Małgorzata Dolińska

Management of Open Innovations and Their Contributors in Crowdsourcing

Maria Curie-Skłodowska University Press

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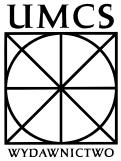
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Małgorzata Dolińska

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Maria Curie-Skłodowska University Press
ul. Idziego Radziszewskiego 11, 20-031 Lublin, Poland
tel. +48 81 537 53 04
www.wydawnictwo.umcs.lublin.pl
e-mail: sekretariat@wydawnictwo.umcs.lublin.pl

Sales Department
tel./fax +48 81 537 53 02
Online bookstore: www.wydawnictwo.umcs.eu
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Introduction

Crowdsourcing has become widely adopted in recent years to various business problems and is useful and advisable in areas of open innovations and customer benefits. Its initiatives have in common the use of online platforms activated to engage crowd members in efforts to solve innovative problems that crowdsourcing platform (CP) clients face and also create new solutions for their future development (Bernier et al., 2023; Daradkeh & Atalla, 2022; Devece et al., 2017).

Crowdsourcing can be understood as a model for innovative problem-solving, based on the effort, knowledge and work offered by the Internet community, i.e. crowd members on CPs (Brabham, 2013; Vignieri, 2021). The platforms enable crowd members to participate in the development of open innovations (new values, market trends, knowledge, design ideas, innovative solutions also new products, services) for CP clients (i.e. companies, non-profit organizations, individuals) in accordance with their orders and expectations (Dolińska, 2019, 2020).

The aim for any CP is to encourage a crowd that has both the willingness and skills to create new values and innovations for the platform clients. The crowd can be a source of innovative competencies and knowledge from all over the world. It can also be involved in developing innovative solutions, new products, or services on CP (Allen et al., 2018; Bakici, 2020; Dolińska, 2022).

The evolution of the Internet technology and its ubiquitous access gives new opportunities in providing user interactivity, collaboration and bringing massive intelligence to solve various problems at an affordable price (Bhatti et al., 2020; Rahman & Rahman, 2023). The strength of CPs is the ability to deliver value to clients in a more efficient and effective way, because crowd members can solve innovative problems faster, cheaper and even better than traditional companies. By encouraging the relevant crowd members to contribute to knowledge or new solutions creation, CPs have an opportunity to significantly increase their own size and revenue without increasing their activity costs at the same time (Blohm et al., 2018; Kohler, 2018; Lee et al., 2019).

The online work of crowd members becomes competitive, hence managing collaboration with crowdsourcing workers and CP clients while generating open innovations is the basis for the platform activities and development, as well as building its valuable offer on the Internet market. CP offer crowd members performing online and voluntary work, which is individually accepted by them, meets their expectations, interests and aims of personal development. Crowd members as prosumers (producers and consumers) are involved in the value creation processes during open innovation development on the platforms. Open innovations in crowdsourcing base

on mutual cooperation of CP managers with contributors, i.e. crowd members, clients and other external partners. A CP enables managers to collaborate with many solvers and creators, and use their knowledge, ideas and skills at a lower cost, while effectively integrating their resources to encourage them to create open innovations on the platform.

The market success of CPs largely depends on their managers' abilities to motivate crowd members to perform online work and simultaneously involve their external resources of knowledge to solve innovative challenges (Bakici, 2020; Dolińska, 2022; Karachiwalla & Pinkow, 2021; Moghaddam et al., 2023; Sun et al., 2023), in accordance with orders and requirements of their clients.

Management activities are the basis of CP existence, creating market value of the platform and its offer as well as its continuous development on the competitive online market. The performance of these activities enable CPs to create expected values for clients by crowd members during 1) collaboration with them and also between them in 2) crowdsourcing open innovation processes, whose concept is proposed by the author.

Hence, the development of the multidimensional model of managing open innovation processes and their contributors on CPs that could be utilized in business practice is defined as the research problem to be solved in this monograph, and identifies the research gap to be addressed. The proposed model and the research carried out in accordance with the purpose formulated in Chapter 3 present possibilities of solving the above problem. This research purpose is defined as follows: To verify whether the proposed model of managing crowdsourcing open innovation processes and cooperation with their contributors fits into the activities of existing CPs on the online market.

Next, the following research gap is identified in Chapter 4: How to motivate crowdsourcing workers to develop open innovations using intrinsic, internalized and extrinsic types of motivations? This research gap is also the research problem to solve. The model of motivating crowdsourcing workers to develop open innovations was proposed to solve this problem.

The research goal to solve the above research problem is defined as follows: How do existing CPs use intrinsic, internalized and extrinsic types of motivations to motivate crowd members to develop open innovations?

The theoretical purpose of this monograph is to elaborate, in relation to the research problems formulated above, the following two multidimensional models:

1) the model of managing open innovation processes and their contributors on CPs;

2) the model of motivating crowdsourcing workers to develop open innovations which constitutes a complement to the first (1) model.

The author's own concept of open innovation processes was used while preparing the two proposed models. The utilitarian goal related to the above theoretical purpose is to verify the possibilities of using the proposed models in business practice, i.e. by

existing CPs that operate on the online market. CP managers focus on harnessing the opportunity to effectively connect CP clients' orders with skills and knowledge of crowd members as solvers and creators during the development of crowdsourcing open innovations.

The first model determines management activities which:

– are performed during mutual collaboration of CP managers with crowd members and clients also between them; and

– are defined in three phases and six stages of crowdsourcing open innovation processes.

The second model of motivating crowdsourcing workers to develop open innovations is elaborated:

– for three phases of open innovation processes; and

– in accordance with assumptions of the self-determination theory (SDT) framework.

The extrinsic, internalized and intrinsic types of motivations defined in SDT are adapted and extended for crowdsourcing workers and many motivational factors are defined for each (also internalized) type of the crowd motivation as well as the relevant phase of the analyzed processes.

The monograph consists of four chapters, an introduction and conclusions which also include directions of the future study. The first chapter presents crowdsourcing definitions. It also contains literature study on conditions, principles and benefits of CP and its contributors' activities. Then different kinds of CPs, the examples of existing platforms' operations and development on the Internet are presented. This chapter ends with the identification and characteristics of crowdosourcing application benefits in business practice. Next the determinants and opportunities for generating open innovation on CPs were identified, as well as the essence and rules of mutual collaboration of CP managers with clients, crowd members, among themselves and with other external partners of the platform. An idea of open innovations' development on CPs is the basis of the presentation of the author's concept of crowdsourcing open innovation processes in the second chapter. This concept is used in two models proposed in the third and fourth chapters, respectively.

To build presented models, the literature review on management and crowdsourcing open innovations as well as on motivating crowd members on CPs was carried out. The assumptions and determinants of creating the model of managing open innovation processes and their contributors on CPs, as well as its components are presented in the third chapter. Next, the research purpose and five research questions were formulated to check the possibility of using this model in business practice on the example of the examined CPs on the Internet. Then, the obtained research results were analyzed and discussed.

The fourth chapter describes the conditions and rules of voluntary and online work of crowd members during generation of open innovations. It describes the

SDT framework and its possible application on CPs, as well as the literature review on crowd members' motivation. Next the model of motivating crowdsourcing workers to develop open innovations and research results on opportunities of its practical utilization are presented according to the defined research goal and three research questions formulated for it.

The research, the results of which are presented in the third and fourth chapters, was conducted for 69 CPs existing on the Internet in 2023. The platforms for research were selected in a non-random and purposeful manner. The study was conducted using secondary research and observations of the analyzed CPs websites, as well as the social media they used. The answers to all research questions formulated in Chapters 3 and 4 were positive and the objectives of the performed studies were achieved. The analysis of the conducted research results was performed using descriptive statistics and its results confirm that the developed models fit the activities of the analyzed CPs and could be used in business practice of existing CPs on the Internet. Hence, the final conclusion is as follows – the theoretical and utilitarian purposes of the monograph were achieved.

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CHAPTER 1

Characteristics of Crowdsourcing Platforms (CPs) and Their Contributors

1.1. The idea of crowdsourcing. Principles and determinants of CP activities

Howe (2006) defined crowdsourcing as "the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call" (p. 3). This definition is clear and comprehensive to present a useful starting point (Saxton et al., 2013, p. 3). The word "crowdsourcing" connects the terms "outsourcing" and "crowd" (Pohlisch, 2021, p. 15).

Crowdsourcing is simply the outsourcing of different tasks or work to a diverse group of individuals in an open call for the purpose of utilizing their intelligence (Zhen et al., 2021, p. 1) and can be also understood as lying at the intersection of three components: the crowd (the Internet society), outsourcing, and advanced Internet technologies (Saxton et al., 2013, p. 3). It is the strategy of service provision by an organization (also a company) or people, by means of an open call on unknown members of the crowd on the CP, where they generate and CP clients receive usable and expected economic advantages, also open innovations in business practice (Chesbrough, 2019; Mladenow et al., 2014).

The main strength of CP is that it connects different people to focus on solving innovative challenges. The success of crowdsourcing lies in the use of collective knowledge, skills of crowd members, which lead to cooperation and teamwork. Crowd members offer fresh insights, own ideas during solving problems, thus, the final solution is often superior to the one proposed by individuals. Currently, crowdsourcing is also used to support and enhance software engineering in various aspects of solving innovative problems (Acar, 2019; Ismailoglu, 2022; Zhen et al., 2021).

Crowdsourcing presents a transformative approach, facilitating the development of the open business model by breaking down boundaries of traditional organizations and leveraging distributed stakeholders' resources and capabilities (Kohler & Nickel, 2017; Song et al., 2024). It is a form of IT-enabled generation of open innovations (new: values, market trends, knowledge, design ideas, products, services and also other solutions) which are created during solving innovative challenges by crowd members on CPs for their clients (i.e. companies, non-profit organizations, individuals) (Dolińska, 2019, 2020).

Crowdsourcing blurs boundaries between production and consumption by creating new opportunities for acting as a supplier, typically by online work of crowd members. CPs are covering a wide range of purposes among others: apparels' design (threadless.com), solving R&D problems, developing new products (InnoCentive), incubating ideas (e.g. OpenIdeo, Ideastorm), customizing graphic designs (e.g. DesignCrowd), crafting designs (e.g. 99designs), executing micro-tasks, including human intelligence (e.g. MTurk), supporting authorities (e.g. LEEDIR), and so on. The presented kinds of platforms offer seekers a service process through which they can outsource a task or a job, traditionally performed by internal employees of organizations, to a crowd created by a large unspecified group of individuals active on the Internet (Bauer & Gegenhuber, 2015; Jianjun et al., 2017; Vignieri, 2021).

According to Song et al. (2024), crowdsourcing model is characterized as a powerful approach for innovation creation in the modern business landscape. By using open collaboration, this model has the potential to revolutionize manufacturing processes and bring about unprecedented levels of creativity and efficiency.

Crowdsourcing relies on two-way communication: clients who want to solve problems or perform tasks turn to a crowd of potential solvers, many of whom respond by offering contributions (Bauer & Gegenhuber, 2015, p. 662). It is a method of solving a specific set of functions/actions by outsourcing and using distributed human computing capabilities via the Internet. A CP requires an IT infrastructure which is the physical network with standard languages and protocols that allow mutual communication, collaboration and knowledge transferring among different nodes of the network and also proposes services and applications that enable more efficient storage, transfer and share of knowledge connected with its management and transfer via the computer network (Bhatti et al., 2020; Shaqrah & Noor, 2017).

Another definition shows crowdsourcing as a production platform through which people and firms send requests and other people (the crowd) return expected responses. A CP connects crowd members, employs their abilities, and/or knowledge to develop an innovative solution or solve a problem. Crowd members decide to voluntarily contribute to the development of a potential open innovation. Crowdsourcing is also emerging as a key new enabler for organizations to leverage talent and experience from their outside boundaries (Blohm et al., 2018; Saxton et al., 2013).

When conducting a literature review, Estellés-Arolas and Guevara (2012) identified 40 different definitions of crowdsourcing. On this basis, they have derived a coherent definition: Crowdsourcing is a type of participatory online activity in which individuals and organizations propose to a group of crowd members of different knowledge, heterogeneity and number, via a flexible open call, to voluntarily undertake tasks. The task of variable complexity and modularity in which the crowd should participate,contributing their engagement, work and knowledge, always entails mutual benefits. The user will receive satisfaction of a given type of need, which will enable him to obtain economic or social recognition, or develop individual abilities,

while the crowdsourcer (CP client) will obtain and use to their advantage what the crowd member has brought to the venture, the form of which will depend on the kind of activity undertaken (Estellés-Arolas & Guevara 2012, p. 197; Pohlisch, 2021, p. 16). Hence, crowdsourcing is only possible under conditions that secure the chain of communication acts and information flow from sourcing clients to the crowd and back (Bauer & Gegenhuber, 2015, p. 663).

Since the term was first presented by Howe (2006), crowdsourcing has emerged as a complex, multidisciplinary concept with many applications in a wide variety of domains, including computer science, IT, public health, engineering, business and management (Afuah & Tucci, 2012; Brabham, 2009; Karachiwalla & Pinkow, 2021). Crowdsourcing generally varies in terms of participants (ranging from individual inventors, start-ups, research facilities, experts, or amateurs), the method of participation and mutual interaction (collaborative and/or competitive), motivations (monetary or non-monetary), and the type of the platform host, i.e. a company-owned or intermediary CP (Füller et al., 2021; Howe, 2008; Kohler, 2015).

Today's crowdsourcing offers much more complicated human work, including business areas such as R&D, accounting, new product design, digital (social) media production, peer-to-peer finance, software development, translation to foreign languages, citizen journalism, or creating new brands (Acar & van den Ende, 2019; Saxton et al., 2013).

By publishing an open call on the Internet, a CP invites crowd members to submit solutions to a specific problem (Blohm et al., 2018, p. 123). Bauer and Gegenhuber (2015) characterize a CP as a networked online production space where human beings interact with each other and perform activities for their own advantage. A CP connects people, employs their skill sets, and/or aggregates their knowledge, and the responding crowd members are managed to innovatively develop solutions and/or solve problems. Crowdsourcing is applied when an individual, team, or organization uses external sources during solving a problem or performing a task and a CP identifies these sources through a call broadcast to a crowd (Bauer & Gegenhuber, 2015; Saxton et al., 2013).

Crowdsourcing is also characterized as a bottom-up and open process of interaction, and its focus is not primarily on the tool used (a website or a platform) but on the way in which this process supports businesses. A crowdsourcing process is a type of participatory online activity in which an individual, non-profit organization, or a company proposes to a group of individuals as crowd members with the relevant knowledge, via a flexible open call, to perform the voluntary work and complete the assigned tasks (Estellés-Arolas & Guevara, 2012; Vignieri, 2021).

The term "crowdsourcing" refers to the participation of prosumers (consumers and producers) as well as other actors in the production process, changing the work model that is typical of a traditional production organization (Caruso, 2017; Pinheiro et al., 2020). Crowdsourcing is simply the outsourcing of tasks or work to a large and

diverse group of crowd for the purpose of leveraging human intelligence. It is considered as the efficient and effective way of finding expected information, knowledge in online labor market (Zhen et al., 2021, p. 1). Crowdsourcing has the potential to rationalize not only production processes but also people's work, collaboration and life, i.e. to replace occasions and capacities virtually for free and enable CPs to perform productive activities under an effectiveness-and-efficiency regime. Therefore, the trend toward working prosumers is imposed on and advanced by active consumers as workers on CPs (Bauer & Gegenhuber, 2015; Saxton et al., 2013).

Currently, innovative firms learn how to use the wisdom, knowledge, experience, and creativity of crowd members when generating design ideas, new product concepts, solving scientific and technical problems on CPs. Crowdsourcing can also offer complicated human intelligence work, including R&D results, the use of new technologies, accounting, new product designs, peer-to-peer finance, digital media production, software development, and more, such as the creation of new brands and their logos. This shows that, when combined with the low-cost and easy-to-use social media technology platform, crowdsourcing diversifies knowledge-sourcing mechanisms and creates new global markets for work and innovations (Boons & Stam, 2019; Dolińska, 2017a, 2022; Saxton et al., 2013).

Crowdsourcing becomes part of current shifts in the organization of production, which specifically concern the trends of increased acquisition of external knowledge resources, innovative competencies and new solutions. It deals with crowds as sources of economic value and becomes a tool for generating new goods and/or services. The success of outsourcing and advanced Internet technologies are significant factors for the attention paid to crowdsourcing development. The enormous growth of crowdsourcing is its inherited power of parallel processing, i.e. it enables to perform multiple tasks or actions simultaneously, reducing the time and cost of solving innovative problems. A CP mobilizes crowds via Internet calls and then, depending on the task, selects one, several, or many of them as external expected sources and relevant workers (Bhatti et al., 2020; Christensen & Karlsson, 2019; Rahman & Rahman, 2023). Building absorptive capacities and their practical application in gaining experience and creating knowledge, innovative solutions by crowd members in order to capture the value expected by CP clients is an important purpose of CP activities. Table 1 presents principles and possibilities of conducting business through CPs on the Internet.

CPs offer crowd members relevant conditions for online and voluntary work, individually accepted by them, in accordance with their expectations, their own interests, aims and possibilities of their use.

Table 1. Characteristics of CP activity

CP activity	
principles	possibilities
• online collaboration of CP managers with external contributors: crowd members, clients, other CP users • crowd members work individually and/or in teams/networks; they are representatives of open, Internet (global) labor market • work performed by crowd members as volunteers • organizing production connected with marketing as a trend toward increased external online sourcing • crowdsourcing blurs boundaries between production and consumption • encouraging and engaging external innovators (relevant crowd members) to contribute to the knowledge, value, and the creation of new solutions • high degree of openness, offering new ways of online communication and cooperation among CP users • offering permanent open calls for CP collaboration • participation of crowd members as prosumers in creation of open innovations, development of new products and services • the use of collective intelligence and knowledge of crowd members, which lead to cooperation, teamwork, mutual development, learning	• IT-enabled production, development of innovative solutions, their promotion and/or sale • solving innovative challenges, development of open innovations • servicing global (Internet) market • access to international resources of work, knowledge, and skills • choosing the best innovative solutions during contests organized for solvers • online using new sources of knowledge, creativity, innovative competencies, professional experience, creative abilities that can provide novel and meaningful designs or solutions • the ability to significantly increase size and revenue without increasing CP activity costs • a wealth of up-to-date information, new ideas, and knowledge created by CP users that stimulate development of innovative solutions, as well as new products and services • mutual cooperation and knowledge sharing between providers and seekers of innovative solutions • evaluation of submitted design ideas, concepts of new products and services by crowd members • organizing cooperation between cross-functional teams of crowd members

Source: Author's own study.

According to Bhatti et al. (2020), each CP includes the following four key components: 1) a task that is outsourced with a set of instructions for its execution; 2) a crowdsourcer or seeker (as CP client) who may be an individual, a company, or a non-profit organization and who publishes tasks in order to find a solution to the defined problem; 3) crowd members as workers (solvers, providers) who possess the appropriate knowledge, abilities and can provide computating power to perform different types of outsourced tasks; 4) a platform that acts as the mediator between seekers and crowd members, provides management of crowdsourcing activities and may undertake some affairs related to seekers.

1.2. Crowd members, clients, managers and other contributors of CPs

There are three types of key contributors to developing innovative solutions in crowdsourcing: 1) crowd members (solvers, creators), 2) clients and 3) CP managers. The active role of crowd members on CPs goes hand in hand with the rapidly evolving global trend of social communities' development and their engagement in being active and performing work on the Internet (Dolińska, 2018, 2020). The key components of CP are shown in Figure 1.

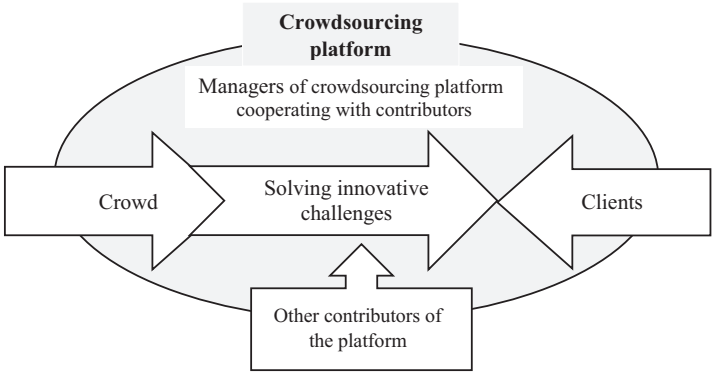

Figure 1. The key components of CP

Source: Author's own study.

CP managers cooperate with providers (crowd members as crowdsourcing workers) and seekers (clients) of innovative solutions, organize and conduct collaboration with them as well as between them, also with additional external CP partners, i.e. consultants, patent owners, trainers of crowd members, experts, facilitators, designers, employees of specialized firms also R&D institutes (Table 2).

Table 2. Types of main contributors of CPs

Types of CP contributors	Characteristics
• the crowd (Internet community) members (prosumers, solvers, creators, providers of innovative solutions, also crowdsourcing workers)	• individual members of the crowd • team/network of crowd members • other providers of innovative solutions: employees of companies, scientific and research institutes, laboratories, universities, colleges, other organizations offering innovative competencies
• clients (seekers) of innovative solutions	• they order innovative solutions, are their users and/or purchasers, and may be companies, people or non-profit organizations
• CP managers (leaders)	• cooperating with CP crowd members, clients or other CP partners
• other external contributors	• experts, consultants, patent owners, designers, trainers of crowd members, facilitators of specialized software, employees of specialist companies

Source: Author's own study.

Contemporary firms are taking advantage of the reality that not all of the smartest people work for a company and that a company does not have to conduct its own research to profit from it. The basis of this concept is the use of online crowdsourcing, in which firms can draw upon the creativity, abilities, engagement of crowd members, or they can transfer ideas to others (Brunswicker & Chesbrough, 2018; O'Reilly & Binns, 2019).

Crowd members as crowdsourcing workers may be professionals in their respective fields, as well as researchers and representatives of different commercial and non-profit organizations. They create innovative solutions and/or co-create them in teams, within networks or in collaboration with CP clients and other crowdsourcing partners as suppliers of the expected knowledge, patents, and software (Dolińska, 2015, 2020). In the context of crowdsourcing, "crowd" has a different meaning, referring to a mass audience that can be reached through a communication channel such as traditional mass media or the Internet as well as social media, rather than to a locally gathered group. These crowds have become sources of development of new ideas, solutions, production of goods and services on CPs, as well as of social media users (Bauer & Gegenhuber, 2015; Benbya & Leidner, 2018; Blohm et al., 2018; Mount & Martinez, 2014).

Managers organize and facilitate communication, cooperation with crowd members, screen their ideas and final solutions (Busse & Siebert, 2018, p. 29), and motivate them to effectively implement crowdsourcing tasks. Placing a task on CPs means inviting an appropriate group of crowd members, also specialists, to participate in solving problems and performing defined actions. In this way, managers can invite contributors with the appropriate innovative competencies, interests and past achievements.

Crowd members can be contributors with specific abilities, demographics or experience, professional achievements or amateurs, who decide to do online work and submit solutions to innovative challenges on CPs. They become sources of external knowledge, innovative competences and participate in creating economic and market values in crowdsourcing. Sharing diverse sets of knowledge from different people that cover various skill and expertise domains creates a greater diversity of new values, design ideas, innovative solutions, thereby increasing the crowd's opportunities for individual, team and interorganizational learning while developing open innovations (Dolińska, 2022; Mount et al., 2020).

Technological development and market turbulence motivate firms to use crowdsourcing and influence the effectiveness of its use to achieve innovative creativity. CP clients' demands positively influence the role of crowdsourcing in gathering creative ideas that address unmet marketplace needs and preferences (Johnson et al., 2019, p. 252). Lego, for instance, is transforming consumers into active crowdsourcing workers in an effort to innovate beyond their traditional massmarket model. In this situation, crowd members help design expected Lego sets online (Kohler, 2015, p. 63, 64). Organisations as well as companies and individuals, as CP clients, can learn from crowds. They empower crowd members to leverage their creativity (Zooppa

crowdsourcing workers create advertisements for leading brands), share the creativity of prosumers (Threadless community members submit T-shirts designs) and improve competition in the online markets served by them.

Innovation communities on CPs can be integrated virtually by managers for short interaction times or continuously when generating innovative solutions. These communities feature a higher level of online communication and interaction (Busse & Siebert, 2018). As platform leaders, the managers organize and facilitate online cooperation, knowledge sourcing, exchange, and usage with crowd members and clients while developing open innovations as well as new products and services.

Instead of managing and monitoring the complex contractual processes and working behaviors of third-party companies (as in the traditional outsourcing model), the crowdsourcing model actively involves the contributors (crowd members, clients) in the process of online production activity (Saxon et al., 2013, p. 4) within the online network. Network effects trigger contributors' affiliation with a CP, so as to reinforce the benefits of joining (Vignieri, 2021, p. 110). Crowdsourcing can ensure the involvement and credibility of users without significantly affecting the cost and time in which interact and engage with each other, as well as enables the creation and application of customers knowledge (Shaqrah & Noor, 2017, p. 4).

Crowd members as prosumers are involved in the value creation process more than just as consumers: for instance, they contribute as developers or producers. Prosumers provide information about their expectations, preferences with respect to customization or personalization of goods (Mladenow et al., 2014, p. 78). Toffler defined the term "prosumer" in reference to the evolution of mass products toward mass customized or personalized goods and services, thereby incorporating more and more of the producer's components into the consumer's role (Bauer & Gegenhuber, 2015, p. 671). Prosumers' information, opinions, and advice constitute the basis for the production of the final solutions on CPs. As a result, prosumers can be active participants in the development of open innovations due to their contribution to content generation. CPs consider them as partners in developing innovative solutions as well as new products and services expected by clients. Collaboration with engaged crowd members as solvers, creators, co-producers, co-marketers in crowdsourcing gives CP clients insights into what consumers in the markets they serve currently want and what is the best solution for them. CP prosumers can offer many variants of ordered solutions, from which clients choose the best according to their opinion and which additionally influence the evolution of markets in accordance with prosumers' expectations.

New IT and the current possibilities of their use in the area of creating open innovations have transformed individuals from mere consumers of products, services to full-fledged prosumers in creating value on CPs. The use of digital technology and the capitalization of prosumers' knowledge, engagement in voluntary work in crowdsourcing, influence the change of innovations and business models from closed

to open which are used by organizations when generating open innovations online according to the expectations and preferences of innovative market consumers.

Crowdsourcing is connected with broader societal and economic trends changing consumers' and producers' roles in the market, i.e. leading toward "working consumers" as crowd members and "consuming producers" as CP clients. Customer demands positively influence the role of crowdsourcing in gathering knowledge, creative ideas, innovative solutions that address unmet market needs. Today's consumers are both buyers and sources of new values, ideas, market trends, and they are involved in producing, promoting and selling new solutions, also products and/or services in the markets (Bauer & Gegenhuber, 2015; Chang & Taylor, 2016; Füller, 2010; Johnson et al., 2019).

Crowd members become a rich source of current knowledge, skills, and professional experience. CPs make it possible to use them for designing ideas and solving problems in the context of open innovation development. A typical CP allows crowd members to support or oppose other people's ideas so that the preliminary assessment of the proposed ideas can be obtained. Through such initiatives, CP clients can acquire a great number of new concepts and innovative solutions. Completing tasks and developing innovative projects always implies mutual benefits for crowd members and clients. Crowd members will get satisfaction of a given need, while the initiative organizer will obtain and use what the user has proposed as a contribution for his/her own benefit (Allen et al., 2018; Chiu et al., 2014; Pinto & dos Santos, 2018). CP managers plan how to achieve organizational goals when cooperating with providers and seekers, and motivate solvers to use their intelligence, creativity, knowledge when developing open innovations.

Researchers argue that the participation of a large group of prosumers in the generation of crowdsourced open innovations always brings optimal outcomes when their seekers lack the relevant project expertise and/or specialists with the necessary innovative competencies, as well as the knowledge that can be offered by creators on the Internet, also on CPs (Cricelli et al., 2022; Lee et al., 2019).

CP clients can be representatives of companies, high schools, R&D institutes, government agencies, as well as non-profit organizations or individuals. They define the problem to be solved, also in terms of new technologies to be used in organizations, on the market, and managers present it on CP websites, and then crowd members with the appropriate knowledge and abilities can offer new concepts, design ideas, knowledge or solutions to it and use their own creative skills in the open innovations they propose. Clients determine innovative challenges to be solved, requirements, expectations regarding ordered open innovations, as well as financial rewards offered to creators, time of task implementation and performing work by:

- individual crowd members according to orders and contests organized by CP managers;
- prosumer-specialists appointed and chosen by managers to elaborate ordered innovative solutions in the relevant teams or within networks whose activities are organized by managers.

The development of crowdsourcing open innovations is processed online according to the rules determined by CP managers and the management activities performed by them, which connect and coordinate the implementation of crowdsourcing tasks from the initial instructions for crowd members to the submission of proposals for innovative solutions, their evaluation, transfer of the final projects of the best innovative solutions to clients, and finally, their practical use and/or commercialization.

CPs facilitate complementary interactions among contributors and increase the utility they derive from mutual collaboration (Vignieri, 2021, p. 110). The market success of CP development is connected with its managerial skills in working with clients and engaging crowd members in active work during generating knowledge, innovative solutions. Managerial activities are connected with building beneficial collaboration with platform contributors as well as competition between them.

The cooperation of CP managers with crowdsourcing contributors conducted within the network creates synergic effects during their activities and development on the Internet. This cooperation can take the following forms when implementing crowdsourcing tasks and creating new values and solutions on CPs (Dolińska, 2015; Kohler, 2015):

- Building relationships to develop and support creative, active crowd members. For example, Zooppa develops relationships with users of media programs at universities to cooperate with talented, creative young designers and film makers. Local Motors collaborates with car companies such as BMW to offer new opportunities to crowd members as generators of new concepts and engage them in solving innovative challenges that affect the automotive market.
- Increasing the value of CP and its offer – particularly on the product platforms, where collaboration with external partners becomes an important source of new value creation. Companies applying this model actively search for beneficial ways to cooperate with prosumers to expand their own business according to consumers' expectations and preferences. By creating partnerships with device manufacturers, Leap Motion extends the value of its own CP and its offer.
- Consumer value creation by distribution channel of companies to get and use creative, valuable crowd solutions expected by consumers. Arcbazar reported that building partnership with the startup-listing site AngelList accounts for half of their consumers each year.

Managers cooperate with crowd members when performing different tasks on CPs, starting from recognizing current values, changes, development trends taking place in the markets, determining expectations, needs of their consumers, developing innovative concepts and solutions as well as presenting how and when to effectively use new products and services as well as how to promote and/or sale them (Battistella & Nonino, 2012; Busse & Siebert, 2018; Dolińska, 2018).

1.3. Types of CPs

According to the opinion of the researchers, mixed forms of crowdsourcing are mostly observed in real-life settings (Geiger & Schader, 2014; Pohlisch, 2021). The literature presents various taxonomies of crowdsourcing types. The classification of the types of CPs currently used on the Internet is characterized below.

Although many companies, including Google, Dell, SAP, Starbucks, Lego, or Procter & Gamble, have successfully developed and conduct own CPs, it is important to take into account the costs of founding, operating and managing such platforms, as well as the potential for their future expansion. Using CPs with appropriate management mechanisms and software can be challenging for companies that do not have prior experience in being active and participating in crowdsourcing activities. Other important determinants of CP activity are cooperation with clients and access to a large crowd with varied, also expected skills, knowledge and experience (Ford et al., 2015; Karachiwalla & Pinkow, 2021).

Boudreau and Lakhani (2013) classified crowdsourcing according to whether users work independently or together to solve a task, problem. Selected researchers present differences between integrative and selective crowdsourcing. Integrative crowdsourcing consists of individual elements which have very little value, while selective crowdsourcing focuses on choosing an input from a set of options provided by crowd members. The following types of crowdsourcing tasks are distinguished in the literature: simple, complex, and creative. Simple tasks are, for example, short text translations, while complex tasks concern developing new products, services, technology and performing knowledge-intensive actions. Creative tasks are connected with application of creativity as a new value (e.g. creating logos of the brands) (Dimitrova & Scarso, 2017; Zhen et al., 2021).

The author's research results on CPs were the basis for distinguishing the following types of the platforms:

1. CPs are independent companies and operate as brokers between clients and crowd members (e.g. CrowdSpirit, InnoCentive, 99designs, XeroX, IdeaConnections). CP managers organize online collaboration between crowd members and

1.1. – many different clients (organizations as well as companies and individuals) of innovative solutions. The composition of crowd members that collaborate with CPs may change or be stable over time;

1.2. – one or several companies that are regular clients of CP for a long period of time. Managers are owners of these kinds of CPs and acquire knowledge, innovative solutions from the crowd in accordance with orders and requirements of their own clients.

2. Crowdsourcing activity is carried out by companies that are both clients and owners of innovative solutions that are developed by the crowd (e.g. MTurk of Amazon, Ecomagination Challenge of General Electric, CoCreate IKEA, IdeaStorm

introduced by Dell). Managers of these types of CPs cooperate with crowd members to obtain expected knowledge and innovative solutions from them.

Therefore, organizations can either develop and manage their own CPs or use third-party (intermediary) platforms. The above types of CPs are analyzed in the research part of the monograph. Another taxonomy takes into account the distinction between external and internal crowdsourcing.

A distinction between internal and external crowdsourcing can depend on the location of crowd members. In internal crowdsourcing, the crowd consists of company's employees who can submit their own solutions. In external crowdsourcing, the crowd is formed by individuals or their team outside the company (Pohlisch, 2021, p. 17, 18). Internal crowdsourcing is defined as an IT-enabled group activity based on an open call for participation in a company innovative development (Zuchowski et al., 2016, p. 168).

Many organizations have turned to intermediary-based crowdsourcing. Intermediaries play a key role in managing crowdsourcing open innovations, including formulating the problem to be solved, distributing tasks to relevant crowd members, choosing the best solutions, and providing communication, interaction with CP users, and feedback to solvers (Karachiwalla & Pinkow, 2021, p. 575).

Currently, the most popular type of crowdsourcing is external crowdsourcing that involves acquiring knowledge, new ideas, and solutions from organizations' external environment. It includes all crowdsourcing activities that are addressed to crowd members and allow each of them to participate in their implementation. In some cases, companies searching for crowd-generated solutions can use preselection criteria to choose appropriate participants for performing crowdsourcing tasks. It refers to the company that directs problem-solving to a large and varied group of self-selected external contributors beyond its formal internal boundaries. The choice between establishing and operating an internal platform or using an external intermediary is a crucial decision in the crowdsourcing activity and development. Companies choose intermediaries and cooperate with them because they can support clients by providing advice, manage intellectual property and associated risks, track innovation generation and overall crowdsourcing performance (Dimitrova & Scarso, 2017; Thuan et al., 2018).

Internal crowdsourcing can be particularly advantageous for large companies where many employees are geographically dispersed and have diverse experiences (e.g. IBM, Microsoft, Allianz, NASA, Siemens, McKinsey & Co) (Benbya & Leidner, 2018; Davis et al., 2015; Pohlisch, 2021). Well-known examples of external crowdsourcing in the world include InnoCentive, IdeaConnection, Yet2, NineSigma. These intermediaries collaborate with a global network of the following providers of innovative solutions: relevant experts, specialists and experienced professionals in various fields. These CPs play the role of a mediator, connecting seekers with relevant providers via their own web-based platforms. Companies must choose the right crowdsourcing intermediaries, based on the nature and complexity of the problem to be

solved because they differ in the expertise they offer and the knowledge used in the innovative projects prepared on these CPs (Dimitrova & Scarso, 2017; Karachiwalla & Pinkow, 2021).

Multinational companies can employ diverse and heterogeneous groups of employees to use their collective knowledge, wisdom, professional achievements while developing innovations. Alternatively, some companies can draw on their own internal and/or external innovative networks and contacts that bring together experts in various fields (e.g. R&D, promotion, sales, production) (Simula & Ahola, 2014; Soon & Saguy, 2017).

The basic idea of internal crowdsourcing is to mobilize and strengthen the internal exchange of knowledge, information and interaction as well as collaboration among employees within the company. This crowdsourcing process aims to directly promote problem-solving capacities through interdisciplinary thinking, mutual learning and collaborative skills for cooperation among employees as well as between managers and employees. Existing experience, knowledge, also person-related technical and experiential knowledge, can be made available within the company through the use of internal crowdsourcing and enable the development of ideas, solutions and processes. The main idea of internal crowdsourcing is to leverage the expertise and rich knowledge of employees of a large industrial company and use them in business practice. In this way, employees may have better access to up-to-date knowledge of the products, services, processes, and operational data involved in their development (Simula & Ahola, 2014; Ulbrich et al., 2021a, 2021b).

Crowdsourcing is also classified according to whether participants work independently or collaboratively to solve the problem or task (Boudreau & Lakhani, 2013; Pohlisch, 2021). In the research on CPs, four types of crowdsourcing are mentioned, i.e. crowd-voting, micro task crowdsourcing, idea crowdsourcing and solution crowdsourcing. There are many CPs that provide the opportunity to have work done by experts who use the above types of crowdsourcing around the world, for example, Amazon Mechanical Turk specializes in the use of micro tasks (Dimitrova & Scarso, 2017; Zhen, et al., 2021).

The types of CPs that take into consideration goals of their activities may be the following: the platforms covering a wide range of purposes, e.g. offering graphic designs (DesignCrowd), solving R&D problems (InnoCentive), creating business ideas (OpenIdeo), designing clothing (threadless.com). The characterized types of platforms offer processes through which they can outsource a task or job, traditionally performed by an internal employee, to a large undefined group of crowd members on the Internet, in the form of an open call (Howe, 2008; Vignieri, 2021). Geiger and Schader (2014) describe the following types of crowdsourcing information systems:

- Crowd rating that is based on many homogeneous users whose value is not derived from the individual tasks but from their collective contributions (e.g. TripAdvisor rating).

- Crowd creation – this approach results from the aggregation of many heterogeneous contributions that are complementary and are results of a collective work performed and aggregated (e.g. Wikipedia).
- Crowd processing is based on a large number of contributions that characterize a high degree of homogeneity.
- Crowd solving is a heterogeneous set of contributions submitted, representing individual and different solutions to a given problem; additionally, the proposed solutions can be complements or substitutes.

In the literature on the subject there are also distinguished explicit and implicit types of crowdsourcing. Explicit crowdsourcing includes tasks that contributors perform deliberately, while implicit crowdsourcing refers to tasks that crowd members perform as an effect of their current online activities (Dimitrova & Scarso, 2017, p. 589).

Brabham (2009, 2013) delineated crowdsourcing according to "for-profit" or "non-profit" (not-for-profit and governmental) applications. He proposed to expand the crowdsourcing beyond the for-profit sector, and to establish a model that impacts the way people can solve social and environmental problems. Estellés-Arolas et al. (2015) have compiled crowdsourcing classifications of different researchers and proposed integrated topology that consists of five main types of crowdsourcing:

1. Crowdcollaboration – it includes projects in which participants offer their knowledge/abilities to solve problems or propose ideas collaboratively, usually without reward. The following subtypes of this type of crowdsourcing can be found which differ on the ultimate goal:
   1.1. Crowdstorming – massive online brainstorming sessions, in which different ideas are raised and the crowd can support them with their own comments and votes (e.g. IdeaJam).
   1.2. Crowdsupport – the customers themselves solve the problems of other customers and they do not need to contact the official customer support (i.e. Getsatisfaction).
2. Crowdcasting – actions where the participant who best solved the defined challenge receives a reward (e.g. Innocentive).
3. Crowdcontent – in this case, in crowdsourcing tasks, the crowd uses their work and knowledge to create various solutions but not in a competitive way. Three subtypes of this crowdsourcing can be determined:
   3.1. Crowdproduction – the crowd should prepare content, as it is done individually when translating short pieces of text or preparing images (e.g. Amazon Mechanical Turk).
   3.2. Crowdsearching – in this case the crowd searches for content on the Internet for any purpose (e.g. Peer to Patent Review).
   3.3. Crowdanalyzing – the crowd searches inside multimedia documents such as videos or images, but off the Internet (e.g. Stardust@home).

4. Crowdopinion – its goal is to know crowd members' opinions about presented ideas, issues or proposed products through votes, comments, discussions (e.g. ModCloth, Intrade).
5. Crowdfunding concerns an individual, organization, also company, seeking for funding from the crowd to implement the project (Belleflamme et al., 2014) (e.g. Indiegogo).

Sánchez et al. (2015) have presented examples of the relevant crowdsourcing projects prepared according to crowdsourcing types defined above:

- Crowdcollaboration – the following subtypes are characterized under this category:
  - Crowdstorming – the example may be the session held by the toy company Lego Group which allowed customers to submit ideas for new products, and even to share the future revenues derived from the sale of the best-developed products.
  - Crowdsupport – the company Hootsuite provides an example through the GetSatisfaction platform with over 2,600 active crowd members and 1,769 ideas posted by them on this CP.
- Crowdcasting – an example can be the challenge issued by the company Sun-Night Solar in the Innocentive platform. The company encouraged crowd members to develop a dual-purpose solar light that would function as a lamp and a flashlight to be used in African villages without electricity. Two months after, an electrical engineer from New Zealand solved this challenge and was awarded USD 20,000.
- Crowdcontent – the following subtypes fall under this category:
  - Crowdproduction – they are the projects through which content is created by collaborating with others or performing various tasks, e.g. writing articles in Wikipedia or micro tasks that humans can perform more efficiently than computers, e.g. translating short texts or labelling images on Amazon Mechanical Turk platform.
  - Crowdsearching – for example, the project Peer to Patent Peer developed by the United States Patent and Trademark Office that opens the patent evaluation process to public participation.
  - Crowdanalysing – used, for instance, by the American company BlueServo, which allows users to locate illegal immigrants in the United States–Mexico border with using their images taken by the cameras placed on this border.
- Crowdopinion – the example are activities of Tripadvisor, that is the world's largest travel site, which contains over 170 million reviews and opinions of travelers on lodgings, restaurants and attractions that allow other visitors of this website to plan their own tourist trips.
- Crowdfunding – the platform Kikstarter is a representative example of publishing creative projects seeking collective funding for the development of innovative products or services by Internet users.

Crowdsourcing classification elaborated by Saxton et al. (2013, pp. 8–11) describes the following models that contain business and control processes performed in web platforms:

- Product design model is typical for the following CPs: Threadless and Zazzle, where prosumers produce products (e.g. T-shirts, shoes, calendars, mugs, etc.), which are submitted by creative crowd members.
- In the intermediary model (e.g. Amazon's MTurk), crowd members participate in the following process: 1) finding, 2) finishing, and 3) earning through CP. The InnoCentive crowdsourcing website conducts a similar process. Its crowdsourcing workers can be scientists, engineers, researchers or other creative CP users. They perform R&D challenge-solving tasks and accomplish them as innovative problem solvers. In this model, crowd members from around the world choose interesting innovative problems posted by firms, decide to participate in their solving, next submit the developed solutions, and receive rewards for the results of their work selected for practical use by the company seeking solutions.
- Consumer report model is typical of product-recommendation social websites (e.g. Crowdstorm, ThisNext, Buzzillions) that offer users the opportunity to prepare their product reviews.
- The knowledge base building model aggregates human intelligence, information or knowledge about specific topics. It is characterized by "wikis" as an effective knowledge-building method. For example, Trendwatching offers rewards for gathering high-quality information on business trends from people around the world. Here, the information- or knowledge-creation processes are outsourced to crowd members, and various kinds of incentive measures and quality control procedures are used to make a decision about the use of knowledge and information proposed by crowd members.
- The digital goods sales model is a platform (e.g. iStockPhoto, ShuttersStock) that sources digital pictures from crowd members around the world. They upload and sell their digital pictures through the company-provided web platform, and they are rewarded based on the number of downloads of their pictures. Creators enter into agreements with CPs that screen the quality of new members' pictures and then share a relevant percentage of the profit from the sale of these pictures. Then, the platform is involved in the production process providing market demand information and policies to define potential copyright and intellectual property protection rules.
- The collaborative software development model is used for software development by crowd members. Once the crowd member posts a product idea on the web site, other members vote on the best idea each week. Development of product, service design, market research, marketing actions, software development in this model are outsourced to crowd members, who work as project managers, web designers, programmers or marketers.

- The collaborative science project model takes advantages of human knowledge used in development of computer algorithms by introducing crowd members into the machine learning process. Here, the Scour website allows project participants vote or comment on the search results returned by Yahoo, Google, and MSN users to tag images and audio.
- Crowdsourcing of the citizen media production generates revenue through user-generated news, TV programs or commercials, and shares the profits with journalists, reporters or media producers. In this model, CP becomes a collaborative media content production platform and its users prepare or directly post news content developed from own perspectives. In this situation readers are active producers of the current news, presentations because they also will read them at the end of their preparation and earn profits for the media content they contribute. Media companies are involved in crowdsourcing process by determining the principles of copyright and quality control, intellectual property protection, also using control systems of media final production.

1.4. Examples of CPs operating in business practice

Examples of CPs' activities in business practice are presented for the following Internet platforms: Xiaomi, Mulino Bianco, IdeaConnections, Lego Ideas, Dell IdeaStorm, Amazon's Mechanical Turk (MTurk), Ecomagination Challenge of General Electric, Threadless, InnoCentive.

Xiaomi develops a collaborative open innovation community on the Internet and currently is the world's third-largest smartphone manufacturer after Apple and Samsung. Its new smartphone development community encourages users to participate actively in preparing ideas that can be used in Xiaomi mobile phone operating system. Thanks to user's concepts for new products, the smartphone operating system has undergone significant changes and improvement. Xiaomi users can be connected to the following sections: product innovation, R&D, an idea presentation, proposed solution testing or marketing. Responding to Xiaomi's call, users participate voluntarily by suggesting new tasks, possibilities for the operating system. They submit their solutions, evaluate and comment on other users' ideas. Then Xiaomi's experts select, evaluate the ideas submitted by users and next send the chosen solutions feedback on their evaluation or suggestions for improvement. Through this process, ideas that are novelty and valuable for Xiaomi are applied in the updated operating system (Cai, 2016; Liu et al., 2020).

The Mulino Bianco company produces and sells various bakery products. Its crowdsourcing activities are based on online communication, interactions and collaboration with the crowd members via the application of marketing techniques on their own website. A CP of Mulino Bianco enables solvers to propose new bakery

product ideas, vote for the best and most original ones. The goal of the crowd actions is to propose, analyze, and evaluate the proposed ideas. The company collects and actualizes them if they are consistent with its mission, plans of market development and current values. A CP of Mulino Bianco connects presentation of consumer expectations, preferences and development of new product ideas, their subsequent screening, evaluating and commenting by crowd members. The most voted ideas are submitted to financial and marketing analysis by the firm experts. If their assessment is positive, the Mulino Bianco company begins to produce the best bakery products and introduce them in the market (Di Guardo & Castriotta, 2013).

IdeaConnections organizes solving innovative challenges, designing new products and developing new technological solutions for firms by teams of the crowd members. A CP manager organizes mutual communication and collaboration between clients and creators of innovative solutions. A CP presents an innovative problem to be solved, divides it into smaller challenges and defines the related requirements and expectations. Companies as CP clients propose financial rewards for selected solutions that meet their expectations. A CP presents interviews with the creators of the best innovative solutions, and proposes users a free Innovation newsletter. The platform has links to social media where it offers users the opportunity to participate in discussions on design ideas, innovative solutions and new technologies proposed by solvers (Battistella & Nonino, 2012; Vuculescu & Bergenholtz, 2014).

In 2008, Lego implemented crowdsourcing with a foreign partner – Tokyo-based technology company Cuusoo. In 2014, the platform moved from Cuusoo to Chaordix, a Canada-based software provider that links companies with their customers to inspire them to submit proposals of open innovations. The platform of Lego Ideas enables site users to send plans and a sample model that demonstrate the concept of a potential new Lego set. Solvers use real bricks, software, or any combination to prepare the product concepts before submitting them to a CP. Crowd members are offered various options to interact, comment, discuss and vote on design ideas. Each new product proposed can be seen by the community of other Lego users, and they can participate in discussion and ask questions about it during a review stage. It may impact on some product improvements. Receiving support via votes on a CP is most crucial because design ideas are considered by Lego only when reach a 10,000-vote threshold. It is an effective market test of new product design for Lego. Lego experts review the winning ideas and choose the best candidates for implementation and sale. The chosen solutions become part of the Lego market offer. Top creators are thus encouraged to offer their marketing skills and encourage the community to support them. Lego presents the new models in catalogues and activates their creators to sell through online and offline channels. The owner of the best idea receives 1% of the net revenue from the new product sold as well as opportunities to work with professional Lego designers. Lego focuses on involving creators in post-launch commercialization of the product and participating in viral marketing. This form of promotion by solv-

ers usually takes place via social media channels (Digital Initiative, n.d.; Reffell, n.d.; Schlagwein & Bjørn-Andersen, 2014).

Dell launched IdeaStorm CP in 2007. Within the first five months, IdeaStorm crowd members submitted over 6,200 ideas to help Dell become a more innovative company. These ideas covered a wide variety of areas, such as preinstalling the Linux operating system to introducing a new tablet of this brand. Several hundred proposed solutions gained immediate popularity, and Dell implemented them. Through IdeaStorm platform, crowd members can submit their own ideas, vote, and comment on them. IdeaStorm allows the company to gather ideas for product improvements and innovations from online communities of current and potential Dell customers. Once crowd members put an idea or suggestion on the website, IdeaStorm users are able to vote on the idea, signaling whether it should be utilized by Dell or not. A forum section of the Dell site allows users to discuss proposed ideas. Crowd members provide an idea title and description and have the option to classify the ideas from over 30 categories (e.g. Linux, Sales Strategies, Desktops). Creators are not given financial rewards for participating, but they can benefit in other ways. Top solvers are honored on the Top Idea Makers list of this platform. Dell and IdeaStorm have received many public acknowledgements from famous IT news magazines, professional bloggers for effective introducing and running a CP, also using a user-driven innovation process (Bayus, 2013; di Gangi et al., 2010; Garner, 2007; Impact Economist, n.d.).

Amazon's CP – Mechanical Turk (MTurk) – is an artificial intelligence web service. It performs HITs (human intelligence tasks) that cannot be easily duplicated or replaced by machines also computers. This service utilizes people' intelligence and creative skills through the artificial environment of computing networks for solving innovative problems, proposing and preparing new solutions for the Amazon, that are difficult for machines to be developed but easy for elaboration by crowd members. Amazon users cooperate with Amazon specialists to generate new design ideas, evaluate them and then develop the best solutions for MTurk. The global reach of calls broadcast via MTurk translates into a substantial labor surplus and, finally, offering crowd members low wages (an estimated average hourly wage of this platform is under USD 2.00, far below US minimum wage) (Bauer & Gegenhuber, 2015; MTurk, n.d.; Saxton et al., 2013).

General Electric (GE) launched the Ecomagination Challenge CP. The main aim of this platform is to globally search for new knowledge and the latest technologies to improve GE's strength and the possibility of practical use of innovative solutions. In accordance with CP's long-term strategy, GE defined a number of challenges in the field of sustainable development and invited financially motivated crowd members (including Internet users, experts, business partners, startups, employees of universities, R&D institutes) to submit new innovative solutions. GE regularly uses the Ecomagination platform to engage creators from around the world to participate in innovative projects under development (Chesbrough, 2012b; Ecomagination.GE News, n.d.; Kohler, 2015).

As a CP, Threadless relies solely on prosumers to create and share their product designs. It is a community-based T-shirt company that outsources T-shirt designs to crowd members through an ongoing open call for design submissions. Once a T-shirt design is submitted, crowd members begin voting, scoring and commenting on design ideas. Each week, Threadless presents the results of the assessments of design projects, chooses around 10 designs from which to manufacture T-shirts. These shirts are available worldwide, through online store, also through retail Threadless store in Chicago. Any submission, both regular and for a challenge, has to compete for votes with works of artists from all around the world. Threadless holds the rights to the designs on proposed shirts; but the designers also retain the rights to their designs. Self-promotion is often used both by new and experienced artists to draw attention to their latest submissions. In addition, Threadless rewards active members with a free merchandise or pays for sending photos of products. The offered monetary rewards or gifts are seen by many creators as a strong motivator and an incentive to cooperate with this CP (Gruner & Power, 2017; Kavaliova et al., 2016; Kohler & Nickel, 2017).

InnoCentive is the first online CP to host open innovation contests and its goal is to connect business with science. It is a massive problem-solving platform with more than 250,000 registered solvers, more than 1,400 posted innovative challenges, and an average success ratio of 50%. Many companies (e.g. Boeing, NASA, Thomson Reuters, Ford Motors, DuPont, Procter & Gamble) use this CP to seek innovative solutions that are relevant to their businesses and solving R&D challenges. The disciplines that sponsor contests on InnoCentive CP include business, computer science, engineering, chemistry, design, mathematics and statistics. InnoCentive serves as a CP where various organizations post innovative challenges to be solved by different crowd members (individuals, employees of organizations or consultancy firms). After the registration, crowd members are able to show and review the open challenges in the InnoCentive challenge or join a particular project room where they get access to more precise seeker orders, requirements and technical information, and ask questions regarding the relevant challenge, and submit their own solutions. Companies as CP clients present innovative problems to be solved and define the requirements and expectations related to them. Solvers register on the CP website, read the challenge, and send back their proposed solutions within the specified deadline. InnoCentive breaks the problem down into smaller challenges. Next solvers (scientists, experts, researchers, and engineers from around the world) develop and submit solutions. CP managers analyze presented proposals, choose the best solutions, integrate them back as the answer to the defined problems of clients. A CP facilitates virtual knowledge-sharing and flow, and defines rules for intellectual property protection. For developing innovative solutions that are connected with solving knowledge-intensive R&D tasks, InnoCentive proposes creators appropriate monetary awards that can amount to millions of dollars (Brabham, 2017; InnoCentive, n.d. *About us*, *Our solvers*; Kohler & Nickel, 2017; Vignieri, 2021; Vuculescu & Bergenholtz, 2014).

1.5. Benefits of using crowdsourcing

Crowdsourcing shifts from crowds as sociopolitical entities to crowd workers as well as solvers, creators, and sources of innovative solutions connected with economic value creation. Crowdsourcing becomes part of contemporary evolution in organizing online production and marketing, a trend toward increased acquiring external resources of knowledge and sources of work, as well as a tool for developing and producing goods and services (Bauer & Gegenhuber, 2015; Boudreau & Lakhani, 2013).

The Internet is characterized by a high degree of openness, new opportunities for online communication and cooperation among its users and the wealth of current information, new concepts, knowledge that stimulate the development of open innovations on CPs. IT enables the creation of highly flexible, interactive, agile and user-also consumer-oriented systems that influence the changing conditions of human activity and work.

New ITs have encouraged companies to leverage the creative potential and expansive knowledge offered by crowd members as crowdsourcing online workers (Afuah & Tucci, 2013; Bazaluk et al., 2024). A firm's ability to identify, acquire and use knowledge from the environment is related to its innovation activity, as crowdsourcing knowledge acquisition, exploration and exploitation should improve new product performance (Allen et al., 2018, p. 110). CPs virtually open their own activities to crowd members to aggregate their collective knowledge, intelligence and skills.

The strength of CPs is to deliver the value unit in a more efficient, effective, and personal way, because online crowd members can develop open innovations better, more effectively and more cheaply than independent companies. By engaging external innovators to contribute to value creation, crowdsourcing business models allow for keeping fixed costs at a considerably lower level. Hence, a CP has the ability to grow significantly in size and revenue without simultaneously increasing its activity costs (Blohm et al., 2018; Kohler, 2018). CPs allow companies to shorten the time needed to develop new products, services and introduce them to the market as well as reduce innovation costs. They enable CP consumers to increase market acceptance of implemented new products and services, also improve the consumer's perception of novelty (Goglio-Primard & Crespin-Mazet, 2015; Devece et al., 2017). In this situation, crowdsourcing businesses can increase production and services at minimal marginal costs. The advantage of using crowdsourcing interactions is, above all, rapid knowledge exchange which allows crowd members to produce a large number of innovative solutions, new ideas and products in a cost-efficient way (Majchrzak & Malhotra, 2013; Sun et al., 2023).

CPs have unique features, and a central one is the presence and practical application of network effects (Evans & Gawer, 2016, p. 5). In recent years, many organizations have turned to crowdsourcing-based business models to solve innovation challenges, adapt to rapidly evolving customer expectations, shorten product lifecycles and increase overall innovation efficiency (Karachiwalla & Pinkow, 2021; Kohler,

2015). The most valuable crowdsourcing feature is its ability to cross geographic, economic, cultural, technological barriers by seekers of innovative solutions. This enables CPs to organize and facilitate cooperation with crowd members and customers from all around the world in generating open innovations and solving a wide scope of challenges by crowd members, as well as organizing cross-functional also international teams of creators (Dolińska, 2017a, 2017b).

Crowdsourcing has become widespread in various business fields since Internet contributors can solve innovative challenges more efficiently than employees of traditional companies. It influences the sharing of innovation development risks, the reduction of R&D costs, and can increase the speed of introducing new products and services to the market because CP allows easier access to expected skills, know-how and expertise of active prosumers. Crowdsourcing reduces prices by involving crowd workers who are willing to accept particularly low prices for the work performed because they treat it as an investment in future professional success and often also as an additional interesting activity. By getting crowd members to create value for free or at low cost, CP cost structure can be substantially better than that of traditional firms (Blohm et al., 2018; Vermicelli et al., 2020).

Companies try to reduce the cost of generating innovation by incorporating external knowledge in a way that can drive value creation processes. A key principle underlying the sharing economy is the ability to use multisided platforms as CPs to facilitate the sharing of knowledge, information, goods, services, thereby create value for all users (customers–seekers on the one hand, and producers–solvers on the other). The sharing economy combined with the search for external knowledge and its use in open innovations has stimulated many businesses to harness the collective energy and creativity of a large number of crowd members in crowdsourcing (Hamari et al., 2016; Marjanovic et al., 2012; Sundararajan, 2016; Vignieri, 2021). However, managers still have to discover when to use online tools exclusively for crowdsourcing to facilitate customer-oriented innovations in a world where online techniques increasingly coexist with, rather than substitute, more traditional methods of gathering ideas for new products and services (Gruner & Power, 2017; Zhao & Zhu, 2014a).

Crowdsourcing enables companies to shift their focus from innovation initiatives limited by internal resources to those that are expanded by external (also global) knowledge, work and networks on the Internet. Firms utilizing crowdsourcing can reduce costs by promoting self-service activities and innovative achievements via the Web and by transferring internal work processes to consumers (i.e. the concept known as outsourcing consumer), which is a basic motivation for creating their own presence, opportunities and activities on the online market. Global search on CPs aims at maximizing the number of innovative solutions sought in order to increase the likelihood of finding the best ones. CP clients focus on an aggregate effect that can be achieved by accumulating possibilities of many similar contributions offered by crowd members, because global search maximizes the number of sources identi-

fied and expected solutions obtained (Bauer & Gegenhuber, 2015; Devece et al., 2017; Kleemann et al., 2008).

Firms are increasingly taking advantage of engaging customers in the development of open innovations. They struggle in their efforts to leverage prosumer participation to create more successful innovations, as this always leads to market success of new products. For example, products created with customer input result in five times higher sales than those developed only through internal R&D of companies. In order to solve innovative challenges and improve innovation processes, companies are increasingly moving away from traditional customer engagement to using online methods and cooperation to innovate in a manner that stimulates customer creativity and market learning as well as to drive transformational shift towards the effective use of crowdsourcing (Chang & Taylor, 2016; Goglio-Primard & Crespin-Mazet, 2015; Gruner & Power, 2017).

CPs can significantly decrease development costs and other risks associated with crowdsourcing solutions, therefore, making them an attractive problem-solving approach for organizations, companies, etc. By enabling a growing number of globalizing markets, crowdsourcing increases market efficiency. It reduces prices for developed solutions by involving crowdsourcing workers who are willing to accept particularly low prices for their work. It is also a topic with important ethical implications (possibilities and offers of a large representation of society but also the risks of the increasing exploitation of crowd members as workers and creators). The engagement of crowd members as prosumers in the implementation of crowdsourcing tasks can both accelerate the pace of innovation and improve the innovation success in markets. Users can create original design ideas, new products and can offer their own values, creativity, new concepts which constitute important sources of innovations (Bauer & Gegenhuber, 2015; Devece et al., 2017; Ford et al., 2015; Karachiwalla & Pinkow, 2021; Zhao & Zhu, 2014a). The additional value of innovation development in crowdosurcing is that a large and diverse group of crowd members is attracted to engage in problem solving – not only experts from the relevant fields but also researchers from other domains or enthusiasts who may have fresh ideas, expected skills and knowledge to solve innovative challenges (Acar, 2018; Acar & van den Ende, 2016).

According to Allen et al. (2018), crowdsourcing enables organizations to 1) transfer new ideas into executable innovative solutions, 2) provide access to new knowledge that can provide meaningful design solutions, 3) increase access to necessary resources when solving innovative challenges, and 4) generate more collaborative processes in integrating external knowledge and solutions of crowd members with clients' expectations.

CPs propose clients the opportunities to find an efficient innovative solutions to various problems (e.g. in terms of reliability and relevance of proposals, time of communication, professionalism and engagement of crowd members, and an area of ordered solutions). CPs enable prosumers to design specialized and potentially valuable product improvements that cannot be acquired from internal employees (Shaqrah & Noor, 2017; Vignieri, 2021).

A characteristic feature of CP activities is the possibility of open collaboration with many contributors such as clients, crowd members and other external partners who are interested in it and derive mutual benefits from it. Table 3 presents the possible benefits of using crowdsourcing in business practice.

Table 3. Benefits of using CP in business practice

Benefits of using crowdsourcing
• crowdsourcing is considered as the efficient and effective way of finding and using current information, new knowledge, innovative solutions in the online market • collaboration with crowd members as crowdsourcing workers who are representatives of the global labor market • opportunities for solving innovative challenges faster, cheaper and better than in traditional companies • fixed costs of CP activity are low • development of open innovations as well as new products, services according to the expectations of CP clients and prosumers (as well as consumers of the relevant markets) • increasing market acceptance of new products and services developed by prosumers on CPs • the inclusion of crowd members as costumers in the development of open innovations can improve their success rate in the market • increased external sourcing of work and knowledge during developing and producing new goods and services • possibilities of the reduction of R&D costs, risks of open innovation generation • increasing the speed of introducing innovative products, services to the market • shortening the open innovation development time • access to a wide variety of skills, know-how and expertise on CPs • CP creators offer their own knowledge, inspiration, creativity, professional experience, skills and can develop original design ideas and innovative solutions • encouraging and engaging crowd members as external innovators to contribute to value creation on CPs • CPs can reduce costs by promoting their own activities and achievements online on their own websites and social media • opportunities for organizing cooperation and managing cross-functional and international teams of solvers • transferring work processes to crowdsourcing prosumers • delivering the value unit in a more efficient, effective, personal way than in traditional companies • global search maximizes the number of identified sources of knowledge, innovative solutions, as well as contributors (also clients, crowd members) • opportunities to overcome geographic, political, economic, cultural, technological barriers by open innovation providers and seekers • crowdsourcing workers accept low financial prizes for the best innovate solutions • opening CP activities to the online community to aggregate collective intelligence and crowd wisdom • creating value for the company, economy, society for free or for a low fee on CPs • possibilities of individual and team learning, knowledge development, increasing professional achievements, cooperation with specialists • a CP has the ability to grow significantly in size and revenue without increasing its activity costs at the same time • using collective energy and creativity of a large number of contributors • rapid spread of online information, interactions, knowledge on CPs • offering seekers the possibility to find an efficient solution according to their requirements and expectations • crowdsourcing can allow organizations to access the crowd's specialized skills, which may be unavailable internally • creating synergic effects of using collective and competitive as well mutually complementing skills, knowledge of crowd members and other external collaborators on CPs

Source: Author's own study.

CHAPTER 2

Development of Open Innovations in Crowdsourcing

2.1. Generation of crowdsourcing open innovations

In recent years, open innovations and crowdsourcing have been popular topics in the literature related to research projects on innovation management, generating significant interest and influencing significant number of publications on this subject (Bogers et al., 2018; Cricelli et al., 2022). Organizations and companies must continuously innovate to maintain competitiveness of their activities and offers (Chesbrough, 2012a, 2017) in the markets. Traditionally, they have relied on internal R&D and own specialists.

In recent years, many organizations and companies have opened their R&D processes to gain a competitive position in the online market. As a part of this evolution, they are increasingly adopting outward-oriented approaches like crowdsourcing, which are based on the principles of open innovations. This trend of development influences the flow of external knowledge and ideas beyond organizational boundaries to solve innovative challenges using crowdsourcing (Cui et al., 2024; Xiao et al., 2021; Ye & Kankanhalli, 2017). Crowdsourcing configures a mode of open innovation and is frequently used by organizations and their employees to leverage knowledge of highly skilled users to address specific challenges concerning the use of new technologies, products and services. The goal of CP is to create a "space" for transferring R&D skills to develop innovative solutions (Brabham, 2013; Vignieri, 2021). Crowdsourcing is used as an effective tool for solving different innovative problems.

Crowdsourcing researchers argue that the participation of a large crowd from different countries, with different professional experience and innovative competencies in creating open innovations always brings optimal outcomes in accordance with the expectations of CP clients (Lee et al., 2019; Saxton et al., 2013).

Open innovation is a current innovation management model consisting of two dimensions: inbound and outbound open innovations. Inbound open innovation is an outside-in process that involves opening up the process to external knowledge exploration and in crowdsourcing it refers to the acquisition of knowledge from crowd members. Outbound open innovation is an inside-out process that relies on opening up the innovation process to external exploitation, and in crowdsourcing it relies on commercialization of knowledge used in innovative solutions ordered by CP clients (Brunswicker & Chesbrough, 2018; Lichtenthaler, 2011). Crowdsourcing open innovations are defined as the implementation of R&D tasks, development of innovative

solutions by crowd members who offer new design ideas, knowledge, creative skills that are used in open innovations created according to the requirements of CP clients (Lee et al., 2019, p. 149). A CP takes on the key responsibility of coordinating and negotiating conditions of collaboration with clients and crowd members when developing innovative solutions as a crowdsourcing service (Dolińska, 2019; Song et al., 2024). Through crowdsourcing collaboration, organizations effectively use a large pool of people, exploit their knowledge, skills at a lower cost to promote the effective integration of their resources which has an impact on achieving competitive open innovations on CPs (Brabham, 2009; Liu et al., 2020).

Models of open innovation suggest using external resources of knowledge, creative skills for innovation generation and application. Possible way to involve external sources is opening CP activities to crowd members, who can provide new solutions for seekers. The crowd can be a source of innovative competencies and knowledge from around the world and is committed and motivated to solve innovative challenges, as well as to create design ideas, develop new products and services (Allen et al., 2018; Bakici, 2020; Dolińska, 2020). Crowdsourcing open innovations are based on the mutual cooperation of CP contributors and are related to the evolution towards collaborative processes and adaption to the rapidly changing environment.

CPs generate and use collective creativity. In open innovation teams, crowd members as solvers work together to develop new solutions, products, services and their markets. The factors influencing open innovation generation in the scientific field are much greater, whereas individual, team, and management dimensions are important factors influencing the development of open innovation on CPs (Beck et al., 2022; Jiang et al., 2023). CP activities are coordinated by managers through community-based online services that influence the scale of mutual interactions of crowdsourcing contributors and the level of creating collective values, innovative solutions (Hamari et al., 2016, p. 2048).

Innovation initiatives on CPs have moved beyond traditional product and service development in R&D units. Given the advancements and growing possibilities of IT, organizations can now cooperate with crowds to harness their collective intelligence and achieve their own goals in the area of open innovation generation. Contemporary companies use CPs to acquire and integrate external knowledge during the development of products, services in accordance with consumer needs, which are more likely to succeed when they enter the marketplace. An increasing number of CP clients recognize the growing potential of online sourcing knowledge, new concepts and solutions and use them in crowdsourcing open innovations (Acar, 2019; Allen et al., 2018; Cheng et al., 2020). A fundamental benefit of using crowdsourcing is that it brings together crowd members from all over the world who can be able and willing to solve various innovative challenges.

Contemporary companies are becoming more and more open to novelty and innovations also created on CPs. In this situation organizations are interested in exploring CPs as well as social media as a way to improve innovation generation and commercialization (de Mattos et al., 2018, p. 143). The wide use of the Internet in business

and society changed the behavior of people, the communication and relationships on CPs. Growing possibilities of digital technology and the use of innovative potential and skills of the crowd are blurring organizations' borders and influence the evolution of innovations from closed to open (Kohler, 2015, 2018; Yin et al., 2022).

Crowdsourcing open innovation must cross the boundaries of the original framework and engage in cross-border knowledge flow outside the organization using the Internet (Christensen & Karlsson, 2019, p. 242). Open innovations on CPs mobilize people from all over the world and connect joint efforts. Managed efficiently, crowdsourcing becomes a powerful technology for achieving the needed engagement of crowd members that drives the expected results of companies (Rowledge, 2020) and their markets. Open innovation crowdsourcing can help companies meet the challenges of a rapidly changing environment and improve their innovation performance (Jiang et al., 2023, p. 1).

The Internet creates new opportunities to use consumer' creativity and knowledge during solving innovative challenges. Generating open innovations in crowdsourcing relies on the development of complementary networks. In a network approach, an innovation is considered as a solution to the problem experienced by its solvers cooperating with each other. Prosumers' integration has been recognized as a promising open innovation practice on CPs, because many crowd members combine and adapt their resources/abilities within innovation networks and participate as volunteers in developing open innovations (Füller et al., 2012; Goglio-Primard & Crespin-Mazet, 2015).

General principles and guidelines for harnessing crowdsourcing can be provided by market orientation principles, because understanding client needs is a critical aspect for the market performance of innovative products and services (Stanko et al., 2015, p. 129). CPs adopt valuable user ideas and incorporate them into the development of innovative solutions as well as producing new products and services that better meet users' demands and/or preferences (Eservel, 2014; Schlagwein & Bjørn-Andersen, 2014). Crowdsourcing becomes a useful tool to produce open innovations according to the expectations of the relevant market customers who are represented by CP clients as well as crowd members as prosumers.

2.2. Mutual cooperation of CP contributors during the development of open innovations

By leveraging knowledge and ideas of users, companies outsource innovation tasks traditionally performed in-house to a large network of crowd members created on CPs (Chesbrough, 2012a; Howe, 2008). The increasing openness and global connectivity of the Internet enable online communication and cooperation of CP managers with contributors from all over the world. These contributors can be customers, suppliers, consultants, designers, authors of the relevant specialized handbooks, trainers, lead users, public and private research institutions, companies, Internet communities and

other individual and organizational partners. The usage of crowdsourcing has transformed people from product consumers to engaged prosumers in new market trends, design ideas, open innovations generation within CPs. CP managers organize and facilitate mutual online collaboration, interactions with prosumers and clients while creating, exchanging, flowing and using knowledge in open innovation processes.

CPs provide needed services and resources (e.g. human resources, technologies especially IT and specialized experience, skills) to support CP contributors in their mutual communication, interactions and enable them to perform crowdsourcing tasks and collaborate with CP managers when creating new solutions (Lee et al., 2019; Vignieri, 2021).

IT used in crowdsourcing has transformed customers from passive recipients of marketing messages into active workers and promised partners in adding value, creating new products and services (Shaqrah & Noor, 2017, p. 6). With the rapid development of the service economy and the practical usage of new IT possibilities, consumers have gradually shifted to active creators of new values, products, services in the online market (Liu & Xiao, 2022; Qiu & Kumar, 2017; Wooten & Ulrich, 2017). They express their opinions or needs through online forums or social media run by companies to engage in and influence the design and improvement of companies' products. A growing number of organizations have taken advantage of this business and marketing trends, hence established collaborative crowdsourcing communities to solve innovative challenges (Cui et al., 2015; Liu et al., 2020).

Solvers should be aware that building several relationships with collaborators allows them to gather a lot of valuable knowledge and information about CPs to use them to develop innovative solutions and win challenges (Mazzola et al., 2023, p. 291) as well as learn and improve their own abilities. Crowd members on CPs include specialists, amateurs and representatives of commercial and state-owned firms. They can cooperate with CPs individually, in teams, within networks when elaborating innovative solutions in accordance with the expectations of clients (Dolińska, 2018, 2020).

Today's consumers are both buyers and sources of new values, knowledge, innovations and are involved in the production, promotion and sale of new products and/or services. Current customer demands have a positive impact on crowdsourcing in terms of acquiring design ideas, innovative solutions that represent unmet market needs and expectations. Crowdsourcing is connected with social and economic trends changing consumers' and producers' roles, i.e. leading to "working consumers" as crowd members and "consuming producers/marketers" as CP clients, and a shift in power toward the latter (Bauer & Gegenhuber, 2015; Johnson et al., 2019). A central issue for CPs is how to support innovation-oriented organizations in solving managerial, R&D and technical problems through the growing power of prosumers (Bauer & Gegenhuber, 2015; Vignieri, 2021), as well as facilitate collaboration with them and seekers to receive benefits from the development of crowdsourcing open innovations.

Open innovations enhance the application of various knowledge sources in organizations also on CPs through the participation of an extensive range of external col-

laborators and competitors. The innovation networks they create play a major role in the development of open innovation on CPs. By increasing the possibilities of digital environment, co-creation can increase the knowledge capital acquired from prosumers. This can inspire the organization to improve CP's ability to identify the expected knowledge, creativity of customers when co-creating value (Bauer & Gegenhuber, 2015; Shaqrah & Noor, 2017). Crowdsourcing as sourcing by means of "global search" brings the following types of values created for clients: creative expertise and innovative projects.

Nowadays, a significant part of work is done online, using the Internet and its global communities for the flow of information, knowledge, innovative solution and exchange, as well as mutual collaboration purposes offered on CPs. The specific characteristic of crowdsourcing work is that the whole work process is performed online according to the rules of CP activities and decisions of its managers: from defining the initial assumptions, instruction to the final transfer of the performed work results, their evaluation, practical application, promotion, and sale. The crowd creates a global source of knowledge, new goods and services developed in line with the expectations of CP clients opened to new solutions.

Crowd members have opportunities to influence open innovation as well as the development of new product on the Internet, according to the expectations and preferences of current and potential consumers of innovation markets. They participate in defining market trends, creating new values, designing ideas, innovative solutions, products, services, their evaluation, testing, application, as well as in the promotion and sale of the best innovative solutions. The crowd members' contribution to the development of open innovations varies strongly. Therefore, the identification and selection of the competent, engaged and creative crowdsourcing workers combined with effective motivation to perform tasks on CPs play a critical role in the development of crowdsourcing open innovations.

Unlike a one-time contest or a multi-stage tournament held in a competitive crowdsourcing community, a collaborative CP community encourages crowd members as digital prosumers to generate ideas repeatedly over time, in a non-competitive manner (Liu et al., 2020; Mo et al., 2018). Prosumers are both buyers and sources of value. Today, every prosumer can participate in creating, co-creating open innovations as CP workers who belong to international labor market and can be active consumers in various (also online) markets. CP clients as well as crowdsourcing workers can live in different countries, characterized by various economic, technological achievements, specific culture, or life conditions, and they can be consumers and/or sellers in international markets. Hence, CP managers ought to provide CP collaborators the appropriate services using mutual communication, and take into consideration their different possibilities, skills, expectations and interests. Crowd members create and/or co-create innovative solutions individually or in teams (also within networks) when collaborating with crowdsourcing clients, managers and other external CP partners, i.e. consultants, patent owners, facilitators of relevant software, experts, specialized firms or their employees, who offer

external current knowledge, have their own experience and achievements in the appropriate fields (Dolińska, 2020, 2022).

The platforms offer open innovation seekers the opportunity to solve the challenges they present and propose, in accordance with their expectations, developing innovative projects, designing new products/services, offering the results of R&D achievements, including new technology, as well as cooperating with them during development and practical use, promotion and/or sale of selected as the best innovative solutions.

Innovation contests on CPs are used to solve innovative, challenging or creative problems in the form of an open call to a large network of potential contributors (e.g. new product, service development communities on CPs of Starbucks' My Starbucks Idea and Beijing Xiaomi Technology). In such crowdsourcing contests, active crowd members propose their own ideas, participate and compete with each other to generate the best solution(s). The chosen best solutions are awarded financially by seekers, typically in the form of monetary awards. The aim of such contests is to encourage crowd members to submit their own expertise, project and, as a result, obtain innovative solutions beyond the traditional boundaries of an organization (Afuah & Tucci, 2013; Chen et al., 2021; Chen et al., 2020).

After registering on CPs, crowd members evaluate possible financial strategies, interaction processes, platform facilities, capacity as well as offered policies concerning privacy and intellectual property protection. This assessment results are the basis for crowd members' decisions to cooperate or not cooperate with CPs. In order for CP to achieve a critical mass of users (i.e. crowd members and clients) and provide them an effective online distributed innovative challenge solving process, the crowdsourcing model has to generate and capture values expected by clients and their markets (Kohler, 2015; Shaqrah & Noor, 2017).

From the perspective of platform managers, crowdsourcing should be focused on establishing a business model that offers a precise and attractive value proposition to CP contributors on both sides of the platform, identifying and building an appropriate level of strategic resources, online services, and using software to effectively support interactions, information flow and cooperation with crowd members and clients during value creation (Chesbrough, 2017; Vignieri, 2021).

Organizations and their employees may attain better access to experts, their knowledge, experience, achievements through crowdsourcing. Therefore, the challenge for a successful CP is to develop an open innovation model that presents possibilities for crowd members to create expected values for clients and to deliver financial, market benefits to seeker organizations using the best innovative solutions proposed by the creators in business practice. Managing collaboration with CP main contributors, i.e. crowd members and clients, is fundamental to building the market value of CP and its offer, as well as developing its online activity. Possible ways of cooperation of crowdsourcing managers with CP contributors during open innovation development presents Table 4.

Table 4. Cooperation of CP managers with contributors in open innovations

Mutual cooperation of managers with	Possible ways of cooperation of CP managers with the relevant CP contributors
crowd members	• access to relevant handbooks, training offer for crowd members • organizing and conducting contests for solvers • managing the cooperation of innovative solutions' creators (with diverse innovative skills, level of professionalism, knowledge) in teams, networks • proposing crowd members assessing and commenting on submitted design ideas, participation in voting for the best solutions • offering creators useful knowledge resources collected by a CP • making software available to developers to design and test expected innovative solutions • proposing access to CP knowledge resources, its experts, mentors, facilitators • defining the rules for selecting winners of crowdsourcing contests • providing information about the best creators and their achievements • preparing reviews, opinions, certificates for creators of the best solutions
clients	• joint defining innovative challenges to be solved • determining motives/incentives for crowd members • proposing financial rewards, methods of rewarding the best solutions • offering crowd members the opportunities for professional career development • presentation of preliminary materials that are the basis for open innovation elaboration • defining principles for providing and presenting solutions • combining solutions elaborated by team members into a final project in accordance with client requirements • evaluating winning solutions by client experts • agreeing on the rules of intellectual property protection
clients and crowd members	• enabling mutual communication, cooperation during development of open innovations • presenting case studies, publications on the best innovative solutions • characterizing innovative problems to solve • presenting services proposed on CPs • participation in selecting contest winners • determining how to submit the best solutions by creators and deliver them to clients • enabling mutual exchange of knowledge, experience, co-creating value by solvers and clients • involving winning creators of the best of innovative solutions (also new product, services) in their commercialization, i.e.: promotion via CP community (also on social media); sale via online and/or offline channels
clients, crowd members, and other external contributors of CPs	• building relationships with well-known CP partners who conduct activities in the area of open innovations (e.g. governmental institutions, famous magazines), presenting information/data about them • proposing subscription of CP magazine(s), newsletter(s) • presenting success stories of CPs, news and important events related to their activities • posting information about CP top solvers • enabling access to information, presentations on blogs, social media

Source: Author's own study.

Support of well-known CPs stakeholders as additional crowdsourcing partners gives more trust to seekers and providers of open innovations and builds trust in CP activities. Any relationship or support from CP governmental institutions, famous innovative partners, specialized companies, magazines, or social media are more likely to add trust to performance of CPs. Previous success stories, actual achievements, case studies, publications on implemented open innovations, their market successes, or testimonials also create additional value of CP offer and build positive image of CP brand among crowd members, clients and other CP contributors as well as encourages them to cooperate with the platform.

2.3. The concept of crowdsourcing open innovation processes

Recently, open innovation research has reffered to the role of CPs in solving business innovation problems (Evans et al., 2016; Mokter & Ilkka, 2015). Open innovation has been used to innovate business models, to reduce R&D and innovation development costs, and also to acquire external knowledge and work resources to help organizations to solve innovative, scientific and technical problems for business (Chesbrough, 2019; Christensen & Karlsson, 2019; Kohler, 2015; Vignieri, 2021). Open models suggest using resources of external knowledge and work sources for the innovation processes and currently can be applied on CPs.

A process is defined as a series of activities carried out by all participants to achieve a particular result or solve a determined problem (Pedersen et al., 2013, p. 581). A business process model connects interdependent activities and tasks that determine the way a company runs their own business when cooperating with customers, suppliers, vendors and other external partners (Amit & Zott, 2012, p. 43), and in the case of crowdsourcing – with innovative solutions providers and seekers, as well as the other CP contributors.

Open innovation processes rely on the development of complementary networks. Then, an innovation is considered as a solution to the problem experienced by its users. This process involves participants who combine, adapt and use their resources to generate the innovation (Devece et al., 2017; Goglio-Primard & Crespin-Mazet, 2015). The Internet is considered as the major enabler of crowdsourcing, because companies are able to reach an unlimited number of crowd members with very little effort. The crowd is co-opted as a major partner during open innovation development (Ghezzi et al., 2018, p. 343). Crowd members on CPs are a source of knowledge, which is used to solve specific problems in the context of open innovation as well as to develop new product and services (Allen et al., 2018, p. 108).

Crowdsourcing open innovation processes can be defined as the outsourcing of innovative problem-solving, R&D tasks to crowd members who perform them according to the orders of CP clients. CP managers, prosumers and clients cooper-

ate with each other during the accomplishment and improvement of these processes (Dolińska, 2022, 2024). Opening crowdsourcing innovation processes enables CPs to acquire a richer set of external resources, invite participants to implement consumer-driven innovations and share the social capital created by collaborators in networks.

In crowdsourcing open innovations, CP clients submitt the problem and crowd members offer design ideas, knowledge, or new solutions to innovative challenges (Lee et al., 2019, p. 149) solved on the platform. Today's consumers as members of the Internet community may be both buyers and sources of new values, knowledge and may be involved in producing and commercializing new products and services (Bauer & Gegenhuber, 2015, p. 662).

The scientific publications concentrate on building a definition of the "crowdsourcing-as-open innovation" model. It utilizes advanced Internet technologies to use the collective knowledge of the Internet community and/or encourage the crowd to produce innovative solutions, also new products, services (Saxton et al., 2013, p. 8). According to Kohler (2015, p. 64), open innovation model in crowdsourcing consists of three components: (i) companies that cooperate with crowd members, (ii) opening up certain processes and resources to external creators, (iii) CP crowd members who can create individually or co-create values and solutions during cooperation with other CP users.

CP activities are focused on the effective sharing knowledge between crowd members and clients along open innovation processes performed according to the market expectations of contemporary organizations, their employees and consumers. Therefore, the structure of these processes can be presented by interconnected stages that combine tasks and activities carried out by crowd members in cooperation with CP managers and clients, also in accordance with their assumptions and expectations.

CP prosumers can be involved in anticipating the innovation market evolution, trends, presenting new values, needs, customer preferences, submitting elaborated new concepts, solving technical, R&D problems, generating innovative solutions, new products and services and sometimes participating in their implementation or commercialization. The current possibilities of practical use of IT and the growing number of active crowd members encourage CPs to take advantage of open access to global resources of knowledge, creativity, online work and to use them to accelerate the development of crowdsourcing open innovations (Dolińska, 2017b, 2020).

The process-oriented open innovation development in crowdsourcing uses the creation of new solutions and effective implementation of activities (Thuan et al., 2018, p. 286) during the collaboration of CP managers with their co-workers.

Opening up innovation processes to online crowdsourcing workers provides seekers of innovative solutions with access to the Internet crowd of innovators, their knowledge and creative skills. In crowdsourcing open innovations, seekers present the problem and crowd members offer their own ideas, new solutions to this problem, and in this way external knowledge and abilities are used in open innovations (Dolińska, 2018; Hemetsberger, 2013; Kalsson, 2019).

Companies may apply online crowdsourcing to access concepts that extend beyond the limits of internal organizational knowledge. By creating new ideas, crowdsourcing gathers innovative solutions that cannot be developed from internal sources. Crowdsourcing helps identify and implement new sources and innovation types. Although in-house specialists may be constrained by their past professional experience when trying to develop open innovations, crowdsourcing brings a novel and fresh point of view to solving innovative problems (Allen et al., 2018; Johnson et al., 2019).

A well-formulated problem for solving is one of the most important steps in crowdsourcing and has a direct impact on the quality and results of the tasks executed as well as solutions proposed during the implementation of open innovations. The task is usually the starting point of contact between clients and crowd members, upon which solvers make an independent choice to participating or not in performing the task. The specification and execution of tasks refers to how well the crowdsourced problem is defined and presented for potential crowd members (Afuah & Tucci, 2012; Karachiwalla & Pinkow, 2021; Thuan et al., 2018).

Crowdsourcing contests are becoming increasingly common as an increasing number of companies and other organizations as well as individuals recognize the great potential of sourcing knowledge, new ideas and innovative solutions from the Internet crowds as external online workers (Schäfer et al., 2017, p. 33). While crowdsourcing idea contests have the potential to leverage widely distributed knowledge, the number of ideas and the complexity of the solutions involved in idea assessment constitute a significant effort and challenge for contemporary organizations (Cui et al., 2024, p. 1).

CP clients define the conditions for conducting crowdsourcing contests with managers. They present problems to be solved, post tasks and describe the requirements for their implementation, as well as the duration of the contests, the rules of evaluating the proposed design ideas, and the rewards offered to the winners. Crowd members submit relevant solution proposals in the form of new market trends, consumer values, design ideas, prototypes of new products, and other innovative solutions to the presented problems. Rating, voting and commenting are popular tools in crowdsourcing to express crowd members' opinions and to assess the quality of the proposed solutions on CPs. Seekers review the proposed best solutions, cooperate with the appropriate experts during their financial and marketing analysis and after their positive evaluation, they finally decide which solutions are the best candidates for practical usage, and/or sale on the market. Sometimes, CP clients engage the best creators in the commercialization of winning solutions (their promotion and/or sale via online and/or offline channels). The rules of intellectual property protection presented on CP websites are very important for solvers and clients of crowdsourcing open innovations.

Based on a comprehensive literature review, Zuchowski et al. (2016) define four steps in the internal crowdsourcing process: 1) preparation, 2) execution, 3) evalu-

ation/aggregation, and 4) resolution. The preparation step includes actions such as the description of the current assignment, expectations, evaluation criteria and also criteria for selecting crowd members. The task for solvers is published and the crowd submits their proposed solutions during the execution step. In the next step, the evaluation and aggregation of the submitted ideas from the crowd are performed. Then, either all solutions that meet a certain quality standard (integration) or only the best solution (selection) can be chosen. The chosen best solution is finally implemented, and its creator is rewarded in the fourth step of the process.

Barlatier et al. (2023) distinguished the following three innovation stages: 1) the idea and design phase, which includes R&D, idea generation, idea screening, concept development, and product or service design; 2) the development phase, connecting technical implementation and market testing; and 3) the commercialization stage, comprising market and business analysis, commercialization and improvement. The above stages were determined in accordance with studies of Muninger et al. (2019, 2022) or Mount and Martinez (2014) who conducted them on social media used as a tool for open innovation generation.

Crowd members as voluntary workers of the global market use and develop their own knowledge, innovative competences, and creative skills when performimg tasks in crowdsourcing processes of open innovations. Managers encourage and engage them in performing tasks at subsequent stages of open innovation processes that can include: presenting expectations of innovative market and new values connected with them, successively generating and submitting proposals for new design ideas, evaluating them, choosing the best solutions, developing final innovative projects for them as well as new products and services, successively participating in their utilization and/or improvement, promoting and/or saling them in target markets, as well as diffusion in economic practice and/or society.

Management activities performed at subsequent stages of crowdsourcing open innovation processes are the basis of their successful implementation. The role of active, engaged prosumers becomes central in generating open innovations on CPs. Cooperation of CP managers with Internet communities as innovation networks on CPs depends largely on the number and a set of their active, creative prosumers with expected knowledge and experience, as well as their interest in participating in the implementation of open innovation processes in accordance with the expectations of CP clients. Online cooperation between managers and contributors of open innovation processes brings the following benefits to CPs:

- the rapid mutual communication and interactions with CP collaborators;
- using external sources of real knowledge and work resources on the Internet;
- mutual exchange of knowledge, experience, learning among crowd members, solvers and CP clients;
- creating synergic effects of using collective abilities, creativity, innovative competencies of crowdsourcing workers;

- building social capital of CP;
- increasing trust to CP activities/achievements;
- creating new knowledge, market trends, values, design ideas, innovative solutions as well as new products and services;
- achieving purposes of the platform's activities and future development;
- increasing the market value of the platform and its offer;
- shaping the platform's competitive position on the online innovation market.

Tasks in crowdsourcing open innovation processes are performed by crowd members in collaboration with managers and/or clients as well as other external CP partners. Different levels of detail may be examined when describing and analysing these process. They can be characterized by the following three phases defined in the proposed concept of these processes:

A. Presenting open innovation development rules and consumer expectations in crowdsourcing.

B. Creating, evaluating design concepts, choosing the best innovative solution(s).

C. Developing final projects of the best open innovations, their commercialization.

Phases of crowdsourcing open innovation processes may consist of the following six stages (two stages for each phase):

1. Defining conditions and possibilities of open innovation development.

2. Enabling cooperation with contributors and presentation of consumers' expectations.

3. Generating and submitting design ideas.

4. Evaluating design ideas and choosing the best innovative solution(s).

5. Preparing the final project of winning innovative solution (also new product, service).

6. Utilization, improvement, promotion and/or sale of the best open innovations.

The phases and stages of crowdsourcing open innovation processes specified above, as well as values that are created along these processes on CPs are presented in Figure 2.

The main collaborators of crowdsourcing open innovation processes are clients and crowd members (as crowdsourcing workers), and cooperation of CP managers with them is the basis of the platform existence, activity and development on the online market. Managing CP value focuses on creating values for clients and at the same time on building value of clients and crowd members for a CP. In this situation, the purpose of CP managers' activities becomes effective collaboration with the analyzed above CP contributors at every stage of crowdsourcing open innovation processes. Along these processes there are created the following values on CPs:

- for clients by crowd members;
- of clients and crowd members as basic resources of CPs;
- of the platform and its offer on the online market.

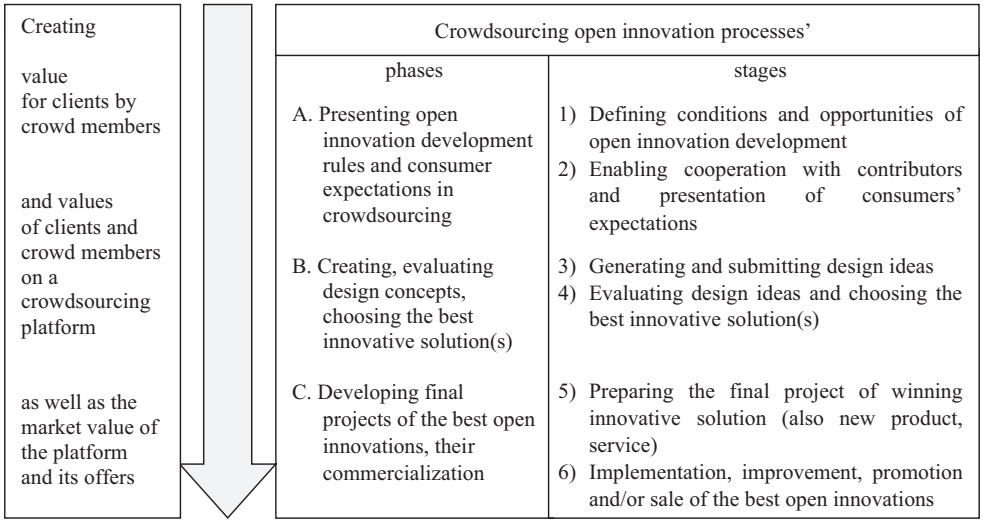

Figure 2. The concept of crowdsourcing open innovation processes

Source: Author's own study.

Hence, the following conclusion: managers simultaneously manage (i) crowdsourcing open innovation processes as well as open innovation (ii) seekers (i.e. CP clients) and (iii) their providers (i.e. crowd members) to increase business competitiveness and market value of CP.

CHAPTER 3

Management of Crowdsourcing Open Innovations and Their Contributors

3.1. Assumptions for the management of open innovations and their contributors on CPs. Literature review

The Internet is characterized by a high degree of openness, new ways and possibilities of mutual communication, collaboration among its users and a wealth of information, knowledge, new concepts that stimulate the development of innovative solutions, new products, services by crowd members as prosumers for CP clients. Contemporary companies expand their own boundaries to use external (including virtual) sources of knowledge, innovative solutions efficiently and cooperate with outside partners (including consumers) within the framework of innovative networks created by CPs. These changes influence the evolution of innovation processes from linear and closed to open and networked, also performed on the Internet, and enable CP managers to cooperate with relevant crowd members as crowdsourcing workers who are active during the development of open innovations.

The related topics of crowdsourcing and open innovations are of interest to researchers, scientists and practitioners in the field of management (Bernier et al., 2023; Blohm et al., 2018; Cheng et al., 2020; Cricelli et al., 2022; Ghezzi et al., 2018; Kohler, 2015; Zhao & Zhu, 2014a).

The strategy of using CP to solve innovation challenges depends upon managerial attention to gather external knowledge because crowdsourcing is an approach that managers use to search for external resources and solutions that solve innovation problems in accordance with expected requirements. The chosen designers, suppliers, collaborators and clients perform the relevant tasks and often work together, using insights they gain from the design, submitting solutions to iterate toward a manufacture ready product (Allen et al., 2018; Johnson et al., 2019).

The managerial dimension of online crowdsourcing regards all the aspects related to knowledge and information management, design, an implementation of an appropriate business model, IT application, or creating connections between different CP users (Cricelli et al., 2022; Vianna et al., 2020; Wilson et al., 2018). Bogers et al. (2018) expressed the opinion that a better understanding of connections between open innovation and crowdsourcing can lead to higher efficiency of CP activity and it contributes to the research in the innovation management field.

The defined research gap combines management activities of crowdsourcing open innovation processes and their contributors, especially the main CP contributors, i.e. crowd members (as crowdsourcing workers) and clients, as well as collaboration between them during the execution of these processes. The aim of crowdsourcing management activities is to create and increase the value of CP and its offer on the online market. This value is the result of building valuable resources of CP contributors such as crowd members and clients during collaboration with them as well as generating expected values for clients by crowd members.

Crowdsourcing requires continuous crowd engagement to improve existing innovations and to identify and develop additional innovations that influence further attention and implementation by CP clients (Daradkeh & Atalla, 2022, p. 634). Engagement is defined as a psychological state that encourages people to contribute energies, while effort combines the energy, resources and time used by people (Liang et al., 2018, p. 170).

Assigning tasks by CP managers means inviting an appropriate group of crowd members to participate in solving innovative challenges. Managers invite crowdsourcing workers with appropriate innovative competencies and experience who can live in different countries (Allen et al., 2018; Bazaluk et al., 2024; Blohm et al., 2018; Pongratz, 2018). According to the relevant papers, the following types of tasks can be performed in online crowdsourcing (Jaafar & Dahanayake, 2015; Ulbrich et al., 2021b):

- Crowdstorming – crowd members are called on to identify challenges and possibilities of solving them. The objective of the call is to collect proposed ideas and solutions.
- Crowdvoting – crowd members are called upon to express own opinions; they participate in votes concerning presented ideas and solutions. The aim of the call is to gather their assessment results.
- Crowdsolving – solvers are called upon to propose innovative solutions to defined problems to benefit clients. The purpose is to optimize CP offer for clients.
- Crowdcreation – creators are called on to generate new concepts, design ideas, innovative projects for products, services and/or processes. The goal of the call is to create innovations.

CP clients select and implement the most valuable innovative solutions as well as new products and services that are the result of effective work of crowd members and can be competitive in markets (Liu and Xiao, 2022; Liu et al., 2020). CPs evaluate the quality of elaborated tasks and ideas submitted by crowd members and offer financial rewards for the best innovative solutions (Dimitrova & Scarso, 2017, p. 586). Important activities of CP managers are comprehensive categorization, clear presentation of tasks to be performed by crowd members according to the orders and requirements of CP clients as well as principles, possibilities of open innovation creation in crowdsourcing. Managers as CP leaders organize and facilitate online

communication, cooperation, knowledge sourcing, exchange, development and using along crowdsourcing open innovation processes.

The goal of CP management is to encourage and engage the appropriate crowd members who have both the willingness, capacity and abilities to perform relevant tasks that involve identifying new values, market trends, concepts, solving challenges, participating in the assessment of design ideas proposed by solvers, creating and using knowledge while developing innovative solutions prepared for CP clients in accordance with their orders and leading to their satisfaction. The opportunities and effects of innovation creation and/or co-creation by crowd members on CPs depend on how the cooperation between them and clients is managed during the accomplishment of crowdsourcing open innovation processes.

In crowdsourcing, there are activities related to knowledge sharing and collaboration. Some of them are structured as competitive with no or minimal knowledge sharing, some are performed as collaborative actions with extensive knowledge exchange, and some of them have both collaborative and competitive components (Khasraghi & Hirschheim, 2022; Majchrzak & Malhotra, 2016).

CP managers take into consideration the conditions for performing crowdsourcing tasks and organize individual and/or team work for crowd members as well as develop collaboration with clients and other external crowdsourcing partners with expected professional knowledge and experience. CP leaders focus on using the opportunity to effectively connect CP clients' orders with solvers' skills, creativity and knowledge during generation of crowdsourcing open innovations. They can organize the development of innovative solutions on CPs in the following way:

1) offering crowd members to participate in the contest and submit proposals for innovative solutions ordered by clients, and next choosing the best candidate for implementation and/or sale;
2) dividing the innovative project into parts, which are assigned to appropriate solvers and/or their teams for development, and then combining the parts developed by them into the final project of the ordered innovative solution which is finally delivered to the CP client.

Sometimes a CP may offer solvers access to knowledge resources accumulated on the platform, and/or provided by external specialists, as well as necessary software for designing and/or testing proposed innovative solutions.

Many CPs organize contests, because advances in IT have reduced the cost and time of conducting online contests. Crowdsourcing contests are typically used to solve challenging or creative problems in the form of an open call to large network of potential online contributors. There are hundreds of contests active on CPs at the same time, and relatively smaller-scale contests can be hosted on CPs with just a few mouse clicks. In such contests, participants self-select into taking part and compete with each other to prepare and submit innovative solution(s). Financial compensation is an important motivator for active participation in CP contests (a few hundred

to a few thousand or even million U.S. dollars) (Bernier et al., 2023; Jian et al., 2019; Malhotra & Majchrzak, 2014).

Contests on CPs allow more crowd members to provide solutions. Examples of crowdsourcing contests include Innocentive, TopCoder, Kaggle, 99designs and TaskCn. Crowdsourcing contest is an innovative solution by which clients broadcast tasks or problems to a large crowd of solvers to receive the expected ideas, solutions and offer rewards to the winners for the best solutions (Afuah & Tucci, 2012; Liang et al., 2018).

The primary essence and benefit of such crowdsourcing contests is the mobilization and effective use of knowledge, experience, creative skills of crowd members and obtaining from them innovative solutions beyond the traditional boundaries of an organization (Bernier et al., 2023; Boudreau & Lakhani, 2013; Zheng et al., 2011).

The success of these kinds of contests depends on the quality of submitted ideas and solutions, and an active participation of crowd members. Companies increasingly rely on crowdsourcing especially in the form of contests to receive many high-quality ideas and solutions from the crowd (Füller et al., 2012; Khasraghi & Hirschheim, 2022; Moghaddam et al., 2023).

Crowdsourcing contests are becoming more and more common as an increasing number of organizations and individuals recognize growing potential of acquiring external knowledge, new solutions from crowds of external workers and creators. Companies facing strong technological and market competition as well as internal resource shortages are seeking possibilities to participate in crowdsourcing contests to channel the capital innovation of the online society and start cooperation with appropriate CPs (Jian et al., 2019; Schäfer et al., 2017; Yin et al., 2022).

Managers plan and decide how to conduct crowdsourcing activities, organize and lead cooperation with clients, crowd members and other CP users as well as coordinate the execution of work by crowd members. Their activities are related to building trust in the proposed offer of innovative solutions during the presentation of CP achievements, especially the implemented open innovations and their creators on CP websites also in the social media used by the platform. In this way, managers build confidence in CP business and its offer and create the platform (its brand) value on the online market.

Managers organize and facilitate cooperation, interactions, mutual exchange and flow of information, knowledge along the entire process of value, innovation creation and combine it with the quality assessment of CP activity and its offer (Boons & Stam, 2019; Kohler, 2018; Malhotra & Majchrzak, 2014; Rowledge, 2020). They are responsible for providing the relevant infrastructure, software, tools when collaborating with external crowdsourcing contributors as well as coordinating the submission of solutions, assessment combined with anonymous voting and discussion, as well as delivering the best solutions, supervising their implementation, promotion and/or sale.

Crowd voting on CPs has a few advantages over expert evaluation, because it involves a large number of unpaid volunteers as selectors, and could be cheaper to operate. Moreover, crowd members evaluate more objectively as potential consumers, and in this situation even better than specialist rating. It may also co-evolve knowledge and engage more crowd members in building the crowdsourcing community. Knowing these advantages, it is worth asking whether a contest organizer should choose a winner-selection design that relies more on crowd voting, especially when it can offer both expert-rated and crowd-voted prizes in the same contest (Chen et al., 2020; Majchrzak & Malhotra, 2013).

Determining the requirements for crowd members' contribution is considered one of the most crucial steps as it influences the solvers decision to be active in crowdsourcing. Seekers should ensure that contribution requirements are clearly presented because they serve as a guide for crowd members to participate in preparing solutions on CPs (Boons & Stam, 2019; Steils & Hanine, 2016).

Managers are responsible for defining with clients and presenting innovative problems to be solved, open innovations to be developed on the CP website and engaging crowd members in anticipating the evolution of markets which are or will be served by CP clients. In collaboration with clients, they prepare the basic material that is used by crowd members to develop innovative projects and define the principles of CP contributors' participation in generating crowdsourcing open innovations. Managers agree with clients on the terms of the crowd work to ensure that its results, as expected innovation solutions, can be successfully implemented in economic practice and/or in society.

Clients indicate their expectations regarding intellectual property rights in the problem statement, because it has a significant impact on active participation of crowd members in crowdsourcing contests and solving innovative problems. Hence, platforms present exact rules for intellectual property protection for creators on CP websites. They are clarified under the direction of managers and intellectual property arrangements should take into account the level of complexity of the problem to be solved and the expected solution requirements (Karachiwalla & Pinkow, 2021; Steils & Hanine, 2016).

Managers concentrate on more effective delivering human intelligence, the wisdom of crowd members to clients in the form of developed open innovations that use new technologies, add new advantages, values of crowd members and are evaluated in the submitted design ideas, innovative solutions. In this way, they become important components of shaping and increasing their quality (Cheng et al., 2020; Daniel et al., 2018). Controlling the quality of crowdsourcing open innovations in line with the requirements of clients enables CP managers to run crowdsourcing business more efficiently, improve the work of crowd members and cooperate with them and CP clients.

The contribution requirements serve as an indicator of how the solutions proposed by crowd members will be evaluated by CP clients. The best innovative solutions

selected should correspond to their expected quality. Quality control in crowdsourcing includes the following elements: crowd members' work quality, the development process as well as the quality of the innovative solution. It is achieved via a proper worker selection process and possible via redundant work which means assigning the same tasks to many workers (Cheng et al., 2020; Daniel et al., 2018) and then choosing the best solutions that are the results of their work and are accepted by clients. One of the goals of continuous improving the quality of crowdsourcing open innovations is to improve the management of their development. Quality control is perceived as a crucial component of effective managing CP, performing its operations and influencing the value of its offer on the online market as well as shaping the value of prosumers and clients for the platform.

CP leaders coordinate connecting all the diverse ideas and solutions together when they are developed in teams and networks by co-creators with the relevant knowledge and achievements. In the case of collective work, CPs should be provided by managers with comprehensive procedures, tools that combine all the diverse ideas, solutions of co-creators into the final expected innovative project.

CP managers have to introduce and implement what is called the "Fourth Industrial Revolution (4IT)" to enable a CP to survive and improve the quality of its activity on the online market. This 4IT deals with current and future technologies, especially the use of growing IT capabilities. Innovation creation, problem solving, new product development, data provision, using external knowledge are the areas of applications of crowdsourcing in the so-called 4IR (Allen et al., 2018; Vianna et al., 2020).

CP managers can invite the crowd members with the appropriate technical background who have also successfully solved similar problems in the past. Sharing diverse sets of current information and knowledge offered by prosumers, which may include different areas of skills and knowledge, creates a greater variety of new ideas or solutions and increases the opportunities for knowledge development and mutual learning on CPs (Blohm et al., 2018; Mount et al., 2020; Testa et al., 2020). Managers are responsible for determining how the developed ideas and innovative solutions should be submitted, uploaded and next evaluated on CPs. They propose opportunities for crowd members how to be active as crowdsourcing workers and present own comments, participate in discussions, and vote on design ideas to choose the best ones. The results of the evaluation of the submitted ideas by solvers additionally enable CPs to control their quality and impact on its improvement. In parallel, managers cooperate with CP clients (their experts) during conducting financial and marketing analysis of winning innovative solutions. Its results are the basis for choosing the best candidates for use in practice and/or sale. Sometimes clients continue collaboration with the best creators and invite them to active participate in implementing production and/or introducing new products and services to the relevant markets.

From the crowd perspective, the success of any crowdsourcing project largely depends on the knowledge, motivation and diversity of the crowd members. There-

fore, CP managers must consider the characteristics of the available crowd members with relevant competencies when preparing innovative projects and choose the right solvers to develop them. In this situation, one of the challenges that CPs struggle is which crowdsourcing actions to use and how should external problem-solvers be organized as a collaborative community and/or competitive market participants? (Darmody et al., 2017; Karachiwalla & Pinkow, 2021; Khasraghi & Hirschheim, 2022).

Online work of crowd members very often is creative and connects multifunctional tasks or even interdisciplinary knowledge, hence, crowdsourcing workers should be appropriately motivated to perform tasks during solving innovative challenges. Managers should encourage appropriate, also creative, sometimes qualified, experienced crowd workers to work on CPs, because then they are able to add expected values, promising concepts to innovative solutions, as well as new products, developed technology during generating crowdsourcing open innovations.

Managers organize and are responsible for more efficient delivery of knowledge, wisdom, innovative solutions of crowd members to their clients. They put in a significant effort into it, but CPs are still far from the expected results in this area of CP development (Cheng et al., 2020; Daniel et al., 2018). Under the leadership of managers, CPs present publications, news, case studies on the best solutions developed by creators and implemented in practice, and offer solvers links to social media to share knowledge or present opinions on innovative solutions. Managers together with CP clients participate in the preparation and presentation of e-promotions by crowd members, especially via CP websites, as well as on social media, and/or offer financial rewards to creators when they sale new products via online and/or offline channels.

CP managers focus their activities on using the power and opportunity to effictively connect CP clients' orders with the skills, knowledge, and possibilities of solvers during the implementation of open innovation processes. They should provide CP contributors with appropriate online services taking into account their various experiences, expectations and take into consideration the goal of the platform development and increasing its competitiveness on the market.

Recent studies suggest that crowdsourcing is an influential and efficient approach to generating open innovations (Bogers et al., 2018; Sun et al., 2023). Open innovations in crowdsourcing has gained increasing attention from researchers in a wide range of fields such as economics, business and management, information system, computer science, engineering (Cricelli et al., 2022; Ghezzi et al., 2018; Zhao & Zhu, 2014a).

A recent review of the innovation-crowdsourcing literature reports that only 7% of papers drew from organization theory or related fields and 13% of those used methods other than qualitative case-study or survey research. The analyzed papers theoretically examine how crowd members' knowledge influence the generation of innovative knowledge (Bernier et al., 2023; Ghezzi et al., 2018; Sun et al., 2023; Testa et al., 2020). Ghezzi et al. (2018) reviewed 121 articles on crowdsourcing and arrived

at a conclusion that their authors adopt a process perspective using the framework of: 1) input (problem/task), 2) process (problem, knowledge management, technology development), and 3) outcome (elaborated innovative solution/completed task, seeker and solver benefits). De Mattos et al. (2018) analyzed how two Brazilian companies from different sectors have integrated crowdsourcing mechanisms into the open innovation process. Testa et al. (2020) conducted a study on social media-based open innovations and their two main actors – innovation provider and seeker presenting answers to three main questions – why (determinants), how (activities), and what (outcomes). Jiang et al. (2023) introduced network externalities as influencing factors of the crowdsourcing open innovation synergy mechanism and used the evolutionary game method as an open innovation synergy mechanism in crowdsourcing.

Research on crowdsourcing also focuses on the absorptive capacity of organizations in the area of crowdsourcing. Here, absorptive capacity refers to an organization's ability to recognize the value of external information and knowledge as well as to assimilate and use them for commercial purposes (Afuah & Tucci, 2012; Boons & Stam, 2019; Karachiwalla & Pinkow, 2021). Kohler (2015) studied 48 cases of crowd value creation on CPs using the business model canvas and its components: customer segments, value proposition, key company activities, key crowd activities, customer relationships, channels, key knowledge resources, and key partners. Kubiak and Wziątek-Kubiak (2019) also utilized the model canvas to study business model innovation based on the examples of a few analyzed CPs and actions of their crowd members. Vignieri (2021) presented the case of InnoCentive as a successful CP where open innovation-driven organizations (crowdsourcing clients) are looking for solutions to their R&D tasks. The paper highlights which factors are crucial for a CP to be effective in supporting people seeking innovation in an open manner, as well as to understand how modern managers may impact on solving innovative challenges. Bogers et al. (2018) expressed the opinion that a better understanding of the relationship between open innovation and crowdsourcing can lead to increased CP efficiency and it is related to research in the field of innovation management.

From an organizational point of view, crowdsourcing provides an innovative way of doing work and enables more flexible and dynamic management, also performing operations on a CP. The managerial dimension of online crowdsourcing regards all the aspects related to knowledge and information management, design, an application of an appropriate business model, and creation of connections between various CP users (Cricelli et al., 2022; Wilson et al., 2018). This dimension also concerns solving research problems, that are investigated in Chapters 3 and 4 of this monograph, as well as building the relevant models that enable solving these problems.

3.2. The model for managing open innovation processes and their contributors on CPs

Management activities are the basis for the existence of CP, building the market value of the platform and its offer as well as its development in the competitive Internet market. The implementation of these activities is connected with 1) collaboration of managers with crowdsourcing contributors, especially with the main CP users, i.e. crowd members and clients, as well as 2) the implementation of crowdsourcing open innovations.

Hence, the development of the multidimensional model of managing open innovation processes and their contributors on CPs, that could be utilized in business practice, is defined as the research problem to be solved in this monograph, and also constitutes the research gap to be addressed.

The proposed model determines the opportunities of solving the defined research problem. This model presents the management activities which are performed during the interaction of CP managers with crowd members and clients (and between them) in the subsequent three phases that combine six stages of open innovation processes executed on CPs (each phase consists of two stages). The concept of these processes is presented in the third chapter.

The purpose of CP management is to improve the platform activities and its continuous development as well as to increase the competitiveness of its innovative offer on the online market. This goal can be achieved by encouraging clients to order innovative solutions on CP as well as motivating and engaging crowd members as crowdsourcing workers to participate in their development during the implementation of open innovation processes, as well as successively controlling the results of their work to meet requirements and expectations of clients.

The basis for achieving the defined goal is CP leaders' management of collaboration with crowdsourcing clients and workers during the implementation of crowdsourcing open innovation processes. CP types, their managers and contributors participating in the implementation of crowdsourcing open innovation processes are characterized in Table 5.

The proposed model for managing open innovation processes and their contributors on CPs is presented in the relevant columns of Table 6. It connects together:

1) the concept of crowdsourcing open innovation processes that consists of the phases defined in column 1 and stages defined in column 2 of Table 6 (see Figure 2);

2) management activities performed by CP managers and/or under their supervision at subsequent stages of crowdsourcing open innovation processes during collaboration with:

- (i) crowd members (column 3 of Table 6);
- (ii) clients (column 5 of Table 6);
- (iii) crowd members, clients and between them (column 7 of Table 6).

Table 5. Characteristics of CP types, managers and contributors developing open innovations

	Characteristics of CPs developing open innovations
CP types	• CPs are seekers and owners of crowdsourcing open innovations • CPs operate as brokers between seekers and providers of open innovations and they are independent companies
CP managers	• management of crowdsourcing open innovation processes and collaboration with their collaborators
types of CP contributors	• crowd members and their possible types: – individual crowd members (providers, solvers, creators; they may also include experts, researches, specialists, amateurs, other prosumers with appropriate knowledge, innovative competencies) – team(s), network(s) of crowd members (with expected abilities, knowledge, professional achievements, experience) – organizations (companies, R&D institutions, high schools, laboratories, also non-profit organizations, other institutions and/or their employees) • clients, i.e. companies, non-profit organizations, individuals: – companies that are owners of CPs as well as users of the ordered innovative solutions – external CP users and clients and/or purchasers of innovative solutions, i.e.: companies, individuals, non-profit organizations also government agencies, universities, colleges, research institutions, etc. • other external specialist partners of CPs, for example: consultants, patent owners, specialized firms and their employees, R&D institutes, high schools, government agencies, trade or other also non-profit organizations, etc.

Source: Author's own study.

The proposed model for managing open innovation processes and their contributors on CPs is connected with a complementary model for motivating crowdsourcing workers to develop open innovations that is presented in Chapter 4.

CP managers can be engaged in performing the appropriate (several or all) management activities that are presented in the subsequent phases and stages of open innovation processes in Table 6. Their participation in performing management activities depends on conditions, possibilities as well as aims, rules for running and developing the platforms, innovative challenges, and/or solutions generated online on these platforms.

Table 6. Managing open innovation processes and their contributors on CP

Open innovation processes'		Management activities and percentage of the analyzed CPs that perform them in appropriate stages and phases of open innovation processes during collaboration with					
phases	stages	(i) crowd members	% of CPs	(ii) clients	% of CPs	(iii) crowd members and clients, and also between them	% of CPs
1	2	3	4	5	6	7	8
A. Presenting open innovation development rules and consumer expectations in crowdsourcing	1) defining conditions and opportunities of open innovation development	a) determining rules of a crowd participation in development of open innovations b) presenting CP winners, their careers	81.16 31.88	a) identifying innovative challenges solved and services provided on CP b) presenting support of well-known corporations, governmental institutions, other partners	100 72.43	a) presenting CP activities, news, success stories, also cases studies on implemented open innovations b) proposing newsletter, magazine subscription, press	84.06 69.57
	2) enabling cooperation with contributors and presentation of consumers' expectations	a) offering e-handbooks, books on innovations b) determining new needs, expectations, preferences of consumers in markets served by clients	34.78 92.75	a) defining challenges for solving, open innovations, also new products, services for elaboration according to orders of CP clients b) preparing primarily materials used by crowd members during solving innovative problems	92.27 62.32	a) answering questions of CP users b) facilitating interactions, information flow, knowledge exchange and development along open innovation processes	76.81 73.91
B. Creating and evaluating design concepts, choosing the best innovative solution(s)	3) generating and submitting design ideas	a) encouraging for creating, co-creating (also developing) and submitting innovative solutions b) organizing cooperation with solvers in teams/networks	97.10 65.21	a) setting and presenting submission guidelines, terms b) agreeing on the rules of conducting contests and judging submitted innovative solutions	84.06 55.07	a) determining rules of intellectual property protection b) defining clear principles of choosing winners of the contest	33.33 52.17
	4) evaluating design ideas and choosing the best innovative solution(s)	a) ensuring voting on submitted design idea, rating them by crowd members to choose the best innovative solution(s) b) evaluation in form of discussions, comments on the submitted design ideas	47.82 33.33	a) presenting criteria of choosing the best innovative solutions b) reviewing best ideas, their financial and marketing analysis by clients and choosing best solutions for implementation and/or sale	66.67 78.26	a) proposing solvers the relevant motivations, career options b) testing the best design ideas according to clients' requirements during collaboration with solvers	71.01 50.72

Open innovation processes'		Management activities and percentage of the analyzed CPs that perform them in appropriate stages and phases of open innovation processes during collaboration with					
phases	stages	(i) crowd members	% of CPs	(ii) clients	% of CPs	(iii) crowd members and clients, and also between them	% of CPs
1	2	3	4	5	6	7	8
C. Developing final projects of the best open innovations, their commercialization	5) preparing the final project of winning innovative solution (also new product, service)	a) offering creators of final projects access to knowledge resources of CP also external experts, facilitators b) combining developed solutions by creators in teams into final innovative project	53.62 65.21	a) providing specialized software for creators to design and/or test the relevant innovative solutions b) delivering winning innovative solutions to clients	28.98 100	a) collaboration during mutual sharing of knowledge, innovative skills, experiences between creators and clients b) enabling application of intellectual property protection rules in practice	62.32 33.33
	6) implementation, improvement, promotion and/or sale of the best open innovations	a) participation of winning creators in the application and/or development of the best innovative solution(s) b) promoting wining solutions by creators on CP websites, social media	62.41 74.45	a) proposing winning creators financial or other prizes only for most profitable and/or cost-effective innovative solutions b) financial motivating creators for profitable selling of open innovations (also new products)	84.06 17.39	a) cooperation with winners in joint promotion of innovative solutions (also new products) b) involvement of creators to sell open innovations (also new products) via online and/or physical channels	47.82 21.74

Source: Author's own study.

3.3. Research results and discussion on the applicability of the proposed model

The following research purpose is formulated in this subchapter:

- to verify whether the proposed model of managing crowdsourcing open innovation processes and cooperation with their contributors fits the activities of existing CPs on the online market.

The relevant research was conducted for 69 existing CPs in 2023. The analyzed platforms were selected for the research in a non-random and purposeful manner. This study was conducted using secondary research and observations of the websites of the analyzed platforms as well as the social media they use.

The following research questions were formulated (see Figure 3) to verify the possibilities of achieving the research purpose defined above:

- (RQ1) Do CP managers collaborate most intensively with clients during the development of crowdsourcing open innovation processes?
- (RQ2) Is the first phase of open innovation processes – "Presenting open innovation development rules and consumer expectations in crowdsourcing"– the most important while managing these processes and their contributors on CPs?
- (RQ3) Do CP managers collaborate intensively with crowd members at all phases of crowdsourcing open innovation processes?
- (RQ4) Does the intensity of managing collaboration with all analyzed contributors, i.e. crowd members and clients and also between them, decrease in the subsequent analyzed phases of crowdsourcing open innovation processes?
- (RQ5) Can the proposed model of managing crowdsourcing open innovation processes and cooperation with their contributors be used in business practice?

The examination of appropriate management activities performed by managers of the analyzed CPs was carried out (according to the model presented in Table 6):

- at three subsequent phases and six stages of crowdsourcing open innovation processes;
- and respectively for two relevant activities performed by managers at each stage of the processes during the collaboration with:
  - (i) crowd members;
  - (ii) clients;
  - (iii) crowd members and clients, and also between them.

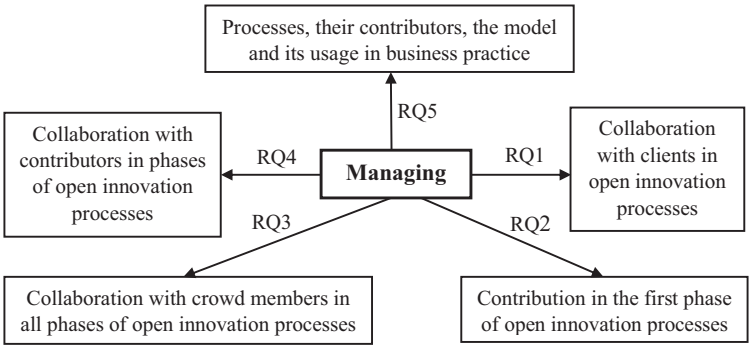

Figure 3. Research questions (RQ) regarding the use of the model for managing crowdsourcing open innovation processes and their contributors

Source: Author's own study.

During the research on the analyzed CPs, the implementation of 36 management activities was examined, in accordance with the model presented in Table 6. The descriptive statistics were used to analyse the research results.

Managers of most of the analyzed CPs cooperate with the following types of open innovation providers: individual crowd members on 78.26% of CPs, and/or teams, networks of crowd members on 65.21% of CPs as well as other external specialist contributors (52.17%). The results of the conducted study (in %) are presented in columns 4, 6, 8 of Table 6, respectively. They characterize the percentage of the examined CPs, on which the appropriate management activities are performed (defined in the relevant columns of Table 6 in accordance with the proposed model). These activities are performed during collaboration with, respectively: (i) crowd members, (ii) clients, (iii) crowd members and clients, and also between them. The results presented in Table 6 justify the opinion that all management activities presented in the proposed model, and analyzed during research performed according to this model, are applied by the examined CPs.

The results specified in Tables 7, 8, 9 are the arithmetic mean of the corresponding data presented in columns 3, 5, 7 of Table 6, respectively. Results of calculating the average percentage of CPs implementing the analyzed management activities at all stages of open innovation processes (according to data in Table 6) are presented in Table 7.

Table 7. Arithmetic means of the results for the model components and the analyzed CPs

Arithmetic means of the results (in %) for CPs that perform management activities at all stages of open innovation processes when collaborating with		
(i) crowd members	(ii) clients	(iii) crowd members and clients, and also between them
61.76	70.13	56.40

Source: Author's own study.

The above results show that managers are most involved in cooperation with clients (on 70.13% of the analyzed CPs), then with crowd members (on 61.76%), then with crowd members and clients, and also between them (on 56.49%). These results confirm that managers of the analyzed CPs cooperate most intensively with clients during the implementation of crowdsourcing open innovation processes, as well as a positive answer to the first research question (RQ1).

Additionally, these results prove that management activities in the area of crowdsourcing open innovation processes and cooperation with their contributors analyzed in the model are conducted by more than 56% of the examined CPs, therefore, the answer to the fifth research question (RQ5) is also positive.

The majority (i.e. more than 50%) of the examined CPs perform all management activities when cooperating with crowdsourcing contributors in all phases (and also at all stages of these phases) of open innovation processes (as in columns 5 of Table 8, respectively). The average results determined in Table 8 show that the collaboration of managers with crowd members, clients and between them is conducted by:

- 72.57% of CPs in the first phase;
- 61.22% – in the second phase;
- 54.28% – in the third phase of crowdsourcing open innovation processes.

The presented results prove that the first phase (A) –"Presenting open innovation development rules and consumer expectations in crowdsourcing" – of crowdsourcing open innovation processes is most important for cooperation with all contributors on the examined CPs.

Table 8. Research results for managing contributors in phases of open innovation processes on CPs

Arithmetic means (in %) of the results for all analyzed CPs that performed all management activities during cooperation with relevant contributors in the phases of open innovation processes				
Phases of crowdsourcing open innovation processes	Collaboration with the following contributors			Average for all contributors of the analyzed CPs
	(i) crowd members	(ii) clients	(iii) crowd members and clients, and also between them	
1	2	3	4	5
A. Presenting open innovation development rules and consumer expectations in crowdsourcing	60.14	81.76	76.09	72.57
B. Creating and evaluating design concepts, choosing the best innovative solution(s)	60.87	68.52	51.81	61.22
C. Developing final projects of the best open innovations, their commercialization	63.92	57.61	36.55	54.28

Source: Author's own study.

Therefore, this study results confirm a positive answer to the second research question (RQ2).

More than 75%, i.e. 81.76% of the analyzed CPs, cooperate with clients and 76.09% of CPs cooperate with crowd members, clients and between them in the first phase of crowdsourcing open innovation processes. Additionally, the results presented in Table 8 show that CP managers collaborate intensively with crowd members in all phases of crowdsourcing open innovation processes (this collaboration is conducted by managers in more than 60% of the examined CPs in every phase of the analyzed processes). These results confirm positive answer to the third research question (RQ3). In the case of cooperation with crowd members, most of the CPs (i.e. 63.92% of them) participate in the development of the third phase ("Developing final projects of the best open innovations, their commercialization") of the analyzed processes.

Average results presented in column 5 of Table 8 confirm that the intensity of managing collaboration with all analyzed CP contributors, i.e. crowd members, clients, and also between them, decreases in the subsequent (A, B, C) phases of crowdsourcing open innovation processes. These results (respectively 72.57%, for the first phase, 61.22% for the second phase and 54.28% for the third phase) constitute the basis for formulating the positive answer to the fourth research question (RQ4).

Managers of more than 50% of the examined CPs collaborate with clients at all stages of crowdsourcing open innovation processes (see Table 9), more than 60% of CPs at the first five stages of these processes and more than 70% at the first, second and fourth stages of the processes. These results show that managers from most (i.e. 86.22%) of the analyzed CPs cooperate with clients at the first stage, 77.80% at the second stage, and 72.47% at the fourth stage. Cooperation of CP managers with clients in these (first, second, fourth) stages have the greatest impact on the quality improvement of ordered innovative solutions.

Table 9. Research results for managing contributors at the stages of open innovation processes on CPs

Stages of crowdsourcing open innovation processes	Average % of the analyzed CPs that perform all management activities at the appropriate stages of open innovation processes during collaboration with the following contributors			
	(i) crowd members	(ii) clients	(iii) crowd members, clients, and also between them	all analyzed contributors
1	2	3	4	5
1) Defining conditions and opportunities of open innovation development	56.52	86.22	76.82	73.18
2) Enabling cooperation with contributors and presentation of consumers' expectations	63.77	77.80	75.36	72.47

3) Generating and submitting design ideas	81.16	69.57	42.75	64.48
4) Evaluating design ideas and choosing the best innovative solution(s)	40.58	72.47	60.87	57.97
5) Preparing the final project of winning innovative solution (also new product, service)	59.42	64.49	47.82	57.24
6) Implementation, improvement, promotion and/or sale of the best open innovations	68.43	50.73	34.78	51.31

Source: Author's own study.

Managers of most (81.16%) of the analyzed CPs collaborate with crowd members as solvers, creators at the third stage, 68.43% – at the sixth stage, and 63.77% – at the second stage of crowdsourcing open innovation processes.

Cooperation with crowd members and clients, as well as between them is conducted in more than 75% of the examined CPs in the first and second stages of open innovation processes and additionally in more than 60% of CPs at the fourth stage.

Managers cooperate with crowd members, clients and between them in more than 50% of the explored CPs at all stages and in more than 70% at stages one and two of the analyzed processes. The results presented here confirm that managers of the examined CPs focus on enabling crowd members to develop open innovations of expected quality in line with orders and requirements of clients.

Arithmetic means (calculated on the basis of the data specified in % in Table 6) presented in column 5 of Table 9 confirm that more than 51% of the analyzed CPs perform management activities at all stages of crowdsourcing open innovation processes during collaboration with all analyzed contributors. These means show that more than 70% of the examined CPs are involved in managing collaboration with contributors at the first and second stages, more than 60% of CPs – at the third stage and more than 51% – at the fourth, fifth, and sixth stages of crowdsourcing open innovation processes.

The management activities are presented respectively for the phases (in column 1 of Table 6) and stages (in column 2 of Table 6) of the analyzed crowdsourcing open innovation processes. The research results presented in this table prove that 30.56% (11 out of all 36) of management activities determined in Table 6 are implemented by more than 75% of the analyzed CPs. Additionally, most, i.e. 72.22% (26 out of all 36) of the analyzed management activities are performed by 50% of the examined CPs. The research results shown in Table 6, and their synthetic analysis presented in Tables 7, 8 and 9 confirm that the proposed model of managing crowdsourcing open innovation processes and contributors can be used in business practice. This is the next confirmation that the answer to the fifth research question (RQ5) is positive. Therefore, the answers to all (five) research questions are positive.

The analysis of the research results may be the basis for formulating the opinion that the proposed model of managing crowdsourcing open innovation processes and cooperation with their contributors fits into the activities of existing CPs on the Internet. Therefore, the research purpose has been achieved.

The following research topics falling within the research areas of management and open innovations in crowdsourcing are presented in scientific publications prepared by the relevant authors:

- crowdsourcing management and its models (Blohm et al., 2018; Kohler & Nickel, 2017; Saxton et al., 2013; Thuan et al., 2018; Ulbrich et al., 2021b);
- open innovations in crowdsourcing (Bernier et al., 2023; Bogers et al., 2018; Cricelli et al., 2022; Gruner & Power, 2017; Karlsson, 2019; Vignieri, 2021; Wilson et al., 2018).

The model proposed in this chapter represents a multidimensional, original process approach to solving the defined research problem: managing crowdsourcing open innovation processes and their contributors. It connects new solutions located in all research areas defined above but proposes new process approach to open innovation management in crowdsourcing and includes solutions based on collaboration of CP managers with its main contributors, i.e. crowd members, clients and between them. Hence, the presented model differs from those presented in publications listed above. Therefore, the following conclusion:

- the proposed multidimensional model of managing open innovation processes and their contributors on CPs can be used in business practice and this confirms that the research problem defined in Chapter 3 has been solved;
- the proposed model provides the solution to the defined research problem.

The multidimensional process-based model for managing crowdsourcing open innovation processes and their contributors presents the following interconnected new solutions:

- definition of the management activities performed:
  - during mutual collaboration with (i) crowd members, (ii) clients, as well as (iii) between them;
  - in subsequent three phases combining six stages of crowdsourcing open innovation processes (according to the proposed concept of these processes);
- to create values of CPs and their innovative offers on the online market.

The model also identifies the possibilities of building values of crowd members and clients as the basic resources of CPs. The presented model can be used while:

- improving management activities on CPs;
- developing open innovation processes and cooperation with their contributors;
- creating higher values for clients by crowd members as crowdsourcing workers;
- shaping competitiveness of innovative activity and offer of CP on the online market.

All components of the proposed model and dependencies determined among them present the opportunities of conducting innovative activities by CPs on the online market.

The final conclusion of the conducted research and analysis of its results is the following – the proposed model for managing crowdsourcing open innovation processes and cooperation with their contributors fits into the activities of existing CPs on the online market. Therefore, the research problem formulated in the chapter has been solved. The model presents the opportunities to create and increase the values of CPs, crowdsourcing open innovations, their contributors and can be used in business practice of the platforms.

CHAPTER 4

Motivating Crowd Members to Develop Open Innovations on CPs

4.1. Characteristics of crowdsourcing workers

Crowdsourcing is an amalgam of "crowd" and "outsourcing" and is based on work that crowd members undertake on the firms' behalf through their active participation in performing tasks that CPs "outsource" to crowdsourcing workers (Ford et al., 2015; Yuksel et al., 2019). Crowdsourcing activities focus on the use of online platforms applied to engage crowd members in solving innovative problems that companies also face and creating new values, solutions for their current and future development (Bernier et al., 2023; Daradkeh & Atalla, 2022).

Open innovations suggest using external knowledge and work resources. Companies facing growing market competition and internal resource shortages are seeking crowdsourcing possibilities also in the form of contests conducted on CPs to use prosumers' creativity, knowledge, skills and experience during competitive generating open innovations on CPs (Chesbrough, 2012b; Yin et al., 2022). An important difference between company employees and crowdsourcing workers is that in-role behaviors are mandatory tasks for employees, but crowd members are voluntary workers (Baruch et al., 2016; Darmody et al., 2017).

The current way to involve and use external resources is to open CPs to crowd members, who can provide as crowdsourcing innovators new solutions for organizations as well as companies or people. The crowd can be a source of knowledge, experience, innovative competencies from all over the world and is involved in solving innovative problems, designing ideas, and generating new products and services (Allen et al., 2018; Bakici, 2020; Dolińska, 2020).

Crowdsourcing workers participate in online work in accordance with their own expectations, capabilities, interests, as well as the desire to actively complete one, several or many tasks that can be assigned to them by managers during the implementation of open innovation processes. These tasks may concern the acquisition of new market trends, values, expectations, preferences of consumers, using and/or sharing knowledge, abilities while developing design ideas, innovative solutions, new products, services, and sometimes participating in their commercialization in the online and/or traditional market.

Crowd members as prosumers deliver information about their preferences with respect to the customization or personalization of goods; this information is the basis

for designing and production of the final good. Additionally, from a customer's perspective, engagement in participatory and cooperative activities can influence their satisfaction with the developed product and the work performed (Gruner & Power, 2017; Mladenow et al., 2014; Shaqrah & Noor, 2017).

Transforming engaged crowd members into solvers, creators, co-producers, co-sellers on CPs gives CPs and their clients what current or potential consumers expect and what is important to them in a crowdsourcing offer. Collaboration with crowd members enables CPs to prepare valuable offers in accordance with their proposed new values, concepts, innovative solutions, and then to engage the best creators in the promotion and/or sale of new products. This change in the role of consumer engagement in crowdsourcing open innovation development influences the evolution from a company-centric to a prosumer-centric open innovation process, which is possible on CPs. Therefore, effective motivation tailored to the relevant crowdsourcing prosumers influences the results of their work and the platform's activities.

Prosumption referes to the blurring of production and consumption. An example of prosumption in business practice is crowdsourcing where prosumers perform online work and create value for themselves, for others and for the market (Ritzer & Jurgenson, 2010; Yuksel et al., 2019).

The success of any crowdsourcing initiative largely depends on the ability to motivate a crowd to develop innovative solutions. This is especially important for competition-based crowdsourcing when solving innovative problems (Ford et al., 2015; Karachiwalla & Pinkow, 2021). In crowdsourcing, the motivation of crowdsourcing workers is the key factor in participating in open innovation development, because the success or failure in generating innovations lies in the manager's ability to motivate them to such participation within the CPs. Only if crowd members as workers are motivated to contribute promising ideas and relevant know-how, are they able to add new value to open innovation (Battistella & Nonino, 2013; Flostrand et al., 2019; Füller et al., 2012). Being motivated means being compelled or encouraged to act and work (Battistella & Nonino, 2012, p. 559).

Time management, communication, negotiation and technical skills are important for digital workers to collaborate with online platforms (Bazaluk et al., 2024, p. 657), also work on CPs. Digitalization of work has created a new form of employment involving crowdsourcing workers. CP managers define the principles, opportunities and ways to do this work, while motivating crowd members to effectively generate open innovations for seekers, taking into consideration their satisfaction and benefits as results of mutual collaboration.

About 4.8 million crowd members were active on CPs at the end of 2013, and approximately 19 million crowdsourcing workers were actively engaged with CPs at the end of 2020 (Bazaluk et al., 2024; Kässi et al., 2021). Therefore, the growth in the number of crowdsourcing workers was significant in recent years. Crowdsourcing workers can be involved in predicting the evolution of markets, applying new

technologies, especially IT, presenting customer preferences, new design ideas, as well as solving R&D challenges, creating innovative solutions, new products/services and taking part in their assessment, testing, implementation in the practice and/or commercialization. Motivating crowd members to actively participate and cooperate during the implmentation of open innovation processes has influence on the results and quality of their work performed on CPs.

Involving customers as crowd members in product design and development and their involvement in product testing can lead to more successful CP market offerings and improve innovative offer quality (Gruner & Power, 2017; Nishikawa et al., 2017).

Global Internet search aims at identifying the optimum (i.e. finding the best available solution by identifying the best possible source in the world) and refers to online space in crowdsourcing (Bauer & Gegenhuber, 2015, p. 669). When applying appropriate types and elements of motivation on CPs, it is necessary to take into consideration their adaptation to open competition on the online market, conditions and constraints of encouraging crowd members to individual or group, voluntary work. Crowd members' motivation should also encourage them to communicate and cooperate with collaborators, and additionally offer them expected benefits associated with performing work that should also be satisfying or even pleasant for them.

In crowdsourcing contests, external incentives of CP clients, such as monetary prizes are only offered to their winners. CPs do not offer formal agreements governing the terms of crowd members' voluntary work and participation in contests. In such a competitive work, crowd members engagement, and expected benefits resulting from it depend on providing them with the expected motivation (Jian et al., 2019; Liang et al., 2018; Wu et al., 2022). It is crucial to assess the level of complexity of tasks and efforts required to solve innovative challenges. These tasks characteristics strongly influence the motivation of the crowd to participate in solving innovative challenges. Collaboration of CP managers with crowd members, and the transparency of their motivation help in the long-term sustainability of CPs (Ghezzi et al., 2018; Liu & Xiao, 2022; Ta et al., 2021; Zhao & Zhu, 2014b; Zhu et al., 2017).

4.2. Motivating crowd members and literature review on this subject

According to Bazaluk et al. (2024), Liu and Xiao (2022), or Wu and Gong (2021), participation of crowd workers in CP operations will increase when both extrinsic as well as intrinsic motivations are ensured. The market and business success of CPs is connected with the ability of their managers to motivate crowd members to work actively, creatively and collaboratively as well as to compete during the development of open innovations.

The distinction between different types of motivation is based on the analysis of attitudes, intentions, activities and goals that cause people to act, work, be creative and behave in a certain way. Crowd members are motivated to offer design ideas, relevant

know-how and CP managers propose them the opportunities to develop their own abilities and generate valuable innovative solutions (Dolińska, 2017a, 2024; Flostrand et al., 2019; Jian et al., 2019).

The framework of motivations can be divided into intrinsic motivations, such as enjoyment, entertainment, altruism, and doing valuable work as well as extrinsic motivations, i.e. economic ones that include financial rewards, and individual motivations, such as career benefits, personal learning, higher reputation among professionals, and/or social motivations, that are connected with mutual knowledge-sharing, learning, developing with others and collective participation in building social capital (Battistella & Nonino, 2012; Chan et al., 2021; Liang et al., 2018).

CP managers offer crowdsourcing workers various types of extrinsic and intrinsic motivations. Extrinsic motivations include economic (financial benefits) and non-financial motivations, which may include: individual motivations (as professional benefits, opportunity to express one's own activity, creativity, presenting achievements as winning solvers, satisfaction, expressing individual enjoyment, and even treating task performance as fun) as well as social motivations (collective knowledge development and application, mutual learning). Intrinsic motivations do not concern financial benefits and may combine: individual motivations (i.e. personal learning, self-creation of new concepts, innovative solutions) and social motivations, which refer to sense and collective benefits of mutual cooperation of online community members (i.e. building social capital during preparing team projects, creating benefits for the economy and society) (Acar, 2018, 2019; Battistella & Nonino, 2012; Dolińska, 2020, 2024; Mladenow et al., 2014; Moghaddam et al., 2023; Yan & Hollingshead, 2022).

Given the growing importance of innovation, crowdsourcing and consumer engagement, many companies are very interested in finding ways to encourage crowd members to generate new product ideas. Managers often use monetary rewards as one of the beneficial management tools to stimulate desired behaviors of crowdsourcing workers. They are offered financial rewards, however, among crowdsourcing participants, only one or a few winning solvers can be rewarded in this way (Acar, 2018; Battistella &Nonino, 2013; Bakici, 2020; Xicheng et al., 2022).

Intrinsic motivations of workers influence their ability to use own creativity, feel attached to the group, understand the sense of membership, take part in fun and entertainment, have group identity, exchange information, benefit from cooperation, and learn independently and collectively. Developing design ideas, new products in accordance with client wishes and own concepts, and possibilities of their improvement may be important from the crowdsourcing worker's point of view. The presented intrinsic motivations are connected with feelings that result from being involved in solving problems that are interesting for solvers on CP. Other intrinsic motivations are connected with the crowd desire to exchange knowledge, experience with other collaborators as well as to learn and improve personal skills, competencies during performing relevant tasks. Extrinsic motivations are provided in crowdsourcing in

the form of financial rewards as well as the desire to be appreciated by other people, which is connected with the growth of professional status, participation in building social capital and engaging in self-marketing actions. Non-monetary extrinsic motivations may result in the improvement of professional advantages or future material benefits in the form of better job or higher salaries (Acar, 2018, 2019; Bakici, 2020; Feng et al., 2018; Iskender & Polzehl, 2021; Moghaddam et al., 2023).

On the one hand, there are crowdsourcing projects in which crowd members act rationally and contribute only if they are adequately rewarded. Then the creators may receive financial rewards and/or have access to information and knowledge valuable for them. On the other hand, volunteers taking part in the preparation of an innovative project can be motivated by the desire to experience something interesting, cooperate with crowdsourcing partners, share knowledge or achieve aims that are important to them. Sometimes they want to perform sensible, beneficial work for themselves and/or the society, or are interested in preparing team projects with collaborators (Blohm et al., 2018; Jian et al., 2019; Mladenow et al., 2014; Pee et al., 2018).

Applying effective types of motivation to influence both participation of crowd members and the quality of their work becomes a critical challenge for CPs (Chan et al., 2021; Chen et al., 2021; Flostrand et al., 2019; Ta et al., 2021). Motivations and incentives for crowdsourcing workers should be considered and used very carefully, clearly presented on CP websites as the results of managers' consultations with clients and aligned with crowd members' possibilities, competencies, skills and even interests in solving the appropriate innovative challenges on CPs. The voluntary workers' motivation on CPs influences the results of their work, which are expected by CP clients and are connected with achieving the aims of workers' engagement and job satisfaction. Hence, managers attach great importance to motivating crowd members.

Self-determination theory (SDT) has often been used as the main theoretical framework in research exploring crowd members' motivations. Principles of this theory of human motivation are related to the connections between different types of motivation, the impact of social environments on motivation and how it influences workers' behaviors at work (Flostrand et al., 2019; Ryan, 1995; Ryan & Deci, 2000).

The concept of SDT is based on the assumption that motivational system exists on a self-determination continuum of extrinsic vs. intrinsic motivations. Intrinsic motivation is fully self-determined and involves individuals undertaking an activity and taking into account their own needs, expectations, benefits, interests, or enjoyment, fun. Intrinsically motivated people think that their effort and work are voluntary. At the opposite end of the self-determination continuum are behaviors regulated externally, in accordance with the extrinsic motivations. These include actions taken to obtain something positive, beneficial (such as a reward) or avoid something negative (such as punishment) (Acar, 2019; Acar & van den Ende, 2016; Battistella & Nonino, 2012; Ryan & Deci, 2000). SDT and the crowdsourcing literature suggest that crowd members who are highly motivated by inner needs and preferences tend to have

a greater desire to achieve self-fulfillment by engaging in solving innovative challenges (Feng et al., 2018; Liang et al., 2018).

Researchers also take into account various forms of internalized motivations, which are characterized as occurring between intrinsic and extrinsic motivations, and can also be used on CPs (Acar, 2019; Ta et al., 2021). Internalized motivations of workers involve greater autonomy in their activities than extrinsic motivations and less autonomy than intrinsic motivations. Then, the effort is driven not by inherent interest of workers, but by the belief that it will help them to achieve another aim which is particularly valuable for them and at the same time involves effort that may be less voluntary (Acar, 2019; Ryan & Deci, 2000). Internalized motivators force individuals to act because they understand the benefits of their own actions. The more workers internalize the reasons for an action and assimilate them to themselves, the more motivated their actions become (Roth et al., 2015; Ryan & Deci, 2000).

Intrinsic motivations concern tasks that are intrinsically playful. These motivations include possibilities of expressing individual creativity, self-development, achievements, possibilities of better organization of one's own work, growing its effects, gaining satisfaction from work, acquiring new abilities, possibilities of solving innovative challenges, belonging to the project team, collective cooperation with users of CPs, participation in fun and entertainment, conducting online self-marketing as well as improving efficacy of communication and cooperation with crowdsourcing collaborators (Acar, 2019; Battistella & Nonino, 2012; Dolińska, 2020, 2024).

Although intrinsic motivators such as individual interests, passions or individual achievements cannot be directly controlled, CPs should try to incorporate solutions into their own activities that promote learning and the development of innovative abilities into incentive mechanisms, for instance, the possibility to communicate and receive answers from experts or opportunities to cooperate to further solve innovative problems (Geiger & Schader, 2014; Karachiwalla & Pinkow, 2021). Individuals may be motivated to develop solutions based on intrinsic motives such as altruism as well as being creative or demonstrating their skills during working projects that interest them (Afuah & Tucci, 2012; Schäper et al., 2021).

The following internalized motivations can be identified for use on CPs: clear and interesting presentation of CP offer, services, as well as its market and/or technological achievements, self-promotion of solving solutions, participation of crowd members in reasonable and creative work, exchanging valuable information and knowledge with collaborators, individual and mutual learning, taking part in creating social capital, altruism in one's own actions, doing something beneficial for people/society. These motivations also include participating in the organization of one's own work, building a reputation in a professional environment, meeting new friends with similar interests, growing work efficacy, and innovative development of skills.

Crowd members who offer own solutions also bear the costs of time and effort required to solve innovative problems. An appropriate presentation of the task to be

performed by crowdsourcing workers provides information and data for solvers that enable them to solve problems, create solutions and convey potential motivators. This constitutes the interdependences required for knowledge and social exchange processes on CPs. The solutions elaborated by the crowd depend on CP managers providing a sufficiently detailed description of tasks, solution requirements and the knowledge and skills of the crowd needed to propely do the task and to develop the expected solutions. Hence, managers must take into consideration not only various extrinsic motivators, such as financial rewards, but also determine which potential intrinsic and internalized motivators may influence crowd work results (Acar, 2019; Dolińska, 2020, 2024; Karachiwalla & Pinkow, 2021; Wu et al., 2022).

Authors of scientific publications highlighted the importance of monetary rewards as extrinsic motivations of CP solvers (Acar, 2018; Bakici, 2020; Liang et al., 2018; Yan & Hollingshead, 2022; Zhao & Zhu, 2014b). Pee et al. (2018) identified the four primary motivators of crowd members used on CPs, i.e. payment, job-market signaling, competence development and fostering social affiliation. The role of relevant information presentation in motivating crowd members in crowdsourcing contests was analyzed by Yin et al. (2022). Baruch et al. (2016) examined the influence of motivations, enablers and barriers on the voluntary participation of crowdsourcing workers in CP activities and presented the final result that altruism was a key motivator for them.

Ye and Kankanhalli (2017) proposed a model to explain the impacts of trust, benefit and cost on the participation and behavior of solvers in crowdsourcing. Bakici (2020) explored social factors and motives that either increase or decrease people's intention to be active and work on CPs. He analyzed a combination of motivational and socio-cognitive perspectives and their mutual relationships within two different types of CPs: third-party-hosted community and brand-hosted community. Liang et al. (2018) presented a mediated moderation model to explain how extrinsic incentives and intrinsic motivation affect participation of solvers in CP contests. Feng et al. (2018) studied gamification artifacts, i.e. reward and feedback, and also four intrinsic motivations (i.e. self-presentation and efficacy, social bonds also playfulness) in the context of crowdsourcing application.

Moghaddam et al. (2023) as well as Yan and Hollingshead (2022) examined how extrinsic motivations affect solving innovative challenges on CPs. The analyzed studies also presented how extrinsic and intrinsic motivations impact on the task execution by CP solvers (Chan et al., 2021; Zhao & Zhu, 2014b; Zheng et al., 2011) as well as the development of crowdsourcing innovations (Battistella & Nonino, 2012). The paper by Acar (2019) shows that intrinsic and extrinsic types of crowd members' motivations were related in different ways to the accuracy of solutions generated on InnoCentive CP. Additionally, the same author analyzed three motivational factors of internalized motivations used in crowdsourcing.

Based on the analysis of the above publications on motivating crowd members, the following research gap was identified:

- How to motivate crowdsourcing workers to develop open innovations using intrinsic, internalized and extrinsic types of motivations?

This research gap is also the research problem to be solved in this chapter.

4.3. The model for motivating crowdsourcing workers to develop open innovations

To solve the defined research problem, the model for motivating crowdsourcing workers to develop open innovations is proposed. The basis for the development of this model is the use of:

- the presented concept of three-phases open innovation processes (Figure 2 and column 1 of Table 6) in this monograph;
- assumptions of the SDT framework, which are adapted and developed for motivating crowdsourcing workers on CPs.

According to the concept of SDT,

- the intrinsic, internalized and extrinsic types of crowd members' motivations are extended for crowdsourcing workers,
- i.e. appropriate motivational factors are defined for each type of motivations and they are specified for the relevant three phases of crowdsourcing open innovation processes.

The model components and the relationships between them are characterized in Table 10.

Table 10. Components of the model for motivating crowdsourcing workers to develop open innovations

Components of the model	Characteristics of the relevant components
Collaborators of crowdsourcing workers in open innovation processes:	• other individual crowd members, also as partners of team(s) or networks • clients of open innovations • managers of crowdsourcing platforms
Types of crowd members' motivations (according to the SDT framework)	1) intrinsic 2) internalized 3) extrinsic
The analyzed three phases of crowdsourcing open innovation process	• determined (as A, B, C) in Figure 2 and in column 1 of Table 6 and column 1 of Table 11
Motivation elements	• determined for each type of motivations • used in the appropriate phases (A, B, C) of crowdsourcing open innovation processes

Source: Author's own study.

The motivations of crowd members in the proposed model are presented in Table 11 for their types (in column 2), as well as significant motivational factors (in column 3), and in the subsequent (three) phases of crowdsourcing open innovation processes that are shown in column 1 of this table. The proposed model in Table 11 complements the model of managing crowdsourcing open innovation processes and their contributors that is presented in Chapter 3 of this monograph. In this situation, the relevant modification and adaptation of the model presented in Dolińska (2024) were carried out.

The model proposed here consists of:

- three phases of crowdsourcing open innovation processes;
- and three motivation types suitable for each of the phase;
- as well as twelve factors of motivation that are defined for every type of motivation and are suitable for crowdsourcing workers.

Hence, the entire model presents 36 motivational factors.

Table 11. Crowdsourcing workers' motivations and percentage of all analyzed CPs that use them to develop open innovations

Phases of crowdsourcing open innovation processes	Types of motivations	Motivational factors that can be used on CPs	Percentage of CPs that use the relevant motivational factors
1	2	3	4
A. Presenting open innovation development rules and consumer expectations in crowdsourcing	1. Intrinsic	enabling mutual communication, exchange of knowledge, experience with other collaborators of CPs	73.91
		possibilities of learning from other solvers in teams, networks and external partners of CPs	68.11
		learning how present one's own achievements, solutions as top solvers on CP websites	28.98
		opportunities to solve social innovative problems	89.85
	2. Internalized	possibilities of self marketing learning during conducting own blogs	56.52
		open access to information on events, achievements, success stories of CPs on their websites	84.06
		opportunities to ask questions	76.81
		attachment to crowdsourcing community, sense of membership, entrepreneurial mindset	86.96
	3. Extrinsic	defining the rules for performing tasks during development of open innovations on CPs	81.16
		proposing access to current press, newsletters, magazines	69.57
		clarification of rights and ownership of crowd members after the submission until the end of the contest	55.07
		offering access to e-books on developing innovations	34.78

Phases of crowdsourcing open innovation processes	Types of motivations	Motivational factors that can be used on CPs	Percentage of CPs that use the relevant motivational factors
B. Creating, evaluating design concepts, choosing the best innovative solution(s)	1. Intrinsic	opportunities to cooperate with managers, clients, other crowd members, and external partners of CPs	91.30
		presenting the results of the contest winners' work	55.07
		taking part with other crowd members in evaluating and voting to choose the best innovative solutions	71.01
		treating performance of tasks by crowd members as enjoyment, fun, entertainment	37.68
	2. Internalized	possibilities to use one's own knowledge, innovative competencies in the proposed design ideas	85.50
		organization of work time	78.26
		opportunity to express creativity, abilities during collaboration in teams, networks, with external partner	69.57
		taking part in building social bonds with co-workers and development of social capital on CPs	57.87
	3. Extrinsic	possibilities to participate in free trainings, workshops	26.09
		defining clear conditions for competing with other crowd members in contests	68.11
		offering intellectual property protection	33.33
		organizing cooperation of solvers (with diverse innovative abilities, professional knowledge level) in teams, networks	65.21
C. Developing final projects of the best open innovations, their commercialization	1. Intrinsic	opportunities to create personal profiles by solvers on CP websites	30.43
		learning creators/winners how to sale and/or promote the implemented open innovations	74.45
		being listed as a winner increases job satisfaction, professional status	66.67
		elaborating innovative solutions that are beneficial for people as examples of altruism	56.52
	2. Internalized	enhancing professional reputation – presenting one's own achievements by creators on CP websites and/or social media	62.31
		sensible, creative work during joint development of final innovative projects	85.51
		presenting one's own work results in CP publications, case studies on implemented innovations	82.60
		mutual interorganizational learning, sharing knowledge between collaborators	76.81
	3. Extrinsic (financial and non-financial)	financial rewards for winning innovative solutions	85.51
		offering creators participation in conferences, professional meetings, innovative events	21.73
		preparing reviews, testimonials for creators	43.48
		sharing professional knowledge, experience, skills during the joint preparation of final projects	75.36

Source: Author's own study.

This model takes into account the motivations that encourage crowd members to work individually and collectively to develop and improve open innovations, as well as possibilities of increasing the efficiency of CP operations, and crowdsourcing workers' work performed for the benefit of the economy and society.

4.4. Results of research on the possibilities of using the presented model

The research goal that allows solving the research problem defined above is formulated as follows:

- How do existing CPs use intrinsic, internalized and extrinsic types of motivations to motivate crowd members to develop open innovations?

To verify the possibilities of achieving this goal, the following research questions were specified (Figure 4):

- (RQ1) Does the proposed model of motivating crowd members fit into the development of open innovation processes on CPs?
- (RQ2) Are the motivational factors defined in the first phase of crowdsourcing open innovation processes used by most of the analyzed CPs?
- (RQ3) Are the internalized motivations the most important type of crowd members' motivations in crowdsourcing open innovation processes?

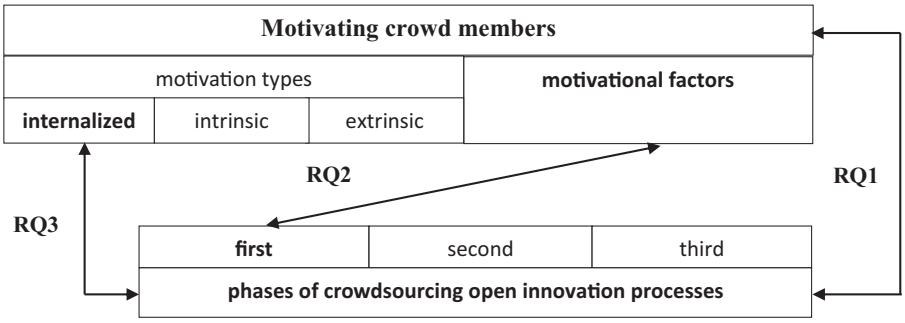

Figure 4. Research questions (RQ) connected with using the model for motivating crowdsourcing workers to develop open innovations

Source: Author's own study.

To solve the research problem defined above, the relevant study for 69 CPs was conducted in 2023, in accordance with the procedure described in Chapter 3. The results of the conducted research on motivational factors analyzed for the use by the examined CPs are presented in column 4 of Table 11. The analysis of these results was performed using descriptive statistics.

All motivational factors defined in the model are used by the examined CPs. The vast majority, i.e. 77.77% of all analyzed motivational factors, are applied by more than 50% of the examined CPs and 33.33% of these elements are used by more than 75% of the CPs. Tables 12, 13 and 14 show the synthetic final results determined for data presented in column 4 of Table 11. Calculations of arithmetic mean performed for all analyzed CPs that use all motivational factors defined in the model is 61.14%, while the median is higher and equals 68.84%. These research results confirm that the answer to the first research question (RQ1) is positive.

Table 12. Arithmetic mean and median specified for all analyzed CPs and motivational factors defined in the model

Calculations (in %) for motivational factors used by all analyzed CPs	
arithmetic mean	median
61.14	68.84

Source: Author's own study.

The research results determined in Table 13 for every type of motivation applied by all analyzed CPs respectively at all three phases of open innovation processes are higher than 55%, and are as follows:

- most of the platforms use internalized type of motivations, which is confirmed by the arithmetic mean of 75.23% and the median of 77.54%;
- fewer platforms use intrinsic type of motivations (arithmetic mean is 62% and the median 67.39%),
- the fewest examined CPs utilize extrinsic incentives (arithmetic mean is 55.20% and the median 60.14%).

The above results confirm that the answer to the third research (RQ3) question is positive.

Table 13. Arithmetic mean and median specified for motivation types used by all analyzed CPs

Motivation type	Percentage of all analyzed CPs that use the relevant motivation type calculated as	
	arithmetic mean	median
Intrinsic	62.00	67.39
Internalized	75.23	77.54
Extrinsic	55.20	60.14

Source: Author's own study.

Table 14 shows synthetic results of the research determined as arithmetic means of the analyzed crowdsourcing platforms used in the relevant phases of open innovation processes:

- all motivational factors defined in the proposed model (results are presented in column 2 of Table 14);

- and appropriate motivation types of crowdsourcing workers (results are shown in column 4 of Table 14).

Table 14. Calculations (in %) for CPs motivations used in phases of open innovation processes

Phases of crowdsourcing open innovation processes	Arithmetic means of all analyzed CPs that use all motivational factors	Motivation types of crowdsourcing workers	Arithmetic means of all analyzed CPs that use motivational factors of the relevant motivation type
1	2	3	4
A. Presenting open innovation development rules and consumer expectations in crowdsourcing	71.60	1. Intrinsic	65.21
		2. Internalized	76.09
		3. Extrinsic	60.15
B. Creating, evaluating design concepts, choosing the best innovative solution(s)	61.83	1. Intrinsic	63.77
		2. Internalized	72.80
		3. Extrinsic	48.94
C. Developing final projects of the best open innovations, their commercialization	63.45	1. Intrinsic	57.02
		2. Internalized	76.81
		3. Extrinsic (financial and non-financial)	56.52

Source: Author's own study.

The percentage of the examined CPs using the motivational factors defined in the model in the subsequent three phases of open innovation processes is as follows (according to the results presented in column 2 of Table 14):

- most (71.60%) of the CPs use them in the first phase of the processes,
- fewer (63.45%) CPs utilize motivational factors in the third phase,
- the fewest (61.83%) of CPs apply them in the second phase of the processes.

Therefore, most of the analyzed CPs use motivational factors defined in the model in the first phase of crowdsourcing open innovation processes. Hence, the answer to the second research question (RQ2) is positive. Motivating crowdsourcing workers in the first phase influences the effects of their work in the subsequent (i.e. the second and third) phases of crowdsourcing open innovation processes that are performed in accordance with client orders and expectations. Most of the analyzed platforms apply the internalized type of motivations in every phase of open innovation processes, i.e.:

- 76.09% of the analyzed CPs use internalized motivations in the first phase of the processes;
- 72.80% of CPs – in the second phase;
- 76.81% of CPs – in the third phase of the processes.

Fewer analyzed CPs apply the intrinsic type of motivations in every (i.e. 65.21% of CPs in the first phase, 63.77% of CPs – in the second phase and 57.02% of CPs – in the third one, respectively) phase of the processes. The fewest CPs use extrinsic motivations in every (i.e. 60.15% of CPs in the first, 48.94% of CPs – the second and

56.52% of CPs – the third) phase of crowdsourcing open innovation processes. The results presented in Table 14 confirm that the answer to the third research question (RQ3) is positive. Therefore, internalized motivators are recognized by managers of the majority of the analyzed CPs as the most important to encourage crowd members to perform tasks in open innovation processes and have the greatest impact on their work results expected by clients. Hence, the conclusion that the use of internalized motivations is beneficial for CPs as well as their crowdsourcing workers.

The above analysis of research results shows that the answers to the three research questions are positive. It also presents how all analyzed CPs performing activity on the Internet use intrinsic, internalized and extrinsic types of motivations to motivate crowd members to develop open innovations. Thus, the research goal defined in this chapter is achieved. The analyzed research results confirm that the proposed model determines opportunities on how to motivate crowdsourcing workers to develop open innovations using intrinsic, internalized and extrinsic types of motivations in business practice of CPs. Hence, the conclusion can be formulated – that the defined research problem has been solved.

CP managers offer crowd members the appropriate types of motivations and motivational factors that influence their engagement and creativity in crowdsourcing work as well as enable them to increase job satisfaction, professional development opportunities and even entertainment connected with simultaneous learning. The results of the conducted research show that CP managers understand the impact of motivating crowdsourcing workers in terms of achievements of the platform in the online market of open innovations. The motivational factors defined in the presented model are important in the analyzed platform's operations and development, therefore, the model can be used in business practice.

Most researchers have investigated the use of extrinsic and intrinsic motivation types (Acar, 2019; Battistella & Nonino, 2012; Chan et al., 2021; Liang et al., 2018; Moghaddam et al., 2023; Wu & Gong, 2021). Moreover, Acar (2019) additionally analyzed the application of a few internalized motivations on CPs. Feng et al. (2018) examined the use of intrinsic motivations. Fewer researchers were concentrated on analysing the use of extrinsic motivations as monetary rewards in crowdsourcing (Acar, 2018; Bakici, 2020; Yan & Hollingshead, 2022; Zhao & Zhu, 2014b). Some researchers focused on motivating crowd members when solving innovative problems on CPs (Acar, 2019; Battistella & Nonino, 2012, 2013; Moghaddam et al., 2023; Yan & Hollingshead, 2022), while others analyzed the motivation of crowd members to participate in contests which are currently an important organizational solution used during the development of open innovation development (Xicheng et al., 2022; Yin et al., 2022; Zhao & Zhu, 2014b). The presented authors conducted crowd members' surveys for several selected motivations.

The proposed model for motivating crowd members to develop open innovations on CPs presents for the analyzed types of motivation: intrinsic, internalized and

extrinsic, many (39) motivational factors defined in three phases of crowdsourcing open innovation processes and additionally takes into account CPs that conduct or do not conduct contests as part of their online activities.

The results of the performed research confirm that the proposed model is suited to the current working conditions of crowd members, their motivation, as well as CP activities on the online market. It presents how the analyzed CPs motivate crowdsourcing workers during the development of open innovations processes using intrinsic, internalized and extrinsic types of motivation, as well as motivational factors defined in the presented model.

The results of the conducted research also show that managers of the examined CPs understand the impact of motivating crowdsourcing workers on the mutual benefits of cooperation and the achievements of the platforms on the online market. Motivating crowd members enables CPs to connect orders and expectations of open innovation clients with the appropriate knowledge, creativity, experience and R&D skills of online crowdsourcing workers around the world.

Conclusions

The continuous development and practical application of innovative solutions as well as the growing possibilities of using new IT in the economy and society lead to online sourcing of open innovations through CPs. The possibilities and effects of creating and/or co-creating crowdsourcing open innovation depend on the management of collaboration with crowd members, clients, and other external partners of CPs in open innovation processes as well as motivating crowdsourcing workers to perform them.

Current principles, tools and mechanisms of CP operations on the online market have become the basis for developing the following two multidimensional models:

1) managing crowdsourcing open innovation processes and their contributors;
2) motivating crowdsourcing workers to develop open innovations.

These interrelated and complementary models, as well as their constituent components take into account synergistic effects of their possible application in business practice. The proposed solutions in these models are located in the research area of managing open innovations and their contributors in crowdsourcing. New solutions applied in the proposed models differ from those presented in the analyzed publications on management and open innovations in crowdsourcing.

Research results performed for 69 CPs existing on the Internet confirm that the two proposed models could be applied by the analyzed platforms. All management activities determined in the first model are performed by all analyzed CPs in all stages (also phases) of crowdsourcing open innovation processes and most, i.e. 72.22% of these activities, are executed by 50% of the explored CPs. The conducted research also confirms that all motivation components defined in the model are used by the examined CPs in the three analyzed phases of open innovation processes and most (71.05%) of them are offered by more than 50% of the platforms. The answers to the research questions formulated while verifying the possibilities of using both the first and second models proposed by the analyzed CPs in business practice are positive. The results of the conducted research show that the proposed models are adapted to the current conditions and principles of the analyzed CP activities, crowd members' work and expectations of their clients.

The goals of the development of the first model as well as the verification of how this model can be applied in business practice by the analyzed CPs have been achieved. Therefore, it can be concluded that the formulated research problem –

How to manage open innovation processes and their contributors on CPs? – has been solved.

The second model as well as the verification of possibilities of its use in business practice confirm that the next research problem – How to motivate crowdsourcing workers to develop open innovations? – has also been solved.

Hence, the final conclusion is as follows – the research problems defined in the studies conducted in Chapters 3 and 4 have been solved and the theoretical and utilitarian purposes formulated in the monograph have been achieved.

Literature reviews and the development of the proposed models, as well as the research on the verification of the possibilities of using these models in business practice are the basis for solving the research problems formulated in this monograph.

The presented models are focused on increasing the efficiency of managing crowdsourcing open innovation processes as well as cooperation with their contributors, i.e. clients, crowd members, and between them, as well as with other external CP collaborators.

Crowd members as voluntary workers and CP clients may participate in the development of crowdsourcing open innovation processes in accordance with the management activities defined for the appropriate phases and stages of these processes. Motivating crowdsourcing workers with the expected knowledge, experience, and creative skills to participate in the implementation of open innovation processes on CPs affects the results of their work performed according to clients' orders and requirements.

Solving research problems formulated in this monograph may have an impact on the results of CP activities and its development as well as on the creation of the competitiveness of the platform's innovative offer on the online market. The use of the proposed models in business practice may influence:

- improvement of performing management activities on CPs;
- developing crowdsourcing open innovation processes and cooperation with their contributors, i.e. crowd members, clients and other partners of CPs;
- creating higher values for CP clients by crowd members as crowdsourcing workers;
- increasing the value of CP and its innovative offer on the online market;
- shaping the competitiveness of CP activities on the online market;
- motivating crowdsourcing workers to perform tasks, actions more effectively during the implementation of open innovation processes on CPs.

Each crowdsourcing model should evolve over time to take into account current and future development trends, especially in the area of the latest IT and AI application as well as when operating online markets and providing the relevant services to users, especially contributors of open innovation processes. Moreover, the results of future surveys of CP managers and their analysis could be the basis for improving the management of crowdsourcing open innovations and their contributors as well

as more effective motivation of crowd members. Additionally, the future study could also concern the improvement of CP motivation system based on the survey results of crowdsourcing solvers.

Hence, the future research may focus on improving the quality of services offered to contributors of open innovation processes on CPs, increasing the efficiency of cooperation with them, using the latest IT by platforms, as well as taking into account the use of AI in managing crowdsourcing collaborators.

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Crowdsourcing enables application of knowledge, intelligence, skills of the online community (crowd) members as prosumers in open innovations as well as new products, services that are developed for clients (companies, non-profit organizations, individuals) on crowdsourcing platforms (CPs). Managing open innovations and the platform contributors, i.e. prosumers also clients, and other external partners is the basis of effective creating innovative solutions in crowdsourcing as well as influences their practical utilization and/or commercialization on the market. Hence, two multidimensional and interrelated models are presented in this monograph: (1) the model of managing open innovation processes and their contributors on CPs, (2) the model of motivating prosumers to crowdsourcing work. The conducted literature studies on the components of the proposed models as well as the analysis of the results of research carried out for 69 existing CPs, on the Internet in 2023, confirm that the elaborated models could be used in business activities of CPs developed on the online market.

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