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CLOUD TECHNOLOGIES AS AN ELEMENT OF STARTUP PROJECTS MANAGEMENT

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ХМАРНІ ТЕХНОЛОГІЇ ЯК ЕЛЕМЕНТ СИСТЕМИ УПРАВЛІННЯ СТАРТАП- ПРОЕКТАМИ

Pointed out that the main tendencies of modern innovation processes require exploration of perspective improvement directions for the created products quality and uniqueness and search of new technological solutions for implementation of startups. Proven that there is a need for the research of cloud technologies using to develop the startup projects market. Revealed that the usage of cloud technologies creates preconditions for effective application of the innovative potential of domestic startups, significantly reducing the cost of implementing the startup projects by using of an extensive IT service system furthermore additionally increasing the quality and uniqueness of the developed products. The basic patterns and trends of the development of start-ups are identified, namely: use of the Internet, focus on the creation of smartphones applications and involvement of specialists from large corporations in the projects. Defined that cloud-based storage processing and data processing technologies provide the opportunity to accelerate the process of software products releasing and its introduction to the IT market. Specified the priority tasks solved by the information systems of automation of innovation activity. Considered the general features of the new infrastructure, existing models of cloud services representation and the benefits of using cloud-based technologies for startup projects. Emphasized that at present there is no differentiation according to which there is a category of cloud services, oriented exclusively for the needs of startup projects. The description of existing models of cloud services for making technological and organizational decisions with the purpose of forming the flow of startups and supporting them at the initial level is made. Noted that the use of cloud technology has a wide range of advantages that include scalability and dynamism, allowing the use of infrastructure capacity without going into the complex processes of managing cloud technology. The prospects for the development of cloud technologies are analyzed and it is emphasized that at the state level there is

still no legal regulation of the interaction between the service provider and the user of cloud technologies in the field of startup projects.

Зазначено, що основні тенденції сучасних інноваційних процесів потребують досліджень перспективних напрямів підвищення якості та унікальності створених продуктів та пошуку нових технологічних рішень реалізації стартапів. Доведено, що існує потреба у дослідженні моделей використання саме хмарних технологій задля розвитку ринку стартап-проектів, Визначено, що використання хмарних технологій дозволить ефективніше використовувати інноваційний потенціал вітчизняних стартапів, значно скорочуючи затрати на реалізацію стартап-проектів шляхом використання розгалуженої системи ІТ послуг та дозволить значно підвищити якість та унікальність створених продуктів. Визначені основні закономірності та тенденції розвитку стартапів, а саме: використання Інтернету в роботі, орієнтація на створення додатків для смартфонів та залучення у проекти фахівців із великих корпорацій. Зазначено, що саме хмарні технології зберігання, обробки та висвітлення даних дають можливість значно пришвидшити процес виведення інформаційного або програмного продукту на ринок ІТ. Здійснено уточнення пріоритетних завдань, які вирішують інформаційні системи автоматизації інноваційної діяльності. Розглянуто основні характеристики, притаманні новій інфраструктурі та переваги використання хмарних технологій в сфері стартап-проектів. Підкреслено, що наразі відсутня диференціація, за якою існує категорія хмарних сервісів, орієнтована виключно під потреби стартап-проектів. Здійснено опис існуючих моделей представлення хмарних сервісів для прийняття технологічних і організаційних рішень з метою формування потоку стартапів та їх підтримки на початковому рівні. Зазначено, що використання хмарних технологій має широкий спектр переваг, до яких належить масштабування та динамічність, що дозволяє використовувати потужності інфраструктури не вдаючись у складні процеси управління хмарною технологією. Проаналізовано перспективи розвитку хмарних технологій та підкреслено, що на державному рівні досі відсутнє нормативно-правове врегулювання взаємодії постачальника послуг та користувача хмарних технологій в сфері стартап-проектів.

Key words: *innovative potential; startup project; information systems of automation of innovation activity; cloud technologies; cloud services.*

Ключові слова: *інноваційний потенціал; стартап-проект; інформаційні системи автоматизації інноваційної діяльності; хмарних технологій; хмарні сервіси.*

Problem statement. A significant trend of modern business is the rapid proliferation of startup projects as a special organizational structure aimed at developing and implementing a high-tech and innovative product. It is caused by the growing demand for high-tech products and services as well as high-tech standards in the world. The main tendencies of modern innovative processes are changing; therefore, new technological solutions for their implementation into startup projects and an increase of its efficiency are needed to be examined. It is the application of cloud technologies that will make much more efficient the usage of the technical and economic potentials of the state, the innovative potential of state startup projects and meaningfully reduce the cost of implementing the startup projects by using the extensive range of IT services.

Analysis of recent research and publications. It should be noted that the development of startup projects in international markets, economic instruments for improving profitability and attracting investment in the company is revealed in the scientific works of foreign and domestic scholars such as S. Blank, P. Graham, B. Dorf, G. Kawasaki, M. N. Clint Nielsen, D. Mallinst, L. Reiner, E. Ris, K. Antonechko, A. Yevseychev, N. Ivashova, D. Khromova and others [1-5, 8-12]. The scientific literature that explores the issue of creating startup projects, generally mention only ideas for business, marketing tactics, and management decisions. Paying tribute to the theoretical and practical values of previous achievements, there is a need to explore promising areas of using cloud technologies to develop the market of startup projects and improve the quality and uniqueness of the products created.

Purpose of research. In accordance with mentioned above, the urgent purposes of this study are the formulation of tasks solved by the information systems of automation of innovation activities, and the analysis of existing models of cloud services used in the startup projects market.

Research outcomes. Certain theoretical and practical aspects of evaluating the innovation potential of startups, identifying factors and creating prerequisites for their entry into international markets prove that the market for startup projects is developing intensively on a global scale (Table1).

Table 1.
The world market for startups in 2019

<i>Country</i>	<i>Number of startups</i>	<i>Specific weight</i>
USA	46 658	0,522
India	6 341	0,070
UK	4 934	0,055
Canada	2 514	0,028
Germany	2 109	0,023
Indonesia	1 991	0,022
France	1 398	0,015
Australia	1 390	0,015
Spain	1 212	0,013
Brazil	1 075	0,012
Others	19 725	0,225
Total	89 347	1

Source: compiled by authors according to [6]

Therefore, as of 2019, 89 347 startups have been funded worldwide, among the leaders in the financing of startup projects, the first position in the number of projects is US (more than 50%), followed by India and the United Kingdom. If to consider the market of start-up projects from the perspective of 10 largest companies, then the leading positions belong to the USA, Canada, Australia, Hungary and Israel).

Table 2.
Top-10 startup projects in the world, 2019

<i>Position</i>	<i>Name of startup project</i>	<i>Country</i>
1	Medium	USA
2	500px	Canada
3	Canva	Australia
4	Giphy	USA
5	Quora	USA
6	Prezi	Hungary
7	Fiverr	Israel
8	CloudFlare	USA
9	Freelancer	Australia
10	Coursera	USA

Source: compiled by authors according to [6]

The development of startup projects has certain patterns and trends that are typical for all projects [7]:

- Using the Internet for work. The Internet offers enormous opportunities for the successful organization and monitoring of the implementation of the startup project. Nowadays, more and more frequently cloud services are used for storing a large amount of data and providing the employees with an opportunity to work remotely. A large number of startups become multinational projects. The role of the Internet is actively growing in the sphere of promotion of companies' products and advertising.

- Active usage of various social networks to promote the company's ideas. Social networks become a multifunctional tool in the hands of project managers (e.g. headhunting and recruitment, products advertisements within the network).

- Most projects focus on creating apps for smartphones. The niche of smartphones is now actively developing and requires a large number of high quality and innovative software products for users in the following areas: health, lifestyle, time planning, task managers, travel and tourism, remote house management and others.

- In the niche of startup projects, there is a trend to bring specialists from large corporations into their projects. The new professional approach is to focus on the effective use of innovative solutions rather than on the application of conventional approaches.

That is the cloud storage, processing, and data processing technologies that can significantly accelerate the process of injection of software products to the market of IT services and increase the productivity of an innovative project, subject to the efficient usage of financial resources. According to scientists [7, 10], we can define the following tasks solved by the information systems of automation of innovation activity:

- search and analysis of technological innovations;

- analysis of the novelty of specific innovation;
- formation and support of joint activities of teams of innovative projects;
- search for potential business partners;
- search for innovative structures to support the innovation project;
- automation of construction of business plans of innovative projects;
- forecasting the risks of innovative projects;
- integration and analysis of information from different sources;
- competitive intelligence;
- formation of a consumer audience and promotion of innovations;
- prototyping and modeling of innovations;
- modeling the response of socio-economic systems to innovation management.

Most of the tasks that arise in startups can be easily solved by using cloud-based technology to organize work. The following main characteristics inherent in the new infrastructure can be allocated:

- automation of information resource allocation processes on a dynamic basis;
- ensuring the quality (or quality assurance) of service provision in the presence of effective metrics of services;
- the possibility of implementing open standards for the transition between the components of the information system and the producers;
- integration with other cloud systems and their dynamic adaptation to modern requirements.

The rapid expansion of cloud-based technology offers enormous potential for the market of startup projects. According to the authors, the main advantages of using cloud technologies for startup projects can be determined as follows:

- The cost-effectiveness of cloud technologies. Payment is made only for computing power, which, being used for the needs of the project startup itself, eliminates the need to purchase expensive hardware.
- Quick start. Participants of the startup project have the opportunity to customize the platform in a few simple steps, according to the use of a wide range of software offered by distributors of cloud services.
- Fast scaling and full utilization of hardware. An increase in computing power during project expansion can be accomplished with minimal time loss by leveraging additional virtual resources. In case of unnecessary resources, suspension of its usage can be done on the basis of a contract with the resource supplier company without the need to get rid of (dispose of) such resources.
- Data security. The possibility of reliable data storage ensured by the performing of data backups on the provider's side, which goes unnoticed by the user and does not require unnecessary costs and efforts from the side of the project participants.
- Fast independent data access. The use of cloud services does not require binding to particular geolocation or infrastructure, and therefore the data can be accessed regardless of the location of the project participants.

By now, there is no differentiation, according to which there would be a category of cloud services, oriented exclusively to the needs of the startup projects. However, depending on the needs of the project, one of the existing forms of cloud computing can be used and easily adapted to any user requirements. Thereby, the active use of cloud services for startup projects can ensure the efficient execution of a variety of tasks: from financial accounting to optimization and management of the team. Although most services have limited functionality, it is definitely more flexible and affordable.

Nowadays, large IT companies offer both technological and organizational solutions for creating a stream of startups and their support at the initial level.

Despite the fact that the cloud technology market is almost new, it is already quite flexible and responsive to changes. The application of different service models can be considered the main adaptation, whereby all types of cloud services can be divided into three types: Software as a Service (SaaS); Platform as a Service (PaaS); Infrastructure as a Service (IaaS). These types of models can only be used if necessary, that is, not on an ongoing basis since access to them is provided after a subscription, which may be not only annual but also monthly or even hourly. Let us consider the existing cloud service maintenance models:

Software as a Service (SaaS). The consumer is provided with software tools - provider applications that run on cloud infrastructure. Applications are available from a variety of client devices through the thin client interface, such as a browser or even an email with a web interface. The advantage of this kind of cloud service is the ability to work with applications running on cloud infrastructure, not only with the use of thin clients but also special client applications that are downloaded as needed. The main disadvantage is that the consumer is not able to control the very cloud structure on which the deployment of the service is carried out. But in some cases, (s)he can access some settings. This kind of provision involves giving the client a ready-made solution with minimal adjustment. In theory, this means that, by subscribing to such a service, any user with minimal involvement of the system administrator or without such help at all can manage it. The most prominent representative of this service in the corporate environment is iCloud.

Platform as a Service (PaaS). The consumer is provided with means to deploy within the cloud-based infrastructure consumer-generated applications developed using provider-supported tools and programming languages. The PaaS model provides greater control over the user's data processing process, but transfers to him (her) all of the

responsibility and requires additional development costs for applications. Examples of PaaS services would be Google AppEngine, Red Hat's OpenShift, Heroku, etc.

Infrastructure as a Service (IaaS). The consumer is provided with data processing, storage, networking and other basic computing resources on which it can deploy and run arbitrary software, including operating systems and applications. The consumer does not manage and does not control the most of cloud infrastructure, but can control operating systems, storage facilities, applications, and has limited control over selected network components (for example, a consumer-controlled host firewall). Obviously, the IaaS model has the highest level of security due to the ability to control resources, but it requires many implementation costs and in-depth knowledge of computer technology.

Findings. Thus, an important role in innovation processes is played not only by its informational support at all stages of the innovation life cycle but also by the tools of support for the implementation of these stages. There is a significant range of solutions that allow the automation of many processes related to innovation, both in startup projects and in innovation managing processes. The main advantages of using cloud technologies include scaling and dynamism, which allow using the capacity of the infrastructure without going into complex processes of managing cloud technology.

Cloud technologies are basic for the third generation infrastructure, which allows you to create a powerful information and telecommunications system with new architecture and capabilities. According to the forecasts of the leading IT consulting companies in the world, the rapid improvement and spread of cloud computing in the coming years will completely change the development of both the IT industry and the development of innovative entrepreneurship in our country and all over the world.

It is important to notice that although the use of cloud technologies has a wide range of advantages, the process of formation of a regulatory framework for settling user service provider interaction still remains pending.

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