Reengineering of supply chain management integrated scheduling processes

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Abstract. The paper describes the principle of the reengineering of supply chain management integrated scheduling processes in order to increase in efficiency of business process and decrease the decision-making time at collision of plan-fact deviations. The basic concept of business-processes reengineering is analyzed. The experience of reengineering of supply chain integrated scheduling business processes for the oil and gas branch is presented. The bottlenecks of the current practice were revealed. The purpose of this paper is to carry out recommendations for improving business processes based on an analysis of the current realization of the process, his provision with information systems and data flows.

1 Introduction

Innovations – one of the key points promoting maintaining competitiveness of the organizations in the modern world. The activity of the large enterprise is not imaginable without application of advanced technologies, methods of predictive analytics and forecasting now.

Modern conditions demand from the business of mobility and flexibility, openness to changes. Continuous improvement became a necessary condition of any enterprise if it is interested in support of competitiveness. Large investments into information technologies and the equipment directed to increase in productivity often do not bring to essential to improvements. One of the main reasons: introduction of new technologies without change of processes.

In the modern world of the company are systems which functioning is provided due to realization of system of business processes. She is a guarantor of effective activity of the enterprise with that account that processes are designed and realized properly and work on constant improvement of a control system of business processes is conducted. It explains the reasons of interest of the organizations in models of the processes assuming the process focused reorganization of the enterprise.

As the process focused reorganization of the enterprise, it is understood as cardinal reengineering of business processes, and on step improvement of processes.

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Reengineering of business processes — the fundamental reconsideration and radical redesign of business processes for achievement of the maximum effect of production and economic and financial and economic activity issued by the relevant organizational and administrative and normative documents.

Reengineering as reception of innovative management affects the innovative process directed as to production of new products and operations, and to their realization, advance, and diffusion. As an ultimate goal of reengineering are innovations (i.e. innovations), reengineering in narrower understanding is reengineering of innovations.

Reengineering represents engineering and consulting services in reorganization of business activity based on production and realization of innovations.

Business processes reengineering assumes business approach change. Instead of having many people involved in process who are not considered as responsible decision-making falls on employees who are directly responsible for creation of value for the consumer.

Within business processes reengineering modeling of processes as they are understood to the staff of operations sections from which support in identification of problem zones in the existing processes must follow is also supposed. At the same time, it is necessary to observe integrity and complementarity of models of processes.

2 Materials and methods

The focus of improvement by necessity is thus the business process, which is the collection of activities or tasks that create outputs of value to a customer. These activities could be value-adding activities which are of importance to the customer, hand-off activities that move work across organizational boundaries, or functions and control activities that control/approve movement of work flow. Order fulfillment, for instance, takes an order as an input and follows a sequence of activities, approvals and hand-offs until the process results in the delivery of the ordered goods. In most cases, the power of modern information technology, both computing and communication, plays a major role in transforming slow sequential tasks into parallel simultaneous tasks whereby enhancing communication between tasks can lead to the achievement of these dramatic performance improvements [1,2].

But firstly, business process is an activity or set of activities that will accomplish a specific organizational goal. Business process management is a systematic approach to improving those processes. If an organization is unable to perform certain business processes internally due to cost or resources, the company might utilize business process outsourcing.

To measure success of a business process, organizations track successful completion of different steps within the process, i.e., benchmarks, or reaching the end of the process. When a business process is not helping an organization reach a goal within timeline or with the resources at hand, there are several strategies to execute for improvements. Business process mapping is often undertaken as an exercise during business process reengineering and process transformation to improve a maybe unsuccessful business process. Organizations might also focus on business process visibility to identify issues in process performance or execution [3,4].

Depending on the organization, industry and nature of work, business processes are often broken up into different categories. Categories include:

- operational processes (or primary processes): Operational or primary processes deal with the core business and value chain. These processes deliver value to the customer by helping to produce a product or service. Operational processes represent essential business activities that accomplish business objectives, e.g., generating revenue;
- supporting processes (or secondary processes): Supporting processes back core processes and functions within an organization;
• management processes: Management processes measure, monitor and control activities related to business procedures and systems.

Business process modeling in business process management and systems engineering is the activity of representing processes of an enterprise, so that the current process may be analysed, improved, and automated. BPM is typically performed by business analysts, who provide expertise in the modeling discipline; by subject matter experts, who have specialized knowledge of the processes being modelled; or more commonly by a team comprising both. Alternatively, the process model can be derived directly from events' logs using process mining tools [5].

The business objective is often to increase process speed or reduce cycle time; to increase quality; or to reduce costs, such as labour, materials, scrap, or capital costs. In practice, a management decision to invest in business process modeling is often motivated by the need to document requirements for an information technology project. [6]

Oil products supply is a final link of vertically integrated companies of oil and gas branch in a supply chain "Production – Transportation – Processing – Distribution". By results of distribution the overall effectiveness of all chain is estimated, i.e. the cost of oil products paid by the end user has to compensate as a result all expenses and to provide the profit of all links.

The scheduling of shipment is performed with the principle of ensuring uniformity of shipment taking into account frequency of preparation, certification, filling and shipment of oil products, technical capabilities of points of filling, the schedule of approach of tankers, calendar needs of consumers, etc.

The main problem which the company faces at all stages of distribution process is the product accounting. Having several tens of storage objects, it is necessary to plan very precisely receipt and movement of fuel and to control existence of necessary quantity of current assets. The fundamental direction of reengineering of business processes is the optimization of key productive indicators and parameters of activity (income, quality, level of service, efficiency of management).

The following problem zones have been revealed while the analysis of current processes performance:

• lack of a possibility to obtain the agreed and correct data for the scheduling and the adjusted information exchange between the main process and adjacent processes;
• planning of shipments doesn't consider data on oil depots condition that results in deficiencies at the places of realization and long idle times at the destination stations caused by surplus;
• mostly data for scheduling turn out in the settlement way on the basis of expert knowledge and experience of staff of different divisions and subsidiaries;
• there are no services and the interfaces corresponding to exchange data between information systems on the actual production, filling and shipment, planned works on platforms, equipment failures, agreed shipping requests and volumes contracted to shipment.

Planning is made often manually, without use of opportunities of information systems of the company on the basis of the formalized algorithms and expert knowledge. The description of algorithms of planning doesn't contain the description of criterion function and restrictions in the form of formulas. Part of data for planning come not from information systems and pay off by indirect methods.

Also duplication of operations at information exchange in view of lack of due automation of process of data transmission about production and shipping operations is observed.

Reengineering of process provides optimization of supply chain in particular automation of process of primary and sliding scheduling of shipments of products for 60 days, due to ensuring the fullest and uniform shipment of products taking into account all logistic restrictions influencing a possibility of shipment.
3 Results

Offers on optimization have to be directed to the solution of strategic objectives of the branch:
- increase in speed of decision-making on deviations;
- increase in rhythm of shipment;
- reduction of processes performance time;
- improvement of quality of the deliveries given on a chain;
- increase in extent of automation of processes on a chain of deliveries;
- increase in controllability of processes by the management of the company;
- increase in transparency of processes.

Modeling to-be business processes is implemented due to change of the simulated models of as-is business processes taking into account the created offers on elimination of the revealed problem zones. While modeling the business process special attention was paid to a question of information exchange between components of business process and adjacent processes, to improvement of quality of data on a chain of deliveries and the possibility of introduction of planning in the sliding mode.

For achievement of the above-designated purposes it is offered to change approach to the organization of processes of planning. For ensuring correct realization of target process creation of system of internal quality control yielded and checks of results of calculation is offered. For improvement of quality of the formed plans and decrease in quantity of deviations on a chain of deliveries it is offered to make the following corrections to process:
- to consider desirable schedules of shipment from the staff of subsidiaries of commercial directorate and directorate of regional sales;
- to consider product stocks on oil depots of subsidiaries of commercial directorate and directorate of regional sales;
- to consider goods in a way with average counted time of delivery;
- to consider prohibitive telegrams of the Russian Railway;
- to consider fixed schedules from providers of logistics services;
- to consider standards of commercial stocks of a product on oil depots of subsidiaries of commercial directorate and directorate of regional sales;
- as data often arrive unbalanced or uncoordinated, before operation of planning it is necessary to include a step of quality check of data. Data need to be checked for coherence, correctness of the sums and codes of oil products. Since it is very frequent in production and distribution to use different codes for one product;
- on end of planning stage it is necessary to realize verification of the schedule on compliance to requirements to exclude excess iterations of replanning. Rates need to check the schedule for uniformity, frequency rate, performance of distribution, fixed schedules of shipment (delivery in a pipe and shipment from the mooring), lack of deficiencies or surpluses at oil refinery and objects of storage;
- in case the discrepancy of the received schedule to requirements was revealed, it is necessary to initiate introduction of adjustments in entering data instead of direct updating of the received schedule. It is necessary to develop the culture of elimination of debalans of entrance data because updating of the calculated schedule is connected with the manual expert adjustment resistant to formalization in algorithms;
- the process steps connected with the analysis of deviations have to form an exit to process of work with deviations and a process of daily planning. It needs to be made in order that the uniform center of responsibility for planning and results of implementation of plans was created.
Fig. 1. The diagram of the to-be process
The entering data for planning need to be checked for balance, i.e. for ensuring material balance of the plant. Results of calculation will be checked for the following criteria:

- execution of distribution balance;
- lack of unloads or overloads on distribution balance;
- uniformity of shipment on platforms and lines of balance;
- frequency rate to desirable volumes of platforms;
- lack of overloads on capacities of platforms;
- lack of violations of storage standards at oil refinery;
- performance of desirable and fixed schedules of shipment;
- implementation of prohibitive telegrams of the Russian Railway.

The offered changes in a type of top level process are presented in figure 1.

In target realization for planning it is offered to use below-given data:

- standard reference information on logistic objects of the centers of shipment, namely design capacities, the maximum available capacities and assortment of loading;
- standards of storage at oil refinery and oil depots of subsidiaries;
- the scheduled plan of repairs on platforms of the centers of shipment;
- scheduled plan of preparation and certification of production;
- balance of distribution of oil products;
- the scheduled plan of delivery of a product in the pipeline;
- scheduled plan of approach of tankers to the mooring;
- the scheduled plan of approach of empty cars from the supplier of logistic services;
- the shipping requests agreed with the Russian Railway and prohibitive telegrams of the Russian Railway;
- estimated average time of delivery of production;
- the actual stocks at oil refinery and oil depots of subsidiaries;
- fact of preparation and certification;
- shipment and transportation fact;
- forecast of preparation and certification;
- forecast of demand of commercial divisions;
- expected data of the previous calculations.

## 4 Discussion

In dynamically changing conditions of business, the enterprises face changes constantly. Continuous improvement became a necessary condition of any enterprise if it is interested in support of competitiveness.

Large investments into information technologies and the equipment directed to increase in productivity often don't bring to essential to improvements. It is connected with the fact that the enterprises, introducing new technologies, leave processes without change. The modern manufacturing enterprise is difficult system which functioning is provided with realization of system of business processes. The last is the key to effective activity of the enterprise provided that processes are designed and realized properly and work on constant improvement of a control system of business processes is conducted.

For this reason, the enterprises show huge interest in models of processes which mean the process focused reorganization of the enterprise. She means as cardinal reengineering of business processes, and on step improvement of processes.

Reengineering of business processes carries out standardization of processes for the further improvement having technological character. The basic the purpose of a method...
consists as in obtaining benefit from the best satisfaction of the consumer, and in improvement of activity of the company in general.

A number of bottlenecks in the existing organization of process has been revealed, namely: lack of a possibility of operational management of process, duplication of functions on information transfer, insufficient information support of process by the existing information systems, lack of integration between the existing information systems.

**Conclusion**

For increase in accuracy of planning and decrease in quantity of critical deviations change of logic of realization of process and approach to algorithm of planning of shipments was offered. Also the list of the connected processes and the entering data for planning for ensuring coherence on all chain of deliveries has been revised. Taking into account data on oil depots from subsidiaries will allow to increase efficiency of processes of realization. While modeling to-be processes potential of optimization of the business processes was revealed. The offered reengineering will allow the enterprise to optimize the existing processes due to reduction of organizational interfaces, improvement of quality of the used data, increases in efficiency of management processes.

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