Managing the digitalization of business processes in an organization

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Abstract. This article presents the results of scientific research on the selection and justification of indicators and criteria for evaluating the digitalization of business processes from the point of view of optimizing the management of an international geographically distributed organization, taking into account the peculiarities of the legal field and socio-ethnographic features. A set of methodological recommendations and practical measures has been developed, tested and presented, as well as steps and approaches to implement the tasks set from the point of finding the optimal set of estimated and optimized parameters. A mathematical model has been constructed and modeling has been carried out taking into account the optimization of the above-mentioned tasks from the point of view of the optimum of their functioning. The methodology and practical steps discussed in the material are at the stage of implementation in the organization. Some of the systems are already in use in commercial operation, some are at the stage of acceptance tests and in the process of reconciling disagreements between the participants in the interaction process.

1 Introduction

The widespread use of digital technologies, such as artificial intelligence, machine learning, quantum and cloud technologies, robotics, BigData, blockchain and others, allows us to qualitatively transform existing business models and business processes of companies [1-4]. The pace of digitalization is increasing in industries, telecommunications, finance, healthcare, and public administration [5-12]. Modern companies are characterized by a complex hierarchy of business processes, therefore digitalization is associated with a complex of risk factors: risks of incorrect choice of a digital solution for a particular process, various technical, financial, user external and internal risks. Therefore, the introduction of digital solutions requires careful justification.

Evaluation of the effectiveness of a business process is a process of quantitative and qualitative determination of the results that were achieved after the completion of the business process, inextricably linked to the amount of resources used for this.

Currently, the so-called process approach is widely used in corporate governance. He defines and studies the business processes that cover the entire company's activities. Every business process has its inherent performance. This is regularly evaluated. It consists of the results achieved, the resources used to register them, two benchmarks and specific methods

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of analysis for quantitative and qualitative assessment of the conclusions reached. It is worth noting that there is currently no theoretical basis for the design and rationalization of business processes. In particular, there are no methodological guidelines for their assessment or the development of indicators.

The review of the effectiveness of business processes should include a number of actions to improve all business functions within the overall management of the organization. The first step is to identify the resources and information needed to support business processes. Secondly, business processes must be monitored, measured and analyzed. Thirdly, it is necessary to take systematic actions to achieve the intended results and continuously improve these business processes.

2 Research methodology

What principles formed the basis of the decision? Many companies today use such a method as a balanced scorecard to measure the effectiveness of their business processes. This method is called the Norton-Kaplan method and allows you to evaluate companies based on four measurable indicators: profit and capitalization indicators (the financial efficiency of the enterprise is evaluated), indicators of gaining market shares and acquiring competitive advantages, customer loyalty and the ability of the enterprise to ensure their retention (external efficiency of the enterprise is evaluated), business process quality indicators (internal efficiency of the enterprise is evaluated), indicators of the company's growth potential and personnel qualifications, i.e. His ability to perceive new ideas, his flexibility, his focus on continuous improvement [13-16], Figure 1.
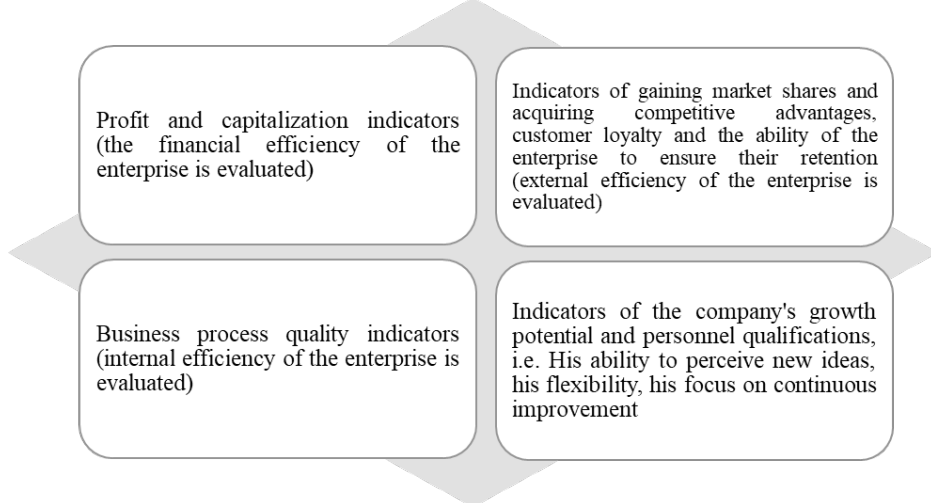
Profit and capitalization indicators (the financial efficiency of the enterprise is evaluated)	Indicators of gaining market shares and acquiring competitive advantages, customer loyalty and the ability of the enterprise to ensure their retention (external efficiency of the enterprise is evaluated)
Business process quality indicators (internal efficiency of the enterprise is evaluated)	Indicators of the company's growth potential and personnel qualifications, i.e. His ability to perceive new ideas, his flexibility, his focus on continuous improvement

Fig.1. Four groups of measured indicators.

This method of measuring the effectiveness of business processes is mainly focused on external consumers who rely on conclusions based on reliable indicators. Therefore, companies usually use non-monetary indicators to assess their financial stability.

To analyze business processes in terms of performance, it is necessary to develop special functional models and data models. The first of these models should determine the workload of the business process and the number of hours worked by operators. Secondly, the analysis of operational and operational costs for business processes traditionally plays an important role.

This often involves estimating production costs across multiple business processes. A separate process planning system has been developed for the organization of business processes. It is important to constantly monitor the effectiveness of business processes.

The indicators for measuring the effectiveness of business processes. In the conditions of modern reality, business managers need to develop document and process management systems "for inconsistencies". In the end, a summary analysis and visualization of the characteristics of the studied business processes of the enterprise should be established.

The efficiency of business processes is measured by indicators, both absolute and relative. Scores in points (from 0 to 10) are set by specially invited experts. Absolute indicators can, for example, express the complexity of the project in man-hours. The basic unit of relative estimation is the percentage used to calculate the ratio of the actual result of the indicator to the maximum possible result.

Methods of measuring the effectiveness of business processes are not sufficiently developed for a number of reasons. In particular, there is confusion in the terminology used in the theory of efficiency and effectiveness. Business process models and indicators have not yet been widely accepted. To date, there are not many new methods for evaluating the effectiveness of business processes, and these methods are based on international standards [17].

Therefore, business processes, as part of the company's economic activity, are characterized by a certain level of efficiency and should be regularly evaluated using special analytical tools and techniques [18]. Key performance Indicators (KPIs) are the main indicators used to measure the company's performance. KPIs are actually indicators that show how well goals are being achieved. KPI is a structure that can be used to measure the efficiency and effectiveness of management processes, activities and functions. They are also used to evaluate the effectiveness and efficiency of management processes, activities and functions.

In addition, the KPI system can be used for planning and analyzing all important aspects of company management, such as production processes, financial functions, personnel management and business processes. Performance indicators help employees understand and monitor the achievement of the company's strategic goals [19].

The establishment of key performance indicators for all levels of the organization ensures that activities at all levels of the business are consistent with the business goals set by management. On the other hand, matching KPIs with business goals increases the ability of management to manage the business as a whole.

Performance indicators can also be considered as a means of evaluating individual work, which allows you to create an effective system of motivation and stimulation. KPIs function as indicators of business processes, so they are, among other things, a measure of the "correctness" of a company's business processes (for example, the average time to complete a task can also be considered a KPI). Together with the defined and established normative values of process metrics, the actual values of business process metrics and their reference characteristics can give an idea of the level of process efficiency.

In the context of process management, performance indicators are closely related to the usual business processes of the company. Performance indicators can be used in combination with BPMS products that automate business processes and ensure the achievement of business goals. It is worth noting that the system of performance indicators is suitable in cases where information systems already exist, since in these cases the indicators are really embedded in the company's business processes.

However, KPIs have an impact on the company's performance only if the correct method of their implementation is chosen. It is necessary to analyze the performance indicators. Measures alone cannot solve problems. There is also a fundamental misconception that every company clearly defines and regularly reviews its performance indicators. All KPIs may lose

their relevance over time, which will affect the motivation of employees, i.e. they may become irrelevant. Therefore, it is important to constantly monitor performance indicators so that they always fully meet the goals set by management.

The system of indicators should be common to all services in order to avoid inconsistencies. In addition, as mentioned above, performance indicators should be redundant and relatively simple, since they are brought to the attention of specific stakeholders in the business process.

3 Building a mathematical model for the development of digitalization processes of business processes

Each division of an international geographically distributed company has its own implementation program. At weekly department meetings, each employee presents their ideas for improving the company's work. Those who take the initiative fill out a special form in which they indicate what, how and why they need to optimize at the moment. Initiatives related to production are the most valuable, as they can reduce the company's costs to the greatest extent.

When forming the cost structure for the budget of the cost center, manual input of costs into the system turned out to be too time-consuming. In large projects, where the cost data for groups of materials increases significantly, it is very difficult to structure the structure by groups of materials. To solve this problem and improve the efficiency of the workflow, it was proposed to introduce a digital automated system for storing materials based on the company's existing barcode system.

You can create a database of materials, and when materials arrive at the production site, the barcode of the product is scanned and information about the material, including its cost categories, is encoded. Based on the updated procedure, a new A1 block was created – "Structure costs by cost centers" in IDEF0 notations. The diagram is shown in Figure 2.
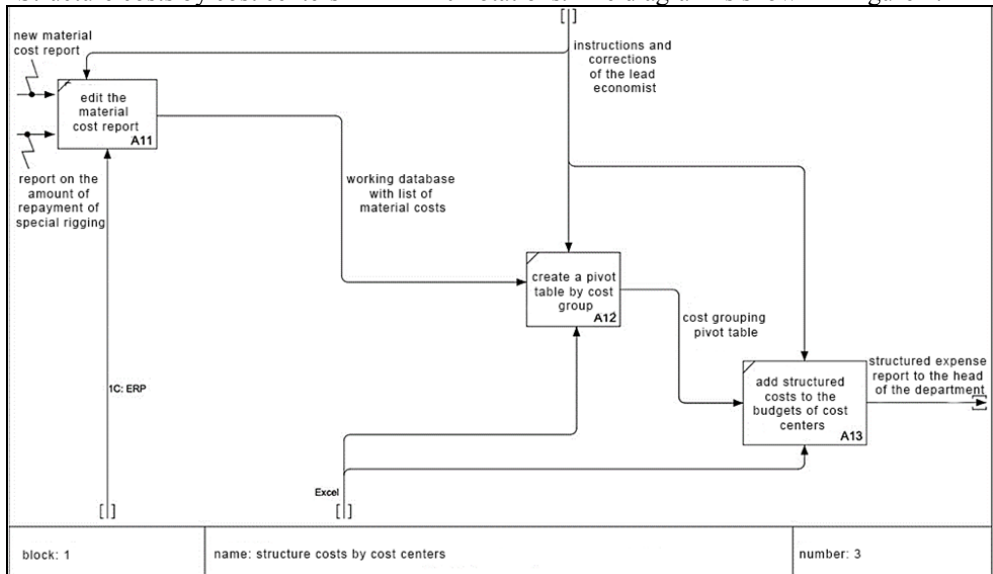

Fig.2. Decomposition of the A1 block after the introduction of digital warehousing.

Digitization of the warehouse eliminated the biggest time barrier. The material cost base is taken from the already distributed 1C: ERP, so all the employee needs to do is create a new distribution "Create a summary table" – block A12 and "Add costs to the budget of the COC

center" - field A13. The main problems identified during the A2 assessment are the lack of coordination between production and sales personnel and the fact that the distribution of manual labor is not optimized due to repetitive processes with similar tasks.

The first problem is solved by integrating route maps into the process of selling goods and services: by agreeing on rules that will reflect the process of maintenance, you can devote time to communication between financial and sales personnel.

The second problem can be solved by transferring the project by ordering the development of a VBA project based on Excel, optimizing the process so that only two blocks remain. Figure 3 shows a diagram in the IDEF0 notation of the A2 process – "Make estimates".
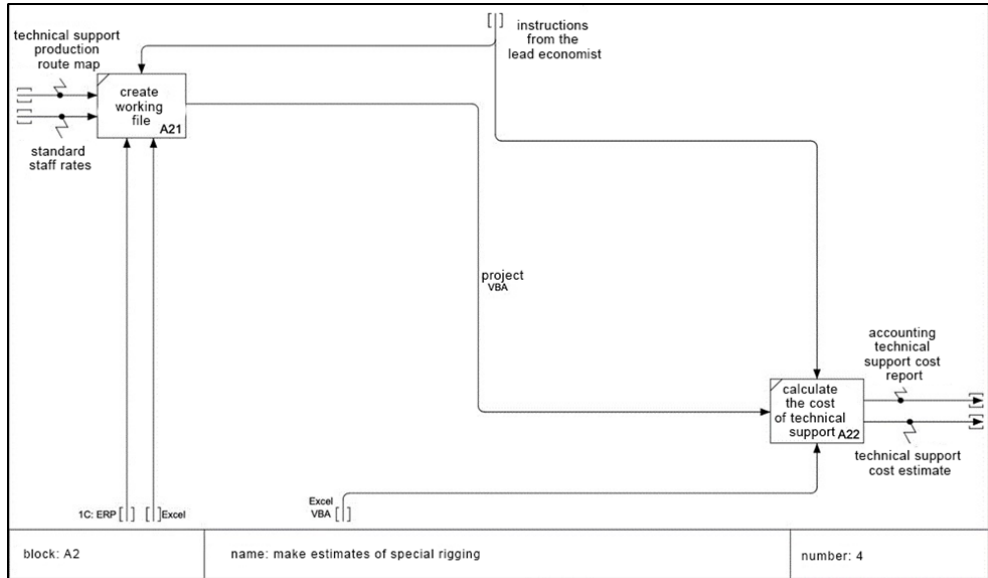

Fig.3. Decomposition of A2 block after process optimization.

This made it possible to halve the processing time, add a new resource, Excel VBA, create working files with initial sales and product cost data, automatically calculate labor and material costs using VBA projects, and automatically generate maintenance cost reports. At the output, we get estimates of the cost of selling goods and services for the needs of the company's own production.

The most time-consuming was the A3 block "Calculate the workload of personnel on projects". This block contained a lot of time-consuming procedures, mainly intermediate calculations, which were repeated manually. This process can also be optimized using the VBA programming language. In this context, the VBA project is the best choice for digitizing the sales department of the production department and optimizing business processes.
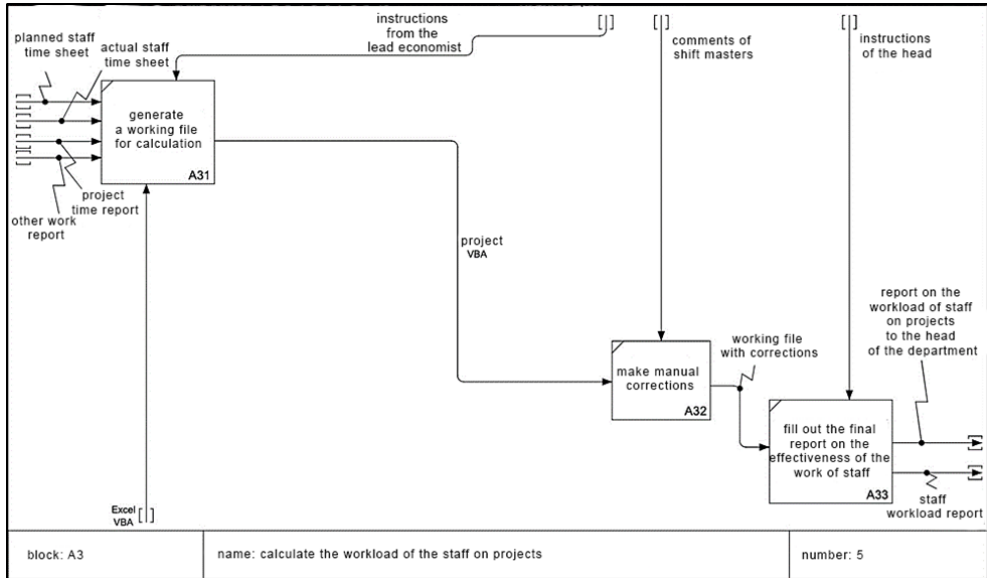
Fig.4. Decomposition of the A3 block after the implementation of the VBA project.

As can be seen from the diagram, the VBA programming language allows you to remove three functional blocks from the decomposition and fully automate them. All the finance staff needs to do is set up the database in the correct format so that the VBA project works optimally. The software then imports data from worksheets and project reports into the final report on staff activities. In this case, the human factor plays a significant role in worksheets and reports, requiring manual adjustments that cannot be eliminated by destroying the business process.

4 Results

Automation of these labor-intensive processes increases the efficiency of the department. This speeds up reporting on project workload, increases the accuracy of calculations, eliminates the need for double counting of employee worksheets, etc. Otherwise, all processes in the company operate quite efficiently and smoothly.

5 Discussion of the results of the research

When forming the cost structure for the budget of the cost center, manual input of costs into the system turned out to be too time-consuming. In large projects, where the cost data for groups of materials increases significantly, it is very difficult to structure the structure by groups of materials. To solve this problem and improve the efficiency of the workflow, it was proposed to introduce a digital automated system for storing materials based on the company's existing barcode system.

Digitization of the warehouse eliminated the biggest time barrier. The material cost base is taken from the already distributed 1C: ERP, so all the employee needs to do is create a new distribution "Create a summary table" – block A12 and "Add costs to the budget of the COC center" - field A13. The main problems identified during the A2 assessment are the lack of coordination between production and sales personnel and the fact that the distribution of manual labor is not optimized due to repetitive processes with similar tasks.

6 Conclusion

The first task is solved by integrating route maps into the process of selling goods and services: having agreed on the rules that will reflect the process of maintenance, you can devote time to communication between financial and sales personnel.

The second task is solved by transferring the project by ordering the development of a VBA project based on Excel, optimizing the process so that only two blocks remain. The most time-consuming was the A3 block "Calculate the workload of personnel on projects". This block contained a lot of time-consuming procedures, mainly intermediate calculations, which were repeated manually. This process can optimized using the VBA programming language. In this context, the VBA project is the best choice for digitizing the sales department of the production department and optimizing business processes.

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