

Available online at www.sciencedirect.com**ScienceDirect**journal homepage: <http://www.elsevier.com/locate/acme>**Original Research Article****Identification and evaluation of processes in a construction enterprise****B. Hoła***

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ABSTRACT

The paper presents the methodology of construction enterprise management based on the process approach. The process approach to management is used to identify all the processes carried out in an enterprise, to determine inter-relationships between them, to consolidate the awareness of employees of their importance and also to measure the efficiency of processes and their continuous improvement. The practical application of the process approach leads to an increase in labour productivity, the quality level and also competitiveness of an enterprise in the construction market. In order to solve the examined task, studies of processes conducted in construction enterprises have been carried out. Based on these studies a universal mathematical model of the process and methodology of its evaluation has been developed. An example of the practical application of the developed methodology is also included.

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1. Introduction

Construction enterprises in Poland operate in a rapidly changing and highly competitive environment. This requires big flexibility and ability in the area of adjusting to changing conditions. In order to maintain and even to improve the position of a construction enterprise on the construction market, it is necessary to use methods that aid management [4,14–17,20,22,24–26,31]. One such method is the use of the process approach to management which is promoted by ISO 9001 standards which involve the identification, analysis and

evaluation of processes and making corrective changes if needed.

In general, the subject of the article is associated with process management. It presents a methodology of analysis and evaluation of processes in a construction enterprise based on the concept of continuous improvement. The proposed methodology has been defined on the basis of surveys conducted in construction enterprises.

The application of the process approach in construction enterprises was caused not only by ISO management standards but also by financial considerations. A common phenomenon in the construction industry is an underestimation of investments

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and exceeding of budgets. The use of the process approach allows the organization of a construction enterprise to be focused on external customers, which in the case of construction enterprises is an investor, as well as on internal customers who are employees. This contributes on one hand to improving the processes and reducing the costs of their implementation and on the other hand, to increasing customer satisfaction. This results in an increase of operational effectiveness, lower production costs and higher revenues from the sale of products and services.

2. Problem description

According to published statistical data, it can be concluded that in Poland in 2012 over 241 thousand construction companies were registered, employing in total over 640 thousand people. As much as 99% of this number are micro and small-sized enterprises which employ fewer than 49 people. In total, in the sector of these companies work over 60% of all employees in the construction industry (Statistical Yearbook 2013). On the basis of the above data it can be concluded that micro and small-sized enterprises constitute a significant sector of construction production in Poland [11].

According to preliminary studies, owners of the majority of micro and small-sized construction enterprises are civil engineers and therefore people possessing extensive knowledge in the area of the design and execution of building structures, while possessing less knowledge in enterprise management and issues related to this. In contrast to large companies the managerial staff are often limited to one or a few people at most.

Moreover, in most construction enterprises in this sector, management systems have not yet been implemented because they are very expensive and company owners cannot afford them. The studies also showed that there is a great interest in process management, but the knowledge of the process approach and benefits for a company coming from its practical use are negligible [9].

On the basis of the conducted preliminary tests it can be assumed that the development of a universal process management methodology, based on the principle of continuous improvement of processes and implementation in micro and small-sized construction enterprises, will improve the efficiency and quality of provided services and as a result will improve and strengthen the market position of an enterprise.

The above observations initiated studies which aimed to: identify the processes carried out both in the production and management area of a construction enterprise, develop universal procedures for processes which are repetitive in many enterprises and also develop a universal standard model of a process and the methodology of process evaluation.

3. Definition of the process approach and the literature survey

The process approach considers the operations performed by an enterprise as processes. This approach covers all the areas of enterprise activity ranging from: design of a building object, preparation of a building site, execution of a building object,

marketing, purchase of materials and ending with the financial settlement and the administration of an enterprise. The essence of the process approach is the systematic identification of: processes which occur in an enterprise, determination of the interrelationships between them and also appropriate process management [2,21].

Hammer, the co-author of the reengineering concept, defines enterprise process orientation as focusing on processes and thus “recognizing and naming processes in an enterprise, consolidating their importance in employee's awareness, measuring of process efficiency and their continuous improvement” [3,5]. An increase of the efficiency level of carried out processes affects the increase of the efficiency of an enterprise as a whole. Therefore, this concept is attractive regarding management theory, which has been gaining more popularity in organizational practice.

The application of process management in the construction industry began to receive special attention in the 90s of XX century. In many papers related to this issue, it is emphasized that the use of the process approach to enterprise management leads to an improvement in the productivity of an enterprise and its competitiveness on the construction market [6,23,27,28,30]. Systematically conducted process control and introduction of corrections causes the reduction of errors and therefore causes the elimination of repeat works and also the increase of customer and employee satisfaction [1,29].

Process management can be found in the ISO 9001 standards. Studies have shown that enterprises which have implemented quality management systems based on the above standards achieve higher productivity and are competitive on the construction market [6,7,19].

4. Objective and scope of studies

A review of literature clearly shows that the use of the process approach to the management of a construction enterprise can bring tangible results in the form of an increase in the efficiency of operation, an improvement of productivity and competitiveness and also an increase of customer satisfaction. The main objective of the conducted studies was to develop a universal methodology for aiding the process of continuous improvement of processes based on the concept proposed by Deming and is shown in Fig. 1.

There are four operation phases distinguished in Deming's cycle:

- Phase I – planning which means determining the corrective agents that can improve the observed course of a process,
- Phase II – implementation of corrective recommendations,
- Phase III – verification of implemented recommendations,
- Phase IV – implementation of new standards into practice.

The quality of processes is raised to a higher level as a result of the above cycle.

The scope of the conducted research was extensive and covered the following issues:

1. Surveys carried out in construction companies with the objective to identify the processes conducted in them.

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