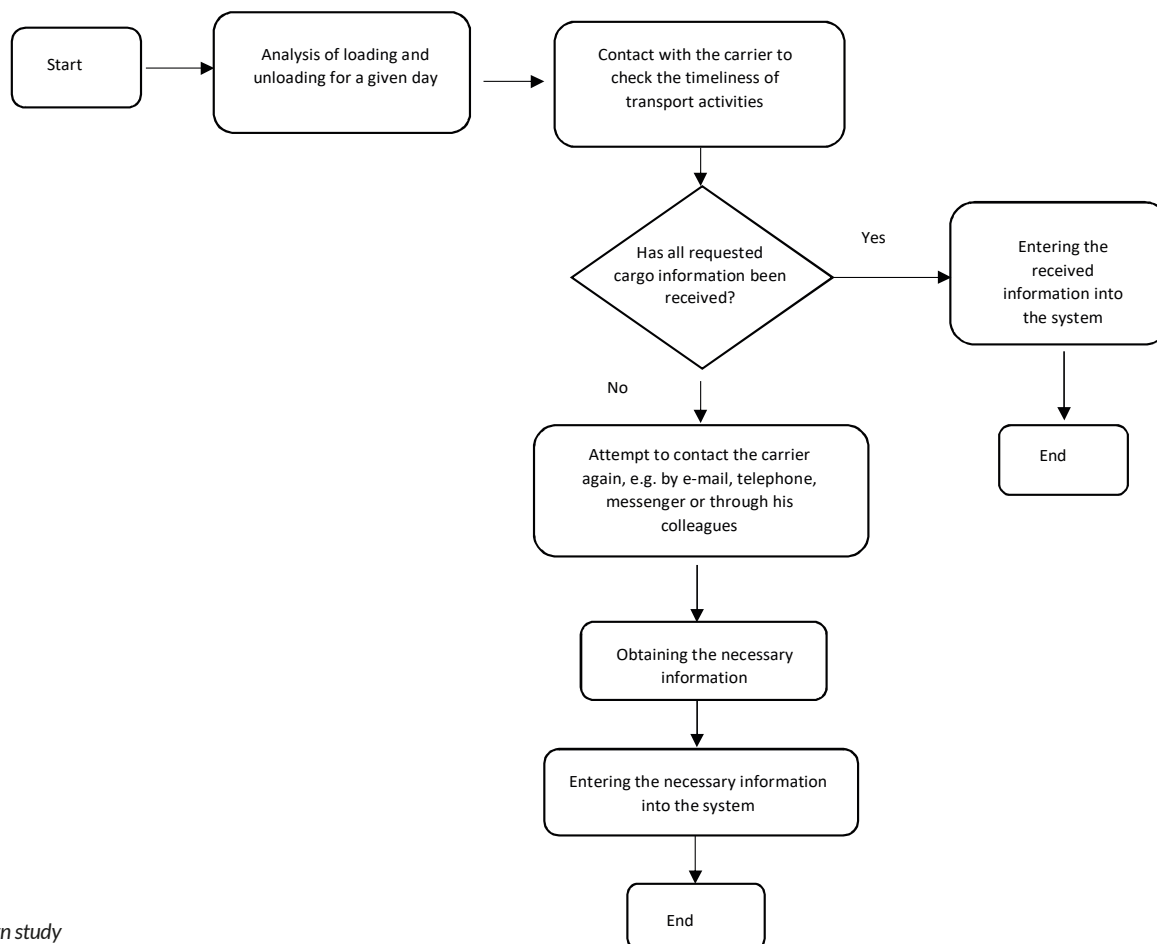
1. Introduction

Many companies, mainly production ones, decide to use the professional services offered by shipping companies due to the lack of knowledge of the rules of international transport. By entrusting transport to an external company, entrepreneurs can focus on achieving the main goals of their companies, and be sure that the transport of their goods is efficient and, above all, legal [10].

Freight forwarding companies act as an intermediary between the manufacturer of goods and their recipient. Based on the acceptance of the forwarding order, the responsibility for the goods entrusted to them is transferred to them. These companies may have their own fleet of vehicles and may also use the services of external transport companies [11]. Supervising the timeliness of individual transport activities is an important element of the forwarder's work, who should also take care of the quality of this type of transport service [12], [13]. In the case of transport outsourcing, however, there are problems with the flow of information between the forwarder and carriers, therefore in a situation where a forwarding company uses the services of transport companies, it becomes very important to build relationships with trustworthy carriers, in which the forwarder sees the potential to establish permanent cooperation [1].

With the above in mind, the aim of the article is to analyze and develop a concept for improving selected forwarding processes using the forwarding company as an example, thanks to the use of available modern technologies. Therefore, the main research problem was formulated as a question: can shipping processes be improved thanks to the use of modern technologies?

Fig. 1. Map of the tracking process



Source: authors' own study

2. Processes that require improvement

Based on the data from the XYZ company, it was found that a large part of the working day is spent by the employees of the Capacity tracking department, completing the employee's data and contacting regular carriers (Fig. 1, Fig. 2, Fig. 3). The team in the Capacity department consists of 7 people. The employees of this team deal with loads whose place of origin is Poland, and the destination countries are Germany, Belgium, Netherlands and the United Kingdom.

Tracking (abbreviation meaning tracking the shipments) is performed three times a day. The XYZ management pays particular attention to this, because the regular checking of the timeliness of individual transport activities allows employees to react faster to the possible delays, and sometimes even faster to detect possible theft of goods.

Tracking is not a complicated process, but it requires the employee to focus and allocate a lot of time. Due to the employee entering manually the arriving and leaving times of vehicles, there is a risk of making a mistake.

The search for carriers takes a significant part of the working day of an employee of the Capacity department. It is logical, as at a company that does not have its own fleet of vehicles and forwarder can rely only on external transport companies, the contact is necessary not only to check the availability of vehicles, but also to build a relationship with the carrier and, as a result, establish permanent cooperation.

Despite the fact that the process of completing the data does not seem complicated, employees should not underestimate it. The consequence of incorrectly entered data may be delayed loading and, as a result, a delay in delivery, which may adversely affect the company's relationship with the customer. In order to calculate the time that an employee spends, e.g. on tracking, the average number of loads per day per one employee in the team is needed. In order to calculate this, the necessary data is the number of orders completed by the team in 2019 in the individual months (Table 1).

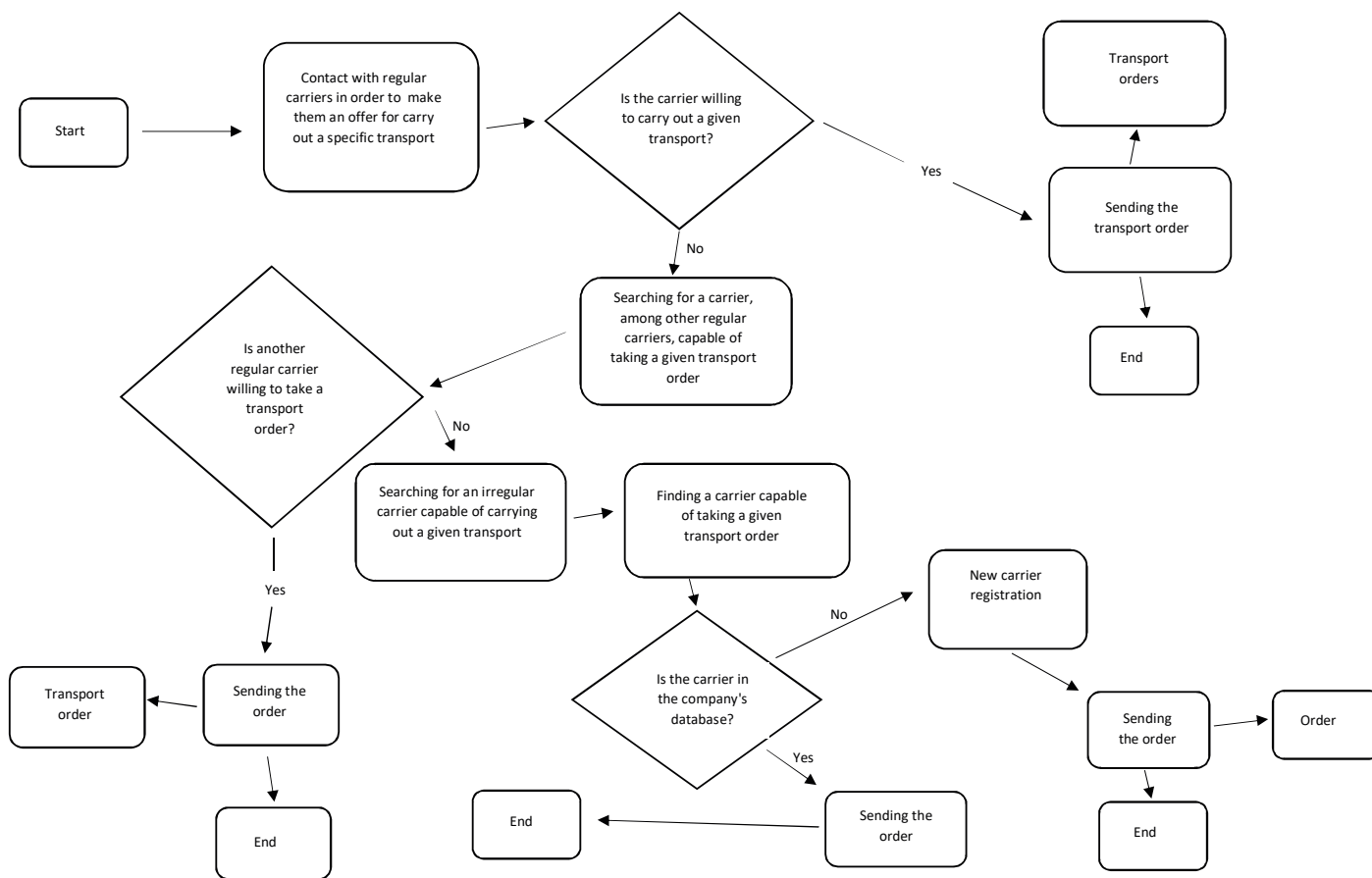
In 2019, there were 251 business days. The average number of loads per one working day is approx. 70.

Fig. 4 shows the employees' daily time, expressed in minutes, allocated to the analyzed processes.

Based on the data presented, the average execution time of the individual processes, by 1 employee, was calculated (Table 2).

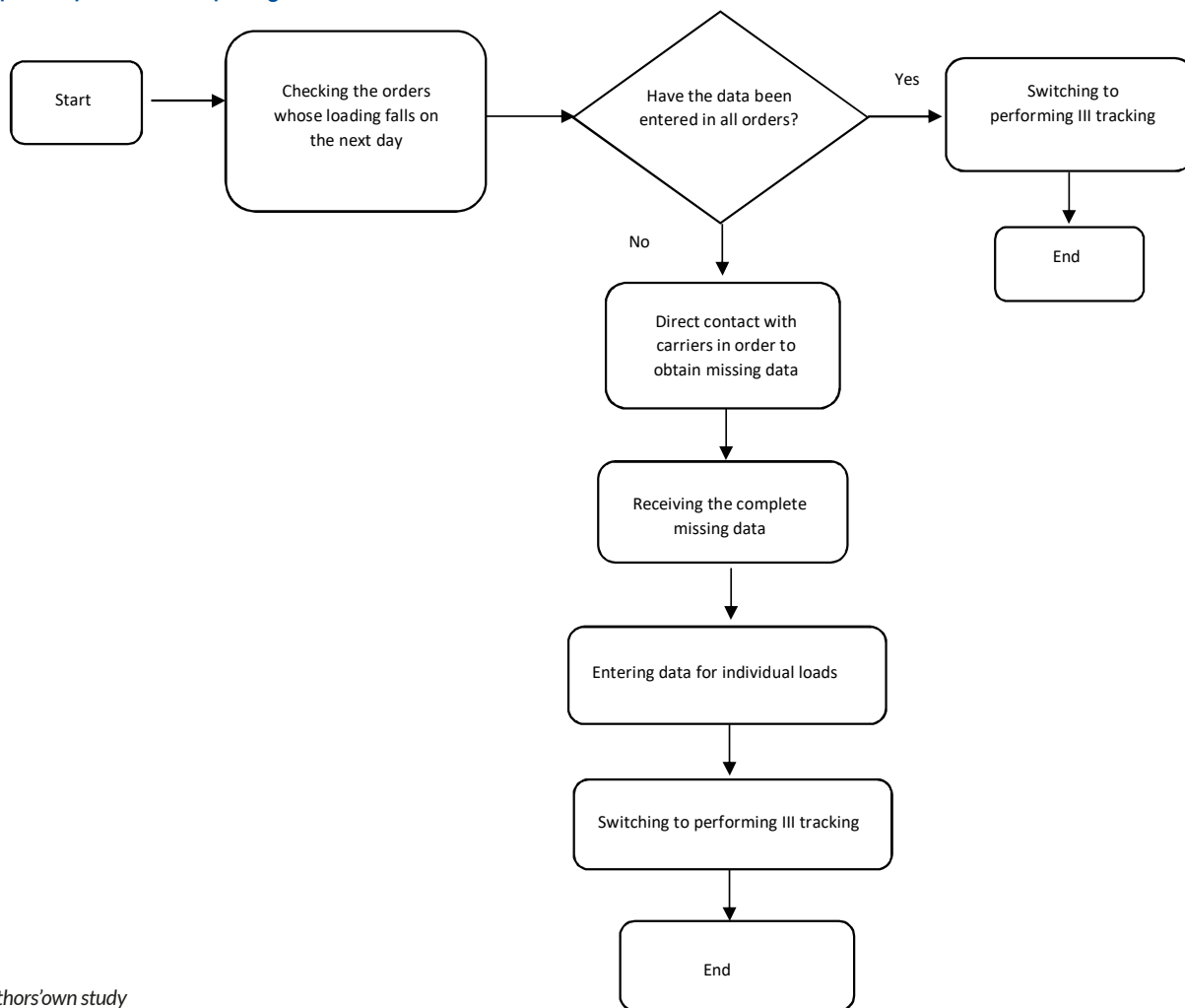
The calculations show that an employee allocates as much as 137 minutes a day, i.e. as much as 2 hours 17 minutes for tracking, entering data and contacting regular carriers. In summary, employees spend a lot of time during one working day on these basic activities.

Fig. 2. Map of the carrier searching process



Source: authors' own study

Fig. 3. Map of the process of completing carrier's data



Source: authors' own study

3. Proposal to improve the analyzed processes

Based on the calculations performed, it is possible to accurately indicate the processes that need to be improved. In order to increase the productivity of the team's employees, the employees' time spent on their implementation should be limited. If the company manages to reduce this time, it is even possible to increase the daily volume of individual clients, because the time saved, employees will be able to spend on more orders per day [14]. The use of modern technologies in these processes could improve the quality of this type of transport service [2], [8], [9], [13].

The first improvement proposal is to combine the signal from GPS transmitters, with which the carriers' vehicles are equipped, with the company's dedicated system. This would mean that an employee of the Capacity department would have a preview of the location of the carrier's vehicle, that would currently be carrying out the transport order for the company. After entering the numbers of the vehicle that will execute the order into the order, the company's system connects to the given transmitter and is ready to receive the signal. When the vehicle arrives for loading, the system will automatically complete the information on the vehicle's arrival time in the given load and the cargo status will change from *checked in* to *loading*. It will save a lot of time, because it will be enough for the employee to look at the load to check whether the status of the load has changed, and it is not necessary to make a phone call to the carrier to check the success of the transport order. The lack of a change in status may indicate that the vehicle is late for loading or a there is breakdown of the GPS transmitter. Thanks to this solution, the employee will be able to focus on looking for carriers that can carry out subsequent transport orders.

Table 1. The number of orders completed in 2019 the individual months

Month	Number of orders
January	1465
February	1455
March	1453
April	1447
May	1456
June	1459
July	1457
August	1457
September	1467
October	1448
November	1470
December	1457
TOTAL	17491

Fig. 4 shows the employees' daily time, expressed in minutes, allocated to the analyzed processes.

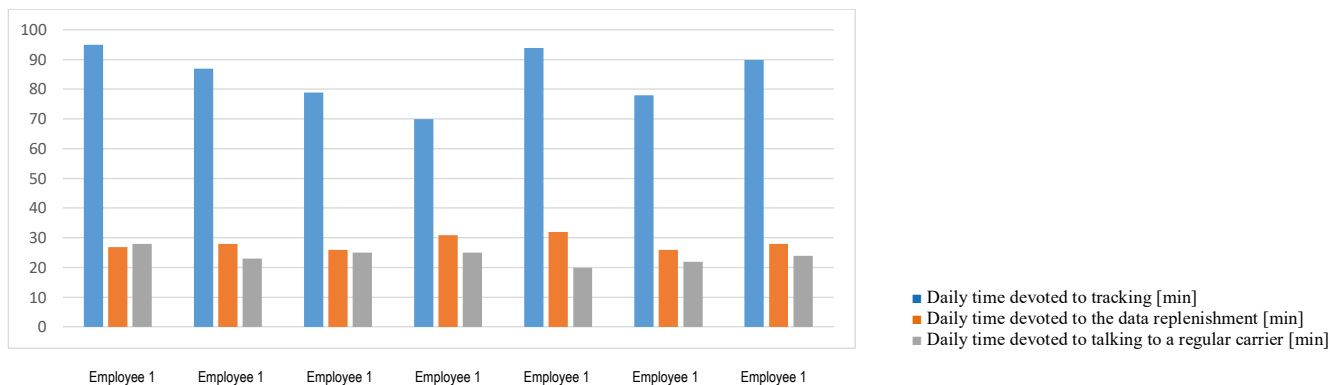


Table 2. Summary of the results obtained

Team spent	Time spent on tracking	Time spent on entering data	Time spent on contact with regular carriers	Total
Team time	593 min	198 min	167 min	958 min
Average time per employee	85 min	28 min	24 min	137 min

Another solution is to develop a mobile application. This application would be intended only for the drivers, it would operate on the principle of the driver manual reporting at the individual stages of transport. Upon arriving at the loading site, the driver would have to open the application on his phone and select the „arrival at the loading site” option. Thanks to the driver’s mobile number provided in the load, after checking in at the loading site, this information would be automatically sent to the company 4 system and the load status would change from *checked in to loading*. After loading the goods, the driver would have to start the application again and select the option „departure from the loading site” and this information would be automatically sent to the company’s system and the load status would be changed to *picked up*. After reaching the destination place of unloading, these activities need only be repeated. This is a good solution for small transport companies with several vehicles that are not equipped with GPS transmitters, however, the condition is that the application should be easy to use, as drivers are of different age groups.

Reducing the time allocated to contact with the regular carriers could be achieved by creating a platform dedicated to the carriers. On this platform, the carrier would have an overview of the available cargos for the coming days. If it noticed a cargo that it would like to transport, only then would it contact a Capacity department employee to determine the rate and other details. This would then reduce the number of phone calls the employees receive from the carriers.

The platform would also show the currently being implemented transport orders for the company, the carrier could mark the arrivals and departures of its vehicles from loading or unloading. In this case, this information would also be automatically transferred to the company’s system and the status of the load would change. So it is another alternative for a carrier who does not want to provide a GPS signal from transmitters located on its vehicles. transmitter. In addition, the carrier could independently complete the data in the order, i.e. tractor and semi-trailer numbers, first and last name of the driver and telephone number. This would save employees the time they spend on supplementing the data they receive from the carrier every day. Self-entry of data by the carrier would significantly reduce the possibility of human error when rewriting data by an employee. Mistakes

often occur, and it is the most problematic when loading or unloading takes place outside office hours. Changing the data in such a situation is very difficult, therefore, if the carrier entered the data himself, it could verify them immediately. In this case, the data on the platform supplemented by the carrier would also be automatically sent to the company’s system. A dedicated platform for the carriers could significantly improve the individual processes.

4. Projected effects of the analyzed processes improvement

The calculations assumed that all carriers regularly cooperating with the company would be happy to use the above-mentioned solutions. The information obtained from the company was used for calculations regarding the number of orders being implemented by the regular carriers, namely, they execute 84% of all orders daily. It follows that employees will have to check 16% of orders per day. It is known from previous calculations that a team of 7 executes an average of 70 orders per day.

- Number of orders processed daily by the regular carriers:

$$84\% \times 70 = 58,8 \sim 59$$

Regular carriers carry out 59 transport orders daily for the company.

- Number of orders still requiring tracking:

$$70 - 59 = 11$$

Calculations show that 11 jobs a day will still require personal tracking by the team employees.

Improving the tracking process

One should calculate the time it will take for the team to check the remaining 11 orders carried out by carriers not using the proposed solutions. Based on previous calculations, the average time needed to check the timeliness of one order should be calculated.

Data:

- 70 orders - daily number of orders for a team of 7 people,
- 10 orders - daily number of orders per one employee,
- 593 min - team, current, average daily time needed to perform tracking,
- 85 min - the current average daily time needed to perform tracking by one team member.

- The average time needed to check the timeliness of one order:

$$85 \text{ min} \div 10 = 8,5 \text{ min}$$

The average time of checking the timeliness of transport activities for one order is, on average, 8.5 minutes.

- Time needed to track the remaining 11 orders per day:

$$11 \times 8,5 = 93,5 \text{ min} \sim 13 \text{ min } 30 \text{ s}$$

Following the introduction of improvements, the team would spend on tracking approx 93 minutes 30s a day.

$$93,5 \div 7 = 13,357 \text{ min} \sim 13 \text{ min } 21 \text{ s}$$

Thanks to the proposed solution of creating a dedicated platform for the regular carriers, the activity of entering data for the cargos would be significantly easier, as well as the possibility of human error during their completion by an employee, reduced.

Improvement of the data completion process

Based on the calculations of the current time spent by employees on completing the data of carriers in the cargos, the average time needed to complete the necessary information in one order should be calculated.

Data:

- 198 min – the average time needed for the team to complete the data in 70 orders a day,
- 28 min - the average time needed for an employee to complete data in 10 orders a day.

- The average time needed to enter data for 1 order:

$$198 \div 70 = 2,829 \text{ min} \sim 2 \text{ min } 50 \text{ s}$$

The average time needed to complete the data in one order takes on average of 2 minutes 50s.

- The average time needed to complete data in the remaining 11 orders:

$$11 \times 2,829 = 31,119 \text{ min} \sim 31 \text{ min } 7 \text{ s}$$

The average time needed for the team to enter the data of carriers carrying out the remaining 11 orders per day is 31 minutes 7s.

Improving the process of contacting carriers

Based on the calculations of the time spent by employees on contacts with regular carriers, the average time spent on one telephone call should be calculated. However, not always the calls received from carriers refer to

the availability of loads, sometimes they relate to problems that occurred during the transport order currently carried out by a given carrier, therefore 2 phone calls per day to one employee were assumed for the calculations.

Data:

- 5 - number of calls received daily by the employee before the introduction of the improvements,
- 7 - number of employees in the team,
- 167 min – time spent by the team on talks with carriers before introducing improvements,
- 2 - number of calls received daily by the employee after the implementation of improvements,
- number of phone calls received by the team before the implementation of improvements:

$$5 \times 7 = 35$$

Before implementing an improvement in the form of the dedicated platform for carriers, the team received around 35 phone calls a day.

- Average time spent on one phone call:

$$167 \div 35 = 4,771 \text{ min} \sim 4 \text{ min } 46 \text{ s}$$

The average duration of a telephone conversation with the carrier is 4 minutes 46s.

- Number of phone calls received by the team after the implementation of improvements:

$$2 \times 7 = 14$$

With the improvement in the form of a dedicated platform for carriers, the team would receive approximately 14 phone calls a day.

- Average time spent by the team on phone calls with carriers after the implementation of improvements:

$$14 \times 4,771 = 66,794 \text{ min} \sim 66 \text{ min } 48 \text{ s} \quad (3.21)$$

In summary, the introduced improvements will greatly help in saving time of employees who spend on activities that could be automated or transferred to the carrier. Table 3 summarizes the duration of individual processes before and after the implementation of improvements.

Table 3. Summary of the duration of individual activities before and after the implementation of improvements

Process		Before improvements	After improvements	Time saved
Tracking	Tracking Time allocated by the team	593 min	93 min 30s	499 min 30s
	Time allocated by the employee	85 min	13 min 21s	71 min 39s
Filling data	Time allocated by the team	198 min	31 min 7s	166 min 53s
	Time allocated by the employee	28 min	4 min 27s	23 min 33s
Contacts with regular carriers	Time dedicated by the team	167 min	66 min 48s	100 min 36s
	Time allocated by the employee	24 min	9 min 33s	14 min 27s

Based on the table, it is possible to calculate the time that a 7-person team could save by introducing the proposed improvements.

- Team time saved:

$$499,5 + 166,881 + 100,206 = 766,587 \text{ min} \sim 766 \text{ min } 35 \text{ s} \sim 12 \text{ h } 46 \text{ min}$$

Thanks to the introduction of the proposed improvements, there is a 7-person team able to save about 12h 46min a day.

- Employee time saved: (3.)

$$71,643 + 23,554 + 14,458 = 109,655 \text{ min} \sim 109 \text{ min } 39 \text{ s} \sim 1 \text{ h } 49 \text{ min}$$

(3.)

Thanks to the proposed improvements, the employee is able to save about 1h 49min a day. The time saved, which the employee previously spent on tracking, entering data and contacting regular carriers, after the introduction of improvements, will be possible to be spent on looking for carriers that can fulfil transport orders for the next days, and thus will be able to process a larger number of orders. In order to check how many more orders, each employee, thanks to the time saved, will be able to process, the following calculations have been made.

- Working time during the day:

Data:

- 8h - working time,
- 15 min - paid break,
- 30 min - compulsory free break.

Thanks to a compulsory break of 30 minutes, theoretically working time is extended to 8 hours 30 minutes.

$$8 \text{ h } 30 \text{ min} - 45 \text{ min} = 7 \text{ h } 45 \text{ min}$$

The employee's daily working time is 7h 45 minutes.

One should calculate the time spent only on searching for carriers, for this purpose the time spent on tracking, completing data and contacting regular carriers, both before and after the implementation of improvements, should be subtracted from the working time.

Calculations concerning the situation from before the introduction of the processes improvements:

- The daily time spent by the employee on processes requiring authorization:

$$85 + 28 + 24 = 138 \text{ min} \sim 2 \text{ h } 17 \text{ min}$$

Before introduction of the improvements, the employee spent about 2h 17 min a day on individual processes.

- Time allocated by the employee to look for carriers before the introduction of improvements:

$$7 \text{ h } 45 \text{ min} - 2 \text{ h } 17 \text{ min} = 5 \text{ h } 28 \text{ min}$$

Within 5h 28 minutes, the employee focuses only on the search for carriers that can carry out transport orders for the next few days. During this time, he/she carries out about 10 orders a day, as shown by the previous calculations.

Calculations concerning the situation after the introduction of the improvements:

- Daily time spent by one employee on processes requiring authorization:

$$13,357 + 4,446 + 9,542 = 27 \text{ min } 21 \text{ s} \sim 27 \text{ min}$$

After introduction of the improvements, the employee will spend about 27 minutes a day on improved activities.

- Time allocated by the employee to look for carriers after the improvements have been made:

$$7 \text{ h } 45 \text{ min} - 27 \text{ min} = 7 \text{ h } 18 \text{ min}$$

The time that the employee, after the introduction of improvements, will spend on searching for carriers that can fulfil transport orders for the next few days will be approximately 7 hours 18 minutes.

- Average daily number of orders per one employee after the implementation of improvements:

$$5 \text{ h } 28 \text{ min} = 300,467 \text{ min} - 10$$

$$7 \text{ h } 18 \text{ min} = 429,3 \text{ min} - x$$

$$X = \frac{420,3 \text{ min} \times 10}{300,467 \text{ min}} = \frac{4203 \text{ min}}{300,467 \text{ min}} = 13,988 \sim 14$$

Thanks to the time saved, the employee will be able to complete 4 more orders per day.

Based on the calculations, it can be seen that thanks to the improvements introduced, an employee can save more than 2 hours a day, which he/she will spend on searching for carriers, thanks to which he/she will be able to complete 4 more orders a day.

Table 4. Comparison of the time and number of orders carried out by one employee before and after the implementation of changes

	Before the introduction of improvements	After improvements are implemented	The difference
Time devoted by one employee to search for carriers	5h 28 min	7h 18 min	2h 10 min
Daily number of orders carried out by one employee	10	14	4

5. Summary

Thanks to the proposed improvements, it would be possible to reduce the time spent by the Capacity department employees on tracking, entering data or contacting regular carriers. It has been proven that the proposed solutions will significantly improve the forwarder's work, and thus increase its efficiency. In summary, the main conclusions that arise from the research conducted are:

- the research conducted shows that the implementation of the proposed solutions using new technologies will significantly save employees' time,
- the research shows that the process on which the most time can be saved is the tracking process (1h 11min), the next is the process of completing the data, on which an employee will save 24 minutes a day, while the least time will be saved on contacts with carriers (15 min), it should be noted, however, that this contact is inevitable, because an important element of the forwarder's work is building relationships with the carriers,
- thanks to the introduction of the proposed modern technologies to the enterprise, the employee will be able to carry out 4 shipping orders a day, which the management can translate into increasing the daily volume of its customers,
- a dedicated platform for carriers is the only solution that is able to independently improve both the tracking process, the process of data completion and contacts with regular carriers.

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