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УПРАВЛІННЯ БІЗНЕС-ПРОЦЕСАМИ ПІД ВПЛИВОМ КІБЕРФІЗИЧНИХ СИСТЕМ НА МЕЗОРІВНІ

Актуальність. В умовах тотальної цифровізації у світі, використання новітніх технологій та їх впровадження в усі сфери життя людини, ведення бізнес-процесів під впливом кіберфізичних систем, переключення мислення на формування «соціального суспільства», нових підходів до управління уречевленою та живою працею, розробки адаптивних механізмів ведення бізнес-процесів, що потребує нового осмислення самої господарської діяльності та участі у цьому процесі людського потенціалу, особливого значення набуває управління бізнес-процесами.

Мета та завдання. Метою даної роботи є формування системної характеристики управління бізнес-процесами підприємницьких структур під впливом кіберфізичних систем на мезорівні. Дана мета дозволила сформулювати такі завдання: визначити управління бізнес-процесами на трьох рівнях: підприємства, територіального устрою (регіону), держави; здійснити моделювання бізнес-процесів за ланцюгами: «Суб'єкт-Суб'єкт», «Суб'єкт-Ринок ресурсно-сировинної бази, продукції та послуг», «Суб'єкт-Держава»; розглянути сучасні технології, які покладені в основі кіберфізичних систем.

Результати. У даній статті визначено, що сучасними авторами не достатньо розвинене питання управління бізнес-процесами під впливом кіберфізичних систем на регіональному рівні. Доведено, що регіон як соціально-економічна система ототожнюють із формуванням бізнес-процесу, оскільки виконуються підпроцеси, операції, функції, які виникають послідовно, взаємодіють між собою та повинні бути збалансованими. Дано економічне обґрунтування бізнес-процесів, на основі таких положень: створення вартості, цільового надходження результату, визначення меж бізнес-процесу, взаємодії учасників та їх адаптація, відповідальності та делегування повноважень всередині процесу, залучені новітніх інформаційно-комунікаційних технологій, функціонального забезпечення та економії наявного потенціалу. Системне бачення управління бізнес-процесами на мезорівні розглядається з позиції: підприємства; територіального устрою; держави, що дозволить більш чітко та конкретизовано здійснювати господарські процеси підприємницької діяльності та адаптуватись до зовнішніх впливів.

Запропоновано та обґрунтовано концептуальний підхід до управління бізнес-процесами на мезорівні, на базі системно-діяльного підходу та під впливом кіберфізичних систем за трьома моделями: «Суб'єкт-Суб'єкт», де з позиції підприємства визначені процеси, підпроцеси, функції, операції, завдання; «Суб'єкт-Ринок ресурсно-сировинної бази, продукції та послуг», де з позиції територіального устрою формуються адміністративні регламенти, регулювання та координація економічної діяльності усіх суб'єктів територіального утворення; «Суб'єкт-Держава», де з позиції держави встановлюються взаємозв'язки з усіма учасниками бізнес-процесів та державними органами влади, формуються бізнес-процеси між регіонами та країнами.

Наведено види технологій, які застосовуються при здійсненні бізнес-процесів, а саме: Великі дані і аналітика, Інтернет Речей, штучний інтелект, Блокчейн, хмарні рішення, моделювання та стимулятори, 3D друк, віртуальна та доповнена реальність, робототехніка.

Висновки. Між суб'єктами бізнес-процесів на мезорівні виникають взаємовідносини, в яких є чітко визначений координатор (керівник, центр, регіональні та місцеві органи) управління та відповідно учасники, взаємодія яких дозволяє: здійснити перетворення вартісної пропозиції (розробка технологій, програмного забезпечення, моделювання та прогнозування); вдосконалити операційну модель (впровадження систем, роботів, апаратів); змінити внутрішню інфраструктуру (обробка даних на основі аналітичних знань та впровадження Нових практик); побудувати взаємовідносин з клієнтами на більшій якості рівні (підвищення кваліфікації персоналу та набуття ним нових компетенцій); скоротити витрати (Великі дані, хмарні рішення, 3D друк); збільшити продуктивність (збір та обмін даними, аналіз, обчислення, оцінювання варіантів). Вплив кіберфізичних систем на управління бізнес-процесами дозволяє змінювати як деякі елементи, так і сам процес задля адаптації до вимог сьогодення.

Ключові слова: бізнес-процес, підприємницькі структури, кіберфізичні системи, мезорівень, взаємозв'язки між учасниками бізнес-процесів, регіональний рівень.

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MANAGEMENT OF BUSINESS PROCESSES UNDER THE INFLUENCE OF CYBERPHYSICAL SYSTEMS AT THE MESO LEVEL

Topicality. In the conditions of total digitalization in the world, the use of the latest technologies and their implementation in all spheres of human life, conducting business processes under the influence of cyber-physical systems, switching thinking to the formation of a "social society", new approaches to the management of physical and living labor, the development of adaptive management mechanisms business processes, which requires a new understanding of the economic activity itself and the participation of human potential in this process, the management of business processes acquires special importance.

Aim and tasks. The purpose of this work is the formation of a system characteristic of business process management of entrepreneurial structures under the influence of cyber-physical systems at the meso-level. This goal made it possible to formulate the following tasks: to determine the management of business processes at three levels: enterprise, territorial organization (region), state; carry out modeling of business processes by chains: "Subject-Subject", "Subject-Market of resource-raw material base, products and services", "Subject-State"; consider modern technologies that are the basis of cyber-physical systems.

Research results. This article determines that modern authors have not sufficiently developed the issue of managing business processes under the influence of cyber-physical systems at the regional level. It has been proven that the region as a socio-economic system is identified with the formation of a business process, since sub-processes, operations; functions are performed, which occur sequentially, interact with each other and must be balanced. The economic justification of business processes is given, based on the following provisions: creation of value, target receipt of results, definition of business process boundaries, interaction of participants and their adaptation, responsibility and delegation of powers within the process, involving the latest information and communication technologies, functional support and savings of existing potential. The system vision of business process management at the meso-level is considered from the position of: the enterprise; territorial organization; of the state, which will allow to more clearly and concretely carry out economic processes of entrepreneurial activity and adapt to external influences.

A conceptual approach to the management of business processes at the meso-level, based on the system-activity approach and under the influence of cyber-physical systems, is proposed and substantiated according to three models: "Subject-Subject", where processes, sub-processes, functions, operations are defined from the point of view of the enterprise, tasks; "Subject-Market of the resource base, products and services", where administrative regulations, regulation and coordination of the economic activity of all subjects of the territorial entity are formed from the point of view of the territorial organization; "Subject-State", where, from the position of the state, relationships are established with all participants in business processes and state authorities, business processes between regions and countries are formed.

The types of technologies used in the implementation of business processes are given, namely: Big data and analytics, Internet of Things, artificial intelligence, Block chain, cloud solutions, simulations and stimulators, 3D printing, virtual and augmented reality, robotics.

Conclusion. Interrelationships arise between the subjects of business processes at the meso-level, in which there is a clearly defined coordinator (head, center, regional and local bodies) of management and, accordingly, participants, whose interaction allows: to carry out the transformation of the value proposition (development of technologies, software, modeling and prognostication); improve the operational model (implementation of systems, robots, devices); change the internal infrastructure (data processing based on analytical knowledge and implementation of New Practices); to build relationships with clients at a higher quality level (upgrading staff qualifications and acquiring new competencies); reduce costs (Big data, cloud solutions, 3D printing); increase productivity (collection and exchange of data, analysis, calculation, evaluation of options). The impact of cyber-physical systems on the management of business processes allows changing some elements and the process itself to adapt to today's requirements.

Keywords: business process, business structures, cyber-physical systems, meso-level, relationships between business process participants, regional level.

Problem statement and its connection with important scientific and practical tasks.

The management of business processes acquires

special importance in the following conditions: total digitalization in the world, the use of the latest technologies and their implementation in all

spheres of human life, conducting business processes under the influence of cyber-physical systems, switching thinking to the formation of a "social society", new approaches to management embodied and living work, the development of adaptive mechanisms for conducting business processes, which requires a new understanding of the economic activity itself and the participation of human potential in this process.

Such trends in the world and, in particular, in Ukraine, make it possible to form new socio-economic relations at the meso-level, which can be aimed at: strengthening regional development, reproduction of industries and types of economic activity, formation of cluster formations, restoration of cooperative ties between business structures, creation of an association of producers, production of new types of products and services on an innovative basis, restoration of animal husbandry, etc. Achieving these development conditions is possible thanks to the implementation of cooperative relations with the acquisition of resources, the production of various types of products, and the provision of services.

The listed associations of entrepreneurial structures are possible both within one region and aimed at interregional cooperation. This creates opportunities for the use of the existing resource and raw material base of all regions of Ukraine and the implementation of cooperative relations in the production of various types of products, which will allow them to achieve self-development and self-sufficiency.

This path of development, in the post-war period, will allow us to rebuild the regions quite quickly and ensure the product and commodity independence of our country.

Analysis of recent publications on the problem. The question of the impact of digital and innovative technologies on business processes was studied by the following scientists: Lazebnyk L.L., Lisova R.M., Bowman G., Eder D., Shalmo D., Brenen S., Dufman K., Westreman G., Harmon P., Reichenger M., Chmeruk H., Vishnevsky O.

The influence of cyber physical systems on all spheres of human life was studied by the following scientists: Yu. Gudzinskyi, S. Yatsyshyn, O. Lysa, N.F. Kazakova, O. Bochkaryev.

Allocation of previously unsolved parts of the general problem. However, management of business processes under the influence of cyber-physical systems at the regional level remains unresolved.

Formulation of research objectives

(problem statement). The purpose of this research is the formation of a system characteristic of the management of business processes of entrepreneurial structures under the influence of cyber-physical systems at the meso-level.

This goal made it possible to form the following tasks:

- determine the management of business processes at three levels: enterprise, territorial organization (region), state;

- carry out modeling of business processes by chains: "Subject-Subject", "Subject-Market of resource-raw material base, products and services", "Subject-State";

- consider modern technologies that will allow to qualitatively improving the performance of sub-processes, functions, tasks, operations as components of business processes.

An outline of the main results and their justification. Any socio-economic system (region) is inextricably linked to the management of business processes, since the system itself is a set of processes and sub-processes that interact with each other and must be balanced. This can be explained by the fact that entrepreneurial activity is based on the implementation of processes, sub-processes, functions, operations, tasks.

All business processes are subject to standardization, improvement, change, adaptation to market requirements, and, accordingly, management.

The economic justification of business processes at the meso level consists in the following provisions [5]:

1. The value created during the business process and its output (finished products) must have a target income (consumer).

2. In the chain of value creation during the business process, each link must create added value for the efficiency of activity.

3. Each business process has boundaries (suppliers, intermediaries, consumers) and forms requirements, expectations and the result of its implementation.

4. The business process must be integral, with the involvement of relevant participants who meet the criteria of flexibility and adaptability to this process.

5. All business processes are carried out from the position of responsibility and delegation of authority.

6. Involvement of the latest knowledge, technologies, digital tools, information and communication technologies in the planning and implementation of business processes.

7. Planning, organization, management and control over the implementation of business processes is carried out systematically and on the basis of saving resource and raw material potential.

Management of business processes consists in achieving goals by means of description, design, implementation, control and improvement of processes and sub-processes in order to establish a new level of relationships between participants (subjects) of business processes increase the resource and material base, ensure self-development of the socio-economic system and increasing the level of its competitiveness.

Business process management represents a conceptual vision of the management process

- from the point of view of the enterprise – processes, sub-processes, functions, operations, tasks;

- from the point of view of the territorial organization (region) – administrative regulations, regulation and coordination of the economic activity of all subjects of the territorial entity;

- from the state's point of view - interconnections of all business processes with state authorities and creation of new business processes between regions and countries.

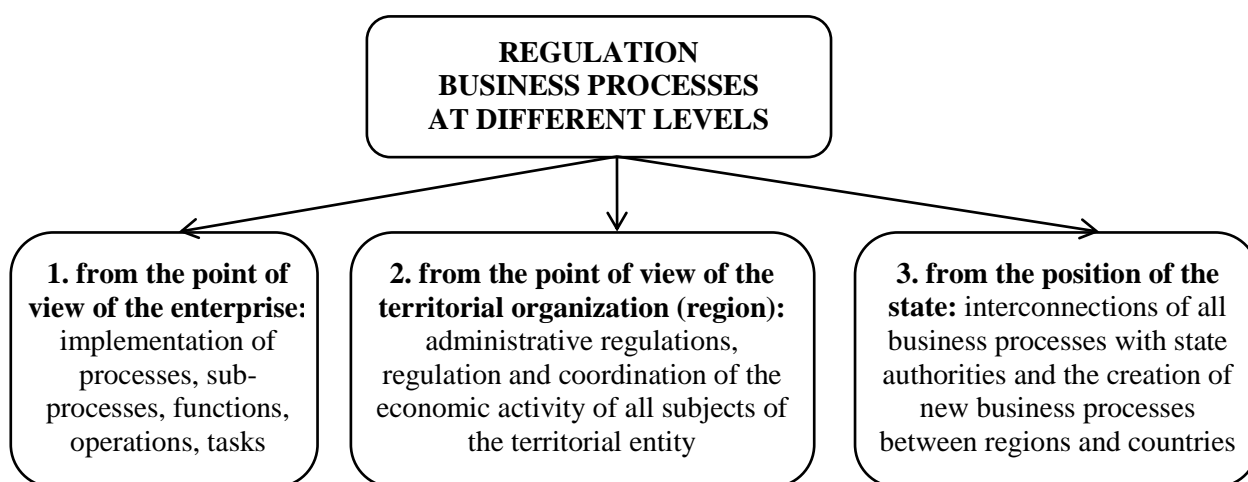


Fig. 1. Management of business processes at different levels of management (compiled by the author)

Consideration of the management of business processes according to these levels will allow more clearly and concretely carrying out the economic processes of entrepreneurial activities and adapting to external influences.

Let's dwell on the meso-level in more detail.

A scientific view on the management of business processes from different levels of management of the economy of the region, which must be studied on the basis of modeling these processes according to three models:

1. The "Subject-Subject" business process model.

2. Model of the business process "Subject-Market of the resource-raw material base, products and services".

3. The "Subject-State" business process model.

This approach makes it possible to form relationships both in a traditional chain within a business entity and in relations between several business entities, the market and the state at the

meso-level.

The models listed above are built on the basis of a system-activity approach, which represents a symbiosis of two concepts:

- life activity models of the economic system – cybernetic VSM-model of S. Bir. This model is characterized by feedback, self-regulation of the system and self-organization in conditions of destabilizing factors of the internal and external environment [1];

- methodology of development of polysystems H.P. Shchedrovtskyi, which includes: an idea, a system of implementation programs and projects, social action, and a person in this process is a generator of ideas [4].

According to the above-mentioned two concepts, the system-activity approach consists of three components, which are manifested simultaneously, as:

- functioning;
- improvement;
- development.

Based on this approach, relationships and

feedback between business process participants at different levels (entity, regional market, and state) are formed in the models.

The model of the "Subject-Subject"

business process under the influence of cyber-physical systems based on the system-activity approach within the meso-level is presented in Fig. 2.

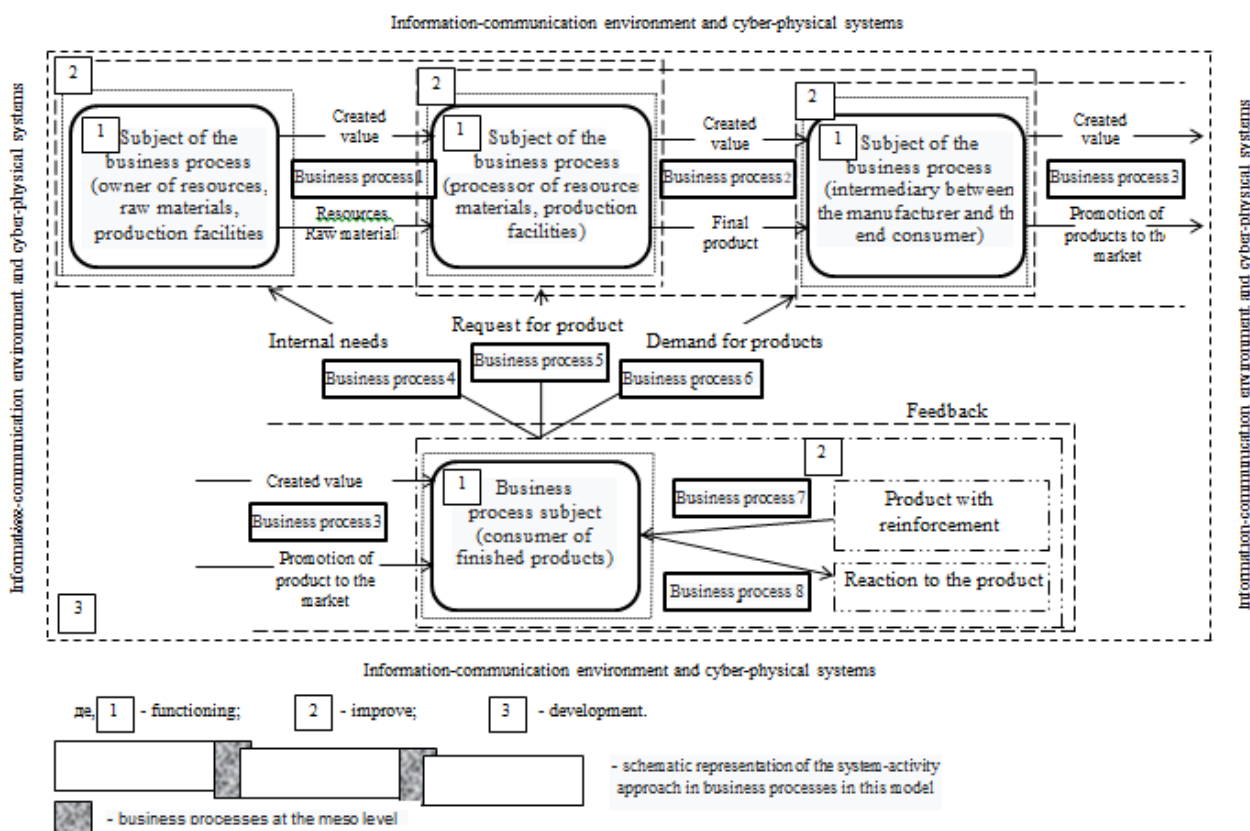


Fig. 2. Scheme of the "Subject-Subject" business process model under the influence of cyber-physical systems based on the system-activity approach within the meso-level (developed by the author)

In this model, the subject of the business process is one of the components of the system activity approach - functioning. It is an autonomous unit that carries out consistent, targeted, regulated actions with the use of resources and on the basis of obtaining a result for the maximum satisfaction of the needs of the system.

The second component - improvement consists in creating value during the extraction of resources, enrichment and saturation of raw materials, some primary processing or finishing, packaging, transfer of resources and raw materials to the next subject (participant), which is the essence of business process 1.

The next step is the operation of another entity that processes raw materials and resources, has production facilities and manufactures finished products. Therefore, a business process 2 arises to transfer this product to another entity, which also creates a cost.

The subject, the recipient of finished

products, also receives value by transferring the products to the market or to the final consumer. It will already be business process 3.

Thanks to information and communication systems and cyber-physical technologies, the final consumer of finished products and services communicates with all previous subjects through feedback, as a result of which the internal needs of the consumer, request and demand for products are determined (business processes 4, 5, 6).

Also, the subject (consumer of products) functions in the surrounding environment and receives additional warranty and post-warranty services (goods with reinforcement), makes his own reaction to the products or services he consumes (business processes 7, 8).

The link - the final consumer may not be the last. The next subject can be a processor of the remains of consumed products or packaging, which can act as raw material for him, which will allow continuing the reproductive chain in the form of a business process.

So, this model allows you to solve issues related to: search for raw materials, resources, products, goods; creation of chains of added value; formation of cooperative ties; digitalization of business and management processes; development of business processes; establishment of regional socio-economic relations; adaptive management of economic systems.

An important component of this interaction of all elements, processes, sub-processes,

functions, operations is their integrity with the information and communication environment of the region and cyber-physical systems.

So, management of business processes according to model 1 is carried out on the basis of innovative information and communication technologies and cyber-physical systems [8].

The types of technologies that make it possible to build business processes more adapted to external influences are given in Table 1.

Table 1

Types of cyber-physical systems by application technologies

View	Characteristic	Possible results from implementation
Big data and analytics	Storage, processing and evaluation of data	Making optimal decisions in real time and space
Internet things	Receiving data from devices to the process or project management system	Implementation of processes and sub-processes (logistics, production, sales) in shorter terms
Artificial Intelligence	Creation of intelligent machines, programs, services, applications	Acceleration of production operations, devices for treating people
Blockchain	A distributed ledger system	Control over the registry is performed by several institutions or all system participants - depending on the type of distributed registry
Cloud solutions	Integration (horizontal) between partners, (vertical) between functions and operations	Creation of digital platforms for combining interests and exchanging information between partners
Modeling and stimulants	Modeling when designing products and processes	Modeling of the physical (technological, production) process in the presence of raw materials and resources
3D printing	Specialized printers for reproduction of components and products	Possibility of decentralization of production, reduction of costs, speed of production of products (orders)
Virtual and augmented reality	Acceleration of management decision-making	Receiving information about actions at a specific time, the possibility of replacing, adjusting equipment in a shorter time
Robotics	Development of automated technical systems (robots, devices)	The development of production, the use of robots in emergency situations, the change of embodied and live labor in the production process

These include: Big data and analytics, Internet of Things, artificial intelligence, Block chain, cloud solutions, simulations and stimulators, 3D printing, virtual and augmented reality, robotics [6].

Table data 1 prove that analog information is rapidly transformed into digital.

Cyber-physical systems are intelligent systems that include interacting physical and computational (software) elements (components) and form them into a single system [7]. They integrate computing resources and the physical essence of any object (technological, biological and informational) [3]. They are a complex system consisting of computational and physical processes and artificial intelligence that receives and uses data from the surrounding environment for further optimization of management processes [2].

These systems support all branches and

sub-branches of the socio-economic system of the country, types of economic activity, as well as the personal life of a person in order to increase the innovative vector of the direction of development, achieve technical progress, overcome the level of poverty and improve the life of the population.

Cyber physical systems work thanks to the means of measurement (data processing, control of process parameters, phenomena and the environment) that determine changes, and software that allows special algorithms to run automation tools to correct changes [7].

So, these systems, on the one hand, are a reflection of existing information and measurement technologies (management, control, logistics, document management, etc.), and, on the other hand, data processing is carried out by built-in computing systems or using cloud technologies.

Thanks to cyber-physical systems, it

This model is characterized by the fact that the subject of the business process enters into relationships with the market of the resource-raw material base, products and services, which represents a set of other subjects - market participants.

Between them, a business process is formed regarding the transfer of resources, raw materials, production resources to the market, and from the market, accordingly, the opportunity comes from other subjects to take part in the processing of raw materials, the manufacture of finished products, the promotion of the product to the market, the formation of public opinion (demand), coordination of regional relations regarding the creation of chains of added value. Feedback is created thanks to the information and communication environment and cyber-physical systems.

In the middle of the market itself, business processes between subjects regarding the production of material and immaterial values also arise.

This model is also built on the basis of a systemic activity approach, where three

components are present: functioning – one subject; improvement - the subject's interaction with the market; development - functioning of the entire market under the influence of the infrastructure, information and communication environment.

The previous model was built under the influence of the information and communication environment, and this one also has an infrastructural component. This is due to the fact that the market is a more complex system and infrastructure support is a rather important component of the process of management and adaptation to external challenges.

The business process model "Subject-Market of the resource-raw material base, products and services" within the meso level includes a set of business entities. One of the new rooks on the market is the subject - "Regional and local authorities, territorial communities", which becomes a customer, consumer, coordinator, guarantor of relations.

Consider the following model of the "Subject-State" business process (Fig. 4).

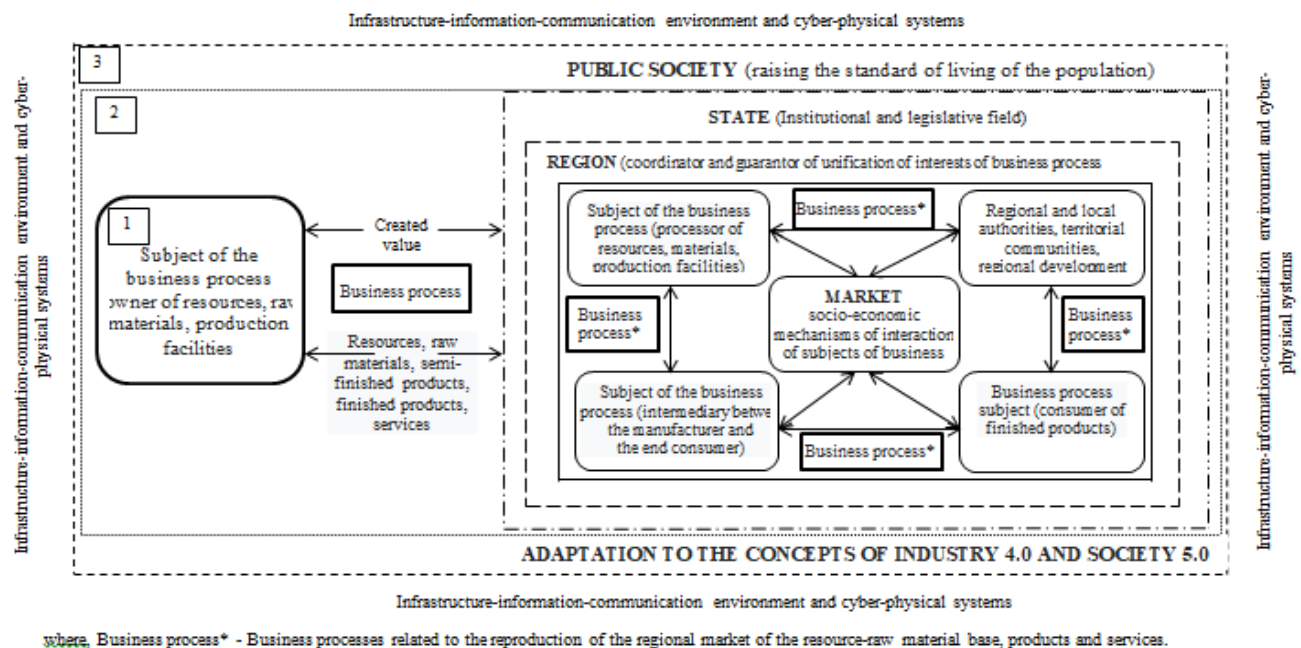


Fig. 4. Scheme of the business process model "Subject - State" under the influence of cyber-physical systems based on the system-activity approach within the meso-level (developed by the author)

The scheme of the business process model "Subject - State" under the influence of cyber-physical systems based on the system-activity approach within the meso-level has the same properties and effects as the previous two

models. Thus, in this model, the following chain of relationships can be clearly traced: "Subject of the business process - Market - Region - State - Civil society".

Any business processes have their own peculiarities of formation, implementation, management and adaptation.

Subjects of business processes that function in the model in Fig. 4, take part in a complex

These steps in business process management are:

- transformation of the value proposition (development of technologies, software, modeling and forecasting);

- improvement of the operational model (implementation of systems, robots, devices);

- changes in internal infrastructure (data processing based on analytical knowledge and implementation of New Practices);

- building relationships with clients at a higher quality level (increasing staff qualifications and acquiring new competencies);

- cost reductions (Big data, cloud solutions, 3D printing);

- increasing productivity (collection and exchange of data, analysis, calculation, evaluation of options).

The impact of cyber-physical systems on the management of business processes allows changing some elements and the process itself to adapt to today's requirements.

Conclusions and perspectives of further research. In this scientific article, a systematic characterization of the management of business processes of entrepreneurial structures under the influence of cyber-physical systems at the meso-level is carried out.

A conceptual approach to the formation of business processes at the meso level is proposed and substantiated, where three models are formed with the help of a system-activity approach and under the influence of cyber-physical systems: "Subject-Subject", where processes, sub-processes, functions, operations are defined from the point of view of the enterprise, tasks; "Subject-Market of the resource base, products and services", where administrative regulations, regulation and coordination of the economic activity of all subjects of the territorial entity are formed from the point of view of the territorial organization; "Subject-State", where relationships are established from the state's position with all participants in business processes and state authorities, business processes between regions

hierarchical system under the influence of a reflexive and active environment, where there is a clearly defined coordinator (head, center, regional and local bodies) of management and, accordingly, participants. and countries are formed.

Scientific and applied regulations on the formation of business process management approaches at the meso-level based on the types of given processes, which will allow business process subjects to quickly adapt to external influences, to form the competence potential of the region based on the construction of these processes in space and time with the involvement of subjects objects at different levels and taking into account the hierarchy of the socio-economic system, the set goals and functional responsibilities of the participants.

Scientific and applied regulations on the formation of business process management approaches at the meso-level based on the types of given processes, which will allow business process subjects to quickly adapt to external influences, to form the competence potential of the region based on the construction of these processes in space and time with the involvement of subjects objects at different levels and taking into account the hierarchy of the socio-economic system, the set goals and functional responsibilities of the participants.

Justification of the structural structure of the chain "Subject-Market-State-Civil Society", which collectively forms a reflexive and active environment of interaction and coordination between the information and communication environment and adaptive management based on the identification of the advantages of adaptive management, the content of the components of adaptive management of business processes, business process technologies, execution and control of business processes at the meso level

The classification of cyber-physical systems by the type of application technology is substantiated, which will allow determining the possible results from the implementation and application of certain types of technologies in specific business processes at the meso-level under the influence of a rapidly changing environment.

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REFERENCES

1. Beer, S. (1966) *Decision and Control*. John Wiley and Sons, 5556.
2. Osoblyvosti zastosuvannya proektnoho pidkhodu do proektiv rozrobky kiber-fizychnykh system dlya ekolohichnoho transport [Peculiarities of the application of the project approach to projects for the development of cyber-physical systems for ecological transport]. Retrieved from: <https://www.khadi.kharkov.ua>. [in Ukrainian].
3. Sanfelice, R.G. (2016) *Analysis and Design of Cyber-Physical Systems. A Hybrid Control Systems Approach. Cyber-Physical Systems: From Theory to Practice / D. Rawat, J. Rodrigues, I. Stojmenovic. CRC Press.*
4. Shchedrovitskiy, G.P. (2003) Metodologiya i filosofiya organizatsionno-upravlencheskoy deyatel'nosti: osnovnyye ponyatiya i printsipy. Iz arkhiva G.P. Shchedrovitskogo, 230. Retrieved from: URL: <https://vdoc.pub/documents/2-39kkpnre1r4g>.
5. Shulyar, R.V. (2019) Formuvannya ta rozvytok ekonomiko-upravlins'koho instrumentariyu zabezpechennya biznes-protseviv. *Dys... dok. ek. nauk. Liviv*, 495. Retrieved from: <https://lpnu.ua/sites/default/files/2020/dissertation/1323/rvshulyardok.pdf> [in Ukrainian].
6. Topalova, I.A. (2020) Tsyfrova transformatsiya sotsial'no-ekonomichnykh system (rehioniv) Ukrayiny. *Series of monographs Faculty of Architecture, Civil Engineering and Applied Arts Katowice School of Technology. Monograph 36. CONTEMPORARY ISSUES OF DIGITAL ECONOMY AND SOCIETY. Publishing House of Katowice School of Technology*, 272-281. Retrieved from: http://eadnurt.diit.edu.ua/bitstream/123456789/11911/1/Sharhun_2020.pdf [in Ukrainian].
7. Van, Chunzhi & Yatsyshyn, S.P. & Lysa, O.V. & Midyk, A-V.V.(2018) Kiber-fizychni systemy ta yikh prohramne zabezpechennya. Retrieved from: <https://science.lpnu.ua/sites/default/files/journal-paper/2018/sep/14522/06st.pdf> [in Ukrainian].
8. Vyshnevs'kyy, O.S. (2018) Tsyfrovi platformy yak yadro tsyfrovizatsiyi ekonomiky. *Tsyfrova ekonomika: zb. mat. Natsional'noyi nauk.-metod. konf., 4–5 zhovtnya*. Kyiv: KNEU, 407 [in Ukrainian].