The Analysis of Freight Forwarding Services Using the Business Process Modelling Tools. Study Case in Constanta Port

IONELA GOIA, ALEXANDRU-STEFAN BACIOIU
Transport Faculty
University „Politehnica" of Bucharest
ROMANIA

Abstract: - This paperwork is aiming to describe the business model for a bunkering process as part of the supply chain network from a Company in Constanta port. The authors have conducted a study of modelling the bunkering process for a ship from the company's fleet, which is moored in the port of Constanta, using the Business Process Modelling tools and methodology. The bunkering process with all its stages will be incorporated in the AuraPortal Helium Modeler program and statistically simulated. This entails putting processes through their paces in fictitious scenarios to discover and quantify any factors that might influence how they are carried out in real life. Bottlenecks, overloads, uneven workload distribution, unnecessary time, expenses, and other issues should be revealed by these activities. The authors will do an actual simulation of the bunkering process in the concluding remarks to reflect the process dynamics issues experienced during the full life cycle.

Key-Words: - business process modeling, port agency, bunkering, supply chain management, process design

Received: July 30, 2021. Revised: April 25, 2022. Accepted: May 18, 2022. Published: June 30, 2022.

1 Introduction

Business process management (BPM) is the art and science of controlling how work is done in an organization to assure consistent results and to capitalize on improvement possibilities. Depending on the organization's goals, the term "improvement" may have several meanings in this context. [2] Cost reduction, execution time and error rate reduction, are all common improvement targets. The "right" processes must be handled in the "right" way to achieve the strategic objectives. Business Process Management (BPM) has emerged as a comprehensive consolidation of disciplines sharing the belief that a process-centered approach leads to substantial improvements in both performance and compliance of a system. Apart from productivity gains, BPM has the power to innovate and continuously transform businesses and entire cross-organizational value chains. [1]

When a company invests time and effort into modeling its business processes, it is inevitable that many questions will arise. Which procedures do I have in my company? What marks the conclusion of one phase and the start of another? I'm not sure how detailed I should represent my procedures. [4]

Once the BPM concept is embraced by an organization, a new challenge arises: How is this concept put to work? Process modeling plays a critical role in BPM research, as has already been stated. Surprisingly, the increased availability of process models in industrial practice encourages new study in and of itself. Process models themselves turn out to be artifacts that lend themselves to new sorts of analysis, the findings of which can yield unique and often surprising insights. [3]

2 Problem Formulation

Using BPM methodologies, this article attempted to develop a workflow modeling design for a bunkering process within a shipowner company in Constanta Port. The authors used the software AuraPortal to ease the process modeling. AuraPortal is a digital business platform that allows you to simply develop and execute even the most

complicated operational procedures without having to write any code. AuraPortal BPM software is available as freeware for businesses of all sizes, even those with millions of processes and/or users. It can automatically govern specific organizational areas or give a complete operations and business automation solution for any corporation [5]

3 Problem Solution

3.1. The statistical simulation of the process

IOCO Bunkering, being the world's largest bunkering company, actively collaborates with the industry and stakeholders to improve its bunkering standards and services. The company has taken initiatives over the years to improve its bunkering standards and services so that they remain relevant in the industry.

The bunkering process has as reference object a vessel from Yuki Investments Company fleet, located in Constanta port for loading purposes. The bunkering procedure within Yuki Investments Company is carried out in a controlled manner by the Owner's representative. Along with Master and Chief Engineer, the Owner's representative establishes directly, or through the designated persons, the necessary amount of fuel quantity needed to be ordered. Their requirements may include the type of fuel (MGO, HFO etc), quantity, density, place where the bunkering procedure shall be performed, etc.

The bunkering procedure can be made inside the port or offshore, from barge-to-ship, by the divisional sourcing officers involved in the bunkering process. The integrated information system implemented at the company level provides the logistic framework for carrying out the bunkering process from the central or local warehouses. The shipowner places an order for a vessel, located in Constanta port for loading purposes. The order is received by the central warehouse in United Arab Emirates, being then transferred to Constanta division for confirmation. The local agent will transmit the price list to the Owner's representative and if the prices are accepted, a supply contract will be drawn-up between the Owner and the selected supplier. Once the contract is sent to Owner for confirmation, the order will be analyzed and the stocks in the refinery will be checked. If the contract is confirmed and accepted by both parties and if the stocks in the refinery are sufficient, the supplier will redact a proforma invoice to be paid before the fuel delivery. After the payment is made and confirmed by the supplier, the bunkering procedure is being made accordingly.

The AuraPortal Helium Modeler program will encompass the entire process, including all related stages. It entails putting processes through their paces in fictitious scenarios to discover and quantify any factors that might impact how they are carried out in real life. Bottlenecks, overloads, an uneven allocation of labor responsibilities, unnecessary times, prices, and so on should all be revealed throughout these procedures.

Aura Portal involves two simulation methods:

- Statistical simulation
- Real simulation

Statistical simulation entails assigning possible data to crucial moments in the process under investigation. For instance, the projected duration of one or more tasks within the process, the resources and expenses connected with the determined activities, and so on. The authors of this study will use AuraPortal software to simulate the bunkering process and observe the problems it faces over its entire life cycle.

The statistical simulation entails feeding probability data into important events in the process under investigation. With these fictitious data, the goal is to forecast "what if" type outcomes, allowing bottlenecks, performance, costs, workloads, and other key performance indicators to be identified.

Fig. 3.1. The parameters applied for statistic simulation

To perform the bunkering process simulation, the parameters must be inserted into the program, as stated in figure 3.1. The "*Process*" parameters show the values in relation to how many processes were run during the simulation. The simultaneous tab represents the quantity of simultaneous processes that will be run during the simulation. Unless the maximum period given in "*Max Duration*" in the calendar panel is achieved first, the "*Executed*" panel indicates the number of completed processes as they are finished during the simulation. The most important panel is "*Pending*" because this will demonstrate how Total and Complete values differ from one another. The "*Calendar*" panel displays the values corresponding to the simulation runtimes:

the default number of working hours every day, which is eight. The simulation results are calculated using this value as a starting point. For instance, if a procedure takes 16 hours to complete and a working day lasts 8 hours, the entire process will take 2 working days to complete. Another parameter used in "calendar" panel is the number of working days per month. This displays the month's average number of working days, which is by default 22.
The "Maximum duration" parameter establishes the longest possible runtime for the process simulation. If there is no value inserted, the field will display Undefined, meaning that the simulation will continue to run until the number of processes specified in the *Total* section of the "*Processes*" section has been completed. The "*Personal Resources Cost*" section includes all the information related to the costs of the people that perform actions during the simulation [6]. All these information pertaining to the expenses of the people who conduct actions throughout the simulation is contained in this section, which will display de currency of the bunkering process, the expected cost and the real cost. The authors formulated a set of descriptors to characterize the structure of such a process model and event log complexity. The establishment of a new property for grid process models leads to a novel search algorithm to an optimized process model [7].
The simulation can begin after all the desired parameters have been configured. The items that receive current will light up with different colors depending on their chronometric during the simulation. The green light appears when the process completes within the predicted time, the orange light appears when the object completes in Alert time, and the red light appears when the object completes in Alarm time.

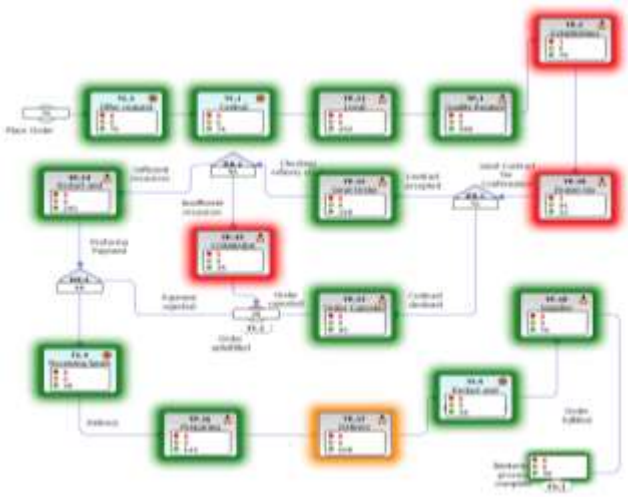

Figure 3.2. Simulation diagram for bunkering process

3.2. The programming methods and tools

As its name suggests, Aura Portal Helium Modeler is entirely web-based program, built with Java technology, and works with all major web browsers, including Internet Explorer, Firefox, Chrome, and Safari. It has been created to properly adapt to the business process diagramming technique utilizing the BPMN 2.0 standard and is very simple to use. It is based on MS Visio, both Standard and Professional. It comes with all statistical simulation requirements and, for simulation no further software needs to be installed. When it comes to version control, the system automatically creates a new version each time a Diagram is edited and saved [8].
The process can be repeated as many times as necessary very quickly. In any case, if we just want to observe how the process behaves while experimenting with various parameters in the System Tasks, Personal Tasks, or other design elements. In contrast to other BPM systems that require programming to implement the modifications, it is possible to simulate an unlimited number of "what-if" scenarios when switching from "Testing Environment" mode to "Development Environment" mode in a matter of minutes or hours. This contrasts with the weeks or even months it takes to perform similar simulations with other BPM systems.

4 Conclusion

Using the statistical simulation in the AuraPortal Modeler Program, the goal of this paper is to find any "bottlenecks" and quantify the time, resources, and costs associated in freight forwarding procedures. The study of the simulation findings may need numerous executions with different parameters, depending on the complexity of the process being investigated; nonetheless, even if the number of executions is enormous, the AuraPortal statistical simulation may replicate years of labor in seconds. Following the authors' investigation, the data needed to model the process was gathered from several companies in Constanta County. These data were added and simulated using the program's mathematical considerations.
The authors seek to provide an outline of what BPMN is and how it may be utilized in practice in a profiled company in the port business, with a focus on bunkering activities. The AuraPortal technique is a software development process that minimizes the costs, particularly in the setting of numerous risk management concerns, such as project delays or being compelled to adjust the project to a variety of variables. The author's efforts will be focused on

other logistic functions to model more functions in port activities using specialized and cutting-edge software tools.
The authors tried to highlight the practical application of the simulation. In practice, any errors or performance issues that may be found during simulation can be corrected right away by skipping "Development Environment" mode, and these modifications can also be tested in execution right away by switching back to "Testing Environment" mode, all without the need for programming.
It takes only minutes or hours to execute unlimited "what-if" scenarios when switching from "Testing Environment" mode to "Development Environment," as opposed to weeks or even months when doing the same simulations with other BPM systems that require programming to implement the changes. Real simulation can save a lot of time and money in consulting projects because it allows users to predict what will happen, which speeds up the identification and resolution of design issues.
However, working momentarily in "Testing Environment" mode with procedures using real data may be appropriate in some circumstances. This manner, changes to the design can be made at any time before it is finally finished.

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