COMPARATIVE ANALYSIS OF PROCESS-BASED MANAGEMENT METHODOLOGIES

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ABSTRACT
In the world practice, the following main process management methodologies are distinguished: Lean Production, Six Sigma, Lean Production + Six Sigma, Rummle Branch, Hammer, SCOR, BP Trends Associates, CMMI, and a methodology, embedded in a software product (for example, BAAN, SAP, 1S). Each of these process methodologies has its subject of research, and also requires specific initial conditions for successful implementation in the practical activities of an enterprise. The presence of several process methodologies introduces certain confusion in management theory based on business processes. In order to streamline information on process management methodologies and their capabilities, the paper identifies subjects of research into these methodologies and compares them according to the following parameters: the availability of methods for optimizing the main business processes, the availability of methods for optimizing the technological operations of the main (production) business processes, completeness of the business processes scope, universality of the methodology, the ability to manage an enterprise as a system, the ability to form a complete enterprise management system, possibility of assessing the process management maturity in an enterprise, definition of the vector for further efforts in the development of the process management as a system, and automation of business processes (within the framework of the methodology). Based on the comparative analysis of process management methodologies in the context of their capabilities, the author has been developed a table that simplifies understanding of the specific features and capabilities of the methodologies considered.

Keywords: management methodology, process approach, comparative analysis, industrial enterprise, management system.

INTRODUCTION
Process technologies for enterprise management are implemented by various management methodologies. All of them are called process management methodologies, but there are significant differences between them, as the subjects of their research are different. In practice, this leads to a multitude of the process management essence interpretations. For example, a company that optimizes production processes and the company that modifies accounting processes in an enterprise information system in accordance with the reference business process models are formally engaged in the implementation of the "process approach", while performing completely different actions.

Existing regulatory documents, in particular, ISO 9000 standards, set only the most common boundaries of the process approach. We quote GOST R ISO 9001-2001 [1]: "An activity that uses resources and is managed to convert inputs to outputs may be viewed as a process. Often the output of one process forms the input of the next directly. The application of the system of processes in an organization along with their identification and interaction, as well as process management can be considered a "process approach".

In the above GOST, business processes are not singled out, their scopes and boundaries are not established, and the stages of process approach implementation are indicated in a generalized manner. Business analysts and researchers are invited to solve these and other methodological problems of process management themselves.
MAIN PART
The solution of these problems was found in the original methodologies of process management. The most common are the following original process management methodologies: Lean Production, Six Sigma, Rummler Branch, Hammer, SCOR, BP Trends Associates, CMMI, and methodologies embodied in 1S, BAAN, and SAP software products [2]. These methodologies were examined in detail in [3-6], their advantages and disadvantages were revealed there. By the results of the analysis, it is possible to identify the subjects of research of these methodologies (presented in Table 1).

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Name of methodology</th>
<th>Subject of study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lean production</td>
<td>Production business processes in general</td>
</tr>
<tr>
<td>2</td>
<td>Six Sigma</td>
<td>Technological operations</td>
</tr>
<tr>
<td>3</td>
<td>Rummler-Branch</td>
<td>Employee productivity</td>
</tr>
<tr>
<td>4</td>
<td>Hammer</td>
<td>Methods of radical modification of business processes based on modern technologies</td>
</tr>
<tr>
<td>5</td>
<td>SCOR</td>
<td>Logistic operations and the flow of wealth</td>
</tr>
<tr>
<td>6th</td>
<td>eTOM</td>
<td>Business processes of telecommunication enterprises</td>
</tr>
<tr>
<td>7th</td>
<td>BP Trends Associates</td>
<td>Algorithm for implementing process management in an enterprise</td>
</tr>
<tr>
<td>8</td>
<td>CMMI</td>
<td>Assessment of process management maturity</td>
</tr>
<tr>
<td>9</td>
<td>The methodology of process management of an enterprise, embedded in the software products 1S, BAAN, SAP</td>
<td>Automation of enterprise management</td>
</tr>
</tbody>
</table>

On the basis of the above table, it can be concluded that one group of methodologies is focused on optimizing one aspect of enterprise activities (№ 1 - 3, 5), and the other group (Nos. 4, 7, 8, 9) for the staged development of the process management.

In order to conduct a correct generalized analysis of these methodologies, we consider it necessary to perform a comparative analysis of them in terms of the opportunities provided for the following main parameters:

1. Availability of methods for optimizing the main (production) business processes. The assessment of this parameter will be carried out whenever possible using methods of methodology to analyze and improve production business processes in general.

2. Availability of methods for optimizing technological operations of the main (production) business processes. The assessment of this parameter will be carried out, if possible, using methods of
methodology to analyze and improve the technological operations of production processes that are performed at individual work centers (machines).

3. Full coverage of business processes. The assessment of this parameter will be carried out according to possibilities of the methodologies to cover all business processes of an enterprise.

4. Universality of the methodologies. The assessment of this parameter will be carried out if possible application of the methodology in any field of activity.

5. The ability to manage an enterprise as a system. The assessment of this parameter will be carried out proceeding from the possibility of a full description of an enterprise activity in the context of business processes and determination of interrelations between them.

6. The ability to form a complete system of enterprise management. The assessment of this parameter will be based on the ability to make informed management decisions based on the results of economic calculations of the basic indicators (revenue, costs, profits), as well as natural indicators which are relevant for an enterprise.

7. The possibility to assess the process management maturity at an enterprise. The assessment of this parameter will be based on the ability to determine the level of development of process management in accordance with the methodology.

8. Determination of the vector for application of further efforts for the purpose of developing a process management as a system. The evaluation of this parameter will be based on the availability of a qualitative description of process management levels and the actions necessary to move to a higher level of process management. At the same time, the transition to a higher level should provide more opportunities to support and make management decisions.

9. Automation of business processes. The assessment of this parameter will be carried out proceeding from the availability of a methodology concerning the stage of business processes automation in the algorithm.

Table 2. Comparative analysis of process management methodologies in terms of their capabilities (author's development)

<table>
<thead>
<tr>
<th>Methodology</th>
<th>Lean production</th>
<th>Six Sigma</th>
<th>Rummler-Branch</th>
<th>Hammer</th>
<th>SCOR</th>
<th>BP Trends Associates</th>
<th>CMMI</th>
<th>Methodology in IS, BAAN, SAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessed parameter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The availability of methods</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>for optimizing the main (production) business processes in general</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Availability of methods</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>for optimizing technological</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>operations of the main</td>
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</tbody>
</table>

Submit Date: 01.09.2017, Acceptance Date: 15.11.2017, DOI NO: 10.7456/1070DSE/147
<table>
<thead>
<tr>
<th>(production) business processes</th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Full coverage of business processes</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Universality of the methodology</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>The ability to manage an enterprise as a system</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>The ability to form a complete enterprise management system</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>The possibility of assessing the process management maturity in an enterprise</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Determination of the vector for application of further efforts for the purpose of developing a process management as a system</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Automation of business processes</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

We consider it necessary to comment on the individual points from Table 2:

1. The methodologies incorporated in the software products 1S, BAAN, SAP, allow to fully cover business processes of an enterprise in the context of their individual parameters (accounting and some economic indicators). Automation in the information system of existing models of enterprise management allows them to speed up implementation of business processes, keep records of their individual parameters, and monitor the financial performance of an enterprise for a certain period of time. Almost all large enterprises use information systems in their practice; this is one of the most important factors of competitiveness. Thus, based on these software products, you can make management decisions and manage an enterprise as a system.

However, this approach to management does not allow us to study in detail the business processes of an enterprise, to react quickly to changes in the factors determining the result, and to optimize business processes.

This methodology should be used in conjunction with other process methodologies, which involve analysis of business processes and their structural elements in terms of natural and economic indicators, their regulation, and optimization of business process models.

2. The "Rummler-Branch" methodology makes it possible to manage an enterprise as a system in the context of one indicator "Labor productivity", but this significantly limits the capabilities of the management system. Management of an enterprise based on one relative indicator will not be complete.

3. The SCOR methodology allows them to manage the main business processes in terms of deliveries of inventory items, but capabilities of the management system are also limited. In addition, within the framework of this methodology, business processes "Marketing", "Sales", "R & D", "Customer Service" are not considered.
METHODS
In the course of the research, the following methods were used:

1. Selective analysis of specialized literature with a high citation index for the subject matter indicated in the title of the paper. In particular, information on process management methodologies "Lean production", "Six Sigma", "Lean Production + Six Sigma", "Rummler-Branch", "Hammer", "SCOR", "BP Trends Associates", CMMI, and methodologies embedded in automated enterprise management systems (for example, BAAN, SAP, 1S).

2. The formed array of information was systematized for the purpose of further analysis. The subjects of research of these methodologies were determined.

3. A comparative analysis of the collected information on the criteria determined by the author has been carried out to identify the advantages and disadvantages of the methodologies examined and to assess the feasibility of their practical application.

4. The results of the study were given the author's interpretation, conclusions were drawn.

RESULTS
On the basis of the foregoing, the following conclusions can be drawn:

1. In terms of the number of proposed opportunities, CMMI, and the methodologies laid down in the software products 1S, BAAN, and SAP are leading.

CMMI is a methodology for the introduction of process management at an enterprise. It contains generalized recommendations for determining the achieved level of process management and its further development.

The methodologies incorporated in the software products 1S, BAAN, and SAP allow their operators to speed up the implementation of automated business processes, keep records of some of their parameters, monitor the financial performance of an enterprise for a certain period of time, and to calculate taxes. On the basis of automated business processes, an enterprise is managed as a whole; however, the possibilities of analyzing and optimizing business processes within the framework of this methodology are substantially limited.

2. It should be noted that in Russian practice the most common are, in addition to the methodologies in these software products, the methodologies for analyzing and optimizing the production processes "Lean Production" and "Six Sigma". This is due to the fact that optimization of production business processes, having accumulated the total costs of the organization, can significantly improve the economic efficiency of an enterprise as a whole and achieve positive synergies.

3. In the opinion of the author, the SCOR methodology is of considerable interest, within the framework of which a database on the most effective business processes of advanced foreign enterprises and the best management decisions has been developed. Based on this information, Russian enterprises can analyze and optimize their business processes focusing on benchmarks and best management algorithms.

4. In the author's opinion, none of the considered process management methodologies covers a complete list of topical tasks of an industrial enterprise. This shows the need to apply a combination of the methodologies considered in the introduction and development of process management.

DISCUSSION
Within the framework of this paper, the results of research on process management methodologies are concentrated. In order to streamline the information, we have developed author's tables that systematize
information on the subject of research of the most common process methodologies. Also, in order to
determine the opportunities provided by the implementation of these methodologies, a comparative
analysis of these methods was carried out based on the following criteria: the availability of methods for
optimizing the main (production) business processes; availability of methods for optimizing technological
operations of the main (production) business processes; completeness of coverage of business processes;
universality of methodology; the ability to manage an enterprise as a system; the possibility of forming a
full-fledged enterprise management system; the possibility to assess the process management maturity in
an enterprise; definition of the vector for application of further efforts with a view to develop a process
management as a system; automation of business processes. These criteria are author's ones, are debatable
and can be supplemented or amended.

CONCLUSIONS
The analysis of existing process management methodologies allowed us to systematize information about
them. To streamline information on process management methodologies and their capabilities, the
research subjects of these methodologies were identified and compared by the following parameters: the
availability of optimization methods for basic business processes, the availability of methods for
optimizing technological operations of the main (production) business processes, the completeness of
business coverage -processes, the universality of the methodology, the ability to manage an enterprise as a
system, the ability to form a complete system of enterprise management, the possibility of assessing the
process management maturity in an enterprise, determining the vector for further efforts in the
development of process management as a system, automation of business processes (within the
methodology). Based on the comparative analysis, the author's table has been developed, which simplifies
understanding of the specific features and capabilities of the methodologies considered.

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