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OPEN INNOVATION PRACTICE: CHANNELS FOR COLLABORATION AND OPPORTUNITIES FOR UKRAINE

Open innovation practice is an effective tool for collaborative work between different agents involved in the process of innovation creation (science, business, government, and civil society). It enhances knowledge creation, diffusion, and use; intensifying technology transfer and commercialization of scientific results. In this context, the paper aims to explore and profile the nature of open innovation practice and its implementation in Ukraine.

In the article, the essence of open innovation practice has been considered. The types of open innovation have been identified, taking into account inbound (outside-in), outbound (outside-out), and coupled open innovation. The channels of purposive knowledge outflows and inflows as elements of the open innovation mechanism have been presented in the paper. It has been identified, that the coupled open innovation is more suitable for business and science collaboration. Inbound open innovation is often used as well for collaboration between representatives of business and science and can bring fruitful outcomes. However, the type of open innovation that combines inbound and outbound open innovation is more effective for business and science partnerships. Outbound open innovation is more suitable for business organizations, which decide to share unused internally developed ideas and assets with external parties to use in their activity.

The article highlights the main tools of open innovation practices in Ukraine. The different online platforms have been overviewed. It has been found, that in Ukraine an efficient tool for the implementation of open innovation practice is e-infrastructure. After the full-scale invasion of the Russian Federation, open innovation practice in combination with different online platforms can be used to find innovative solutions for rebuilding Ukraine during the war and post-war period.

Keywords: *open innovation, knowledge flows, types of open innovations, collaboration, business, science, Ukraine.*

Statement of the problem. In the era of constant transformation and turbulence innovation can be identified as the implementation of new knowledge and ideas to transform or create new products, services, processes, or even business models to add worth, improve productivity, and achieve socio-economic results. The traditional approach to creating innovation involves generating new knowledge and ideas inside the organization or company. Nowadays, when the external environment is changing rapidly, digitalization, demographic growth, the impact of the COVID-19 pandemic, global conflicts, economic recession, and rapid technological changes shift the focus from a closed innovation model to an open innovation model. Implementation of open innovation practice

presents great potential as a tool for adaptation to growing global challenges. It has wide opportunities for rebuilding Ukraine during the war and post-war period.

Analysis of recent publications. The term "open innovation" was coined by H. Chesbrough [11] in 2003, known as the "father of open innovation"[12]. In his seminal books [10; 11] he described his new approach to innovation. Since that time the open innovation concept has been considered in many academic papers and has been used by a large number of companies and organizations for collaboration with external partners. Later H. Chesbrough and M. Borgers further clarify and develop the open innovation concept, which they define "as a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model" [9]. Types and mechanisms of open innovation have been considered in academic articles by H. Chesbrough [9; 13], M. Borgers [8; 9; 31], O. Gassmann [13; 15], E. Enkel [13; 15], J. West [31]. The importance of considering absorptive capacity in organizational culture–open innovation relationship has been emphasized in scientific work by M. Naqshbandi and Y. Kamel [18]. Among the latest publications of Ukrainian scientists, methodological aspects of an open innovation typology have been presented in a scientific paper by M. Kolesnyk, V. Komandrovska, and T. Chernyshova [2]. They have suggested using "an approach to the formation of a typology of open innovations, which is represented by a conceptual knowledge structure that systematically accumulates the differences of open innovations"[2, p. 24]. The practical use of open innovation is the research area of O. Miroshnychenko [5]. The impact of open innovations on business development has been described in the article by E. Gamtsemlidze [1]. Yu. Lazarenko [4] has investigated the peculiarities of the implementation of open innovation concept 2.0 in the conditions of digital transformations. The problem of the development and use of open innovations by businesses in the 21st century has been considered in the academic paper by M. Kuznetsova [3].

Unresolved parts of the problem. The major motivation for the implementation of open innovation practice is that it improves the ability of the company or organization to generate new knowledge and create new products in collaboration with external partners through different channels. The channels, used for collaboration between partners involved in innovation processes, depend on the open innovation model and the type of organization. Therefore, there arises a need to consider the types of open innovations and define the main tools for their implementation for the promotion of open collaborative activities. It can help to find innovative solutions to tackle the extreme challenges posed by Russia's military aggression as well as prepare Ukraine for sustainable recovery and development.

The purpose of the article is to consider the essence of open innovation practice and its connection with knowledge flows; to identify types of open innovation and channels of purposive knowledge outflows and inflows as elements of the open innovation mechanism; to present the main tools for implementation of open innovation practice in Ukraine.

Research methodology. In the paper, systematic and comparative analysis of academic literature has been used to study the essence of open innovation practice and

the definition of open innovation types. The inductive and deductive methods have been employed to consider the relationship between knowledge flows and types of open innovations. Analysis, synthesis, and interpretation have been used to identify the main tools for the implementation of open innovation practice in Ukraine.

Research findings. Henry Chesbrough defined open innovation as "the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation, respectively" [10, p. 1]. Management of knowledge spillovers distinguishes two main directions of knowledge flows across the boundary of the company or organization: inbound (or outside-in); and outbound (or inside-out). Knowledge flows can be a combination of knowledge inflows and outflows between actors involved in the innovation process and use different paths within or across the boundary of the company or organization. Therefore, three types of open innovation can be identified: inbound (outside-in), outbound (outside-out), and coupled open innovation [9; 17].

Inbound (outside-in) open innovation involves sourcing and acquiring knowledge from outside the company or organization and analyzing the external environment for new ideas to identify, select, utilize, and internalize them [9]. It can be identified three phases of the inbound (outside-in) innovation process: obtaining, integrating, and commercializing [31]. The purposive knowledge inflows can involve different channels: crowdsourcing, hackathons, start-up or technology scouting, start-up accelerator programs, spin-ins, student projects and competition support, in-licensing intellectual property, communities, collaboration with universities, intermediaries, suppliers and customers, utilizing nondisclosure agreements, lead user conferences, etc [5; 11; 17]. This type of open innovation has been paid more attention by researchers and businesses in comparison with the next two types: the outbound (inside-out) and coupled. Such channels of inbound (outside-in) open innovation as ideas, start-up competitions, and crowdsourcing were used by the Lego Group [17]. In Ukraine, Nova Post, which is a Group of Companies (Nova Post in Ukraine, Poland, Lithuania, Czech Republic, Romania, Moldova and Germany, Nova Post Global, Supernova Airlines and NovaPay) provides the logistics and related services to private clients and business entities [20], has launched an open innovations platform for creating a network of innovative teams. The mission of the online platform is the creation of innovative solutions to improve logistics, and start-ups development in Ukraine as well as supporting networking and innovators across the country [21].

Outbound (inside-out) open innovation is about the unused and under-utilized internally developed ideas and assets, which go outside the company or organization for external parties to use in their activity. These ideas can be captured by others for purposive commercialization [18; 22]. The channels for knowledge outflows can be out-licensing intellectual property and technology, donating intellectual property and technology, spin-outs, corporate venture capital, business incubators, joint ventures and strategic alliances, etc. [9]. It should be noticed, that the interactions in outbound (inside-out) open innovation can involve either selling the technology or service to customers to get feedback or their

revealing. For example, outbound (inside-out) open innovation practice, was used by Elon Musk, who made the patents for Tesla's drive technology publicly available [17].

Coupled open innovation links the previous two types, inbound (outside-in) and outbound (outside-out). This type of open innovation combines purposive knowledge inflows and outflows, which were collaboratively developed by two or more partners through joint invention and commercialization activities. Coupled open innovation may use any combination of knowledge flow channels for inbound (outside-in) and outbound (outside-out) open innovation, such as joint ventures, alliances, consortia, networks, innovation ecosystems, and digital platforms, which involve working with complementary partners [9]. An example of coupled open innovation practice can be a partnership between Oxford University and biopharma company AstraZeneca. In April 2020 they collaboratively developed and manufactured vaccines against COVID-19 on a large scale [17].

Nowadays, in Ukraine the main tool for the implementation of open innovation practice is e-infrastructure. Different online platforms have been launched in Ukraine. The main online platform for supporting innovation activity, enhancing collaborative work, and promoting entrepreneurship in Ukraine is "Diia.Business" [16]. The platform can be used to find ideas for businesses that require minimum start-up capital, get consultation on how to start your own business, participate in training programs, find information about financial support for your business, etc. It is a sub-brand of the "Diia Digital Government" brand and ecosystem.

In 2018 the Ukrainian Start-up Fund (USF) was established by the Ministry of Finance of Ukraine on the initiative of the Prime Minister of Ukraine. On January 1, 2023, the USF was transferred to the Ministry of Digital Transformation of Ukraine. The USF is a state institution that helps innovative projects and technology start-ups find financing at the early stages of their development and assists in launching new projects [27]. The Fund is the driver of the start-up ecosystem development, provides conditions for the sector's growth, creates a positive investment image of the Ukrainian tech industry abroad, and represents Ukrainian innovative solutions worldwide.

USF has launched a matching online platform "SAVEUASTARTUPS" [26]. The platform aims to unite the proposals of USF's partners from all over the world and Ukrainian start-ups that need support. According to the survey of the USF, 37.4% of start-ups need relocation, 41.1% – have no savings to keep working, 99.0% – need financial support, and 72.0% – need mentorship [26].

The USF, in collaboration with the Ministry of Education and Science of Ukraine, has organized a series of events "Science&Business" [29]. The events are held to combine the innovative potential of scientists, start-ups, companies, experts, investors, and media; to search for innovative ideas and solutions; and to raise awareness of issues in business, marketing, sales, investment, and innovation.

The continuation of the Science&Business initiatives is Science&Business Startup Hackathon [27]. The goal of the hackathon is to develop projects (in the academia-business chain) aimed at the post-war reconstruction of Ukraine in such areas as security,

humanitarian and social support, innovative medicine, SME support, education, infrastructure reconstruction, and culture.

Science&Business Startup Hackathon is:

- a unique opportunity to gain knowledge about the construction of large-scale innovative projects;
- the opportunity to combine theoretical knowledge and its usage in practice;
- networking (to get new contacts that will help participants to implement their ideas);
- a crush test (testing participants for stress resistance in extreme working conditions, analysis of an idea, start-up, etc.);
- mentorship for building innovation projects [27].

After a full-scale invasion of the Russian Federation, the USF's main focus is on supporting military tech and deep tech projects. Currently, there are 3 target programs: the "Grant Support for Dual-Use Projects", the "Innovation Voucher Program", and the "Fast Track for Drones" [30].

Since 2021, the "Science to Business Marketing Model" (S2BMM) has been launched in Ukraine [29]. S2BMM is an online platform for communication and effective interaction between representatives of the business and the scientific community. The presentation of the planform took place on October 30, 2021, during the two-day event Science&Business Startup Bootcamp for scientists, start-ups, and entrepreneurs at the early stages of development in the field of science-intensive innovations and technologies.

S2BMM has been developed by the representatives of the Ministry of Education and Science of Ukraine. It contributes to the development of an innovative economy in Ukraine. The online platform shall become a tool for communication and effective interaction between business and the research community. It shall enable businesses to find and implement innovations, while scientists shall receive an opportunity to monetize the results of their work [29].

The prototype of this model was developed in the frame of the 2nd round of the incubation program EU Association Lab [14]. EU Association Lab was launched jointly by the Government Office for Coordination of European and Euro-Atlantic Integration and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH [23]. It is a component of the project "Advisory Fund for EU Association of Ukraine" that is financed by the Federal Government of Germany. Incubation was implemented by the "1991 Open Data Incubator". It is the first non-profit IT-project incubator launched in Ukraine based on open and big data [19]. Since 2016 it has hosted 22 incubation and acceleration programs and has provided support to 176 start-ups [32]. The goal of the project was to transform large volumes of open state data into a resource for creating start-up companies that provide services to Ukrainian citizens, other companies, and state authorities. The project was designed to "digitize" such industries as agro-industrial complex, energy, infrastructure projects, and public services for citizens (smart-city projects), as well as to create internal analytical systems in the country (e-government), thus preserving the interaction of IT developers, public organizations, and analytical centers with the state authorities [32].

After Russia's full-scale invasion of Ukraine, several projects dedicated to the post-war reconstruction of Ukraine have been launched [5]. The main of them are the hackathons "Rebuild Ukraine" (three hackathons have been held) [24] and a project "Startup-School-Incubator-Accelerator Network" (it has been initiated by the Ministry of Education and Science in Ukraine) [6].

The first hackathon "Rebuild Ukraine" took place at the end of 2022 and included participation from students studying in Ukraine [25]. The hackathon aimed to attract interdisciplinary teams (in the field of architecture, information technologies, and the Internet of Things). The partners and sponsors of the hackathon "Rebuild Ukraine" were persons interested in implementing innovative projects related to the design-construction-operation of buildings and cities, information technologies, software, and machine learning. According to the statement of the hackathon organizers, "the best ideas are invented by mixing, borrowing, re-using, re-inventing and testing existing solutions and concepts from other disciplines" [25].

The second hackathon "Shebuilds Ukraine" [28] was devoted to the search for creative ideas and solutions for the post-war reconstruction of Ukraine as well as and took place in March 2023. The peculiarity of this hackathon is the unification of talent and experience of female students of Ukrainian educational institutions to participate in various programs to develop innovative solutions for the reconstruction of Ukraine using information technologies, software, and any other creative solutions.

The third hackathon "Rebuild Ukraine" is dedicated to creating innovative solutions for the replacement of destroyed residential buildings in North Saltivka, region of Kharkiv city. The Rebuild Ukraine Architectural competition called upon participants (professional architects and students studying in this field) to design 200 new residential apartment units, of various sizes. Participants could engage as individuals, teams, or firms [24].

In 2022, the Ministry of Education and Science of Ukraine offered a project to create a start-up-school-incubator-accelerator network for the restoration and development of an innovative ecosystem based on higher education institutions and scientific institutions [2]. The project will help overcome the aggressive actions of the Russian Federation and create conditions for the development of the national innovation ecosystem. The project is aimed at increasing the volume of innovative products in the total volume of industrial products by expanding the network between business and science. This will allow combining scientific and industrial potential, ensure technology transfer and commercialization of scientific results, and actively involve scientists in the creation of innovative products.

Conclusions. Open innovation practice is an effective tool for collaborative work between different types of stakeholders in the era of global challenges. Channels for collaborative work depend on the types of open innovation. The outbound open innovation is more suitable for business organizations, which decide to share unused internally developed ideas and assets with external parties to use in their activity. This type of open innovation involves either selling the technology or service to customers to get feedback or their revealing. For academia and business cooperation is better to use another type of open innovation that allows to combination of knowledge flow channels for inbound and

outbound open innovation – coupled open innovation. It includes purposive knowledge inflows and outflows, collaboratively developed by partners through joint invention and commercialization activities. The inbound open innovation is often used for business and science collaboration as well as and takes many forms through research, consultancy, science and technical park developments, co-developing curricula, or apprenticeships, etc. However, the type of open innovation that combines inbound and outbound open innovation is more effective for collaboration between representatives of business and science.

Open innovation practice contributes to combining the scientific and business potential, further realizing the innovative solutions of the research community by commercializing the results of scientific research, and, in the long run, helping to rebuild Ukraine during the war and post-war period. The analysis has shown that in Ukraine, the effective tools for implementing open innovation practice, which can be used to enhance the collaboration between business and science, are online platforms and developed e-infrastructure.

Prospects for further research. The concept of open innovation continues to develop due to its ability to generate a large number of ideas and strengthen cooperation with external partners, use effective channels of such cooperation, and create targeted innovative solutions in the face of global challenges. It should be noted, that Ukraine needs to develop a national strategy to support open innovation and create a digital map of knowledge and technologies. It will help to use an effective mechanism for the implementation of open innovation practice and provide suitable conditions for collaboration between science, business, government, and civil society according to the concept of “Open innovation 2.0”.

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ПРАКТИКА ВІДКРИТИХ ІННОВАЦІЙ: КАНАЛИ ДЛЯ СПІВПРАЦІ ТА МОЖЛИВОСТІ ДЛЯ УКРАЇНИ

Практика відкритих інновацій є ефективним інструментом для посилення співпраці між різними учасниками інноваційного процесу (представниками науки, бізнесу, уряду та громадянського суспільства). Її імплементація має позитивний вплив на створення, розповсюдження та використання знань; сприяє інтенсифікації трансферу технологій та комерціалізації результатів наукових досліджень. У цьому контексті метою статті є розгляд сутності, видів відкритих інновацій та особливостей їх використання в Україні для посилення співпраці між окремими учасниками інноваційного процесу на різних етапах його розвитку.

У статті розглянуто сутність практики відкритих інновацій та її взаємозв'язок з потоками знань, що дозволило визначити типи відкритих інновацій. Елементами механізму відкритих інновацій є канали цілеспрямованого трансферу знань від яких залежить тип відкритої інноваційної моделі, яка використовується для сприяння співпраці між різними партнерами інноваційної діяльності.

У статті представлено три типи відкритих інновацій: вхідні, вихідні та комбіновані. Було встановлено, що найбільш дієвим інструментом для посилення співпраці між бізнесом та наукою є використання комбінованої моделі відкритих інновацій. Вхідні відкриті інновації також є ефективним інструментом для взаємодії між представниками бізнесу та науки через дослідження, консультування, створення наукових та технологічних парків, спільне розроблення навчальних програм або викладання. Вихідні відкрити інновації знайшли більше застосування у діяльності бізнес-організацій, які приймають рішення щодо розповсюдження невикористаних внутрішньо розроблених ідей та активів у відкритому доступі. Такий тип відкритих інновацій може бути імплементований у діяльність інших зовнішніх учасників інноваційного процесу, що вже обумовлюється їх абсорбційною спроможністю.

У статті розглянуто основні інструменти використання практики відкритих інновацій в Україні. Встановлено, що ефективними інструментами, які сприяють їх впровадженню в Україні, є розвинена електронна інфраструктура та онлайн-платформи. Їх застосування посилює співпрацю між різними партнерами інноваційної діяльності, має позитивний вплив на пошук та впровадження інноваційних рішень, які можуть бути використанні для підтримки відновлення, відбудови та модернізації України.

Ключові слова: *відкриті інновації, потоки знань, види відкритих інновацій, співпраця, бізнес, наука, Україна.*