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Kyiv National Economic University named after Vadym Hetman***THE ADOPTION OF OPEN INNOVATION PRACTICES: A CAPABILITY-BASED APPROACH**

The paper investigates managerial aspects of open innovation adoption by exploring innovation capabilities of organization. Based on the review of recent publications, key categories which reflect a firm's ability to provide «open» innovation activity are identified and systematized. A conceptual dynamic capability-based model for open innovation adoption in organization is developed as a result of the study.

Keywords: innovation, open innovation, innovation capabilities, knowledge management, learning mechanisms.

Лазаренко Ю.О. ЗАПРОВАДЖЕННЯ ПРАКТИКИ ВІДКРИТИХ ІННОВАЦІЙ: ПІДХІД, ЗАСНОВАНИЙ НА МОЖЛИВОСТЯХ

У статті розглянуто управлінські аспекти запровадження відкритих інновацій з урахуванням інноваційних можливостей організації. На основі аналізу сучасних літературних джерел систематизовано ключові категорії, що відображають здатність підприємства до «відкритої» інноваційної діяльності, та подано їх характеристику. За результатами дослідження розроблено концептуальну модель впровадження відкритих інновацій, яка ґрунтується на динамічному підході до інноваційних можливостей організації.

Ключові слова: інновації, відкриті інновації, інноваційні можливості, управління знаннями, механізми навчання.

Лазаренко Ю.А. ВНЕДРЕНИЕ ПРАКТИКИ ОТКРЫТЫХ ИННОВАЦИЙ: ПОДХОД, ОСНОВАННЫЙ НА ВОЗМОЖНОСТЯХ

В статье рассмотрены управленческие аспекты внедрения открытых инноваций с учетом инновационных возможностей организации. На основе анализа современных литературных источников систематизированы и охарактеризованы ключевые категории, отражающие способность предприятия к «открытой» инновационной деятельности. По результатам исследования разработана концептуальная модель внедрения открытых инноваций, основанная на динамическом подходе к инновационным возможностям организации.

Ключевые слова: инновации, открытые инновации, инновационные возможности, управление знаниями, механизмы обучения.

Statement of the problem. In modern society where intellectual capital becomes dominant the role of knowledge in driving innovation and economic growth will increase in importance. Firms invest tremendous amounts in corporate research and development to stamp their marks in competitive global markets. However, despite high research and development investments modern companies cannot rely entirely on internal or «closed» paths in generating new ideas and bringing innovations to the market. To stay successful, companies have to re-invent their business models and look for alternative approaches to value creation. As a result, an «open innovation» paradigm is emerging, where business entities strive to exploit external as well as internal flows of information, knowledge and technologies to develop their innovation capabilities. Open innovation is most commonly defined as «the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively» [1, p. 15]. H. Chesbrough, the founder of the open innovation paradigm, takes a broader perspective and explains that open innovation is driven primarily by four key factors: the increased availability and mobility of skilled «knowledge-workers», the new external options available for unused ideas, external suppliers increasing capability and finally, emerging venture capital markets that created new strategic opportunities for companies [2, p. 131].

Among the other important factors compelling companies into open collaboration models need to emphasize changeable market conditions, industry challenges as well as opportunities, technological convergence and relevant partners' resources.

In today's challenging environment companies need to develop their innovation capabilities to be competitive in the digital economy. The trend towards open innovation calls into question traditional knowledge management approaches inside the firm. Thus, knowledge

management capacity is not limited to specific internal knowledge processes. To be successful, firms need to extend their internal innovation capabilities by using inter-organizational knowledge transactions.

Analysis of recent research and publications. Within a knowledge-intensive economy the open innovation paradigm becomes an important issue for both researchers and practitioners. Firm-level capabilities necessary for innovation adoption in organizations were investigated by M. Bell [3], J. Bessant and W. Phillips [4], B. Jaruzelski and R. Holman [5], B. Lawson and D. Samson [6], U. Lichtenthaler and E. Lichtenthaler [7], A.-M. Nisula and A. Kianto [8], A.-K. Ridder [9], S. Zahra and G. George [10] and other researchers. Based on a literature review, scholars have previously focused on different aspects of intra-firm knowledge sharing processes. The vast majority of earlier studies have placed great focus on internal knowledge exploitation, or the expansion and modification of the firm's existing knowledge to improve its products or services, while the latest research emphasizes the importance of the firm's openness to external knowledge. Another set of studies has developed an integrative approach to the organization's innovation capability building by realizing the importance of combining internal and external knowledge.

The complementary nature of the internal and external knowledge processes underscores the firm-level coordination requirements, which call for integrative knowledge management [7, p. 1318]. It is our belief that such an approach is the most relevant within the open innovation framework.

Knowledge management research is usually limited to the absorptive capacity, which considers primarily utilizing external knowledge inside a company's boundaries. However, integrative prospects of the firm's ability to manage knowledge in open innovation processes are still unclear. Knowledge management capacity is a step towards a theoretical foundation for open

innovation. In this light, a capability-based approach in the open innovation context contributes to explaining intra-organizational competencies in the innovation partnership.

Problem. The aim of this paper is therefore to investigate firms' open innovation capabilities and establish appropriate managerial implications to develop the innovation potential of the organization. This paper is organized as follows: first, this study focuses on the theoretical background which is related to the innovation capabilities of the organization. Thereafter, key potential open innovation capabilities are systematized and described. Next, the paper reveals the conceptual framework for open innovation adoption in the organization based on a capability-based dynamic approach. The latter is the practical conclusions and suggests implications for future research.

The main material of the study. A common definition of firm capabilities is the «complex bundle of skills and accumulated knowledge, exercised through organizational processes that enable firms to coordinate activities and make use of their assets or resources» [11, p. 38]. Innovation capability is usually defined as an organization's potential to generate innovative outputs [12, p. 119] or as its ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders [6, p. 384]. The innovation capacity is also determined, in more detail, as the ability to absorb, adapt and transform a given technology into specific managerial, operational and transactional routines that can lead a firm to achieve Schumpeterian profits [13].

A.-K. Ridder based on the results of a dynamic capability approach concluded that the relevant capabilities of open innovation can be classified according to whether they support knowledge sensing, seizing, or reconfiguring [9]. Sensing refers to the recognition of market and technological opportunities and the mobilization of requisite resources for innovation activity. Seizing refers to the organizational strategy and infrastructure for making appropriate decisions and absorbing and integrating resources to create and capture value from addressing opportunities. And finally, reconfiguring refers to the continuous renewal and modification aimed at maintaining competitiveness, as markets and technologies change once again.

Internal scouting, searching for potential external opportunities, knowledge sources or customers, and sense-making can drive a company's dynamic sensing capability for open innovation. Inbound and outbound seizing capabilities are required to realize successful transfers and adaptation of knowledge resources. So, the ability to combine, coordinate, and integrate knowledge flows, technologies and innovative decisions both inside and outside the firm emerges as an additional organizational capability.

Alternatively, B. Jaruzelski and R. Holman investigate the critical innovation capabilities using the classification of top-performing firms. Successful competitive companies tend to choose one of three distinct innovation approaches: a need seeker, a market reader or a technology driver [5]. Research suggests there are four key categories of critical innovation capability: ideation, project selection, product development and commercialization. Each of these innovation strategies requires a cohesive set of organizational capabilities to succeed. A need seeker strategy directly engages current and potential customers to better understand their needs, requirements and preferences. That is why deep consumer insights and analytics are critical for this

type of firms. A technology driver strategy depends on developing new technologies that can lead to innovative products, and follows the direction suggested by the company's technological capabilities. Their success is less dependent on fresh ideas imported from the external market environment. Detailed understanding of emerging technologies and trends and product life-cycle management is important for these firms in order to provide effective innovation process. And finally, market readers companies should particularly focus on the stages of product development and commercialization – their main capabilities include resource requirement management and supplier-partner engagement in the development process [5].

U. Lichtenthaler and E. Lichtenthaler underline the critical role of combining internal and external knowledge in the open innovation processes. Based on insights from the literature survey, dedicated to the knowledge management issues, the authors distinguish internal and external knowledge exploration, retention, and exploitation [7, p. 1317].

Knowledge exploration is directed at internally or externally generating new intuitions, and selection, i.e. choosing the most appropriate ideas through evaluation. On the contrary, knowledge exploitation embraces the replication of new approaches in diverse contexts and their internal or external application in different settings. Finally, internal or external knowledge retention connects these coherent processes, and it ensures knowledge transfer, which can thereby lead to the initiation of new processes of knowledge sharing.

To capture internal and external knowledge sharing processes six key knowledge capacities are proposed by the authors: inventive, absorptive, transformative, connective, innovative, and desorptive capacity (Figure 1).

Knowledge management process phase The type of knowledge source	Knowledge exploration	Knowledge retention	Knowledge exploitation
Internal (Intra-firm)	Inventive capacity <u>Key components:</u> <ul style="list-style-type: none"> ▪ Generate ▪ Integrate 	Transformative capacity <u>Key components:</u> <ul style="list-style-type: none"> ▪ Maintain ▪ Reactivate 	Innovative capacity <u>Key components:</u> <ul style="list-style-type: none"> ▪ Transmute ▪ Commercialize
External (Inter-firm)	Absorptive capacity <u>Key components:</u> <ul style="list-style-type: none"> ▪ Acquire ▪ Assimilate 	Connective capacity <u>Key components:</u> <ul style="list-style-type: none"> ▪ Maintain ▪ Reactivate 	Desorptive capacity <u>Key components:</u> <ul style="list-style-type: none"> ▪ Identify ▪ Transfer

Figure 1. A capability-based framework for open innovation processes [7]

Inventive capacity refers to a firm's ability to internally explore knowledge, i.e. to generate new knowledge inside the firm's boundaries. It covers all the process stages of internally generating new knowledge and ideas and integrating it into the existing firm's knowledge base. Absorptive capacity relates to a firm's ability to recognize, explore, modify and apply external knowledge. Within the open innovation framework this capability focuses on knowledge acquisition.

Transformative capacity refers to a firm's capability of internally retaining, reactivating and realigning the existing knowledge base over time. So, transformative capacity relates to the process of maintaining knowledge in a company's knowledge base and reactivating this knowledge inside the organization through experience.

Connective capacity combines elements of alliance capability and relational capability and refer to a firm's ability to retain knowledge in inter-organizational relationships. Within the open innovation practices it deals with external networks. Connective capacity does not assume inward knowledge transfer, but instead firms can get access to external knowledge without acquiring it.

Innovative capacity is associated with a firm's ability to internally exploit knowledge that has been explored and retained inside or outside the company's boundary. Descriptive capacity refers to a firm's ability to externally exploit knowledge. It describes a firm's capability of external knowledge exploitation and assumes identification of potential knowledge opportunities as well as outward knowledge transfer. In this vein, considering the concept of open innovation it is necessary to point out that firms have to combine external and internal learning mechanisms to increase the level of their absorptive capability.

To develop creative ideas, to produce innovative goods or services and deliver it to the market, every firm must have a specific set of innovation capabilities. It is our belief that the firm's innovation capabilities are embedded in different complementary capacities: the technological, the operational, the managerial, the transactional, the learning, the organizational, resource allocation and the intercultural (table 1).

Within the open innovation framework technological capability results from the inter-organizational learning process, which can involve acquisition or adaptation of external knowledge for internal use. Through such mechanisms firms are able to develop new knowledge to put technological changes into practice and, consequently, to achieve a successful business transaction.

In the light of open innovation the main purpose of managerial capability is to maintain a smooth flow of firm's inputs and outputs within the innovation processes to share potential risks and to achieve higher rates of economic efficiency. Managerial capability depends on a lot of firm-level and industry specific factors: it will vary according to firm size, organizational structure and system, market conditions, technological

turbulence, innovation orientation and degree of innovation openness of organization. For each level of innovation openness and absorptive capability, the firm should build its own adaptive management structure and be able to change it over time.

The firm's transactional capability refers to its ability to connect itself to the market and to provide different commercial functions, such as marketing, logistics and sales. Transactional capability is necessary to complete the open innovation process and to guarantee profitable sales.

On this basis, we define open innovation capability as a firm's ability to dynamically manage its knowledge base over time by using inbound and outbound information flows and subsequently transform knowledge and ideas into new products, services, processes or structures for the benefit of the firm and its stakeholders.

Adopting the model of U. Lichtenthaler and E. Lichtenthaler [7, p. 1323], we use a knowledge-based dynamic capabilities approach to provide a framework for the study. A proposed conceptual capability-based model for open innovation adoption is specific to each business entity. It can be illustrated by the following schema (figure 2). An offered conceptual capability-based model for open innovation sets out sequential linkages between the innovation capabilities of the organization and has the following main elements: a set of input firm's potential innovation capacities, external and internal learning mechanisms as a part of the knowledge management capacity, general realized innovation capabilities of the organization (adaptive, innovative, absorptive and descriptive) and framework conditions of an open innovation process, which include external actors and environmental conditions. The arrows indicate linkages and the direction of exchange of information and knowledge flows between the various components of the model.

«External actors» refers to entities that are affected by and which can affect open innovation implementation. They include clients, customers and end users of product (service), suppliers, competitors, consultants, universities, other government or public

Table 1

Definition of firm's open innovation capabilities

Capability	Definition
Technological capability	The firm's ability to absorb and transform a given technology to create or change its operations capacity and any other capability aimed at reaching higher levels of technical and economic efficiency.
Operational capability	The ability to transform the firm's R&D results into products, which meet market needs, to perform the given productive capacity through the collection of daily routines that are embedded in knowledge, skills and technical systems at a given time.
Managerial capability	The ability to transform the technology development outcome into coherent operations and transaction arrangements. It refers to the capacity to identify the firm's internal strengths and weaknesses, external opportunities and threats, adopt different types of innovation strategies that can adapt to environmental changes.
Transactional capability	The ability to reduce the firm's transaction costs, e.g. marketing, outsourcing, bargaining, logistics and delivering costs.
Learning capability	The ability to identify and exploit existing knowledge and competence essential for a firm's competitive success. The firm's learning orientation includes four main components: commitment to learning, shared vision, open-mindedness and knowledge sharing (intra- and inter-organizational). It is associated with knowledge management capacity.
Organizational capability	The ability to constitute a well-established organizational structure, cultivate organizational culture, coordinate the work of all activities towards shared objectives.
Resource allocation capability	The firm's ability to mobilize and expand its technological, human, financial and information resources during all the stages of the innovation process.
Intercultural capability	Refers to effective intercultural communication in order to share the ideas between international partners and provide innovative solutions. It includes characteristics related to team work, social competence and intercultural understanding.

Source: systematized by the author based on [13, p. 4-8; 14, p. 17-21; 15, p. 10-14; 16, p. 23-25]

research institutes, non-government organizations and the wider stakeholders. «Environmental conditions» relates to the main external factors which have the potential to affect the open innovation process. It includes factors of market and technology dynamics, legal regulatory political and social factors, budgets, innovation policy, fiscal constraints, rules and government structures etc.

It is necessary to emphasize, that both components of the proposed model – «environmental conditions» and «external actors» exist objectively, irrespective of whether or not innovation processes take place within an organization. However, outputs of intra-firm learning processes and knowledge sharing can impact on external actors' purposes, demands and expectations, while it cannot impact on external framework conditions of business environment.

It should be noted that

knowledge management capacity is determined as a core element of the proposed model. Following the original work by U. Lichtenthaler and E. Lichtenthaler, in this paper we define knowledge management capacity as a firm's ability to dynamically manage its knowledge base over time by reconfiguring and realigning the processes of knowledge exploration, retention, and exploitation inside and outside the organization [7, p. 1322]. Knowledge capacities are critical for effective open innovation interactions with external actors, because they provide a managerial framework for extending the company's internal knowledge base. However, knowledge management capacity is necessary but not sufficient to achieve Schumpeterian profits and economic benefits from open innovation performance. On the basis of the above findings, it is possible to outline some practical aspects for managing open innovation capabilities of organization:

- the complementary character of internal and external knowledge is important for open innovation processes, thus it is critical for companies to integrate their internal and external knowledge flows;
- innovation capabilities need to match a firm's business conditions, so companies need to transform and reconfigure their innovation capacities by active management to fit changing environments;
- decisions on developing and transforming innovation capabilities need to be aligned with a firm's strategy. Based on their strategic intentions, firms have to put particular emphasis on specific combinations of innovation capabilities to execute their pre-determined strategies;
- successful innovation capabilities reconfiguration requires organizational changes which may be achieved by means of structural and contextual intra-firm mechanisms, the systems, processes, beliefs and expectations that shape organizational behavior;
- both external and internal learning mechanisms are important to the firm's innovation capability building, although these mechanisms differ in their contri-

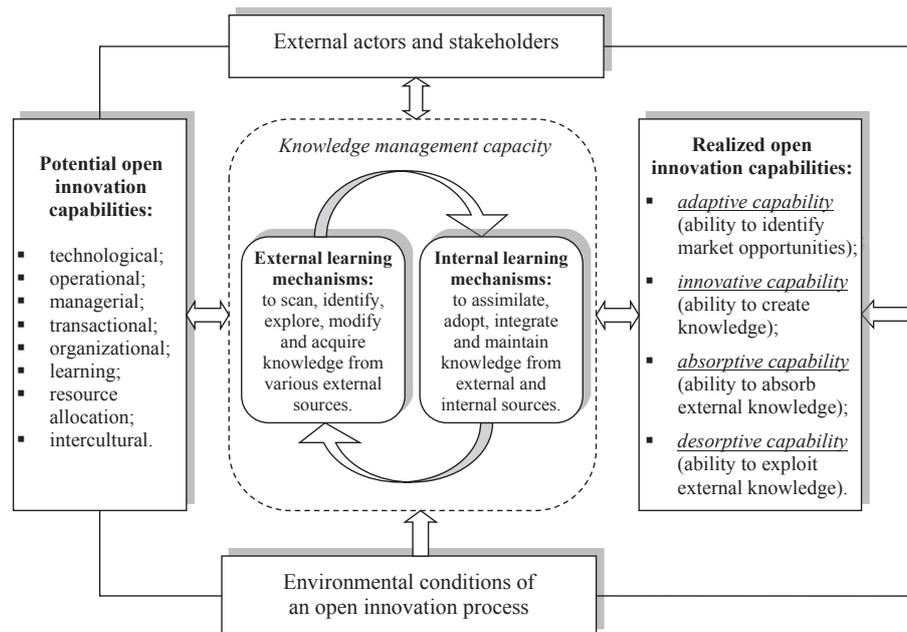


Figure 2. A conceptual capability-based model for open innovation adoption in organization

Source: developed by the author

– bution to the accumulation of specific types of knowledge. Thus, directors must recognize, explore and combine the knowledge base across different internal and external learning mechanisms over time.

Following the modified version of S. Zahra and G. George's approach [10], which covers both the concepts of potential and realized capacities, we treat the actual underlying innovation capacities of the organization (technological, operational, managerial, transactional, organizational, learning, resource allocation and intercultural) as potential knowledge capabilities. At the same time, the output adaptive, innovation, absorptive and desorptive capacities can be viewed as realized open innovation capabilities. A combination of these potential and realized innovation capacities provides the framework for the capability-based dynamic approach to open innovation management in organizations.

Conclusion and future research implications. This paper has implications for research into open innovation management and dynamic capabilities of organizations. With regard to open innovation, the framework presented in the paper provides a basis for empirical studies. The proposed model may be used to identify potential sources of open innovation capabilities. In addition, by considering the interactions between external actors and environmental conditions, the framework contributes to explaining the firm's open innovation process.

From a managerial perspective, if potential open innovation capabilities are improved, external knowledge will be easily identified and acquired in order to adapt the company's strategy to the rapidly changing business environment. Thereby the resulting absorptive capability will be a driver for the fostering of a firm's innovation performance. Realized open innovations capability can be used to help a company to combine its internal and external knowledge and constitute the necessary conditions for developing its competitive advantage.

The «open» approach shows promising potential of making the innovation process less costly, more effective, adaptive, flexible and dynamic. It is necessary to emphasize, that for an efficient open innovation implementation all the firm's capabilities need to be specific and integrated. There is no inalterable set of technological, managerial, operational, organizational or transactional knowledge – capabilities combinations need to be changed over time. To be successful firms have to reconfigure and realign their innovation capabilities to adapt to turbulent environmental conditions better and sooner than competitors. Therefore, a further investigation of the dynamic nature and structure of innovation capabilities would help to explain why firms succeed or fail in their open innovation partnership.

Future research should investigate the firms' pathways of open innovation capabilities building according to firm-specific factors (e.g. firm size, type of organizational structure, firm strategy, managerial behavior, employees' belief and values) and industry-level as well as economy-level factors (e.g. policy framework). Such kinds of analysis would provide profound understanding of firms' capability enhancing processes.

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