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INFORMATION IS THE KEY IN OPTIMIZATION OF TRANSPORT PROCESSES

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In this paper the authors present an analysis of the transport process in a selected enterprise. The process map was prepared in accordance with the BPMN 2.0 standard, currently functioning in the firm (map AS IS) and as a target (map TO BE). Then, to simulate the flow of transport orders, we will built analytical models for the mapped processes and introduced parameters for all activities and process events. The effect of changes examined by values of key performance indicators (KPIs) for the mean time order processing and human resources burden in the original model and the target which included the TMS class system implementations.

Keywords: business process, process map, transport, BPMN

1. Introduction

Making an analysis is necessary before implementing any changes in organizations. One of the methods of searching for changing points – improvements and preparing for their implementation, is the process analysis [2, 3, 4]. It helps to understand the key activities of the organization. It helps to define their terms and their characteristics and also gives opportunity to evaluate their responsibilities for realization of each process. Centre of Process Excellence in Institute of Logistics and Warehousing has established methodology of business processes optimization, using BPMN 2.0 standard. The notation used in this

standard allows to unambiguously map all the processes occurring in the organization. The mapping is understandable not only by standard experts but management and IT specialists who are responsible for implementing tools to these processes as well. Illustrated processes are the starting point for further analysis which is also made in BPMN 2.0 standard IT tool. The software used during the simulation allows to parameterize process transactions and events and to determine the flow parameters of the process (sequence flow) and the flow of messages (massages flow). In this way, process models were built (which are derived of the agreed map and assumed parameters), the simulation helps to find the areas eligible for change [5]. In this case the aim was to reduce the operational costs and to eliminate the "bottlenecks" as well as improving the efficiency and effectiveness of processes used in the company. The purpose of this article is to indicate the possibility of improvements in the flow of transport orders in an selected company, using a model compatible to BPMN 2.0. [6].

The article presents the simulation results of the processes currently used in the company (AS IS) and the target process, taking into account the proposed amendments (TO BE) The result will be the comparison of process simulation with the implemented changes and the real result of implementing them.

2. Research outline

Nowadays BPMN 2.0 standard is the most popular tool for mapping business and production processes. It is acknowledged by many commercial and no-commercial organizations around the World. This standard is defined by the ISO/IEC 19510:2013 norm [16]. Information Technology – Object Management Group Business Process Model and Notation [1, 9, 10, 14, 15]. Main advantages of BPMN 2.0 include the following [7, 8]:

- user friendly style of process description,
- possibility of modeling almost all business processes regardless of industry,
- standard symbols are recognizable in the business sector,
- possibility of diagnosing useless operations.

A business process is a sequence of chronologically ordered actions initiated by one or more input events which are responsible for generating the extra value for the customer [11]. The key elements which need to be examined while defining the business processes [13]:

- the beginning and the end of the process,
- process strukture,

– process inputs and outputs,
– suppliers and customers (internal and external clients),
– process owners,
– measurement and evaluation to ols,
– available resources,
– Key Performance Indicators (KPI),
– process documentation and its course.

The paper adopted the method of process analysis based on the approach "from the particular to the general" (bottom-up) (Figure 1). According to this methodology the analysis of the current transportation process (AS IS) needs [12]:

– identification,
– mapping,
– parameterization process (time, logic flow),
– building simulation scenario,
– assigning the value of KPI.

Key Performance Indicators (KPI) are financial and non-financial indicators used in the processes to measure the level of realization the business goals [12].

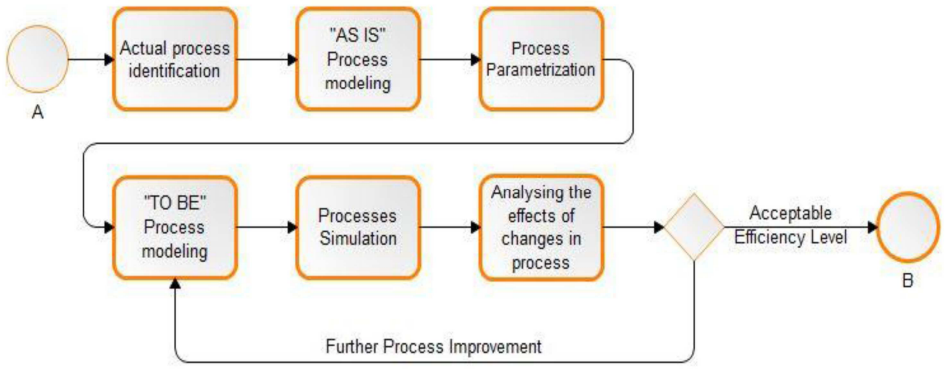

Figure 1. The method of the research realization

The preparation phase is to gather basic information and prepare guidelines based on which the study is carried out. We build a scenario according to which we will explore current running process. The AS IS scenario includes inter alia information about the number of people that support the test process, time resource availability (uptime), information determining the transaction processes in terms of amount and time they are supposed to be generated.

The mapping phase is divided into two parts: AS IS mapping and TO BE mapping. The aim of AS IS mapping is to reflect the current process flow according to practice of their use and to prepare conclusions which are showing the discrepancies from arrangements with process owner. The aim of TO BE mapping is to show the planned changes and then verifying them in terms of business process correctness and logic.

Simulation phase is also divided into two parts: creating and simulating the AS IS model and creating and simulating the TO BE model. The aim of AS IS simulation is to verify if the map prepared during modeling reflects the real state of the transportation process. Verification with the customer is the AS IS conclusion which leads to further work on the project – target state (TO BE) simulation based on changed scenario of business processes.

The ending phase allows to merge all the elaborations, analysis and simulations into one report. Only after approval of this stage the results are handed to the customer.

3. Results of researches

3.1. Process AS IS

In the audited company the transport orders service are handled by: accountant, dispatcher, mechanic and driver. Every person performs process activities which are assigned to the model by placing them in particular lane. Logic of process flow determines if the individual processes can be realized. In the current AS IS model, process gates are parameterized in the way that shows the real flow of transport orders based on the observed dependence.

The process flow of transport orders (Figure 2) starts with an analysis of possibility of realizing by dispatcher, before giving the vehicle. Then the vehicle is issued to the driver, who checked the car and sign the handover protocol. During this activity it can turn out that the vehicle is out of order. Currently, on average it happens in 20% cases. The defects found are removed on the spot by mechanics, while major repairs require to transfer the vehicle to the repair workshop. The average time of transport service is 2.5 days. After this service the vehicle is checked in terms of efficiency, and the handover protocol is signed as a result. The data necessary to prepare the vehicle mileage document (EPP report) is grouped manually twice a year. This activity is released by accountant and loads her work up to 16,75%. EPP is an internal report made in accordance with the requirements of the Accounting Act. It consolidates information about operations of business cars.

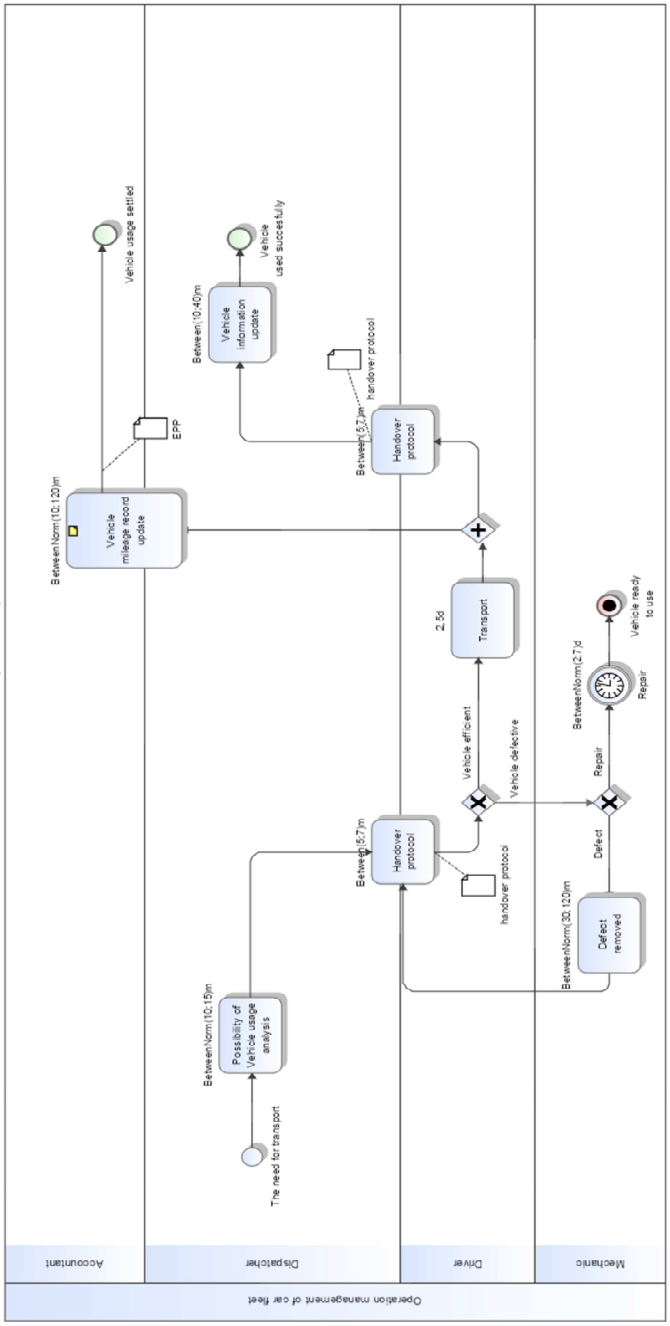

Figure 2. Map AS IS for the process flow regarding the transport orders in enterprise

The KPI indexes received in the process analysis are used as comparative base for the simulation of targeted actions. Thanks to this it is possible to determine whether planned implementations will influence the KPI in the effective and positive way that allows to upgrade the transport orders process flow.

The following values for key performance indicators for the AS IS condition in the flow of transport orders were defined:

- average service time – 24,87 (days) – contains: work time and waiting time,
- average work time – 12,73 (days) – contains: average time necessary for stuff to realise the order, calculation based on gathered time of all activities in the process,
- accountants' commitment in the process – 16,75%,
- dispatcher's commitment in the process – 1,06%.

Existing process analysis consisted of its reconciliation and calibration - selection of parameters of AS IS model in the way that, values showed by the simulation are identical to the real ones, observed in this process. Only a well-calibrated model of the current process allows reliable management of its modification.

3.2. Process TO BE

The next step in the analysis is to create a map with goals of flow process transport orders. During the AS IS model verification, it was determined that the change which was designed and simulated, affects automatization of gathering information about localization of the cars, directions of use and repairs. The goal map – TO BE (Figure 3) shows the crossing point of messages flow with Transport Management System.

Operation “analysis of the vehicle usage availability” lasts longer than in original trial thanks to automatic availability of analytical data. The accuracy of analysis of the history of vehicle exploitation translates into relevance of decision on its use. Processes which were shortened are tagged on the map as a circle, and the ones which were lengthened are tagged as a rectangle. Preparation of the EPP report in the TO BE process is based on checking its positions - the report is created automatically (up to date) from the data from TMS system. Also the report for each car's' history and exploitation is generated automatically – thanks to it, the dispatcher can concentrate on analyzing the data instead of recording it.

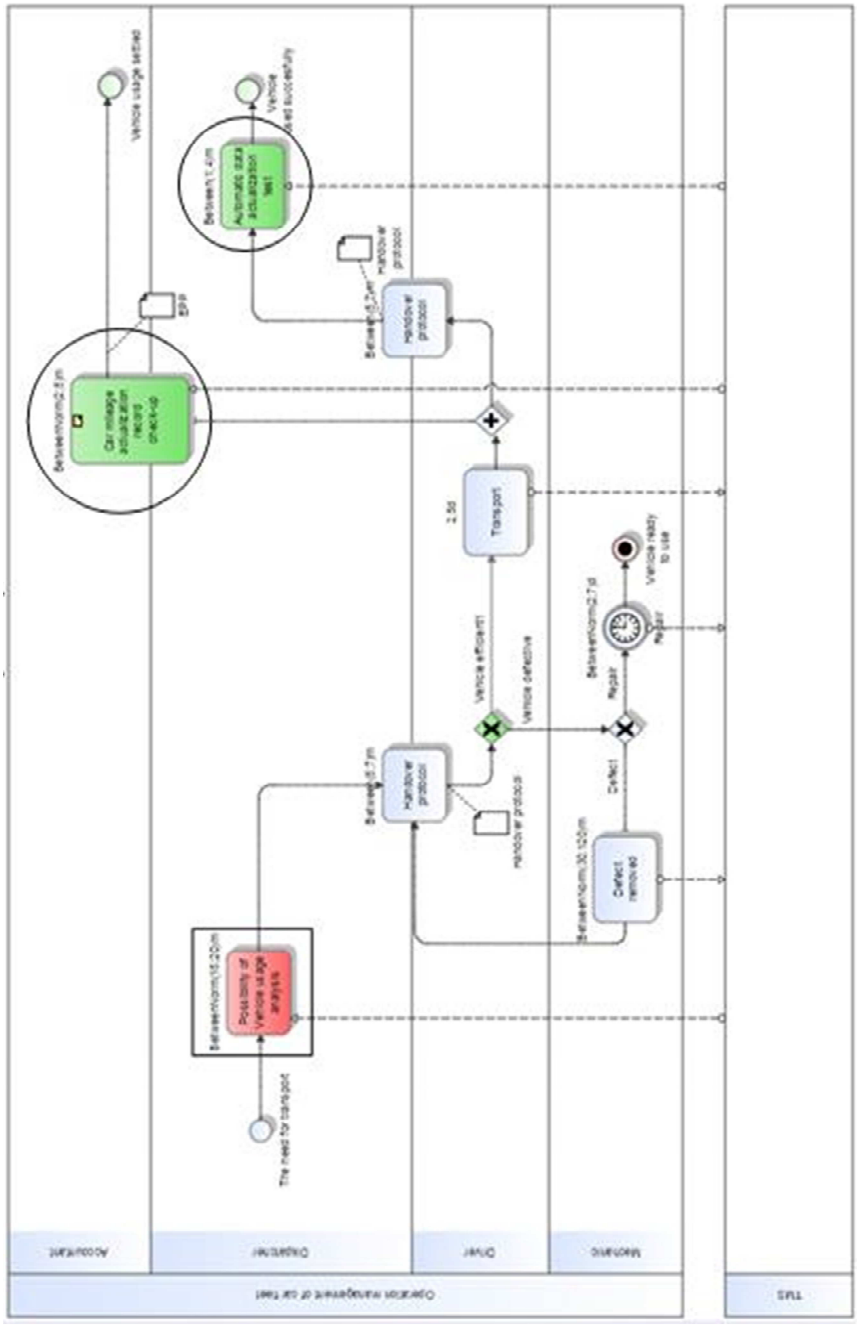

Figure 3. Map TO BE for a process flow regarding the transport orders in enterprise

3.3. The result analysis

Based on the analysis of the starting and target processes, it was possible to compare efficiency of process flows in AS IS and TO BE models. The comparison effect was the assessment if the changes proposed will influence in the effective way the functioning of these processes without implementing them. The KPI indicators are graphically reflected in the charts. The analysis shows that the weighted average of resources usage has decreased (Figure 4) in the whole service transportation process. The effect is the increased time availability of dispatcher and accountant.

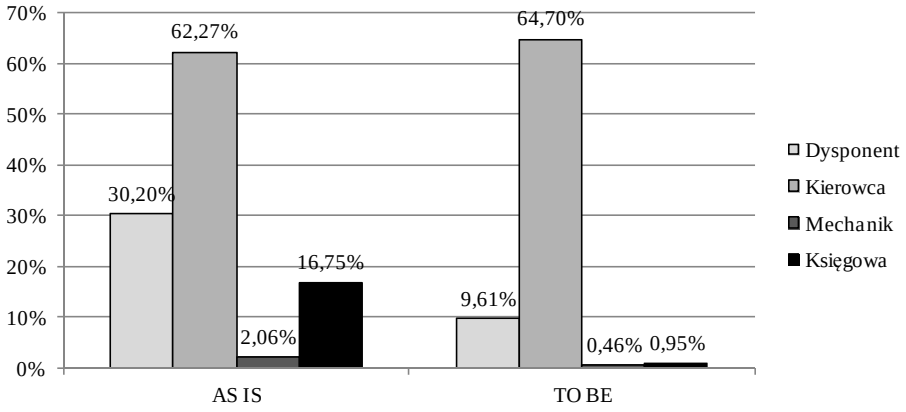

Figure 4. Weighted average use of human resources

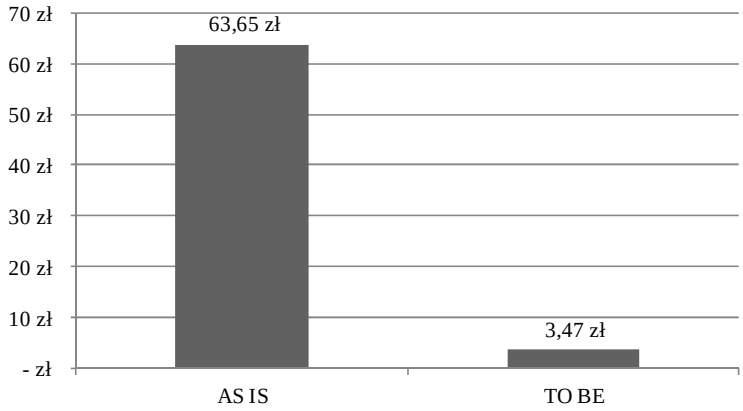

Figure 5. The average accountant cost of handling the process

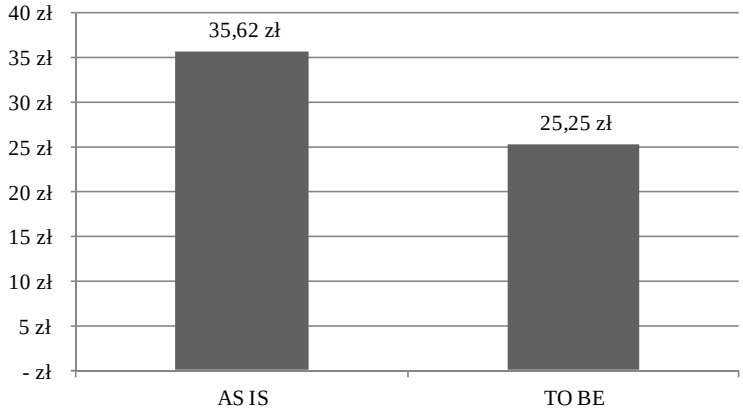

Figure 6. The average dispatcher cost of handling the process

Another analyzed element was the average cost of servicing the process flow of transport orders by an accountant and dispatcher. The analysis shows that the accountant cost has decreased around 18 times (Figure 5) and the dispatcher cost has decreased around 30% (Figure 6). Cost of handling in process has been calculated on the basis of an hourly rate assigned to a resource (dispatcher 35 PLN/h, accountant 25PLN/h) and average working hours in a single process transaction.

4. Conclusion

The article aim was to show, using the case study, the fast (business analysis time is no more than one day) method of research on consequences of process changes in the organization.

In this case we were analyzing the management of organizational process in the transport company from the medium and small companies sector. The main business goal was to reduce the human resources (accountants) engagement. It was achieved thanks to implementing the TMS system, which automated the way of gathering the transport information in terms of vehicle exploitation.

The forecasted increase of the efficiency in the tested process was determined theoretically using process simulation, and confirmed empirically after the implementation of the TMS system. Implementation of the changes resulted in a reduction in staff engagement and provide better and faster access to data with higher quality, more efficient data processing, higher efficiency of the process.

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