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EVALUATION OF THE EFFECTIVENESS OF MODELING THE COMPANY'S BUSINESS PROCESSES IN THE CONTEXT OF DIGITALIZATION

The article is devoted to the development of an algorithm for evaluating the effectiveness of modeling the company's business processes in the context of digitalization. The algorithm for evaluating the effectiveness of modeling a business process proposed in this work presents a list of actions and works to obtain the necessary effect – increasing the efficiency of modeling business processes (main and auxiliary) in the context of digitalization. The calculation of indicators of efficiency of modeling business processes for enterprises in the service sector is given. Mainly organizations in the service sector consider business processes in the context of four separate categories:

- development of products and services;
- demand generation;
- satisfaction of demand;
- planning and enterprise management.

Efficiency evaluation can be carried out at the planning stage of digital transformation activities and at the final stage, when digital technologies are introduced at a certain stage of the product life cycle or any stage of the digital transformation and robotization strategy is implemented.

The algorithm proposed by the authors for assessing the effectiveness of modeling the business processes of a company in the context of digitalization makes it possible to determine the feasibility of digitalization of companies and to take measures to introduce digital technologies. The authors note that it is necessary to calculate the effectiveness of certain changes in order to assert with confidence that the key processes in the enterprise as a result of the introduction of digital technologies will significantly improve.

Key words: algorithm, efficiency evaluating, business process, digitalization, modeling, enterprises.

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Цифрландыру жағдайында компанияның бизнес-процестерін модельдеу тиімділігін бағалау

Мақала цифрландыру жағдайында компанияның бизнес -процестерін модельдеу тиімділігін бағалау алгоритмін жасауға арналған. Бұл жұмыста ұсынылған бизнес -процесті модельдеудің тиімділігін бағалау алгоритмі цифрландыру жағдайында бизнес -процестерді модельдеудің тиімділігін жоғарылату үшін қажетті әсерді алуға бағытталған әрекеттер мен жұмыстардың тізімін ұсынады. Қызмет көрсету секторындағы кәсіпорындар үшін бизнес -процестерді модельдеу тиімділігінің көрсеткіштерінің есебі келтірілген. Негізінен қызмет көрсету саласындағы ұйымдар бизнес -үдерістерді төрт бөлек категория тұрғысынан қарастырады:

- өнімдер мен қызметтерді дамыту;
- сұранысты қалыптастыру;
- сұранысты қанағаттандыру;
- кәсіпорынды жоспарлау және басқару.

Тиімділікті бағалау цифрлық трансформация жөніндегі іс-шараларды жоспарлау кезеңінде және өнімнің өмірлік циклінің белгілі бір кезеңінде цифрлық технологиялар енгізілгенде немесе цифрлық түрлендіру мен роботтандыру стратегиясының кез келген кезеңінде жүзеге асырылатын соңғы кезеңде жүзеге асырылуы мүмкін.

Цифрландыру жағдайында компанияның бизнес-процестерін модельдеу тиімділігін бағалау үшін авторлар ұсынған алгоритм компанияларды цифрландырудың орындылығын анықтауға және цифрлық технологияларды енгізу бойынша шаралар қабылдауға мүмкіндік береді. Авторлар цифрлық технологияларды енгізу нәтижесінде кәсіпорындағы негізгі процестердің айтарлықтай жақсаратынына сенімді түрде сену үшін белгілі бір өзгерістердің тиімділігін есептеу қажет екенін атап өтеді.

Түйін сөздер: алгоритм, тиімділікті бағалау, бизнес-процесс, цифрландыру, модельдеу, кәсіпорындар.

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Оценка эффективности моделирования бизнес-процессов компании в условиях цифровизации

Статья посвящена разработке алгоритма оценки эффективности моделирования бизнес-процессов компании в условиях цифровизации. Предложенный в данной работе алгоритм оценки эффективности моделирования бизнес-процесса представляет перечень действий и работ для получения необходимого эффекта – повышения эффективности моделирования бизнес-процессов (основных и вспомогательных) в условиях цифровизации. Приводится расчет показателей эффективности моделирования бизнес-процессов для предприятий сферы услуг. Преимущественно организации сферы услуг рассматривают бизнес-процессы в разрезе четырех отдельных категорий:

- развитие продуктов и услуг;
- генерирование спроса;
- удовлетворение спроса;
- планирование и управление предприятием.

Оценка эффективности может производиться на этапе планирования мероприятий по цифровой трансформации и на завершающем этапе, когда цифровые технологии внедрены на определенном этапе жизненного цикла продукции или же реализован какой-либо этап стратегии цифровой трансформации и роботизации.

Предлагаемый авторами алгоритм оценки эффективности моделирования бизнес-процессов компании в условиях цифровизации позволяет определить целесообразность цифровизации компаний и осуществлять меры по внедрению цифровых технологий. Авторы отмечают, что необходимо просчитать эффективность тех или иных изменений, чтобы с уверенностью утверждать, что ключевые процессы на предприятии в результате внедрения цифровых технологий существенно улучшатся.

Ключевые слова: алгоритм, оценка эффективности, бизнес-процесс, цифровизация, моделирование, предприятия.

Introduction

In recent years, in the face of the emergence of stable competition in the market, companies, for their own development, are looking for new ways, directions for increasing the efficiency of business processes, increasing productivity and, ultimately, increasing production profitability. Business processes of companies in the context of modern development are subject to digitalization. Within the concept of “Industry 4.0.” small and medium-

sized enterprises of the republic are aimed at implementing the activities prescribed in the Digital Kazakhstan program.

The widespread introduction of digitalization in all spheres of life of a modern person is becoming an objective reality. The use of digitalization at the enterprise changes both the external environment of the organization in terms of the conditions for interaction with the state, suppliers and buyers, and the internal processes taking place in the company, in particular, in the field of management.

The digitalization of the economy of Kazakhstan is an opportunity to take leading positions in the world arena, as well as improve the quality of life of citizens and create favorable conditions for the development of entrepreneurship. The efficiency of business processes is achieved through the implementation and achievement of the goal in relation to increasing the competitiveness of enterprises, and this goal is achieved through the improvement of production through the implementation of digital technologies. According to experts, more than two-thirds of the republic's companies are interested in the digitalization of their enterprises, but at the same time, in most cases, they face a shortage of funds (resources) for this implementation. In modern conditions, organizations should look at their own business, taking into account the approaches of the digital economy. Whether you like it or not, the costs of research, development, consulting services and employee training will inevitably increase as part of the digitalization of the company. Companies that are not ready for such a development of events will sooner or later leave the market. On the other hand, digitalization should not become an end in itself. It is necessary to calculate the effectiveness of certain changes in order to confidently assert that the key processes in the enterprise as a result of the introduction of digital technologies will improve significantly.

The algorithm proposed by the authors for assessing the effectiveness of modeling the business processes of a company in the context of digitalization makes it possible to determine the feasibility of digitalization of companies and to take measures to introduce digital technologies.

Literature Review

Kim E.I. in her work "Modeling of business processes" (Kim, 2016) examines the problems of the effectiveness of the company's resource supply in the context of digitalization.

The purpose and content of financial analysis in accordance with modern organizational and legal structures of management and conditions of resource provision are stated. Given the increased attention to resource efficiency in the context of digitalization, the emphasis is placed on the need to take into account resource constraints in financial analysis.

The authors (Shamsher, 2016; Dijkman, 2011; Джестон, 2015) note that digitalization is relevant in the business processes of enterprises, which is expressed in the introduction of digital technologies

in order to increase production efficiency, which occurs as a result of improving business processes and even completely changing the business model of an enterprise. According to the author, a thorough assessment of business processes will allow at the initial stage of digitalization to increase the economic efficiency of the enterprise's production activities by 2-3%, in subsequent years, taking into account the correctly chosen course, the increase in efficiency will be more noticeable.

Manal A. Abdel-Fattah in the work "An Evaluation Framework for Business Process Modeling Techniques" (Manal, 2017) on the basis of summarizing a significant amount of material presented in numerous publications devoted to business assessment, he proposes methods for assessing the effectiveness of business processes of various companies, as well as a method that provides for the analysis of macro-level economic indicators. The material is structured into sections, in each of which shows the necessary standard methods for assessing business objects, the possibility of their application on specific examples, which makes it easier to understand the material and allows you to consolidate the knowledge gained on the basis of working out the control tasks given at the end of each section.

In the textbook "Analysis and management of business processes" of Varzunov A.V. (Varzunov, 2016) the essence of the functional and process approaches to management is stated, the concept of a business process is considered, and the classification of business processes is presented. Special attention is paid to the concept of reengineering and the practical side of this issue (principles, conditions for successful reengineering, mistakes are typical during its implementation).

Methodology

Business processes of a company in the context of digitalization should be assessed in terms of their efficiency / feasibility of input and modeling. We have developed a corresponding algorithm shown in Figure 1.

This algorithm for assessing the effectiveness of modeling the company's business processes in the context of digitalization is a detailed scheme with certain options for the execution of stages and decisions (with their positive and negative development), which is shown graphically (Figure 1)

The proposed algorithm for assessing the effectiveness of modeling a business process can be conditionally divided into several stages, based on

the results of assessing indicators, an intermediate control of the results is assumed with the necessary adjustments to the business process (La Rosa, 2016). So, for example, if at the initial stage it turns out that the business process is unprofitable, then the assessment of the efficiency of the use of labor resources does not matter, as well as the assessment of the degree of participation of the monetary assets of business processes in the total current assets of the organization, and other actions (Мефферт, 2019).

The algorithm for assessing the effectiveness of modeling the business processes of a company in the context of digitalization begins with a study of the business process, its organization, the degree of implementation, including an overall assessment. The next step in the proposed methodology is

to assess the payback of the proposed business process. This stage is calculated, the calculation of the payback of the proposed business process is carried out according to the formula (1):

$$PP = IF : CF_n; \tag{1}$$

where PP is the payback period of the proposed business process;

IF – the amount of investment funds that are directed to the implementation of the proposed business process, thousand tenge;

CF_n – the average amount of cash flow from the implementation of the proposed business process, thousand tenge;

n – is the number of periods.

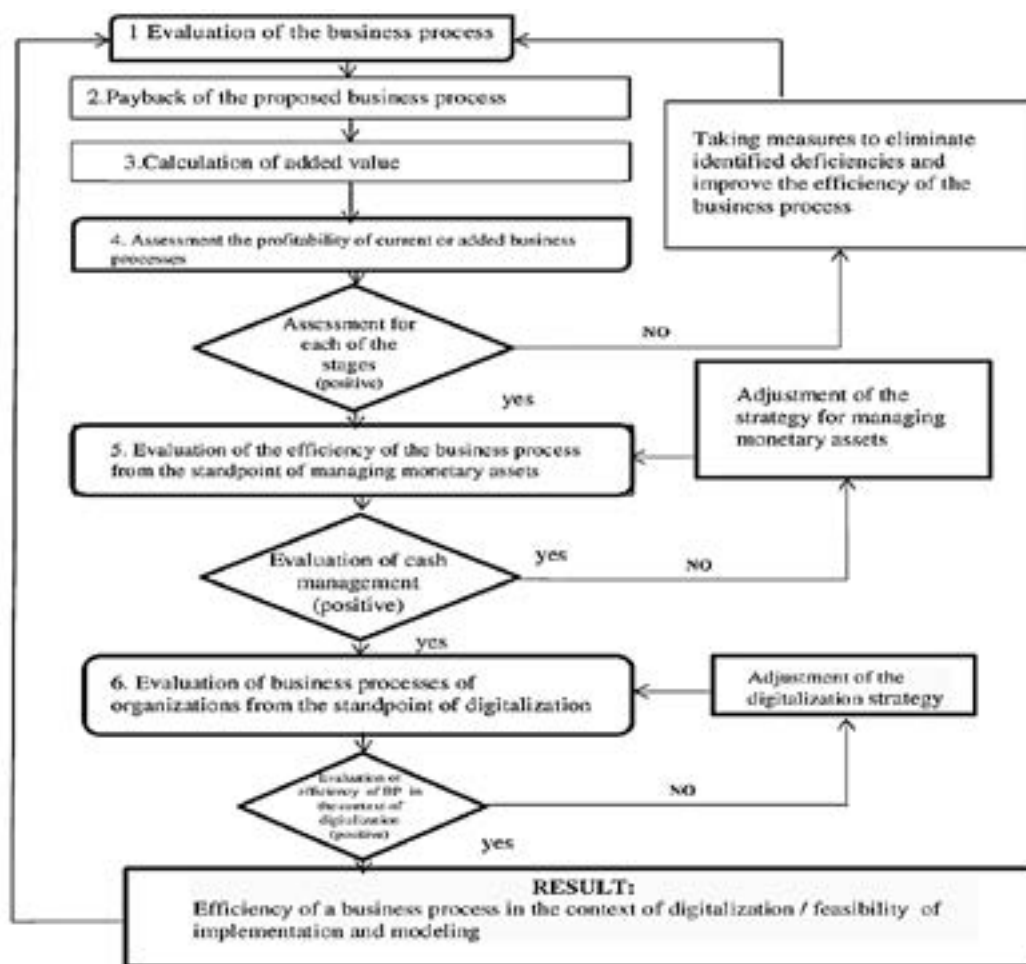


Figure 1 – Algorithm for assessing the effectiveness of modeling the company's business processes in the context of digitalization
Note: compiled by the authors

Characterizing the above indicator, one should pay attention to the fact that it can be used to assess not only the effectiveness of the proposed business process, but also the level of risks (Galliers, 2003; Pennock, 2017). The next stage in the algorithm for evaluating the effectiveness of modeling the company's business processes in the context of digitalization is the calculation of value added.

Value added is a theoretical concept that expresses the relationship between market value and actual costs incurred from the proposed business process. The value added (VA) can be calculated using the formula (2):

$$VA = Va - Vb \quad (2)$$

Va – is the value of the business process after processing;

Vb – is the value of the business process before processing.

In order to assess the effectiveness of modeling business processes that add economic value (costs), in a separate business process, this value can be expressed as a specific specific indicator.

Evaluation of the profitability of current or added business processes is the next stage in the developed algorithm for assessing the effectiveness of modeling the company's business processes in the context of digitalization. This indicator is the relative level of profitability from the proposed business process in the company.

The profitability of current or added business processes (Pr) is calculated using the formula (3):

$$Pr = P : R \quad (3)$$

P – profit from current or added business processes in the organization, thousand tenge;

R – revenue from current or added business processes in the organization, thousand tenge. (Chirikhin, 2013).

In the conditions of obtaining the optimal value (more than 4%), increasing it in dynamics (in comparison with the current indicator, that is, the indicator of the reporting period), it is necessary to proceed to the next stage in the developed methodology. In conditions of a value of up to 4%, its reduction in dynamics, measures should be taken to eliminate the identified deficiencies and increase the efficiency of modeling the business process in the company, in order to subsequently return to the stage and move on to the next one according to the developed methodology (Porter, 2018).

Evaluating the effectiveness of a business process from the standpoint of managing monetary assets is the fifth stage in the algorithm for evaluating the effectiveness of modeling a company's business processes in the context of digitalization. At this stage, the calculation is carried out according to the main indicators of efficiency: the degree of participation of monetary assets of business processes in the total current assets of the organization, the average period of turnover and the number of turnovers of monetary assets of business processes in the period under review, the number of revolutions of the average balance of monetary assets in the period under review for business processes, the coefficient of profitability of short-term financial investments for business processes, as well as the planned amount of the operating balance of monetary assets of business processes (Dijkman, 2011; Baranova, 2017) (Table 1).

Table 1 – Indicators of the effectiveness of modeling a business process with positions of management of monetary assets

Name of indicator (designation)	The essence of the indicator	Calculation (formula with explanation)
The degree of participation of monetary assets of business processes in the aggregate current assets of the organization (CU)	Shows the degree of participation of the company's monetary assets in the working capital in the context of the implementation of business processes	$CU = MA : CA$; MA – average balance of total monetary assets, thousand tenge; CA – the average amount of current assets of the organization, thousand tenge.
Average turnover period and the number of turnovers of monetary assets of business processes in the period under review (TP)	Shows the degree of asset turnover in the context of the implementation of business processes	$TR = MA : VEF$; VEF – one-day volume of expenditure of funds, thousand tenge.
The number of turns of the average balance of monetary assets in the period under review for business processes (NT)	Shows the degree of turnover of the average balance of monetary assets	$NT = VEFt : MA$; VEFt – total volume of expenditure of funds, thousand tenge.

Continuation of the table

Name of indicator (designation)	The essence of the indicator	Calculation (formula with explanation)
Return on ratio of short-term financial investments for business processes (KRI)	Shows the degree of profitability of short-term financial investments for business processes, that is, the economic feasibility of their introduction	$KRI = P: KFI$; P is the amount of profit received by the organization from investment, thousand rubles.
The planned amount of the operating balance of monetary assets of business processes (MA)	Shows the need for balances of monetary assets of business processes in the context of the implementation of business processes	$MA = PV: NT$; PV – planned volume of negative cash flow, thousand rubles; NT – the number of turns of the average balance of monetary assets according to the plan.

Note: compiled by the authors

Results

As mentioned earlier, with a positive assessment of the business process from the standpoint of managing monetary assets (growth in dynamics, for example, in comparison with reported indicators), the next stage is performed, and with a reduction, small values, the existing or selected strategy for managing monetary assets in the company in order to also return to this stage, to achieve the planned goals and objectives.

An important stage in the developed algorithm is the assessment of modeling the business

processes of organizations from the standpoint of digitalization. Mainly, service sector organizations consider business processes in the context of four separate categories:

- development of products and services;
- demand generation;
- satisfaction of demand;
- planning and management of the enterprise.

We formulated the following indicators of the effectiveness of modeling the company's business processes in the context of digitalization (Table 2).

Table 2 – Indicators of the effectiveness of modeling business processes companies in the context of digitalization

Name of indicator (designation)	The role of the indicator in improving the efficiency of modeling the company's business processes in the context of digitalization	Calculation (formula with explanations)
Generalizing indicators (based on the results of the implementation of the proposed business process)		
Number of digital technologies used	Affects the growth of enterprise efficiency, modeling of individual business processes (for example, profit growth), the level of enterprise competitiveness in the digital environment, and the growth of market share	X
Revenue from digitalization (for example, from the sale of goods through the website)	Has an impact on the economic profitability of digitalization, its growth, on meeting the needs of the market, in particular – buyers (clients)	X
Organizational and management costs for digital tools and technologies	Affects the quantity and quality of the tools and technologies used, the competitiveness of the enterprise in the digital environment, the growth of market share, and the profit from their use	X

Name of indicator (designation)	The role of the indicator in improving the efficiency of modeling the company's business processes in the context of digitalization	Calculation (formula with explanations)
Generalizing indicators (based on the results of the implementation of the proposed business process)		
Competence of the management in matters of digitalization of the company's business processes Informative value of the company's business processes in the context of digitalization	It has an impact on the quality of decisions made, on the result obtained, on the competitiveness of personnel in these matters, on the degree of informatization of the studied processes	Evaluated using a qualitative approach, for example, using a survey method, an expert method
Reaching the audience with the applied business processes	Affects the quality of modeling business processes, their customer focus, the visibility of the company through the business processes used (for example, the sale of goods on the website), the company's share in the consumer market	
Grade customer satisfaction (S) of current or added business processes in the organization of the service sector in the context of digitalization	It has an impact on the consumer effect, on the demand for the products (services) of the service sector, on the general economic performance	$S = Ks : Tn$, Ks – is the number of surveyed buyers who are satisfied with the current or added business processes in the context of digitalization in the organization of the service sector, people; Tn – is the total number of surveyed clients of the service sector organization, people.
Profitability index (PI) from digitalization (for example, from the sale of goods through the site)	Affects the increase in the economic effect of digitalization, the competitiveness of the company (goods, technologies)	$PI = CF : C$, CF – cash flow from digitalization, thousand tenge; C – costs of digitalization, thousand tenge.
The degree of novelty (Dn), innovativeness of the company's business processes	Influences the degree of digitalization of the company, its competitiveness in this area, the efficiency of the sale of the company's goods (services)	$Dn = N : Tn$, N – is the number of new, innovative business solutions (processes); units; Tn – the total number of business processes in the enterprise, units.
Automation level (AL) of the company's business processes	Affects the efficiency and competitiveness of business processes in the context of digitalization of the company	$AL = Na : Tn$, Na – is the number of automated business solutions (processes); units; Tn – the total number of business processes in the enterprise, units
Customer Loyalty Index (CLI)	It has an impact on the consumer effect, on the attitude of buyers (clients) to processes, on the demand for products (services) of a service enterprise, on the general economic performance	$CLI = P : Tn$, P – positive perception of people to the company and processes; Tn – the total number of buyers (in the survey), people.
The degree of personnel involvement (Pi) in the development of the company's business processes using digital tools (technologies)	Influences the performance indicators of personnel in the context of the development of the company's business processes using digital tools (technologies)	$Pi = Ni : Tnp$, Ni – the number of involved company personnel, people; Tnp – the total number of company personnel, people.

Note: compiled by the authors

In terms of the effectiveness of the indicators presented in Table 2, their positive development and dynamics (in comparison with the indicators of the reporting period), the final conclusion is made about the effectiveness and feasibility of modeling the proposed business process of the company in the context of digitalization (Asbjørn Rolstadås, 2016). With the reverse dynamics, the digitalization strategy is being adjusted.

Conclusion

Currently, digitalization plays an important role in the business processes of enterprises, which is expressed in the introduction of digital technologies in order to increase production efficiency, which occurs as a result of improving business processes and even completely changing the business model of an enterprise. A thorough assessment of business processes will allow at the initial stage of digitalization to increase the economic efficiency of the enterprise's production activities by 2-3%, in subsequent years, taking into

account the correctly chosen course, the increase in efficiency will be more noticeable (Reijers, 2016). The estimation algorithm proposed in this work.

The algorithm proposed in this work for assessing the effectiveness of modeling a business process presents a list of actions and works to obtain the necessary effect – to increase the efficiency of modeling business processes (main and auxiliary) in the context of digitalization.

Modeling the company's business processes in the context of digitalization was associated with the factors and methods of increasing them, with the active use of modern tools that are of practical importance.

In conclusion, it should be noted that the algorithm developed by us for assessing the effectiveness of business processes was applied in the analysis of the activities of a number of enterprises in the Kostanay region. The management of these enterprises were offered recommendations to improve production efficiency (Baimukhamedov, 2020).

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