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## METHODOLOGICAL PRINCIPLES OF SMARTIZATION: DETERMINATION OF PRIORITY DIRECTIONS

## МЕТОДОЛОГІЧНІ ЗАСАДИ СМАРТИЗАЦІЇ: ВИЗНАЧЕННЯ ПРІОРИТЕТНИХ НАПРЯМКІВ

**Summary.** Innovation has always been the driving force of progress. Innovations allow the enterprise to apply the strategy of removing the cream, leaving behind competitors, improving its activities and, sometimes, the well-being of countries and the world as a whole. However, innovations have two disadvantages: a) high cost; b) a tiny part of them achieves commercial success. If you pay attention to the statistics, a small number of industrial enterprises are innovatively active: from 16 to 19% in recent years. At the same time, it should be noted that Ukrainian enterprises have so far failed to attract foreign investments to finance innovative activities. Every year, the results of innovative activity – the introduction into production of innovative types of products, names and specific weight of implemented innovative products – decrease. At the same time, the particular weight of enterprises that introduced innovations is unchanged: approximately 10–15% in the corridor. In recent years, the meaning has even come out of the hallway. This means that for 17 years, enterprises have continued to engage in innovations at almost the same level. Still, their vector has changed – towards introducing new technological processes, namely low-waste, resource-saving ones. The reality of Ukrainian industrial enterprises is that most of them are at the stage of maturity or decline, that is, at the stages when innovations require significant funds for their introduction. The smartization of the enterprise is an alternative to innovation.

The process of smartization carried out at the enterprise is not isolated, and it acts as an integral part of the complex system of transformation of the enterprise. Ignoring the changes leads to missed benefits or direct losses in implementing smartization works. Smartization, in its essence, is close to reengineering: they are identical in terms of goals but differ in methods. Reengineering is a radical change of business processes to obtain rapid growth of the leading indicators of the enterprise's economic activity. Work on smartization does not start from the bottom (at the level of document flow and execution of single operations of the business process) but from above – at the macro level, when the enterprise is considered an operation in the supply chain of additional values. This allows us to identify and realize the principal reserves of the enterprise since, as a rule, more than 50% of the reserves for cost reduction and quality improvement lie outside the enterprise.

**Key words:** business process, innovation, reengineering, smartization.

**Анотація.** Інновації завжди були рушійною силою прогресу. Саме інновації дозволяють підприємству застосовувати стратегію зняття сливок, залишати позаду конкурентів, покращувати свою діяльність та, іноді, добробут країн та світу в цілому. Проте у інновацій є два недоліки: а) висока вартість; б) дуже мала частина з них досягає комерційного успіху. Якщо звернути увагу на статистику, то незначна кількість промислових підприємств є інноваційно-активними: від 16 до 19% за останні роки. При цьому треба відмітити, що українським підприємствам поки що не вдається залучити іноземні інвестиції для фінансування інноваційної діяльності. З кожним роком знижується результати інноваційної активності – впровадження у виробництво інноваційних видів продукції, найменувань та питома вага реалізованої інноваційної продукції. При цьому питома вага підприємств, що впроваджували інновації, є незмінною: у коридорі приблизно 10–15%. За останні роки значення навіть вийшло з коридорного. Це означає, що підприємства протягом 17 років практично на одному рівні продовжують займатися інноваціями, проте вектор їх змінився – у бік впровадження нових технологічних процесів, а саме маловідходних, ресурсозберігаючих. Реалії українських промислових підприємств в тому, що більшість

з них знаходяться на стадії зрілості або спаду, тобто на стадіях, коли інновації потребують значних коштів для їх запровадження. Альтернативою інновацій вважаємо смартизацію підприємства.

Процес смартизації, що проводиться на підприємстві, не є ізольованим. Він виступає складовою частиною комплексної системи перетворення підприємства. Ігнорування змін призводить до упущеної вигоди або прямих втрат при проведенні робіт із смартизації. Смартизація за своєю суттю близька до реінжинірингу: вони тотожні за цілями, проте відрізняються методами. Реінжиніринг – це радикальна зміна ділових процесів для отримання стрімкого зростання основних показників господарської діяльності підприємства. Робота по смартизації починається не знизу (на рівні документообігу та виконання одиничних операцій бізнес-процесу), а зверху – на макрорівні, коли підприємство розглядається як операція в ланцюжку поставки додаткових цінностей. Це дозволяє виявити і реалізувати основні резерви підприємства, оскільки, як правило понад 50% резервів зниження собівартості і підвищення якості лежать за межами підприємства.

**Ключові слова:** бізнес-процес, інновація, реінжиніринг, смартизація.

**Statement of the problem.** Innovation has always been the driving force behind progress. It is this innovation that allows the enterprise to apply a cream removal strategy, leave behind the competition, improve its business, and sometimes the well-being of countries and the world as a whole. However, innovation has two disadvantages: a) high cost; (b) a tiny fraction of them achieve commercial success. We believe that enterprise smartization is an alternative to innovation.

**Analysis of recent research and publications.** Unfortunately, there are no thorough scientific studies on the conceptual foundations and methodology of smartizing the activities of enterprises. The term “smartization” has recently been used by domestic scientists, but this term does not have a definition. Moreover, this term is mainly considered in the context of smart-city and not industrial enterprises. In addition to the works of the author [1–4], it is possible to highlight only two groups of Ukrainian scientists who use the term “smartization” in the context of the industry:

- Kyiv scientists A. F. Dasiv, A. A. Madykh, O. O. Okhten [5–6] deal with issues of smartization of industrial enterprises but mostly use the terms “smart industrialization” and “smart industry”. The term “smartization” is interpreted by them as “...increasing the role of digital information technologies in all aspects of production activity” [6, p. 121]. This definition is too broad and focuses only on digital information technologies, but a wider range of technologies should be used to smarten production.
- Academician Amosha O. I. and Nikiforova V. A. [7] considered smartization “smart production”. Among their achievements, the main directions and consequences of smartization should be highlighted. However, these properties have a narrow purpose – the metallurgical industry.

The term “smartization” is used by L. O. Zbarazska [8], however, applies, it in the context of indus-

try, but it is worth noting that it describes some general features, such as innovativeness, rationality and economy.

**Formulation purposes of the article.** The purpose of the paper is to determine the priority areas of smartization.

**The main material.** The process of smartization is not an isolated solution carried out at the enterprise but a component of the complex system of enterprise transformation; ignoring the changes leads to missed benefits or direct losses during work and smartization. Smartization, in its essence, is close to reengineering; they are identical in terms of goals but differ in methods [2]. Reengineering is a radical rethinking and redesign of business processes to achieve sharp, leap-like improvements in the leading modern indicators of the company’s activity [1; 9; 10].

The differences between business improvement, reengineering and smartization are presented in Table 1.

Work on smartization does not start from the bottom (at the level of document flow and execution of single operations of the business process) but from above – at the macro level, when the enterprise itself is considered as an operation in the supply chain of additional values. This allows us to identify and realize the central reserves of the enterprise since, as a rule, more than 50% of the reserves for cost reduction and quality improvement lie outside the enterprise. And before going down to the enterprise level, it is crucial to consider the value-added supply chain from “suppliers of suppliers” to “customers of customers”.

Smartization must precede work on automation; otherwise, the “chaos” existing at the enterprise will be automated. The responsibility for smartization may lie with organizational divisions, implementation groups of business process smartization projects, or even business process owners. If the development of financial mechanisms can be entrusted to one department, then other types of business

Table 1

**Comparative characteristics of business improvement, reengineering and smartization**

Parameter	Improvement	Reengineering	Smartization
Level of change	build-up	radical	built-up
Starting point	existing process	“clean slate”	existing process
Frequency of changes	continuously/ one time	one time	continuously
Duration of changes	small	big	average
Direction of change	bottom-up	from top to bottom	cross-functional
Coverage	narrow — at the level of functions (functional approach)	wide — cross-functional	wide — cross-functional
Risk	moderate	high	adjustable
The main tool	strategic management	Information Technology	understanding
Type of changes	change of corporate culture	cultural/ structural	cultural/ structural
The stage of industrialization	The Second-Third Industrial Revolution	The Third industrial revolution	The fourth industrial revolution

Source: author’s development according to the data [1; 9; 10]

processes are not subject to such strict regulation. It is recommended to assign smartization to those organizational structures that are directly responsible for business processes. However, the decision on this depends on the type of activity and the volume of the industrial enterprise; in small enterprises, it is advisable to assign implementation groups for business process smartization projects, and in large ones — to create a business process smartization department.

As it was determined, smartization has inherent characteristics of both a system (phenomenon) and a process; therefore both a systemic approach and a process approach can be applied to its management. We will briefly overview the main approaches (Table 2).

The situational approach should not be used because it involves making decisions not following established work plans, but as potential problems are identified, but smartization should be carried out at the enterprise according to the program.

The system approach assumes that the study of the object (problem, phenomenon, process) is a system in which elements and internal and external

connections are distinguished, and its goals are emphasized, which have a more significant impact on the results of its research. Each of the elements is based on the general purpose of the object.

The second component of the system-process approach is the process approach, and it is known as applicable to management in general. It considers managerial activity as the continuous performance of a complex of certain interrelated types of activities and general management functions (forecasting and planning, organization, etc.). The performance of each job of general management functions is also considered as a process, that is, as a set of interrelated continuous actions that transform some inputs of resources, information, etc., into corresponding outputs and results.

Thus, we believe that it is worth applying a system-process approach, that is, an approach that includes the main statements of the system approach, in which management is based on the fact that any organization is a system consisting of parts, each of which has its own goals, and the process approach, where management is considered as a process — a series of interconnected continuous actions.

Table 2

**Features of approaches to enterprise management**

The name of the approach	Emphasis on management	The optimal period of application of the approach	The primary purpose of the approach
Process	processes, management functions	depends on the duration	process performance, management efficiency
Systemic	activity of the enterprise as a system	long-term	achievement of the strategic goal of the activity
Situational	specific situations	current	optimization of management decisions

Source: systematized based on [11]

In other words, the system-process approach includes the concept of a system approach, which requires, respectively, system thinking, and a process approach, which are inseparable in principle since there cannot be any “systems” without “processes”.

It is necessary to consider in detail the essence, components of the business process and its place in the structure of the enterprise. Fig. 1 shows simplified levels of detail of business processes.

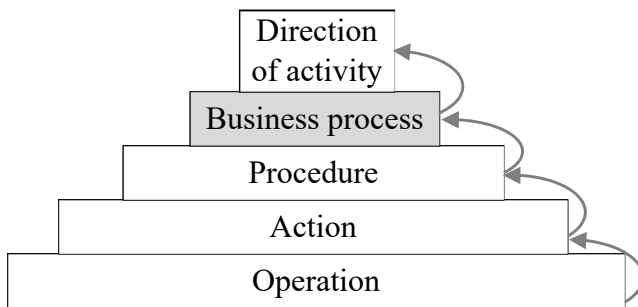


Fig. 1. Detailed levels of business processes

Source: formed based on [1; 12]

The operation is the lowest part for analyzing the activity of an individual employee, which is carried out “automatically” by him without conscious control.

Action — several operations performed in a row; after completion, the performer exercises conscious control (need to focus on the professional level, not on the beginner level, emphasizing operations and actions).

A procedure is a series of actions performed by a particular performer. The process must have a result: a document, product, or information (oral communication, e-mail, message, etc.), depending on the process.

A business process is a set of interrelated procedures performed by various entities, which leads to a complete and meaningful result for the enterprise — for example, a signed contract, goods in stock, etc.

The field of activity is an extended segment of the organization’s activity, which consists of one or more main groups of business processes.

There are many processes in the enterprise. M. Porter [12] proposes a classification of processes based on their role in creating additional value (each process should make an additional contribution to the previous process in the weight of the final product). According to this criterion, all processes are divided into three groups:

- main processes — directly related to the production of products;
- auxiliary processes — support the primary processes (purchasing, personnel management, etc.);
- management processes — include the processes of setting goals and creating conditions for their achievement.

All these processes are interconnected and form a single system.

The smartization of business processes is a rethinking and redesign of business processes using information and innovation technologies to achieve the maximum effect of production and economic and financial and economic activities through the intelligent use of resources.

**Conclusions.** It can’t be called smartization, a simple “decoration of processes”. Smartization of the business process is, first of all, process innovation. The only competitive advantage of the future enterprise is the ability to teach managers new knowledge and skills quickly. The know-how of the most critical business processes is currently one of the enterprise’s most essential elements of knowledge management. They include not only the development of new products and services but also work rules and management procedures individual knowledge and skills of each employee.

Smartization of business processes does not guarantee to anyone the provision of ongoing competitiveness “always and in everything” because the environment is changing, and competitors are strengthening their presence (including due to their smartization projects). The challenge should be answered with a challenge, not stopping the smartization process but turning it into a “business process smartization culture”.

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