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IMPROVEMENT THE PROCESSES IN ORDER PRODUCTION IN CONSTRUCTION INDUSTRY WITH THE ORIENTATION ON PROCESSES PERFORMANCE

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Abstract: This article summarizes the arguments within the scientific discussion on the issue of performance management of processes in Industry 4.0 as a basic prerequisite for improvement of processes, eliminating waste, introducing innovations, gaining competitive advantages. The main purpose of the research was to examine impact of process diagrams to the possibilities of improvement of the processes in order production aimed at increasing the quality of orders. Methods of research were focused on using flowcharts for individual processes for some order. In research was used indicator of process efficiency, limit values of indicator, compare analysis. The object of research was process of order productionin area of construction. The relevance of the decision of this scientific problem was connected with the the quality of orders. The paper presents the results point to significant improvements in the selected company in individual processes and increasing the level of quality of services provided after using flowcharts for processes. In area of human resorces and budgeting of order was the efficiency coefficient decreased, the other processes increased. Flowcharts in process management are very effective instruments for the improvement of processes. The results can be useful for the evaluation of the performance of processes in order production in various area of industry.

Key words: improvement, innovation, quality management, quality, efficiency

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Introduction

Process management in SMEs is not always implemented, because in this area are barriers to implement managerial instruments as financial situation, conservative approach, no changes in management. The enterprises in SMEs don't use the quality system, environmental systems, occupational health and safety system. This paper is ground on examining using of managerial instruments for the improvement of processes in SMEs in specific areas of order production. Markulík et.al (2021) said that the process management and improvement of processes today represent an approach that allows ensuring continuous maximum performance of processes such as production, transport, supply, warehousing, and others. The main purpose of the research is to examine impact of process diagrams to the possibilities of

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improvement of the processes in order production aimed at increasing the quality of orders. Improvement of processes is part of the quality management system in ISO 9001 and to risk management that are control by companies from point of achievement of efficiency (Malega et.al., 2019). In this paper we point out the possibilities of improvement in processes aimed at increasing the quality of orders and services provided by using instruments of quality management system by ISO 9001. The overall benefit of process management in the firm is manifested in terms of meeting customer requirements EN ISO 9001:2015 part 9.1.2, satisfying their needs part 8.2., meeting employee requirements and maintaining supplier-customer relationships part 0.3, risk management in processes part 0.3.3.in terms of achieving added value for the company and for the customer (Figure 1). All these requirements are part of the quality management system in companies according to EN ISO 9001: 2015.

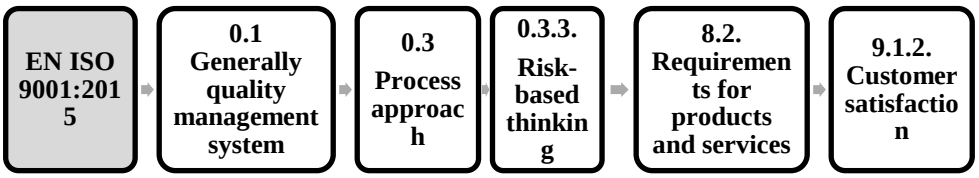

Figure 1: Quality, process, risk management in ISO standard 9001:2015
(EN ISO 9001: 2015).

The process approach supports the fulfilment of firms' strategic goals and ensures the competitiveness of firms in relation to the value chain, which monitors KPI performance indicators for individual processes (Namesanska et.al., 2014, Rajnoha et.al., 2017). This quality management system is today a basic prerequisite for gaining a dominant position of companies in a globalized market (Zavadsky et.al., 2019, Markulik et.al., 2016).

Literature review

The process approach in SMEs is a very important instrument for the improvement of all processes in various areas of business. Achieving competitive advantages and gaining a foothold in the global market brings an economic effect and at the same time becomes a basic impetus for achieving optimal performance in business processes (Potkany et.al., 2020). Achieving performance in business processes mean focusing on innovation, developing knowledge, improving business processes, eliminating risks (Nagyová et.al., 2021, Rajnoha et.al., 2017). At the same time, the basis of the process approach is to eliminate waste, minimize costs, improve technologies, efficiently use production factors, use external services, and others (Potkány et.al., 2019). Identification of corrective measures in individual business processes allows business processes to improve, seek reserves, reduce losses, eliminate waste - 3MU, and improve the financial resources of the firms (Janeková

et.al., 2021, Markulik and Paricsiova, 2016). Within process management, it is necessary to identify all business processes through a process map, describe their characteristics, inputs, outputs, responsibilities of business processes, determine the process owner, and other information necessary for its effective operation (Teplická et.al., 2019). A process-driven company has its processes optimized, documented, and connected to products, services (Markulik and Kozel, 2016). Each process has a clearly defined product - output for the customer, the owner of the process, who controls exactly what, why, how the process is carried out (Kamodyová et.al., 2020). If the business wants to optimize business processes, the most appropriate way is to perform an internal audit for each process (Pattanayak et.al., 2019). A business process audit is an essential tool for identifying weaknesses on the basis of which a company can decide what corrective measures to propose to optimize processes (Nagyová et.al., 2021). The task of the audit is to determine the actual status of all business process activities. Process management (Figure 2) reveals weaknesses where losses occur that are unproductive for the company, which means eliminating them. The production potential creates indicators as the products, services, the gross value added, the number of entities, the average level of employment, or the productivity growth. Those indicators create a base for the value chain in SMEs (Grzegorzewka, E., Stasiak-Betlejewska, R., 2019).

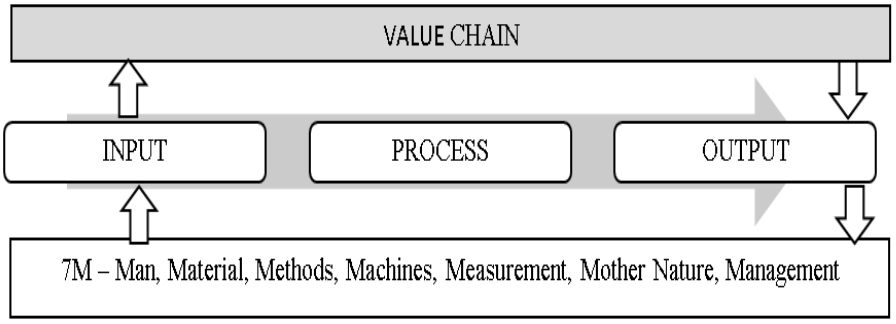

Figure 2: IPO chain with orientation to value chain and quality
(Teplická et.al., 2019).

The value chain in SMEs creates performance and in this paper, it means increasing efficiency of processes in order production.
Performance management must be developed and implemented to provide with efficiency, economy, competitiveness, the innovative culture, organizational learning, productivity, and a precondition for defining the level of enterprise at the "world-class enterprise" level (Bilan, Y., Hussain, HI., Haseeb, M., Kot, S., 2020).
Optimal process management includes support processes (outsourcing, facility processes, operating leasing) that help minimize losses and optimize processes so that weak points, downtime, overproduction do not arise (Potkány M., Kamodyová P., Gejdoš M., 2019 and Teplická, Straka, 2020). Economic entities are often forced to take actions within the framework of increasing the performance of logistics

chains by improving the quality of order fulfillment and contract execution (Salek, R., 2019). In developed countries, support tools for process optimization are increasingly used, which ultimately affects the quality of the final product, service (Potkany, Gejdoš et.al., 2020).

Process management can be provided by managerial approaches which are focused on special areas. The most frequently implemented management approaches include: Supply chain management that is an important managerial tool determinant all conditions significant for suppliers and their use in praxis (Kot, S., Haque, AU., Baloch, A.. 2020), Risk management is an important part of quality management and creates the view for the using of lean management in SMEs (Nedeliakova, E., Hudakova, M. , Masar, M , Lizbetinova, L., Stasiak-Betlejewska, R. , Sulko, P., 2020), Financial Management (FM) content is focused on the perception of the tax system reform focusing on the most important and key factors of its sustainable effectiveness and performance in the context of its non-macroeconomic especially social, technological and process aspects (Kot, S, Stefko, R Dobrovic, J Rajnoha, R Vachal, J., 2019), Facility Management (FaM) is an important service for economic efficiency in SMEs (Potkány M., Kamodyová P., Gejdoš M., 2019). In the area of cost optimization are very interesting instruments as Activity-Based Management (ABM), Cost Management (CM) that are creating a new model of cost optimization (Gomes et.al., 2020), the other very important approaches are Project Management (PM), Human Resource Management (HRM), Environmental management system (EMS), Quality management system (QMS) and other.

Those management approaches focus on processes to shorten the time of product realization, utilization of input resources in a particular process, sensitivity to the interconnection of activities in the process, risk documentation, consistency and completeness in completing reports, records, and processed documentation, corporate social responsibility, employee loyalty, business performance indicators, supply chain management, cost management and cost optimization (Alglawe et.al., 2020, Stojanovic et.al., 2020). The orientation of process management is focused on measuring the KPIs of key indicators of business process performance, which are in the synergy of other management approaches (Ruzekova et.al., 2020). Indicators of quality management and project management, indicators of human resources management, indicators of activity management, and management of support processes (Puzder et.al., 2017). All set indicators must be quantifiable and focused on continuously increasing the efficiency of processes.

Methods and Methodology of Research

Methods of research were focused on using flowcharts for individual processes for selected orders in the construction area. The main goal of the research of order production process was carried out in a selected company, where the partial processes were monitored (Figure 3).

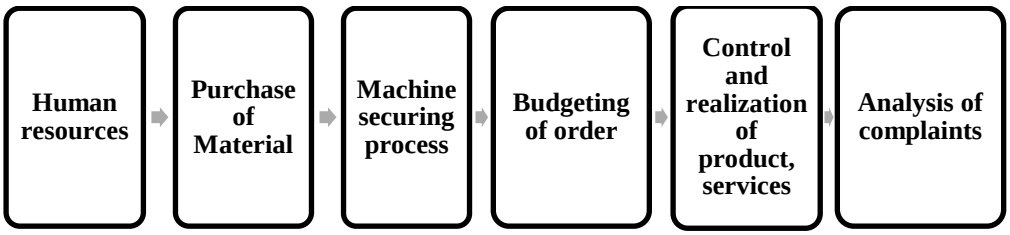

Figure 3: Algorithm of research for production process
(own source).

In research were used indicators of process efficiency , limit values of indicators, the comparative analysis. The object of research was the process of the order production area of construction. In the research was determined hypothesis for improving the efficiency of processes in the order production.
HO: Hypothesis: Creating process diagrams in order production will improve process performance by at least 20%. This hypothesis was check on the basis of efficiency indicator and after implementation of the process diagrams in the firm.
Within the individual processes, quality management tools were used such as flowcharts, questionnaire survey of employee satisfaction, comparative analysis of improvements in individual sub-activities of the company's transformation process, schematic representation of tools in individual sub-activities, analytical tools for sub-processes. In terms of quantitative expression, the indicator of process efficiency coefficient was used.

Coefficient of process efficiency (K_e): $$K_e = \frac{reality\ (s)}{plan\ (p)} \quad (1)$$

where: (s) the fact represents the actual value of the indicator in the observed period, (p) the plan represents the planned value of the indicator in the same reference period.
The coefficient of process efficiency (K_e) can be expressed through any measurable process indicators that the organization must determine before evaluation. The coefficient of process efficiency can be expressed through production indicators, documentation, number of revisions performed, number of quality objectives met, results achieved in customer and employee satisfaction, number of completed projects within the agreed deadline, number of employees in the monitored period, number of educational levels, employees, in the number of confirmed purchase contracts, in the number of orders, in the fulfilment of order deadlines, in the fulfilment of project time based on customer requirements, in the fulfilment of financial and quality indicators, in the number of complaints, and failures (Ambrisko et.al., 2020). The indicator can be expressed by a coefficient, dimensionless number, or can be converted to percentages (Table 1). When calculating the efficiency coefficient of a process, we determine its efficiency, while the value of efficiency takes into account the fulfilment of planned values and expresses deviations of actual values from the planned values of the economic quantity. The purpose of measuring process efficiency is the identification and correction of deviations in processes,

providing information on trends in the development of process parameters, documentation of data obtained from process measurement, cost assessment of processes (Cehlár et.al., 2019).

Table 1. General evaluation of process efficiency

Effective process - coefficient	$\mathbf{K_e \geq 0,85}$
Largely effective process – coefficient	$\mathbf{0,85 > K_e \geq 0,70}$
Noneffective process – coefficient	$\mathbf{K_e < 0,70}$

Source: (Rajnoha et.al., 20017).

Results of Research

In the research part, we focused on a company that aims to optimize business processes in order to achieve quality aimed at reducing complaints, satisfying customer requirements, meeting deadlines, making a profit, gaining a good reputation in the market. To implement its orders, the company needs to provide human resources, input materials, the required technology in the form of machinery and equipment, calculate the order budget, and can begin to implement the order. After the completion of the order, he must hand over the work, check the order, and resolve complaints about the order (Figure 3). The implementation of the entire order requires the effective management of individual sub-activities, which are focused on input sources and the implementation of the output - the finished order and its delivery. All sub-activities had to be precisely described and we identified shortcomings in their management.

Human resources

This activity is focused on acquiring employees for the performance of contracts. The company has permanent employees who perform their professional activities on the required contracts. If the company does not have a sufficient number of employees, it uses outsourcing. As part of the activity of providing human resources, a process diagram was created (Figure 4). The outsourcing addressed working conditions, labour costs, working hours, qualifications, expertise, maturity of receivables from an external company, employment contracts. We monitored the risks in the human resources process and found the following situation: employee dissatisfaction due to low wages, 150 hours overtime without pay, no employee benefits, unpaid travel allowances, no career growth, no employee motivation, high employee turnover, low productivity and quality of work performed. The disadvantage of outsourcing is the delay in payments at the time of payment deadlines, which represents a high turnover of external employees.

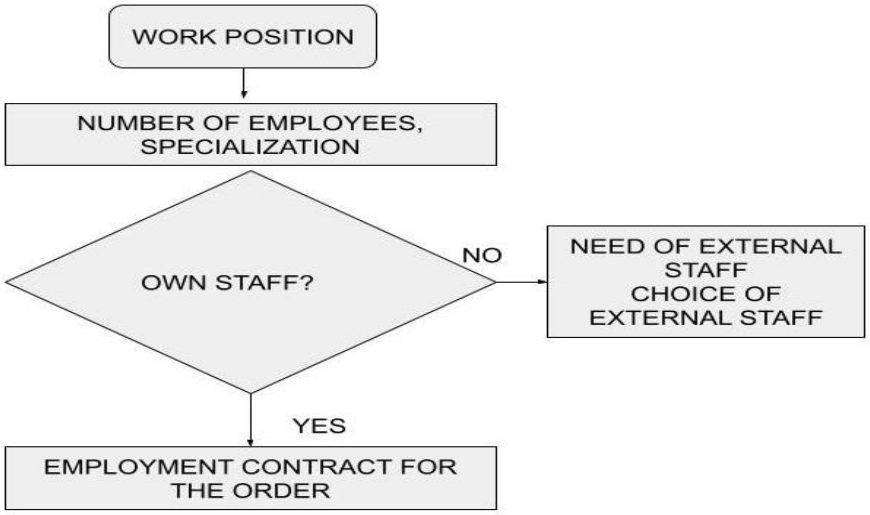

Figure 4: Process of human resource
(own source).

We monitored 5 parts of the human resources process (Figure 5) as the satisfaction of employees, motivation of employees, travel expenses, overtime without rewards, productivity. The indicator of the efficiency of those parts present improving in 3 parts and decreasing in 2 parts., Critical parts are travel expenses and overtime without rewards. These 2 parts are supported by law in Slovakia - Law of labor. The company has to change its approach in this area because this problem is connected to the high fluctuation of employees. The total value of the indicator of efficiency increase by about 0,32 - 32% in the human resources process.

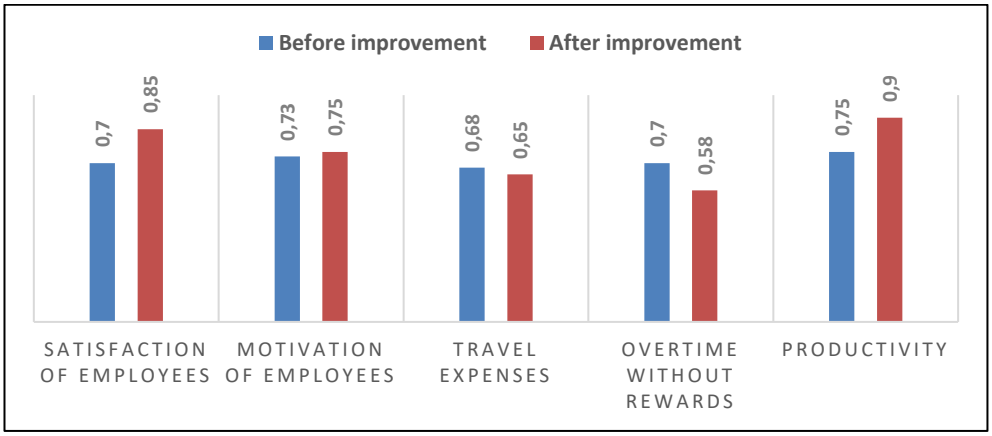

Figure 5: Human resource coefficient
(own source).

Purchase of material

It is a partial process focused on the purchase of input material for the implementation of orders (Figure 6). The company takes a very responsible approach to the selection of suppliers for the input material. This is an important process because the quality and price of the material determine the overall quality and price of the order, which is reflected in the budget. The entire range of materials depends on the nature of the order.

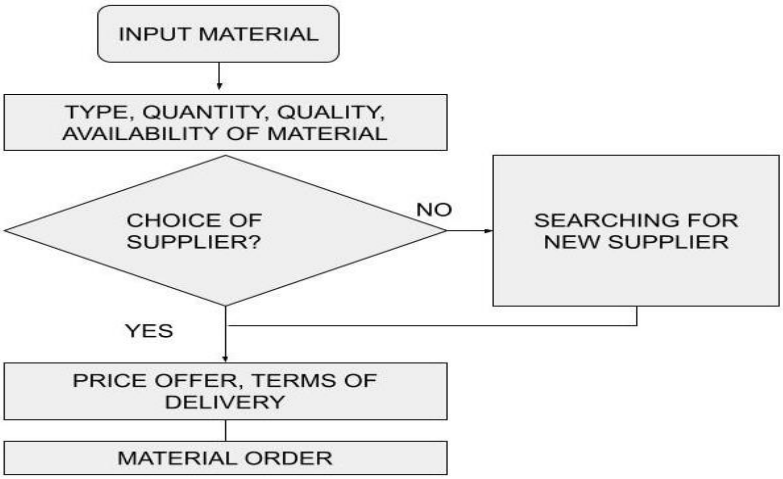

Figure 6: Purchase of material
(own source).

The supplier selection system is not stable; the company does not have contracted suppliers. The material needed for the implementation is purchased in the vicinity of the order. Price offers from suppliers are evaluated and the selection is made according to the required criteria. This method creates downtime in the purchase of material. This process does not have a supplier database, which is a significant risk.

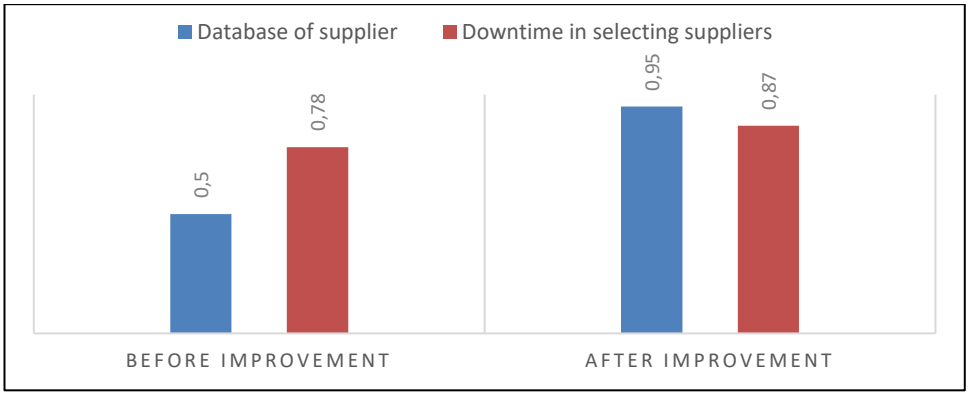

Figure 7. Purchase of material coeffiecient
(own source).

We monitored 2 parts of the purchase of material process as the database of suppliers and downtime in selecting suppliers. The indicator of the efficiency of those parts present improving in 1 part and decreasing in 1 part. A critical section is a downtime in selecting suppliers after an improvement of about an 8% decrease. The total value of the indicator of efficiency increase by about 0,28 - 28% in the purchase of material process.

Machine securing process

It is a partial process of order execution (Figure 8). Before the actual start of the order, it is necessary to plan the need for machines and production equipment. The choice of machines depends on the type of order. Basic issues are being addressed:
What machines do we need to complete the order?
When do we need machines?
How many machines do we need to complete the order?

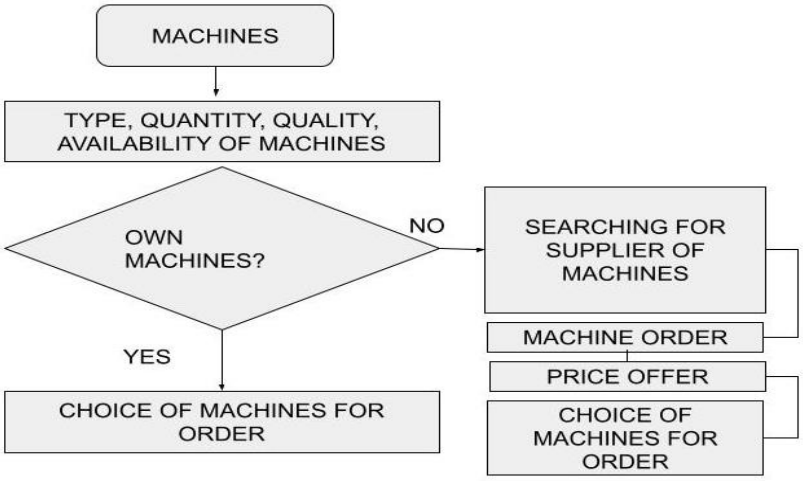

Figure 8: Machine securing process
(own source).

Procurement of machines is related to financial resources for renting machines or using outsourcing. The priority offer is our own machines and production equipment, which are, however, obsolete, it is necessary to use them to 100% of production capacity. The company uses external services - outsourcing, while in turn there is a problem with the choice of supplier, prices, and downtime. We monitored 3 parts of the Machine securing process (Figure 9) as the repair of machines, operating leasing, scaffolding rental. The indicator of the efficiency of those parts presents improvement. The total value of the indicator of efficiency increase by about 0,47 - 47% in the machine securing process.

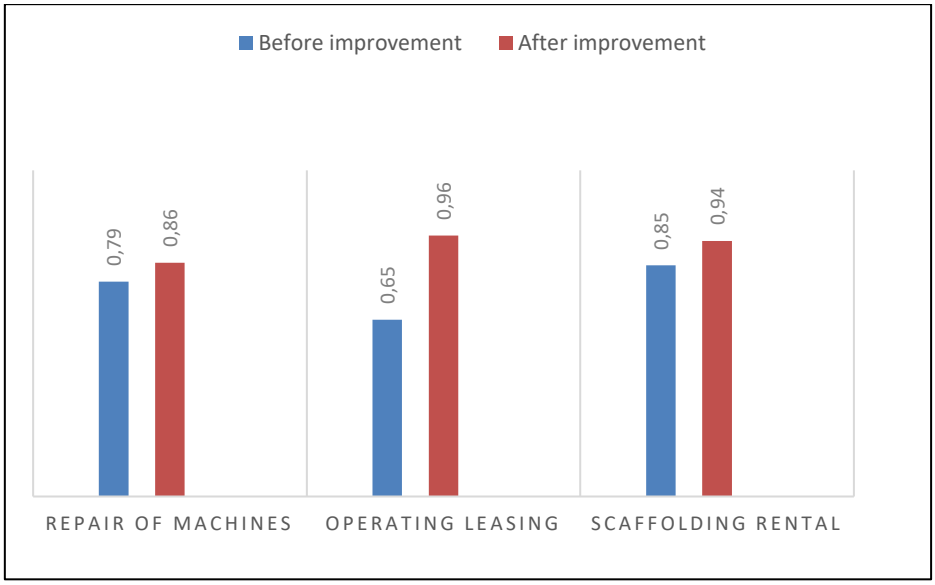

Figure 9: Machine securing process coefficient
(own source).

Budgeting of order

The economic activity is aimed at determining the costs related to the implementation of the contract and then determining the price of the contract for the customer. The price consists of the cost of materials, the cost of machinery, the cost of employee wages, and the profit that the company wants to obtain at the end of the contract. It is very important for the budgeter to determine the costs correctly. They must also accept the risks that may arise with the implementation of the contract. Setting the right price is a complicated process because if the cost budget underestimates the expected profit decreases. The shortcoming in the budgeting process is the creation of the budget, the responsibility of one person, errors in the budgeted items, acceptance of the specifics of individual contracts.

We monitored 3 parts of the Budgeting of order (Figure 10) process as the employee budgeting, mistakes in budgeting, cooperation. The indicator of the efficiency of those parts presents improvement in part cooperation. The total value of the indicator of efficiency increase by about 0,23 - 23% in the budgeting of order process.

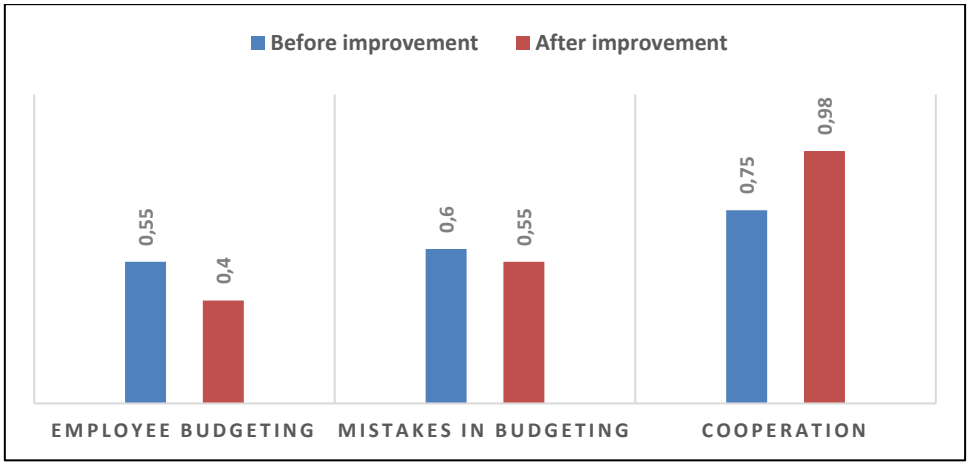

Figure 10: Budgeting of order process coefficient
(own source).

Control and realization of product, services

The actual handover of the construction work takes place by the final inspection and handover protocol. It is the output of the entire order. After finishing the work, the work is handed over to the customer. With the handover protocol, the company is responsible for the execution of the work in the required quality according to the project documentation. This handover protocol is then handed over to the investor, which means the completion of the entire work. We monitored 3 parts of the Control and realization of production process (Figure 11) as the continual control, detailed report, final, photo documentation.

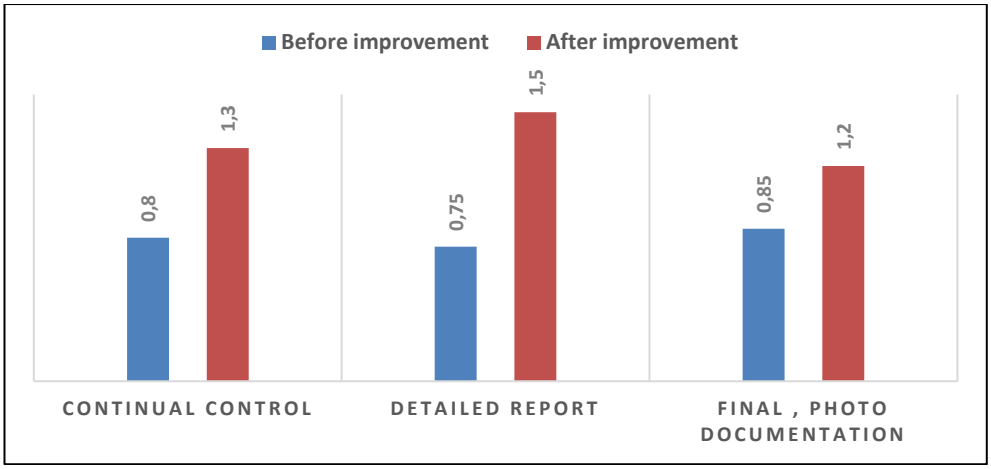

Figure 11: Control and realization of product process coefficient

(own source).

All those parts of this process are evidenced by increasing performance. The indicator of the efficiency of those parts presents improvement. The total value of the indicator of efficiency increase by about (average value) of 53% control and realization process.

This process is checked and verified by the construction supervisor, who checks the construction work in detail. If any deficiencies are found, the construction supervision will invite the company to eliminate them. In this step, the construction supervisor tries to reveal all deficiencies so that the construction can be handed over to the investor for use. The company eliminates all deficiencies at its own expense or from the budget. By analysing the handover and control process, it is necessary to find out where the weak points occur so that they can be eliminated in time. The main risk of this process is insufficient control, details in the handover protocol, monitoring of customer satisfaction, irregular journal entries, and employee error rates.

Complaints analysis

It is a partial process (Figure 12), which is implemented in case of complaints from customers. The analysis of the complaint concerns a substantiated complaint, which is substantiated by photo documentation. If the analysis of the complaint reveals that the error was not caused by the company, the complaint will be rejected. In terms of risks, errors caused by employees are mainly monitored.

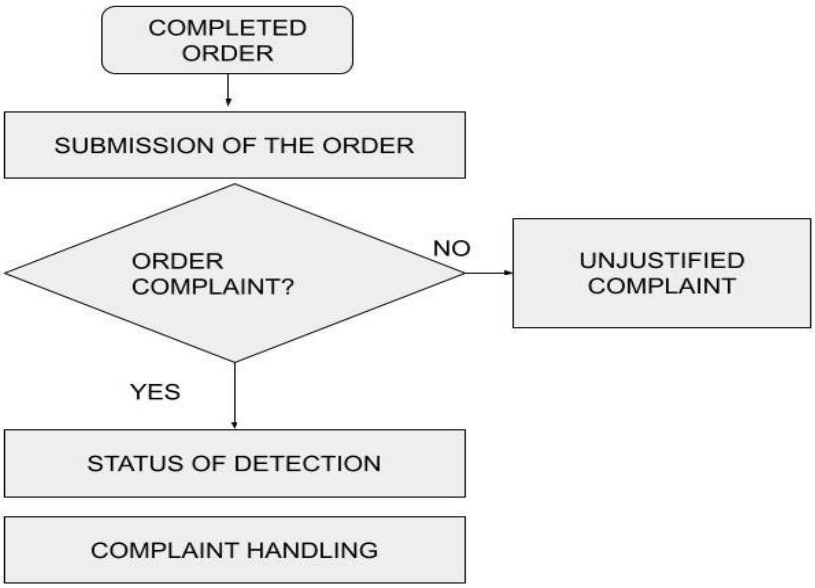

Figure 12. Complaint analysis process
(own source).

We monitored 3 parts of the Complaints process (Figure 13) as the continual control, detailed report, final, photo documentation. The indicator of the efficiency of those parts presents improvement. The total value of the indicator of efficiency increase by about 0,62 - 62% in the compaints process.

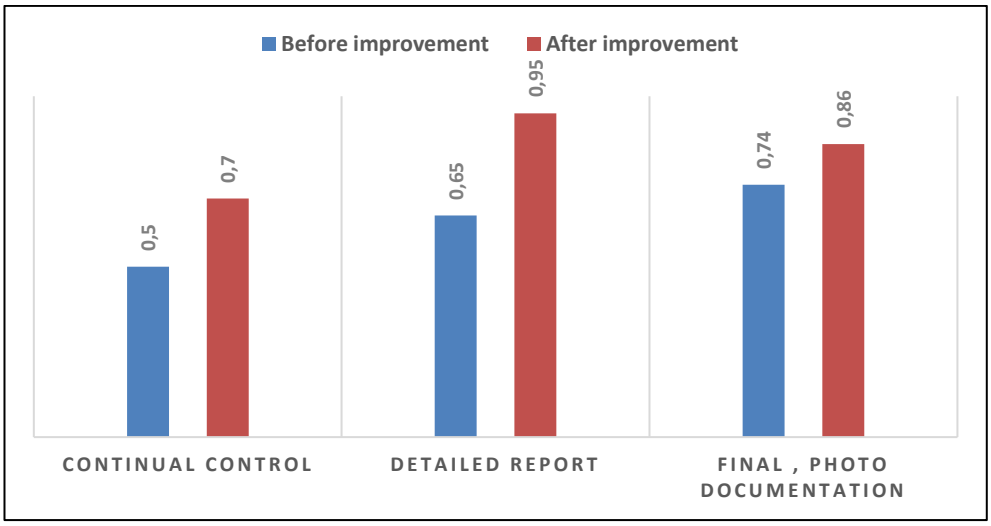

Figure 13: Complaint analysis process coefficient
(own source).

Discussion and Managerial Implication

Process management makes it possible to obtain information on losses, deficiencies, wastes, lack of resources, and necessary information for the improvement of all processes in the firm. In the case of process diagrams in order production in the selected firm means improvements and increasing value of efficiency for the each process. The development cycle of a process-oriented company represents the gradual improvement of business processes and all partial activities within individual processes. We investigated the situation after the introduction of corrective measures for individual processes, after application the process diagrams (Table 2-7).
In the area of human resources (table 2), there was no improvement even after the introduction of corrective measures in the case of the payment of travel allowances and overpayments of overtime, where the efficiency coefficient was Ke <0.70, which means noneffective process. Corrective measures adjusting the conditions of the Labour Code, but their observance and time delay of payments still persist in custom production, so it is not possible to describe these changes as an improvement. Based on a questionnaire survey of employees, shortcomings were found in employee valuation, in employee motivation, in overtime work of 150 hours without the right to remuneration, in low labor productivity with regard to the quality of services, in non-payment of travel allowances. In the area of human resources, corrective

measures were proposed, such as favoring wage conditions for permanent workers, overpaying overtime, providing labor benefits, which ultimately were to affect and increase employee motivation, performance, and productivity. The coefficient of efficiency increase 0,32 – 32%.

Table 2. Comparative analysis Human resources process

Human resources			
Area of improvement	**(Ke)Before improvement**	**(Ke)After improvement**	**Improvement**
Satisfaction of employees	0,70	0,85	+0,15
Motivation of employees	0,73	0,75	+0,02
Travel expenses	0,68	0,65	-0,03
Overtime without rewards	0,70	0,58	-0,12
Productivity	0,75	0,90	+0,15

Source: (own source – research).

In the area of material purchase (table 3), there is no system of suppliers, an effective database of suppliers and the activity of selecting a supplier is time-consuming, space-consuming. In the area of material purchase, there is no system of suppliers, an effective database of suppliers and the activity of selecting a supplier is time-consuming, space-consuming. In this area was used SCM instrument, a corrective measure was proposed for the introduction of an effective system of the supplier database, the conclusion of contracts with suppliers for the purchase of materials, while there was an improvement after the implementation of corrective measures about 28%.

Table 3. Comparative analysis Purchase of material

Purchase of material			
Area of improvement	**(Ke)Before improvement**	**(Ke)After improvement**	**Improvement**
Database of supplier	0,50	0,95	+0,28
Downtime in selecting suppliers	0,78	0,87	+0,08

Source: (own source – research).

In the area of the Machine securing process (table 4) was recorded improvements in all partial activities about 47%. In this area were used outsourcing, facility management, leasing. Procurement of machines and production equipment is financially demanding, the company's own machine park is obsolete, operational rental of machines is unavailable, the company uses scaffolding rental. Corrective measures are focused on outsourcing of machines and production equipment, on the purchase of new scaffolding, repair of non-functional machines in our own machine park. All implemented corrective measures brought improvements.

Table 4. Comparative analysis Machine securing process

Machine securing process			
Area of improvement	**(Ke)Before improvement**	**(Ke)After improvement**	**Improvement**
Repair of machines	0,79	0,86	+0,07
Operating leasing	0,65	0,96	+0,31
Scaffolding rental	0,85	0,94	+0,09

Source: (own source – research).

The area of Budgeting for order (table 5) cost budget preparation is inefficient and inaccurate. This process can use an Activity-based budgeting method or other methods from financial management. As part of the budget process, it is necessary to create a budget team that would prepare an accurate and thorough budget without errors, improving communication between the budgeter and his superior - the construction manager. Despite the proposal to create a budget team, there was no improvement, as the efficiency coefficient was Ke<0.70. The error rate in budgets has been reduced, and communication with the superior in budgeting has been improved.

Table 5. Comparative analysis Budgeting for order

Budgeting for order			
Area of improvement	**(Ke)Before improvement**	**(Ke)After improvement**	**Improvement**
Employee budgeting	0,55	0,40	-0,15

Mistakes in budgeting	0,60	0,55	-0,05
Cooperation	0,75	0,98	+0,23

Source: (own source – research).

In the area of handover, realization, and control (table 6), there are activities that show several shortcomings. As part of these activities, more frequent inspections, preparation of quality documentation, protocols, photo documentation, and feedback provided by satisfaction questionnaires are proposed. All implemented changes have improved and increase the coefficient of efficiency at the level 35-75% for each partial activity. The complex improvement is at level 53%.

Table 6. Comparative analysis Control and realization of product, services

Control and realization of product, services			
Area of improvement	**(Ke)Before improvement**	**(Ke)After improvement**	**Improvement**
Continual control	0,8	1,3	+0,5
Detailed report	0,75	1,5	+0,75
Final documentation, photo documentation	0,85	1,2	+0,35

Source: (own source – research).

There are shortcomings in the area of complaint analysis (table 7), the system of complaints is not implemented and managed. The corrective measure is linked to stricter control of the performed services, motivation of employees to perform better work, recording information in the construction diary. These changes meant an improvement at level 62% in the analysis of complaints.

Table 7. Comparative analysis Complaints

Complaints			
Area of improvement	**(Ke)Before improvement**	**(Ke)After improvement**	**Improvement**
Questionary of satisfaction	0,5	0,7	+0,2

The error rate of services caused by employees	0,65	0,95	+0,3
Regular entry in the task book	0,74	0,86	+0,12

Source: (own source – research).

Managerial instruments that are used in this selected firm for improvement of processes create a base for innovations and customers' needs fill. By these instruments were deficiencies in the sub-activities of the production process were partially addressed and corrective measures were identified within the individual activities, which meant mainly improvements for the production process. The process approach made it possible to draw up flowcharts of activities that enable their effective implementation.
HO: Hypothesis: Creating process diagrams in order production will improve process performance by at least 20%. This hypothesis was check on the basis of efficiency indicator and after implementation of the process diagrams in the firm was confirmed. The individual process improvement was at a level from 23% - 62%, which means more than 20%.

Conclusion

The process diagrams - flowcharts for all processes in the selected firm for order production in construction was recorded benefits in the technical, financial, social, and economic areas. These diagrams brought efficiency in processes. The total value of the indicator of efficiency increase by about 32% in the human resources process, in the purchase of material 28%, in machine securing process about 47%, in the budgeting of order 23%, in control and realization about 53% and in complaints 62%. The process approach makes it possible for the firm to obtain information on losses, deficiencies, wastes, lack of resources, and necessary information. Within the processed flowcharts for individual activities for custom production, their performance can be improved and achieve good added value. Corrective measures for the production process in custom production represent improvements that bring positive benefits. All corrective measures are linked to the use of management approach tools that are in synergy with process management. Cost management supports the activity of budgeting and calculating orders, Facility management includes outsourcing, operational leasing of machines and production equipment for the implementation of orders, quality management monitors the process of order submission and control, auditing, HRM - human resources management is linked to the use of external staff and their employment, Project management is linked to the project documentation of individual contracts. Based on the interconnection of individual management tools in the company, the quality of orders is increased and the requirements of stakeholders, customers, employees, suppliers are satisfied.

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ULEPSZENIE PROCESÓW PRODUKCJI ZLECONEJ W BRANŻY BUDOWLANEJ Z UKIERUNKOWANIEM NA WYDAJNOŚĆ PROCESÓW

Streszczenie: W artykule podsumowano argumenty w dyskusji naukowej na temat zarządzania wydajnością procesów w Przemyśle 4.0 jako podstawowego warunku doskonalenia procesów, eliminacji marnotrawstwa, wprowadzania innowacji, zdobywania przewag konkurencyjnych. Głównym celem badań było zbadanie wpływu diagramów procesów na możliwości doskonalenia procesów w produkcji zamówień w celu podniesienia jakości zamówień. Metody badawcze koncentrowały się na wykorzystaniu schematów blokowych dla poszczególnych procesów dla pewnego zamówienia. W badaniach wykorzystano wskaźnik efektywności procesu, wartości graniczne wskaźnika, analizę porównawczą. Przedmiotem badań był proces realizacji zamówienia w obszarze budownictwa. Trafność rozstrzygnięcia tego problemu naukowego była związana z jakością zamówień. W pracy przedstawiono wyniki wskazujące na znaczące usprawnienia w wybranym przedsiębiorstwie w poszczególnych procesach oraz podniesienie poziomu jakości świadczonych usług po zastosowaniu schematów blokowych dla procesów. W obszarze zasobów ludzkich i budżetowania zamówień obniżył się współczynnik efektywności, a pozostałe procesy wzrosły. Schematy blokowe w zarządzaniu procesami są bardzo skutecznymi instrumentami doskonalenia procesów. Wyniki mogą być przydatne do oceny wydajności procesów w produkcji zleconej w różnych dziedzinach przemysłu.

Słowa kluczowe: doskonalenie, innowacyjność, zarządzanie jakością, jakość, efektywność

以工艺性能为导向，改进工艺，促进建筑业生产

摘要：本文总结了工业 4.0 **中流程**绩效管理问题的科学讨论中的论点，作为改进流程、消除浪费、引入创新、获得竞争优势的基本前提。研究的主要目的是检查流程图对改进订单生产过程的可能性的影响，以提高订单质量。研究方法的重点是使用流程图来处理某些订单的各个流程。研究中采用了工艺效率指标、指标限值、比较分析。研究对象为建筑领域订单生产过程。这个科学问题的决定的相关性与订单的质量有关。本文提**出的**结果表明，所选公司在个别流程方面有显着改进，并在使用流程流程图后提高了所提供服务的质量水平。在人力资源和订单预算方面，效率系数下降，其他过程增加。流程管理中的流程图是改进流程的非常有效的工具。结果可用于评估各个行业领域的订单生产过程的性能。

关键词：改进、创新、质量管理、质量、效率