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DETERMINING THE APPROACH TO QUALITY IN THE CONSTRUCTION OF THE PROCESS LANDSCAPE OF THE ODESSA POLYTECHNIC STATE UNIVERSITY

Л.М. Перпері, Г.О. Оборський, Г.М. Голобородько, Ю.Г. Паленний, В.П. Гугнін. **Визначення підходу до якості при побудові процесного ландшафту Державного університету «Одеська політехніка».** Об'єктом цього дослідження є модель процесного ландшафту закладу вищої освіти. В цьому дослідженні було встановлено взаємозв'язок верхніх рівнів циклів постійного поліпшення з циклами нижніх рівнів. Запропоновано визначати взаємозв'язок рівнів процесів постійного поліпшення через фазу «Роби» таким чином, що ця фаза процесу верхнього рівня реалізується повним циклом підпроцесу. Були визначені вихідні положення та послідовність дій для побудови ландшафту системи управління якістю для чого необхідно було визначити контекст діяльності університету; визначити процеси за категоріями та ступінь їх деталізації; визначити послідовність процесів різних категорій та взаємозв'язку між ними. У результаті побудовано процесний ландшафт із застосуванням графічного методу. Для реалізації інноваційних рішень, реінжинірингу процесу загалом запропоновано цикл PDCA доповнити фазою «S – старт». Ця фаза має ініціювати створення певних процесів, які після старту мають розвиватися самостійно без втручання вищого керівництва. Проведено аналіз процесного ландшафту відповідно до поставлених цілей та їх придатності відповідно до контексту діяльності організації. Цінність роботи полягає в тому, що заклади освіти можуть використовувати результати досліджень, представлених у статті, для побудови власного процесного ландшафту системи управління якістю закладу освіти з урахуванням вимог стандартів ISO 9001:2015, ISO 21001:2018 і стандартів та рекомендацій ESG 2015; у роботі показано способи інтеграції рекомендацій ESG до структури вимог стандартів ISO.

Ключові слова: підхід до якості, процесний ландшафт, управління якістю, забезпечення якості, стейкхолдери

L. Perperi, G. Oborskyi, G. Goloborodko, Yu. Palennyy, V. Gugnin. **Determining the approach to quality in the construction of the process landscape of the Odessa polytechnic state university.** The object of this research is the process landscape model of an institution of higher education. In this study, the relationship of the upper levels of the continuous improvement cycles with the cycles of the lower levels was established. It is proposed to determine the relationship of the levels of continuous improvement processes through the "Do" phase so that this phase of the top level process is implemented by the full cycle of the subprocess. The initial positions and sequence of actions for building the landscape of the quality management system were determined; for this, it was necessary to determine the context of the university's activities; determine the processes by categories and their degree of detail; determine the sequence of processes of different categories and the relationship between them. For the implementation of innovative solutions, reengineering of the process as a whole, the Plan-Do-Check-Act cycle has been proposed to be supplemented with the "S-start" phase. This phase should initiate the creation of certain processes, which after the start should develop independently without the intervention of top management. The analysis of the process landscape was carried out in accordance with the stated goals and their suitability in accordance with the context of the organization's activities. The carried out work value is that educational institutions can use the scientific research results presented in the article to build their own educational institution quality management system process landscape taking into account the requirements of ISO 9001:2015, ISO 21001:2018, standards and guidelines ESG 2015; the article exposes ways to integrate ESG recommendations into the ISO standards requirements structure.

Keywords: quality approach; process landscape; quality management; quality assurance; stakeholders

Introduction

With the introduction of the series 9000 ISO standards new version the organizations developing and implementing a quality management system do focus on the risk-based approach. However, one shouldn't forget that risk-based approach is a part of the process approach based on the continuous improvement PDCA Shewhart-Deming cycle (Plan-Do-Check-Act). The successful result of building the entire quality management system will depend on an adequate description of the organization's processes and in particular on the success in solving tasks related to decision making and risk assessment.

Therefore, first of all, necessary to study carefully and properly describe the organizational processes. Namely executive top processes (managerial), basic, supportive, performance measuring and

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evaluating. The interconnection of top-level processes is usually provided as a process landscape which shows the interaction of management and supporting processes with the main processes aimed at meeting the interested parties' (stakeholders') requests. Development of the organization's process landscape should be based on the chosen approach to quality, namely the approach to management and quality assurance.

Analysis of recent research and publications

Actually, the higher education quality in the context of world economy globalization is considered as a strategic asset of national development and competitiveness. Accordingly, this also renders its effect to the educational services quality. The authors of the work [1] analyzed the methods, structures, processes of quality management used in 311 universities at different countries. At that analysis issue, it was established that the quality management system is used formally or informally by most universities. Research running; the following quality management problems have been identified:

– lack of documented clear procedures with quality management responsibilities allocation ibidem the absence of responsibility matrices;

– insufficiently developed quality management supporting structure, lack of institutional quality management units;

– neglecting quality management tools such as feedback through employment and graduate distribution;

– data and information obtained through monitoring process are not used properly as evidenced by students' feedback ignoring that produces a negative impact on decision-making aimed at improving the quality of teaching and learning;

– lack of assessment procedure.

The paper [2] presents a wide range of academic quality definitions. The term quality management refers to a set of measures regularly taken at the institutional level and aimed at ensuring both individual indicators of the higher education quality and quality improving in general. The term "quality management" is commonly understood to mean the management of all activities that ensure the quality policy implementation, as well as quality objectives and commitments with subsequent implementation through quality planning, its monitoring, provision and improvement. Quality assurance activities depend on the existence of the necessary institutional arrangements ensured by a sustainable quality culture, namely a set of generally accepted quality principles inherent in the management system used in a particular institution.

In the study [3] the author proposed the concept of integrated management in the field of higher education based on establishing casual relationships of various management approaches. As a starting point, it is proposed to use strategic management based on an analysis derived from evaluating the structure indicators' balanced system. At the next stage, it is proposed to apply internal benchmarking and external evaluation to ensure quality. At the final stage, it is proposed using a process approach to improve activities. The author also emphasized that making only structural changes is not a sufficient condition for improving work and increasing its efficiency.

This study running examined was the integration of strategic management and quality assurance in Romanian higher education system on the example of Petru Maior University of Tirgu Mures (UPM) [4]. Quality assurance requirements in Romanian universities are set by the Romanian Agency for Quality Assurance in Higher Education (ARACIS), and the quality management systems implementation in accordance with ISO 9001 is not a regulatory requirement. However, the UPM management decided to implement a quality management system both in accordance with ARACIS requirements and with the ISO 9001 standard, having also developed its own levels for performance indicators. The quality management system implementation was carried out in three stages:

– in the first stage, the quality strategy was implemented based on the standards and performance indicators required by ARACIS;

– in the second stage, 22 own standards have been set to determine the management system performance indicators levels;

– in the third stage, in order to gain a strategic advantage, the management system was reorganized in accordance with ISO 9001:2008 standard version and the requirements of ARACIS.

The UPM developed a process map based on processes categorization according to ISO 9001. With reference to ISO 9001, the university must use adequate methods to monitor and measure processes. To this end, UPM presented a processes matrix for the two main activities: new curriculum development and research management. The processes' documentation routine according to the matrix, includes information on inputs, outputs, measurement methods and frequency, as well as efficiency indicators. The operating procedures for the respective processes are aimed at achieving the performance indicators established by ARACIS.

The paper [5] presents a systematic review of literature on quality management in higher education system. The authors carried out an analysis of quality management systems implemented in higher educational institutions from the position of three levels: the level of the process, the organizational level, the level of quality management principles. In that analysis course there was also revealed that, in most cases, quality management is carried out not at all levels. The positive impact of university quality management systems on the development of tools for higher education institutions classification and ranking is underlined. It is noticed that mostly cited studies are theoretical ones still in some cases containing statistical data but never highlighting practical solutions to improve management systems. The authors believe that the "general" integration of quality management in higher education is not yet a reality, although the quality management practices introduction in a university should be integral to the development of university as is and to its strategic planning. Quality management is just as important as the management quality.

As a result of the conducted reference sources analysis, it can be noted that such quality aspects as quality embodied with excellence, quality as the indicator of compliance with goals set, quality as improvement and excellence reaching tool do change over time, and therefore, it is necessary to revise the approaches to quality that should fit the higher education paradigms.

The purpose of research

This study is purposed to define an approach to quality establishing interconnections between all the processes of university in order to achieve sustainable development by improving the university's organizational system.

Research materials and methods

The development of an approach to quality in universities has a conceptual character in defining activities, their description and systematization. To solve this problem, one can use the methodology for determining the approach to quality in accordance with international standard ISO/IEC 40180:2017 criteria [6]. There exist various options in this task implementation. The first one can be implemented after choosing the quality approach, for example, based on the process approach defined by the international standard ISO 9001 [7] or the EFQM Model [8], either Malcolm Baldrige Quality Award [9], or others; next, in accordance with the chosen model, necessary is to identify the processes and describe them in the categories adopted in some given model. The second option is based on consideration of various approaches to quality, their analysis, and comparison of key elements and adoption of the optimal approach, taking into account the analysis. The third one is based on the harmonization of various approaches to quality and combining them into a consistent model.

Taking into account the specificity of higher education activities context, the legislative and regulatory framework in developing the approach to quality, the third option was adopted as the basis. This approach includes the following steps:

– combining quality approaches contained in international standards, educational standards and guidelines of ENQA, best university practices;

– analysis of quality approaches, determination of cross-standards conformity;

– development of a coherent model.

The ISO 9000 standards contain requirements and recommendations for the construction of quality management systems and offer mechanisms to improve both performance and efficiency. The conformity assessment, for example, in the form of a certification procedure, allows to assess these re-

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quirements implementation. The models of excellence at their core contain criteria for evaluating various types of institutional activity. The degree of compliance allows a comparative assessment of various organizations on the same criteria.

The development of an approach to quality was based on a process approach to the institutional management. The ISO 9001 standard establishes the need for a process approach in quality management systems, focusing the organization's attention on increasing the stakeholders' satisfaction meeting their expectations [7]. Recently, the international standard ISO 21001:2018 was published, which can be used as a tool for managing the educational services providing institutions [10]. In order to determine a systematic approach to quality assurance, it is advisable to take into account the requirements of standards and guidelines for quality assurance in the European Higher Education Area (ESG), which are focused on ensuring the quality of education and teaching, including research and innovation [11].

Results and discussion

The first and most important task the quality management systems developers are facing is to plan the developing process. A high-quality planning is possible only when the task is distinctly defined and clear to the developers that is, it is correctly understood by all the quality management system elaboration process participants. For this purpose, the quality management system planning begins with the development of its model and that model implementation in the form of the described processes (procedures), their inputs, outputs and interconnection.

To create an intelligible clearly understood structure of enterprise processes, generally the developers are using the process landscape (or landscape of processes), which allows to determine on the basis of the chosen system model the interconnection of top-level processes for their coordination according to the standardized pattern of the processes, their inputs and outputs.

The process landscape is necessary in order to present the quality management system structure, its basic properties and interconnections with the organization's context in an accessible and understandable way. Analysis of the landscape structure will allow making optimal decisions on managing the organization's activities without losing sight of the system strategic goals. Apart that, such an analysis will reveal the main sources of risks, which consideration is a prerequisite to build business processes today.

There are several ways to represent the process landscape:

– in the form of processes, their inputs and outputs as well as their interconnection verbal description;

– in the form of a symbolic or graphical representation of the processes, their inputs, outputs and interconnection;

– using the colour mark of individual properties of processes or their interconnections.

The information presented in the form of a symbolic or graphic flowchart is perceived by the project participants better than same processes' verbal description since the structure represented graphically is "easier to read". The ease of flowcharts perception is important for the correct and equal understanding of processes' structure by all the quality management system development project participants.

Dividing the system structure into individual elements (blocks) allows distributing the system individual elements development between different executives thus ensuring the entire control system integrity. The colour marking of processes allows one to represent the system structure in three dimensions by establishing the interconnection and subordination of process landscape various levels.

An unambiguous description of top-level processes structure in the form of a process landscape allows a more accurate planning of system procedures development process by determining the exact number of processes at the appropriate level and their relationships. A clear representation of the system as a whole and of the given process location in the system allows various team members autonomously starting the procedures designed to describe these processes, the intermediate results being controlled while the designed procedure implementation.

A verbal description of control systems processes without their graphical representation nowadays is generally not in use, since such a description is not strictly formalized and, therefore, allows for ambiguous understanding. The description of even a simple system will be long enough and difficult to understand, thus contributing to interpretation errors, for example, due to different understandings of terms. Due to such description verbosity concerning the systems processes and the system as a whole, the probability of errors associated with the different understanding of the developers of individual provisions increases.

Nowadays, sufficient experience has been accumulated in constructing process landscape in creating production quality management systems for manufacturing enterprises. As a rule, they act as follows:

– studying the processes operating at the enterprise, determine their boundaries;

– describing their relationship;

– matching with the standards requirements.

Enterprises with a similar structure, similar processes often borrow the results of such work from those who have already done it. Such ready flowchart use can reduce the cost of creating a management system, but without a proper analysis and understanding of borrowed decisions, an inadequate description of the current management system can be obtained, which in turn will lead to higher costs for bringing the actual management system to its documented presentation.

The main distinctive feature of educational services is the presence of several interested parties, whose vectors of interest do not always coincide. Therefore, the process should be structured in such a way as to ensure the stakeholders satisfaction in the most optimal way. This satisfaction is achieved by creating added value for the client in the most efficient way. The management system effectiveness to a large extent depends on a clear and proper understanding of the organization's processes, an understanding of their interconnections as well as the distinctive features.

When describing the top-level processes of organizations providing educational services, the following distinguishing features from manufacturing enterprises can be evolved:

– differences in the understanding of education goals among different stakeholders;

– need to combine educational and scientific activities in the university;

– degree of dependence on changes in legislation;

– constant changes in the structure of demand for educational services.

The stakeholders of higher education include: applicants for higher education, the state, employers and employees of higher education. Details on the relationship between higher education stakeholders are described in the study [12].

The combination of educational and scientific activities imposes certain requirements for the formation of a process landscape. It is necessary to take into account that the scientific activity results, in addition to the fact that universities must make a profit, should also be aimed at improving the quality of education both by increasing human resources and by integrating the results into educational programs, while these tasks prioritization is ambiguous. Therefore, the processes associated with scientific activities should be “embedded” in the overall “educational and scientific” activities.

In the process landscape, special corporate content management processes are provided taking into account the legislation requirements.

The account for changes in the structure of demand for educational services is implemented in the process landscape through communication processes with society and the media space, as well as through customer satisfaction monitoring.

All of the above features should be consistent with the underlying approaches in determining the relationship of processes while building the landscape. Thus, the following depart points have been adopted:

– the university activity is based on the principle of continuous improvement using the well-known Shewhart-Deming PDCA cycle, and in such a way that the processes of each next level implement the “Do” step of the top-level cycle [13, 14];

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– in contrast to the classical approach, it is assumed that the “Plan” step of each cycle has two inputs: one, since this is taken after the “Act” step, and the second as a link to a higher-level process;

– to ensure their mutual development the educational and scientific activities are considered as interrelated main types of university activities;

– the processes ensure compliance with the requirements of ISO 9001, ISO 21001, as well as educational standards and guidelines of ENQA.

When building a process landscape, they were guided by the fact that its main purpose is to clearly define the main and supporting types of university activities and their interrelations. Documentation allows providing an unambiguous understanding of the highest-level processes by all participants in the educational process. For a better understanding of the interrelationships of top-level processes, the proposed process landscape does not include details on the implementation of these processes. The process landscape describes only the highest-level processes.

One of the main provisions of the developed process landscape is that all levels of processes are interconnected, so that part of the upper level cycle, provided by step “D”, is implemented by the complete cycle of the PDCA process of the lower level (see Fig. 1).

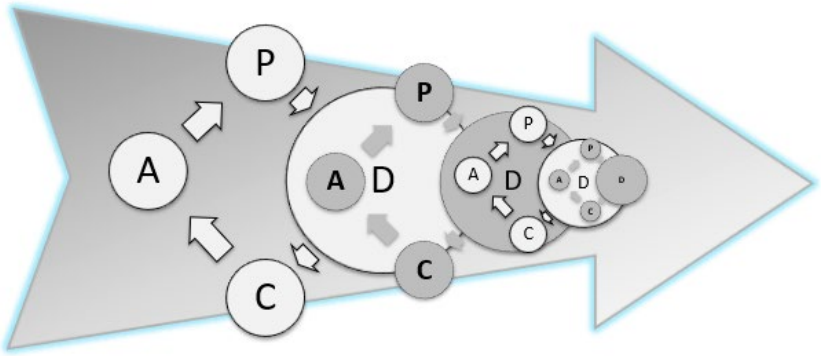

Fig. 1. Implementation of upper and lower levels “nested cycles”

For simplicity, each process of the upper level corresponds to a single process of the lower level, however, in a real control system, step “D” of the upper level of the cycle is implemented by several processes of the lower level as shown in Fig. 2.

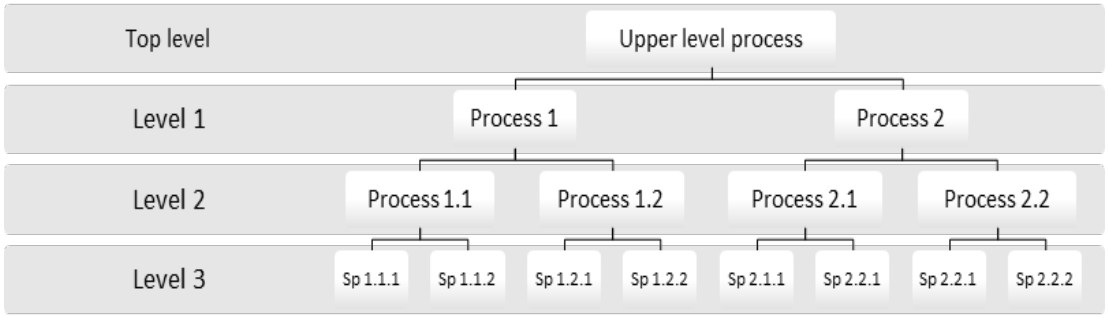

Fig. 2. Hierarchy of the education quality management system processes

Considering the above approaches, a process landscape was constructed to describe the processes of the Odessa Polytechnic State University, thus representing the upper level of the university’s main and auxiliary processes. All educational and scientific activities of the university are based on the principles described above (see Fig. 3).

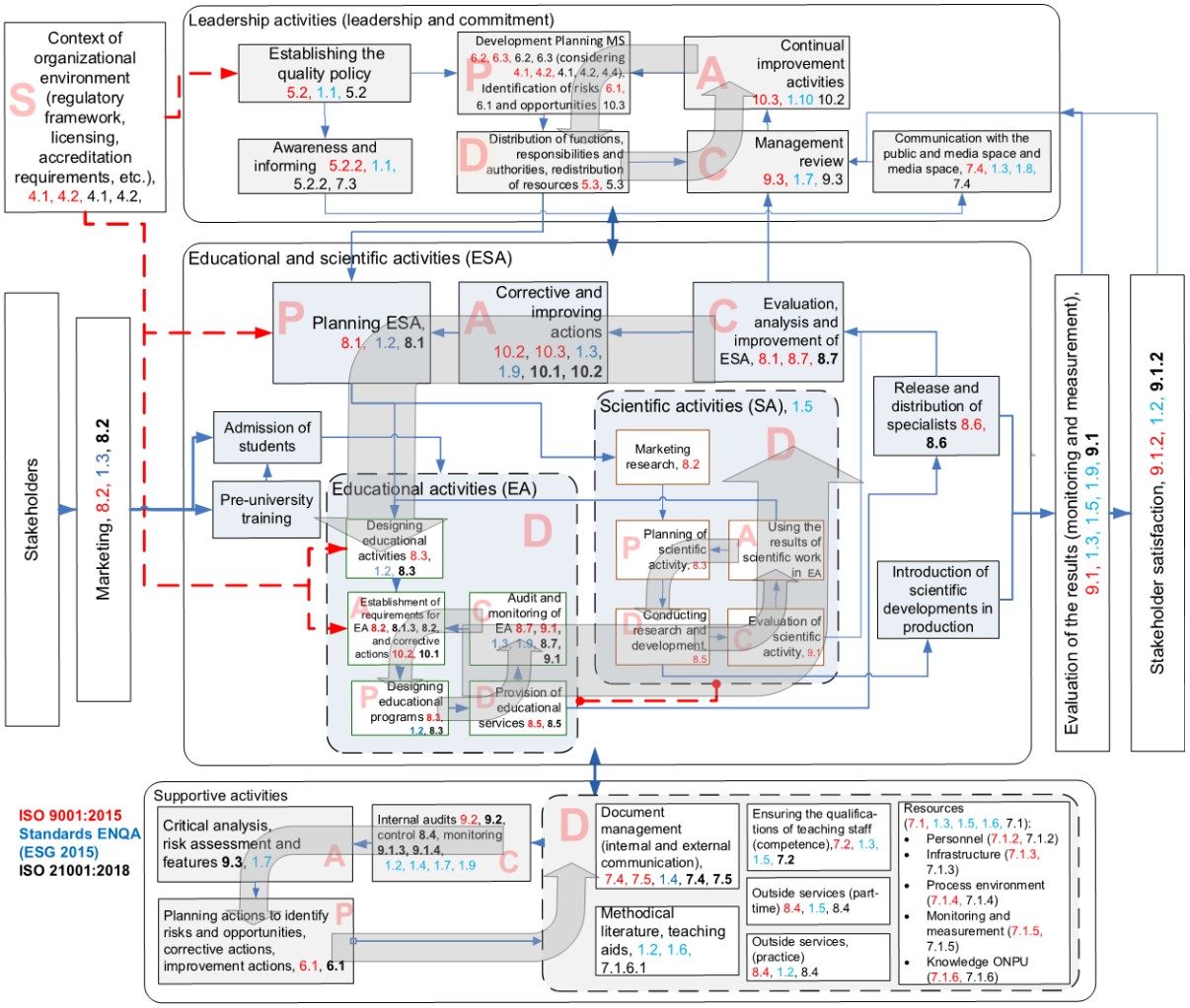

Fig. 3. Process landscape of Odessa Polytechnic State University

All processes are related to the implementation of the principle of continuous improvement of PDCA where: P – "Planning educational and scientific activities", D – "Didactics, educations activities" / "Scientific activities", C – "Evaluation, activity analysis", A – "Corrective and improving actions". Steps D – "Educational activities" and "Scientific activities" are considered as processes of the next level, and include the full PDCA cycle of the corresponding level. So, "Educational activity" is presented in the form of steps: P – "Designing educational programs", D – "Provision of educational services", C – "Audit and monitoring of educational activities", A – "Establishment of requirements for educational programs". "Scientific activity" is presented in the form of steps: P –"Planning of scientific activity", D – "Conducting research and development", C – "Evaluation of scientific activity", A –"Using the results of scientific work in educational activities".

The principle of continuous improvement implies that the process owner should regularly analyse his activities results and, based on that analysis results, plan actions to improve the process. However, in some cases, the impulse to improve the process is not the results of the current process analysis, but is due to factors determined by external conditions. For top-level processes, such an impulse can refer to a change in the legislative base, a change in demand in the market for services, which implementation can be associated not so much with a gradual improvement but rather with the reengineering of the process as a whole. For the university's quality system lower level processes, such an impulse can become orders from the top management, for example, to develop new educational programs aimed at expanding the range of educational services provided. Influenced with such an impulse, the process owner develops new or revises the existing processes and further supports their continuous improvement.

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In the university process landscape for each PDCA cycle, an additional step "S" (start) is provided, which embodies the departure point for the beginning (start) of innovation and reengineering. This step implementation for the university upper level processes is associated with a change in the external conditions or the demand for certain types of educational services. The top management, carrying out its activities, sets tasks for the subordinate processes' owners. Thus, the connection between the processes of different levels is carried out through the step "S".

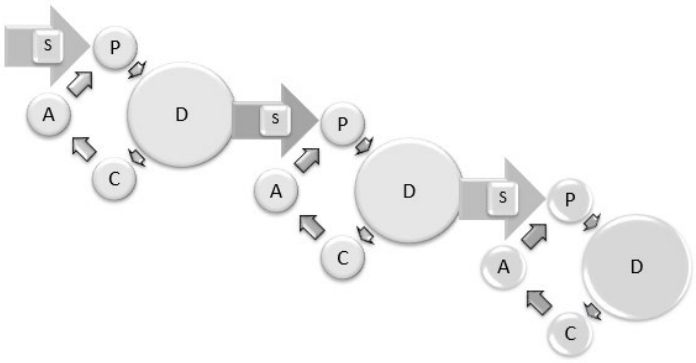

Fig. 4. Mutual relation of upper level processes with the lower level processes

Step "S" in relation to its process is performed not cyclically, but once. At the same time, this step is cyclical with respect to the top-level process (see Fig. 4).

Such a cycle can be written in the form of S.PDCA formula. In practice, the university process landscape structure follows the principle embodies with the procedure "Educational activities development". The input to this process is a change in the requirements of regulatory framework for licensing and accreditation, as well as orders from senior management. A similar process is envisaged for scientific activities.

The presence of an additional "S" step to the classic PDCA cycle serves as a path to implement the "leadership of leadership" principle of ISO 9001, since namely in this way that new processes, new activities and new ways of solving problems are "launched".

The developed Odessa Polytechnic State University process landscape provides for the university educational and scientific activities classical management through the management of activities concerning the distribution of functions, duties and powers, as well as the redistribution of university resources. The distribution and redistribution of powers, responsibility and resources is carried out by the management on the basis of data analysis and evaluation of activities for the university main and auxiliary. In addition, the management takes into account changes in the legislative framework requirements, as well as carries out activities on communication with the public and media space. To this end, the management maintains the processes of monitoring the legislative field as well as of monitoring the university's activities results as a whole, thus providing feedback on the satisfaction of all stakeholders.

The university supporting processes include the processes of document circulation, methodological support to the educational process, ensuring an adequate level of teaching staff qualification, maintaining infrastructure, etc. The new version of ISO 9001 clearly defines the need for a risk-based approach to achieve an efficient quality management system. To implement this approach in supporting processes, a separate subprocess of assessing the risks and opportunities of both the main educational and scientific and auxiliary processes is dedicated.

The risk-based approach is presented in the form of a PDCA cycle containing such steps: P – "Planning actions to determine risks, corrective and improving actions", D – "Performing various types of supporting activities", C – "Internal audits, control and monitoring", A – "Critical analysis, assessment of risks and opportunities".

Conclusions

The analysis has showed the distinctive features of educational services process landscape structure and its integration to the principles of the process approach, focused on continuous improvement.

The significance and place of the university scientific activity, and its interaction with educational activities have determined.

It is proposed to establish the relationship between levels of continuous improvement processes through the "Do" phase in such a way that this upper level process phase would be implemented by the full cycle of the subprocess.

To implement innovative solutions, reengineering the process as a whole, making changes to the educational process not due to internal continuous improvement, but implied by the need to comply with changing legislation, as well as for educational process operational management proposed is to supplement the PDCA cycle with the S-start phase. This phase should initiate the creation of certain processes, which once started shall develop independently without the intervention of top management.

In order to implement the continuous improvement principle, process management is carried out in a closed loop. The process management at the Odessa Polytechnic State University is implemented on the basis of firm knowledge, clearly established principles and methods of management. For the first time the quality management system was certified in 2006, today the university quality management system passed the conformity assessment (repetitive certification) for compliance with the requirements of the ISO 9001:2015 standard in 2017 (No. UA.QS.027.169-17).

The developed process landscape is built taking into account the basic quality management principles in accordance with ISO 9000:2015 ISO 21001:2017 standards. As can be seen from the process landscape (Fig. 3), the main processes of the university, presented as the processes which are interconnected through the Shewhart-Deming cycle, include the stages of planning, implementation, analysis of educational services and implementation of corrective actions. To carry out the structural units' activities analysis in accordance with the established procedures, the Centre for Quality Assurance in Higher Education was established at the university. The university departments activities analysis is carried out in the form of audits organized in accordance with ISO 19011 standard requirements. The produced audit reports allow not only to determine inconsistencies, but also to identify undisclosed potentials for improving the education quality.

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