

COMPARISON OF BASE-MODEL AND ROLE-BASED MODEL
IN VIRTUAL CO-CREATION ENVIRONMENTS:
INNOVATIONS IN HEALTHCARE INDUSTRY

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INNOVATIONS IN HEALTHCARE INDUSTRY

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DECLARATION OF ORIGINALITY

I, Elif Öztürk, certify that

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ABSTRACT

Comparison of Base-Model and Role-Based Model in Virtual Co-Creation Environments: Innovations in Healthcare Industry

Intense competition and technological advances lead companies to adopt open business models and cooperate with consumers to accelerate their innovation processes. Although this cooperation can lead to favorable results, some open innovation initiatives fail due to poor management of the co-creation process. This study aims to explore the inputs of a successful co-innovation platform and examine which instruments will yield valuable contributions and high motivation for all partners in the long run. A multi-method study was conducted including a web-based experiment with 406 participants generating and evaluating ideas in the context of healthcare innovations and a survey capturing perceived benefits, overall experience, and future intention to participate. The results demonstrate that domain knowledge is an indication of contribution quality and innovativeness is an indication of contribution quantity. Although task differentiation improves hedonic and cognitive benefits, overall experience, and future intention to participate, task limitations on idea generation have a negative impact on social and personal benefits. This study provides insights into the impact of customized task design on the performance of co-innovation platforms from company and consumer perspectives and provides a guide for managers to build better consumer empowerment strategies in open innovation projects.

ÖZET

Sanal Ortak Yaratım Ortamlarında

Temel Model ile Rol-Tabanlı Modelin Karşılaştırılması:

Sağlık Sektöründeki Yenilikler

Yoğun rekabet ve teknolojik gelişmeler, şirketleri açık iş modellerini benimsemeye ve inovasyon süreçlerini hızlandırmak için tüketicilerle işbirliği yapmaya yönlendirmektedir. Bu tür işbirliklerinden olumlu ve başarılı sonuçlar elde edilebilmekle birlikte, bazı açık inovasyon girişimleri ortak yaratım sürecinin kötü yönetilmesi nedeniyle başarısız olmaktadır. Bu çalışma, başarılı bir ortak inovasyon platformunun girdilerini keşfetmeyi ve uzun vadede hangi araçların tüm ortaklar için katma değer ve yüksek motivasyon sağlayacağını incelemeyi amaçlamaktadır. Sağlık alanındaki yenilikler hakkında fikir üreten ve değerlendiren 406 katılımcıyla web tabanlı bir deney, ve algılanan faydaları, genel deneyimi ve gelecekte katılım niyetini ölçen bir anket içeren çok yöntemli bir çalışma gerçekleştirilmiştir. Sonuçlar, kişilerin alan bilgisinin katkı kalitesine, yenilikçiliğin ise katkı miktarına etkisi olduğunu göstermektedir. Görev farklılaştırması hedonik ve bilişsel faydaları, genel deneyimi ve gelecekteki katılım niyetini geliştirirken, fikir üretme üzerindeki görev sınırlaması, sosyal ve kişisel faydalar üzerinde olumsuz etkiye sahiptir. Bu çalışma, özelleştirilmiş görev tasarımının ortak inovasyon platformlarının performansı üzerindeki etkisine hem şirket ve hem de tüketici bakış açısıyla içgörü sağlamaktadır ve açık inovasyon projelerinde tüketicileri daha iyi yetkilendirme stratejilerinin oluşturulması yönünde yöneticilere rehberlik sunmaktadır.

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to my mother, who has been trying to find healing for 20 years

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CHAPTER 1

INTRODUCTION

One fundamental characteristic of the digital age is the privileged status of consumers. They are more connected, informed, empowered, and willing to buy the experience instead of the product alone (Guzel, Sezen, & Alniacik, 2020). This change, together with intense competition and technological advances, forces companies to shift the locus of value creation from individual organizations to a networked world (Hurmelinna-Laukkanen, Möller, & Nätti, 2022). As a result, companies are trying to adopt open business models and create ecosystems that constantly improve their value propositions (Muzellec, Ronteau, & Lambkin, 2015). Existing value-creating systems converge into a platform ecosystem that enables the collaboration, coordination, and integration of a range of organizations, actors, activities, and interfaces that provide value to consumers (Hendricks and Matthyssens, 2022; Trabucchi and Buganza, 2022).

Innovation is directly connected to value co-creation, as it is the application of any new idea or method to generate value for the organization and its partners (Lee, Olson, & Trimi, 2012). The innovation paradigm has evolved from closed innovation to collaborative innovation, open innovation, and, more recently, co-innovation. This shift from customer-centric marketing to customer-driven marketing has directed companies to consider consumers as a source of external knowledge (Merrilees, 2016). The buyer role of the consumer is replaced by being a business partner of the company, who takes responsibility during the companies' innovation efforts (Zhang, Kandampully, & Bilgihan, 2015).

Companies aim to accelerate their innovation processes by building an interaction environment among various resources in the network (Vargo & Lusch, 2004). The Italian motorcycle manufacturer Ducati, the American pharmaceutical company Eli Lilly, and the technology company Microsoft are well-known business organizations that have engaged virtually with consumers, suppliers, distributors, and scientists in co-creation activities (Füller and Bilgram, 2017; Sawhney, Verona, & Prandelli, 2005). One such initiative, co-innovation platforms, helps expand the performance of new product development (NPD) processes by involving external volunteers as active participants of the system (Nobre and Ferreira, 2017). It is defined as a virtual customer environment that “allows customers and the firm to collaborate closely to create value that contributes specifically to product and service innovations” (Zhang et al., 2015, p.313).

1.1 Benefits of co-innovation platforms

Interacting with consumers through co-innovation platforms is an imminently growing trend (Hendricks & Matthyssens, 2022). This new approach provides more connections with consumers and a better understanding of their needs, desires, and expectations, which cannot be grasped with traditional marketing efforts. Consumers express their original opinions, connect with other members, and receive monetary rewards and appreciation for their contributions (Alavi, Ahuja, & Medury, 2012). Companies have therefore begun to launch initiatives to encourage consumers to express their ideas, creativity, and co-design (Lee, et al., 2018). This new business approach improves customer loyalty and willingness to pay and increases positive recommendations, brand awareness, and satisfaction (Füller, 2010; Grisseemann & Stokburger-Sauer, 2012;

Martinez, 2014; Schreier, Fuchs, & Dahl, 2012). Additionally, communication and mutual support between peers create social relationships and build a sense of community (Gebauer, Füller, & Pezzei, 2013).

Well-known organizations such as Dell (ideastorm.com) and Starbucks (ideas.starbucks.com) have launched virtual environments that allow consumers worldwide to suggest new product ideas and enhance current products (Fombelle, Bone, & Lemon, 2015). Further examples are the US fashion startup Threadless (threadless.com), which is based on a regular user contest where winning t-shirt designs are produced weekly; the toys company Lego (lugnet.com), which provides an environment for the development and exchange of LEGO brick building concepts; and the Japanese manufacturer Muji (muji.com), which develops products with ideas submitted by users (Nishikawa, Schreier, & Ogawa, 2013; Poetz & Schreier, 2012). Table 1 presents other examples of co-innovation platforms from different industries.

Table 1. Examples of Co-innovation Platforms

Company	Industry	Platform
BMW	Automobile	https://www.bmwgroup.com/en/innovation/open-innovation/crowd_innovation.html
Ford Motor Company	Automobile	https://www.ideaplace.ford.com/
Volkswagen	Automobile	https://www.openinnovation-volkswagengroup.com/
Procter & Gamble	Consumer Goods	https://www.pgconnectdevelop.com/
Unilever	Consumer Goods	https://www.unilever.com/brands/innovation/innovate-with-us/
Coca-Cola	Food and Beverage	https://www.coca-colacompany.com/contact-us/submit-an-idea
Kellogg's	Food and Beverage	https://www.kelloggsawayfromhome.com/en_US/CulinaryInnovation/MenuvationCenter.html
Nestle	Food and Beverage	https://nestleyouthentrepreneurship.com/
PepsiCo	Food and Beverage	https://pepsico.yet2.com/
Osram	Semiconductor	https://www.ledlightforyou.com/

1.2 Drawbacks of co-innovation platforms

Although companies aim to accelerate their innovation processes through co-innovation platforms, inaccurate management can lead to unfavorable results. Some projects fail because of low user engagement, low-quality ideas, or projects that undermine loyalty to the brand and corporate image. McDonald's Germany generated a campaign in 2011 with the theme "Mein Burger" and received 116,000 "concepts" for future burger recipes out of 2.5 million customers that visited McDonald's restaurants in that year (Kristal, Baumgarth, Behnke, & Henseler, 2016). Ninety percent of the customers remained passive, and nine percent were somewhat active in sharing or liking the

campaign and only one percent were active. Dell's Idea Storm community implemented only 550 of the 27,253 ideas generated as of November 2017 (Dell Idea Storm, 2017) because the submitted ideas lacked novelty and usefulness (Bayus, 2013). The grocery manufacturing and processing conglomerate Kraft Foods Australia, a well-known dishwashing detergent Pril and SPAR Bag Design Contest, experienced negative reactions from consumers during the competition (Gebauer et al., 2013). Open innovation initiatives such as ElectriCo from the electronics manufacturing industry and BP from the oil industry failed because they could not manage the interaction process properly (Von Briel & Recker, 2017; Vrgović & Jošanov-Vrgović, 2017).

1.3 User abilities and user behavior

Open innovation communities involve users that present different behaviors, such as competition, collaboration, or both, throughout the co-innovation process. These community members can be profiled as “passive users or observers” who are less involved in co-innovation activities, “active users” who are interested in demonstrating their skills and emphasizing their expertise, and “collaborators” who are focused on providing feedback to others whilst also presenting their know-how (Guo, Zheng, An, & Peng, 2017; Leclercq, Poncin, & Hammedi, 2017). Users compare their abilities with the demands of the community, and a mismatch can cause anxiety and passive behavior as they do not find the task achievable (Novak et al., 2000). Thus, a sufficient fit between the user and the community is required to enhance users' willingness to contribute to co-innovation activities (Shen, Li, Sun, & Zhou, 2018).

Customer-owned resources such as domain knowledge and innovativeness are important factors that have an impact on user contribution (Blohm, Bretschneider,

Leimeister, & Krcmar, 2011; Füller, Mühlbacher, Matzler, & Jawecki, 2009; Luo & Toubia, 2015; Schuhmacher & Kuester, 2012; Wang, Wang, & Tao, 2017). Therefore, researchers often focus on identifying specific user groups, named lead users, who are innovative and have domain experience (Lüthje, 2004).

Domain knowledge facilitates users' comprehension of a problem and provides a solution (Luo & Toubia, 2015). This competence motivates users to share information, help others, and provide feedback, ensuring that they contribute more than other members do. Innovativeness, or novel thinking, is an essential characteristic that companies look for (Oliveira & Von Hippel, 2011). These individuals are receptive to new ideas, and self-confidence, autonomy, and toleration of ambiguity are important personal characteristics of them (Dabholkar & Bagozzi, 2002; Hutter, Füller, Hautz, Bilgram, & Matzler, 2015).

1.4 Research questions and objectives

Extensive research has explored user's motivations to participate in open innovation communities, their collaboration manners with peers, and the market potential of their output (Schemmann, Herrmann, Chappin, & Heimeriks, 2016). Companies open their innovation activities to more consumers to obtain the benefits of both the scale and diversity of their collaborators (Bayus, 2013). User communities consisting of people who differ in terms of background, interests, and skills will come up with distinct perspectives (Kozinets, Hemetsberger, & Schau, 2008; Pee, 2016; Piller & Walcher, 2006; Schreier et al., 2012). However, diverse perspectives may create information overload and make the process difficult and ineffective, as companies have to search for suitable ideas among the huge volume (Lee, et al., 2018). On the other hand, this

diversity can provide beneficial results such as preventing fixation effects and may result in incremental innovations that meet the needs of a wide market segment (Jahanmir & Lages, 2015; Reypens, Lievens, & Blazevic, 2016).

Uniform environments may have been the main reason for undermining success, as these designs could not handle the dissonance between user abilities and needs with the demands of the community. Thus, academics have addressed the need to differentiate tasks and provide customized environments to initiate an effective collaborative process (Guo et al., 2017; Leclercq et al., 2017). However, there are limited studies that explore the impact of customized task designs, and the literature has focused on either user perspective to obtain insights about user abilities and their participation behavior or company perspective to determine the environmental characteristics that improve contribution performance.

In light of this vacancy, the objective of this research is to figure out and evaluate the inputs of a successful co-innovation platform and to examine which instruments will yield valuable contributions and high motivation for all partners in the long run. For this purpose, two different task designs were developed to determine which factors can improve community output from a company perspective in terms of contribution quantity and quality and from a consumer perspective in terms of overall experience, perceived benefits, and future intention to participate. Based on prior research, community members were categorized according to their domain knowledge and innovativeness levels, and the tasks were differentiated. The study aimed to answer the following research questions:

- Does customized task design based on user domain knowledge and innovativeness, and defining tasks accordingly improve the performance of co-innovation platforms in terms of contribution quantity and quality?
- Does overall experience improve with more specialized tasks?
- Which type of expected benefits enhance with a differentiated task structure?
- Does future intention to participate increase in a customized user environment?

1.5 Scientific contribution of the study

This study makes several contributions to research and practice. It presents valuable insights by demonstrating the impact of customized task design on the contribution performance in the context of users. Second, this study provides a guide on how to categorize users and define their roles accordingly to improve the effectiveness of co-innovation platforms from both company and consumer perspectives. Third, this study provides a guide to managers on how to build better consumer empowerment strategies to prevent failures in open innovation projects. Finally, this study reveals the impact of value-added interaction activities on task customization to obtain the greatest benefit from crowds.

1.6 Structure of the thesis

The thesis proceeds as follows. Chapter 2 presents relevant studies from the literature on the company, consumer, and performance perspectives of co-innovation platforms. Chapter 3 demonstrates the research model and hypotheses. In Chapter 4, the research design, study procedure, data collection and sampling, experimental design controls, and

measurement scale are described. Chapter 5 presents the research findings in terms of contribution performance, overall experience, perceived benefits, and future intention to participate in such co-innovation platforms. Chapter 6 discusses the results, including implications for theory and practice, limitations, and future research directions.

CHAPTER 2

LITERATURE REVIEW

Today's world is the business of enabling interactions between all partners and developing platform ecosystems (Hendricks & Matthyssens, 2022). These ecosystems encompass the “engagement, experience, and co-creation of value in a process where new ideas from various sources are applied differently to create value” (Fernandes & Remelhe, 2016, p.315). In order to get insights in this context, a comprehensive literature review was conducted using the topics “value co-creation”, “co-innovation”, “collaborative innovation”, “open innovation” during NPD processes in “online communities”. The relevant studies are presented in this chapter.

2.1 Company perspective of co-innovation

The marketing discipline has shifted from a goods-dominant logic perspective, with the exchange of goods, towards a more service-dominant logic (S-D Logic) perspective, with the exchange of skills, information, knowledge, and processes with consumers and partners (Vargo & Lusch, 2004). This transition from a company-centric view to a co-creation view converts the market into an interactive and collaborative process where dialogue takes place among the consumer, the company and user communities (Blasco-Arcas, Hernandez-Ortega, & Jimenez-Martinez, 2014). Ranjan and Read (2016) identify two core theoretical elements of value co-creation: co-production and value-in-use. Co-production refers to the participation of consumers in the product or service design process, which involves knowledge sharing, equity, and interaction. Value-in-use is the derived value through interaction with the company and its offerings or through a

process of consumption, which consists of experience, personalization, and relationships. Thus, companies treat consumers as co-producers who uniquely and phenomenologically determine value (Martinez, 2014).

Integrating the “voice of customer” through virtual environments may help companies reveal important consumer needs and find alternative and more successful solutions (Poetz & Schreier, 2012). As consumers have knowledge of current products in the market, collaboration with them can help companies discover novel ideas that are not yet available for those products (Pee, 2016). Companies must develop new products and services that accurately respond to customers’ needs and wants to overcome the high failure rates of newly launched products prevalent in the consumer goods sector (Füller, 2010; Huertas, Veludo-de-Oliveira, & Leite, 2013). A deep understanding of consumer latent needs is difficult to grasp with traditional market research techniques (Hoyer, Chandy, Dorotic, Krafft, & Singh, 2010). Firms must communicate with consumers about their preferences, requirements, and needs to improve the NPD process (Urban, 2005). New market offerings developed with a co-creation approach are more rewarding than those developed through classical methods (like focus groups or in-depth interviews) (Witell, Kristensson, Gustafsson, & Löfgren, 2011). Some companies prefer to completely outsource the frontend of NPD to their customers and continuously produce user designs (Schreier et al., 2012).

The transformation of customer value has pushed companies to invest in interactive websites with user-generated content that will enable them to integrate with their co-creation partners. As a result, these communities enable companies to increase their market-sensing ability, advance their organizational competencies, and manage their research and development processes effectively (Zwass, 2010).

Integrating consumers into value creation includes asking for their opinions, desires, and needs, and more importantly, asking to contribute their analytical and creativity skills (Füller, 2010). In the NPD phase, two different roles emerge. These include customer empowerment to generate ideas for new products and customer empowerment to determine new market offerings (Fuchs & Schreier, 2011). These two roles enable companies to collect new ideas from the crowd and make more concrete choices based on feedback from the wisdom of crowds (Mladenow, Bauer, & Strauss, 2014). Table 2 summarizes empirical studies that provide more insights from the company perspective.

Table 2. Previous Studies from Company Perspective

Study	Main Findings	Research Methodology	Subject
(Sawhney, Verona, & Prandelli, 2005)	Collaboration with consumers help companies to enhance their NPD processes.	Case Study	Motorcycle industry - Ducati Motors and pharmaceutical industry - Eli Lilly
(Fang, Palmatier, & Evans, 2008)	Consumer participation improves the effectiveness of the NPD process by providing information among stakeholders and increasing coordination between consumer and supplier.	Survey	Purchasing and procurement executives
(Zhang & Chen, 2008)	Co-creation activities enhance company performance in terms of better understanding consumers, developing value added services, generating new marketing opportunities.	Survey	Senior managers
(Sandmeier, Morrison, & Gassmann, 2010)	Customers' contribution into NPD process improves the response to market changes and the finding of new potential products. Continuous guidance of customers increases profitability and customer satisfaction. These advantages exceed the costs traditional NPD processes.	Case Study	Experienced software engineers
(Fuchs & Schreier, 2011)	Consumer empowerment during NPD provide increase in perceived consumer focus and intention to purchase, positive feeling about company and loyalty.	Multi-Method	Students and nonstudents
(Witell et al., 2011)	New products developed with co-creation techniques are more profitable than traditional techniques. Products generated by lead user ideas contribute more to profits.	Multi-Method	Development projects in European companies

(Grisseemann & Stokburger-Sauer, 2012)	Company support for value co-creation enhances both customer satisfaction, and company loyalty.	Multi-Method	Customers of a travel agency
(Brodie, Ilic, Juric, & Hollebeek, 2013)	Consequences of participating in co-creation activities are loyalty, satisfaction, trust and commitment. Need for information is the main reason for consumer engagement.	Netnography	Travel agency
(Blasco-Arcas et al., 2014)	Co-production and interactions between consumers promote co-creation experience, motivate participation, encourage purchase intentions.	Survey	Students
(Kennedy & Guzmán, 2016)	Motivations of companies to co-create with consumers are company objectives (to increase return on investment, to gain insight from customers, to increase company resource via including consumers, to improve services addition to products, to align with mission statement), and brand objectives (to increase brand value, brand experience, and brand awareness, to enhance consumer loyalty to the brand, to differentiate the brand from rivals).	Multi-Method	Brand managers and consumers
(Kristal et al., 2016)	Co-creation has a positive impact on non-integrated consumers, but this impact is weak.	Experimental Design	Students
(Pee, 2016)	Co-creation result with better products in terms of novelty. Cooperation with consumers in both idea generation and idea evaluation tasks are more beneficial than cooperation in only one task.	Secondary Data Analysis	Customers of e-commerce web site
(Wang, Hsiao, Yang, & Hajli, 2016)	Social influence has a positive impact on co-innovation activities which increased brand awareness.	Survey	Users of online communities discussing Software-as-a-Service

(Roberts & Darler, 2017)	Companies need to decide the level corporation with consumers and their role in the process, type of consumer to work with and type and length of engagement with consumers.	Case Study	Consumer goods companies
(Velamuri, Schneckenberg, Haller, & Moeslein, 2017)	Goals of open innovation are to support idea generation (engaging more participants and encouraging them to be active, enhancing idea quality) and to support idea evaluation (exploring community trends, balancing the preferences between users and experts).	Case Study	Informants responsible for the organization of innovation contests and open evaluation
(France, Grace, Merrilees, & Miller, 2018)	Brand interactivity and brand community enhance consumer participation in co-creation activities, which promote perceived brand value.	Survey	Customers of small and large business enterprises
(Pedeliento, Andreini, & Veloutsou, 2020)	Consumer-managed communities encourage integration, participation, and engagement more than company-managed communities. Company-run communities seem more appropriate for all brand activities that focus on increasing consumers' relationship or knowledge of the brand or product they own.	Survey	Customers of motorcycle manufacturer

2.2 Consumer perspective of co-innovation

A co-innovation platform is an interaction environment between companies and their consumers that provides an affective and cognitive experience (Nobre & Ferreira, 2017). According to self-determination theory, customer engagement in leisure activities, such as value co-creation, is a combination of intrinsic motivation (intrinsic playful task, curiosity-exploration-arousal seeking, flow), internalized extrinsic motivation (achievements-challenge-self efficacy, recognition-visibility, relationship-building and consciousness of kind, escapism), and extrinsic motivation (monetary and non-monetary rewards) (Füller, 2010; Hoyer et al., 2010; Ryan & Deci, 2000; Verleye, 2015).

Drawing on the rich body of motivation literature, consumers expect different benefits in exchange for co-creation activities. According to the Uses and Gratifications approach developed by Katz, Blumler, and Gurevitch (1973), consumers participate in these platforms to enjoy the process (hedonic benefits), acquire knowledge (cognitive benefits), interact with other participants (social benefits), gain a reputation (personal benefits), and earn rewards (economic benefits). One study with consumers who had at least one co-creation experience found that customers were engaged in these projects, mainly because of intrinsic motives. Motivators include intrinsic playful tasks, an opportunity to improve skills, an opportunity to communicate with similar people, and self-efficacy and acknowledgement (Füller, 2010). A study in Finland of 377 consumer innovators found that 58% of the participants engaged for extrinsic motivation (a combination of personal use and potential profit), 18% engaged for intrinsic motivation (intrinsic playful task), and 21% engaged for internalized extrinsic motivation (altruism and skill development) (Raasch & Von Hippel, 2013). In addition, a survey among Sina

Microblog users demonstrated that cognitive benefits and hedonic benefits were significant motivations for intention to participate (Chen, Du, Li, & Fan, 2017).

Companies should, therefore, focus on both intrinsic and extrinsic motivations, as consumers expect individual benefits from participation. Specifically, they should focus on learning and enjoyment, which are the main reasons for participation in the literature (Wang et al., 2016). Additionally, addressing only extrinsic motivations such as financial rewards can have detrimental effects when complex and creative tasks have to be performed (Witt, Scheiner, & Robra-Bissantz, 2011). In one study, during an idea contest for new online services of soccer clubs, intrinsic motivation was shown to have a positive impact on creativity, whereas extrinsic motivation had the opposite effect (Schuhmacher & Kuester, 2012). Thus, companies should consider that co-innovation platforms based solely on extrinsic motivation will not effectively benefit the community (Yen, Hsu, & Huang, 2011). In some studies, these tangible or intangible rewards have no impact on encouraging participation. Apart from expected benefits, appreciation from other community members and company feedback are important dimensions that motivate user participation (Hofstetter, Aryobsei, & Herrmann, 2018). Table 3 summarizes the empirical research on motivation factors, personal features, and other determinants of value co-creation that were studied from a consumer perspective.

Table 3. Previous Studies from Consumer Perspective

Study	Main Findings	Research Methodology	Subject
(Dholakia, Bagozzi, & Pearo, 2004)	Purposive value is the main motivation of community users. Interactivity and connectivity between the participants and feeling important are drivers of participation in small groups.	Survey	Consumers who had participated in a co-creation project
(Nambisan & Baron, 2007)	Learning and hedonic benefits have strong impact on user contribution. Interest in product category and identification with the consumer community are important moderators. Co-creation change consumer's affective levels and have an impact on their attitude towards the company.	Survey	Virtual community participants - Microsoft and IBM
(Roberts, Hughes, & Kertbo, 2014)	At independent level, engagement in innovation activities is individualistic in nature like to demand for a better product or to improve personal competencies and skills. At community level, engagement in innovation activities appear altruistic due to social exchange and intrinsic needs.	Survey	Participants in video games industry
(Verleye, 2015)	Consumer role readiness, tool support, and connection with other participants have an impact on co-creation. Enjoyment, learning, social, personal, pragmatic, and economic benefits differ according to consumers' expectations from co-creation activities.	Experimental Design	Students

(Fernandes & Remelhe, 2016)	Intrinsic motives and knowledge acquisition are important drivers while social motives have a small impact on user participation. Financial motives have no influence on user engagement. Motivations are distinct among frequently and occasionally engaged consumers.	Survey	Members of free software community
(Chen et al., 2017)	Knowledge sharing behavior improves consumer learning value, hedonic value, and social integrative value. Except social integrative value, hedonic value and consumer learning value have an impact on future participation.	Survey	Users of Sina Microblog community
(Laud & Karpen, 2017)	Connectivity with social partners and the degree of cultural sharing with other participants have an influence on co-creation. However, number of social connections have no impact on co-creation. Value co-creation behavior affect objective oriented, brand oriented and self-expression value outcomes.	Survey	Customers of an international weight management firm
(Zhao, Chen, Zhou, & Ci, 2018)	Customers' willingness to participate in value co-creation are influenced by self-efficacy, outcome expectation, community experience, community trust, brand recognition, brand loyalty and perceived value factor.	Survey	Consumers who had participated in a co-creation project
(Guzel et al., 2020)	Extraversion and openness to experience enhance consumers' willingness to participate in value co-creation activities. Also, product involvement influences this tendency.	Survey	Students
(Jiang, Liao, Chen, Hu, & Du, 2021)	Fulfillment of the three psychological needs which are autonomy (freedom and flexibility to perform work), relatedness (the sense of belonging) and competence (perceived self-efficacy) has a positive impact on users' knowledge-sharing behavior.	Survey	Virtual community participants - Huawei

(Chen, Jin, Xiang, & Lu, 2022)	Motivations of users to co-create are affected by environmental factors and personal need factors. Social climate, brand passion, and desire for control drive the value co-creation in the product design field and in the marketing field. Social climate, brand passion, satisfaction, and dissatisfaction drive the value co-creation in the CRM field. Innovation climate does not have strong impact as social climate.	Survey	Members of automobile communities
(Hsieh, Lee, & Tseng, 2022)	Social and functional factors determine perceived experiences in a community. Social factors (perceived responsiveness and demonstration of caring) create psychological empowerment. Functional factors (information and system quality) improve user satisfaction which facilitates psychological empowerment. Satisfaction and empowerment influence users' participation and word of mouth behaviors.	Survey	Virtual community participants - Starbucks, Sony, and Microsoft
(Kumar, 2022)	Psychological ownership (self-efficacy, sense of responsibility, sense of belonging, and self-identity) towards a community has an impact on brand engagement.	Survey	Visitors of firm-created online brand community

2.3 Performance perspective of co-innovation

The literature findings were synthesized under four main thematic groups: idea contribution quantity, idea contribution quality, community-based idea evaluation, and idea assessment scales that may have an impact on the performance of co-innovation platforms.

2.3.1 Idea contribution quantity

Co-innovation platforms are popular tools to connect crowds. As quantity brings quality, more user ideas increase the possibility of high-quality ideas (Schreier et al., 2012). However, it is difficult to motivate crowds to share insights, even for favored brands (Füller, Matzler, & Hoppe, 2008). Gamification increases customer engagement by supporting an innovation-friendly corporate environment (Nobre & Ferreira, 2017). Users engage in these platforms not only because of content but also because they derive enjoyment from interactions with other like-minded individuals (Füller, Hutter, & Faullant, 2011). Thus, gamified transformation aims to promote user interaction, sustainable participation, and improved outputs (Scheiner, Haas, Bretschneider, Blohm, & Leimeister, 2017). Consequently, co-innovation platforms are enriched with game design elements. For example, one of the game elements, named leaderboards, helps recognize leaders and differentiate them from other community members. This achievement creates a viral dimension with players willing to demonstrate their success through social networks (Nobre & Ferreira, 2017). Many organizations tend to gamify their innovation processes, such as Threadless, one of the most cited examples of value co-creation studies, which has transformed its design process into a game (Kavaliova, Virjee, Maehle, & Kleppe, 2016).

2.3.2 Idea contribution quality

Innovation capability, an approach of thinking out of bounds to identify and link possibilities, is a core factor for value co-creation (Ehlen, van der Klink, Stoffers, & Boshuizen, 2017). Users explain their needs better than manufacturers and create more novel ideas, whereas producers create better solutions for well-known needs and create more feasible ideas (Oliveira & Von Hippel, 2011). Producers or company professionals can be biased toward company culture or existing structures, and thus are more sensitive to solution information that may not address customer needs (Piller & Walcher, 2006). In other words, users might define what a potential new product should do and outperform needs-based information, whereas professionals might define how it should work and outperform technical details in solving a problem.

However, studies show that too many consumer ideas can also be detrimental and can lower NPD effectiveness, particularly when the ideas are not feasible for a company to implement during the product conceptualization and design phases (Piller & Walcher, 2006; Poetz & Schreier, 2012). A field study on IT-based idea competition demonstrates that high-quality ideas constitute approximately 10-20% of consumer-generated ideas (Blohm et al., 2011). Other ideas were either small improvements to existing products or were already known. Thus, idea quality is a performance issue that companies should consider because of the discrepancies between users and company professionals.

2.3.3 Community-based idea evaluation

Due to the increasing number of user ideas, rapid actions are needed for assessment, meaning a scalable and real-time approach to evaluate ideas. The evaluation process is expensive in terms of time and human resources (Hofstetter et al., 2018; Martínez-Torres, 2015). The widely accepted approach is to use professionals to determine promising outputs (Benz, Zierau, & Satzger, 2018). Generally, companies forecast the future success of a product or service idea based on the judgments of a few professionals (Velamuri et al., 2017). However, the literature states that the inefficiency of this evaluation method is due to poor expert jury judgements and misestimations of new product success. Thus, community-based idea evaluation is an alternative approach identifying the most creative ideas (Bayus, 2013). Here, companies should collaborate with customers to vote on ideas for determining the most innovative ones, provide decision support, and increase their attention to the product (Wang et al., 2016). An empirical study in an e-commerce setting suggested that companies should open idea generation tasks together with idea selection to develop better products in terms of market success (Pee, 2016). Additionally, enabling users for decision-making increases users' perceived fairness and their perceived control of the community (Faillant, Fueller, & Hutter, 2013; Gebauer et al., 2013).

“Decision-making processes are susceptible to a whole array of cognitive biases” (Benz et al., 2018, p.4). As individuals prefer to mimic others in complex decisions, the availability of peer ratings reduces the evaluation quality (Benz et al., 2018; Cialdini & Goldstein, 2004). Thus, companies should design a user environment that controls social influences on votes together with idea evaluation scales.

2.3.4 Idea assessment scales

The quality of an idea is strongly related to the analysis of its creativity (Blohm et al., 2011). An idea cannot be evaluated based on one dimension, and most researchers have used Amabile's (1982) definition of creativity. The dimensions of creativity include novelty (originality and modifying a paradigm), feasibility (ease of implementation), relevance (effective at solving the problem), and elaboration (clear and detailed) (Blohm et al., 2011; Schuhmacher & Kuester, 2012).

Valuable ideas can become useless if crowds do not analyze effectively and efficiently (Lee, et al., 2018). Crowd voting can be an unreliable indicator of actual idea quality, as ideas re-evaluated by company professionals tend to differ from crowd preferences (Hofstetter et al., 2018). However, the "wisdom of crowds" theory suggests that a large group of people is collectively smarter than individual experts when it comes to decision-making or problem-solving. Therefore, the design of rating mechanisms in idea selection is important because it enhances the validity and reliability of rating scales (Blohm et al., 2011). A thumbs up/down or a promote/demote ranking should be considered to signal idea popularity, and multi-attribute scales that measure novelty, value, feasibility, and elaboration of the idea should be considered to signal actual idea quality. This rating mechanism performs well irrespective of user expertise, and the output matches the performance of expert evaluations.

Table 4 summarizes the empirical research findings that may impact the performance of co-innovation platforms.

Table 4. Previous Studies from Performance Perspective

Study	Main Findings	Research Methodology	Subject
(Lüthje, 2004)	Participants more involved with product category and have more domain knowledge are active during co-creation activities.	Survey	Active users in outdoor sports
(Piller & Walcher, 2006)	The design of a toolkit has an impact on user performance during co-creation activities in NPD processes	Case Study	Sports manufacturer - Adidas
(Ebner, Leimeister, & Krcmar, 2009)	Communication environment between the members and the organization, trust-building and motivating features are substantial factors for achievement.	Case Study	Information technology industry - SAP
(Füller, 2010)	Design of the interaction tool improves participation, understanding of the innovation task and creativity of ideas. Tool support is important for perceived empowerment and enjoyment of the task. Perceived empowerment and task enjoyment have an impact on intention to participate in future co-creation activities.	Multi-Method	Consumers who had participated in a co-creation project
(Füller et al., 2011)	Design competitions provide alternatives for traditional NPD techniques especially for the fashion industry. Enjoyment is the main driver for quantity and quality of submitted designs. Co-creation experience has an impact on contribution quality, number of user designs, and interest in future competitions.	Multi-Method	Designers and consumers in the jewelry design competition

(Hutter, Hautz, Füller, Mueller, & Matzler, 2011)	According to participants activities and interactions with peers, users can be grouped as competitors(interested in showing talent), collaborators (interested in providing feedback), communititors (interested in showing talent and providing feedback), observers (not interested in showing talent and providing feedback).	Secondary data analysis	OSRAM LED contest community
(Kohler, Fueller, Stieger, & Matzler, 2011)	A compelling co-creation experience increase user participation, interest in future participation, and sustainability of the platform.	Multi-Method	Participants of Second Life
(Marchi, Giachetti, & De Gennaro, 2011)	User's willingness to co-innovate, product related experience and alignment with the brand identity have a positive impact on user's ability to generate high quality ideas.	Secondary Data Analysis	Motorcycle industry - Ducati Motors
(Yen et al., 2011)	Effective management of online community, cooperation, level of technology knowledge, and perceived benefits of participation have an impact on co-creation behavior. Extra-role behaviors (recommendation, helping others, providing feedback) are influenced by perceived benefits.	Survey	Consumers who had participated in a co-creation project
(Füller et al., 2012)	Task motivation and creativity are important factors for idea generation. Lack of domain-specific skills does not have a strong impact on contribution.	Survey	Consumers who had participated in a co-creation project
(Parjanen, Hennala, & Konsti-Laakso, 2012)	Participants with high domain knowledge show their skills but do not continue on participation as they do not improve their knowledge. In contrast, participants that have high cognitive distance improve their ideas and continue to contribute.	Case Study	Foundation that provides homes for ageing people

(Poetz & Schreier, 2012)	Compared to company's professionals, user ideas score high in terms of novelty of the product and consumer benefit, but low in terms of feasibility of the product.	Case Study	A company in the baby products
(Franke, Keinz, & Klausberger, 2013)	Fairness expectations (distribution of value among the partners and equal procedure) have an impact on participation more than self-interest.	Experimental Design	Consumers who had participated in a co-creation project
(Nishikawa et al., 2013)	Products generated by users are more novel than the products generated by designers and additionally their sales revenue are high.	Case study	Consumer goods manufacturer - Muji
(Franke, Poetz, & Schreier, 2014)	Consumers with expertise in distant domains (analogous market) provide more novel solutions than the ones with expertise in target market. They have lower constraints due to lack of target market knowledge. However, their solutions show lower usefulness.	Experimental Design	Problem solvers of different markets
(Harwood & Garry, 2015)	Gamified environments do not generate high-quality engagement outcomes for the reason of number of game mechanics implemented.	Netnography	Information technology industry - Samsung
(Jahanmir & Lages, 2015)	Involving laggards in idea generation can enhance the NPD process. Trained with the systematic Lag-User Method, these consumers can generate incremental innovations. Lag-User Method improves their understanding of innovation, learning to innovate, ability to develop new products on their own, confidence about their ideas, capability of innovating.	Secondary Data Analysis	Master students

(Chou, Lin, & Huang, 2016)	Users evaluate the fairness of the co-innovation experience by comparing their input with the results. If the outcomes fit well with their expectancies, they will find the process fair and feel more connected to the community. Sense of community improves contribution of the members.	Survey	Virtual community participants
(Schemmann et al., 2016)	The fact that the participant suggests more ideas does not lead to more idea implementation compared to the participants who generate less ideas. Enjoyment does not bring idea quality. Participants' attention to other ideas has positive impact on idea implementation. Simple rating mechanism can lead to finding valuable ideas. Ordinary users are collectively qualified to determine promising ideas.	Secondary Data Analysis	Consumer goods companies
(Roth, Dumbach, Schliffka, & Möslein, 2017)	Diversity among the members does not lead to successful co-innovation process. Instead, companies should provide appropriate tasks and should make a balance between community members on the basis of age and expertise.	Case Study	Innovation communities of different industries
(Vrgović & Jošanov-Vrgović, 2017)	Simple but specific problem statements increase the number of ideas generated as users do not face with complex questions. Therefore, companies should not collaborate through general problem structures.	Experimental Design	Students
(Huang, Tafti, & Mithas, 2018)	Knowledge investment into users build trust among community members and enhance the community users' overall body of knowledge which also increase user contribution.	Secondary Data Analysis	Information technology industry - SAP
(Shen et al., 2018)	A good alignment between the consumer and the community, needs and supplies, demands and abilities enhance customers' community commitment which leads to contribution quantity.	Survey	Members of XiaoMi Community

(Jeffcoat, Eveleigh, & Tanju, 2019)	NPD process can be improved by inclusion of members that have diverse backgrounds.	Experimental Design	Internal and external engineering professionals
(Renard & Davis, 2019)	Social interdependence is an important determinant of collaboration. Thus, competitive and cooperative design structure improves contribution quantity and contribution quality.	Secondary Data Analysis	Users of the idea crowdsourcing platform
(Zhang, Zhang, Luo, Wang, & Niu, 2019)	Information self-efficacy, diversity of content, personalized task structure, and interactivity of the environment have a positive effect on participants' knowledge sharing and integration behavior which improves accuracy and relevance of the community output.	Survey	Users of Chinese social question and answer community: Zhihu
(Liu, Du, Hong, Fan, & Wu, 2020)	The participant's probability of success on new idea does not relate to previous implementation performance due to cognitive fixation. Length of idea is a significant indicator of idea implementation. When the participants receive unfavorable responses from peers, they put more effort to generate creative ideas with the new information flow.	Secondary Data Analysis	Online innovation community - XiaoMi
(Liu, Xiao, Fang, Zhang, & Lin, 2020)	Social support (informational, emotional, esteem, companionship) positively influences sense of community.	Survey	Members of online health communities
(Addis, Miniero, & Ricotta, 2021)	Difficult tasks cause consumers to lose concentration and perform poorly. Fantastical thinking increases the perceived ease of value-production which lead to enjoyment, and positive attitude toward the co-designed product, and higher levels of intention to purchase.	Multi-Method	Students

(Yang & Han, 2021)	There is a positive relation between peer interaction and number of implemented ideas as users acquire knowledge from other participants' ideas. Number of new idea generations increase when the users interact with diverse idea categories.	Secondary Data Analysis	Idea crowdsourcing platform founded by Microsoft
(Zhang, Lin, Qi, & Liang, 2022)	Number of user reviews, length of evaluation, diversity of the feedback, and valence of content have positive impact on idea popularity in co-innovation communities. Users' number of followers positively influence on idea popularity, on the other hand users' number of followings negatively influence. Voting and reviewing systems are important to improve the quality of outputs.	Secondary Data Analysis	Online innovation community - Lego

CHAPTER 3

THEORETICAL MODEL AND HYPOTHESES

The componential theory of creativity is one of the baselines that helps to understand co-innovation context (Amabile, 1982). The theory has three main components which are domain-relevant skills, creativity-relevant skills, and intrinsic task motivation.

Academics have undergone significant exploration of these three components in co-innovation environments (Akman, Plewa, & Conduit, 2019; Ma, Lu, & Gupta, 2019; Shen et al., 2018; Zhang et al., 2019).

The first component, domain knowledge, indicates a user's knowledge or expertise in a domain (Lüthje, 2004). The knowledge management literature has highlighted that users with high domain knowledge are more inclined to share their expertise with others if they believe their knowledge is valuable (Füller et al., 2008). When a user perceives that the domain to generate an idea is complicated or challenging, the user is unlikely to be involved in creating a new idea because of the high entry barrier (Poetz & Schreier, 2012). Enhancing awareness of a domain and expanding cognitive boundaries will assist users in generating new ideas and improving their self-efficacy (Nambisan, 2002; Zhihong, Duffield, & Wilson, 2015).

The second component, innovativeness, is a person's willingness to try new things and be creative and original (Hurt, Joseph, & Cook, 1977). According to innovation diffusion theory, users' differences in innovativeness have an impact on the time taken to adopt new things (Rogers, 1962). The first group, "lead users", who have adopted a new product, are willing to take risks and are curious about new information (Hirschman, 1980). The contribution quality of these users in the co-innovation process

is not clear and is still a topic of discussion, as they do not provide a solution for a broader marketplace (Trischler, Pervan, & Scott, 2017). However, they are mostly defined as valuable sources of innovation (Von Hippel, 1986).

The last component, task enjoyment, is one of the primary motivators for participants to engage in co-creation activities. Individuals engaging in creative work seek enjoyment, autonomy, and competence, which form the basis of their sense of achievement (Füller et al., 2011). Thus, the tasks should be interesting, challenging, and involving. Researchers have emphasized the need to build customized platforms, as each participant has different expectations and skills (Guo et al., 2017; Shen et al., 2018).

3.1 Theoretical model of the study

The literature findings and componential theory of creativity suggest that domain knowledge and innovativeness are important decision keys for differentiating users in co-innovation platforms. Thus, tasks were differentiated according to user skills (domain knowledge) and personality traits (innovativeness) to explore their impact on the performance of co-innovation platforms, as shown in Figure 1.

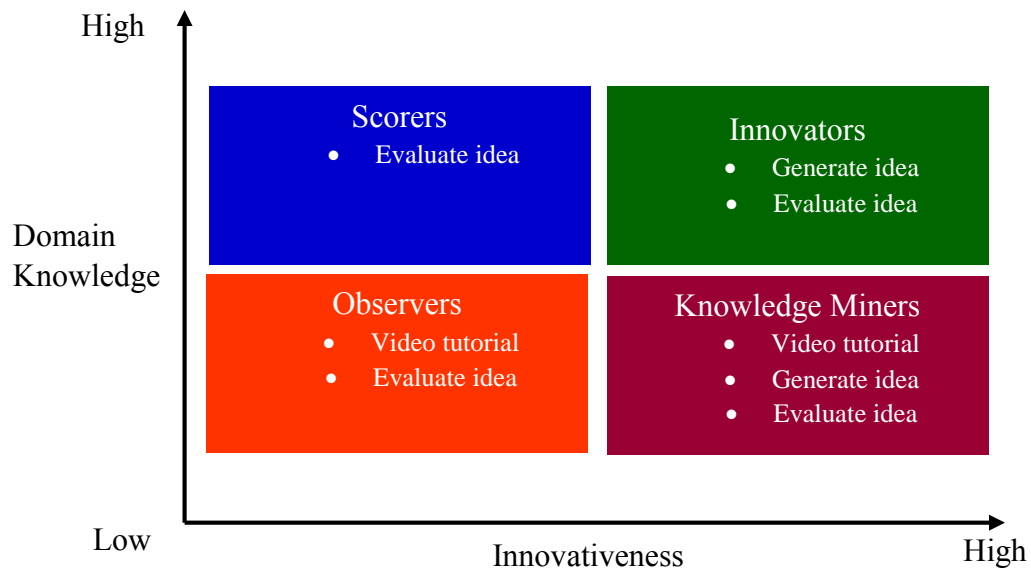


Figure 1. Task design of research model

- “Innovators” have high domain knowledge and high innovativeness scores and their tasks were determined as new idea generation and the evaluation of other participants' ideas.
- “Scorers” have high domain knowledge and low innovativeness scores and their tasks were determined as evaluation of a certain number of other participants' ideas. These users could generate a new idea after making ten idea evaluations.
- “Knowledge miners” have low domain knowledge and high innovativeness scores and their tasks were determined as improving domain knowledge as an initial requirement. After the video tutorial, their tasks were determined to be new idea generation and the evaluation of other participants' ideas.
- “Observers” have low domain knowledge and low innovativeness scores and their tasks were determined as improving domain knowledge as an initial requirement.

After the video tutorial, their tasks were determined as evaluation of a certain number of other participants' ideas. These users could generate a new idea after making ten idea evaluations.

3.2 Hypotheses of the study

Nijstad, Stroebe, and Lodewijkx (2002) developed a theory of idea generation called “search for ideas in associative memory”. This theory explains that information is retrieved from long-term memory, which consists of partitioned images and associations. Therefore, search cues help activate these images and assist users in generating ideas by combining previous information. According to the empirical investigation of Luo and Toubia (2015), among 6000 participants, detailed stimulus ideas are quite advantageous for users with low domain knowledge compared to those with high knowledge. As this study provides a video tutorial to improve domain knowledge and idea evaluation as a prerequisite task to generate new ideas, it is hypothesized that:

H₁: Task differentiation based on user’s domain knowledge and innovativeness has a positive impact on a) contribution quantity and b) contribution quality.

Users expect different benefits in exchange for their activities and seek highly interesting, pleasurable, and mentally stimulating experiences (Nambisan & Baron, 2009; Verleye, 2015). Community members compare their abilities with the demands of the community and engage in co-innovation activities if they believe that they can fulfill a given task (Scheiner & Witt, 2013). Users are heavily involved in a task if the perceived challenges of the task and their own perceived skills are in harmony (Csikszentmihalyi, 1990). Enhancement of current skills and restriction on idea generation may affect users’

overall experience, perceived benefits, and their future intention to participate. Thus, a customized task design may yield better outcomes that improve the fit between needs and supplies. As the study categorized users according to background characteristics and provided tasks based on user abilities, it is hypothesized that:

H₂: Task differentiation based on users' domain knowledge and innovativeness has a positive impact on their overall experience.

H₃: Task differentiation based on users' domain knowledge and innovativeness has a positive impact on their (a) hedonic, (b) cognitive, (c) social, (d) personal, and (e) economic benefits.

H₄: Task differentiation based on users' domain knowledge and innovativeness has a positive impact on their future intention to participate in such co-innovation platforms.

CHAPTER 4

RESEARCH METHODOLOGY

Research design, study procedure, measurement scales, data collection and experimental design controls are presented in this chapter.

4.1 Research design

A multi-method study was conducted to address the aforementioned research questions. The first study was an online experiment applying a 2 x 2 between-subjects design, in which participants were randomly assigned to either the control group or the experimental group. The first study aimed to explore the impact of customized task design on contribution performance. The second study used an online survey to determine the impact of task differentiation on participants' overall experience, expected benefits, and future intention to participate in such co-innovation communities.

4.1.1 Task design

A co-innovation platform with two different task designs, namely, a base model and a role-based model, was designed to provide users with the opportunity to generate and evaluate ideas. The website was developed by an external company, and the cost was funded by the Boğaziçi University Research Fund for Doctoral Studies Grant No: (BAP-16645D).

As illustrated in Figure 2, the participants were assigned to four roles in both the control and experimental groups based on their domain knowledge (high versus low) and innovativeness (high versus low) scores. In the control group, there was no task

differentiation between the subjects, and each participant could generate or evaluate an idea, whereas in the experimental group, the tasks were differentiated according to user abilities (innovativeness and domain knowledge). Participants with low domain knowledge watched a video tutorial to improve their knowledge, and those with low innovativeness scores made a certain number of idea evaluations to improve their creativity.

Base Model (Control Group)		Role-based Model (Experimental Group)	
Scorers <i>Generate idea</i> <i>Evaluate idea</i>	Innovators <i>Generate idea</i> <i>Evaluate idea</i>	Scorers <i>Evaluate idea</i>	Innovators <i>Generate idea</i> <i>Evaluate idea</i>
Observers <i>Generate idea</i> <i>Evaluate idea</i>	Knowledge Miners <i>Generate idea</i> <i>Evaluate idea</i>	Observers <i>Video Tutorial</i> <i>Evaluate idea</i>	Knowledge Miners <i>Video Tutorial</i> <i>Generate idea</i> <i>Evaluate idea</i>

No task difference between the roles

Tasks are differentiated between the roles

Figure 2. Task design of experimental and control groups

4.1.2 Task content

Innovations in the healthcare industry were determined to be the subject of the platform. This subject was chosen because it is a general topic about which people are generally expected to have an opinion. Figure 3 demonstrates the introduction page of the platform which informs users about the research content, study duration, and rewards.



Değerli Katılımcı,

Bu araştırma, internet kullanıcılarının ürün fikri geliştirme platformlarındaki davranışlarını incelemek amacıyla yapılmaktadır. Platformun içeriği sağlık alanında yapılan yenilikler olup, katılımcıların bu içerik ile ilgili yeni fikir oluşturmaları ya da başkalarının fikirlerini değerlendirmeleri beklenmektedir.

Bu çalışma akademik bir araştırma olup doktora tezi kapsamında Boğaziçi Üniversitesi Yönetim Bilişim Sistemleri Bölümü doktora öğrencisi Elif Öztürk tarafından yürütülmektedir.

Araştırmanın başarısı açısından katılımınız ve talep edilen işlemleri belirtilen şekilde yapmanız gerekmektedir.

Değerli zamanınız ve desteğiniz için çok teşekkür ederiz.

BU ÇALIŞMANIN HER HAKKI SAKLIDIR. Araştırmacıların izni olmadan tamamı veya bir kısmı kullanılamaz.

<p>Profilini oluştur Ortalama 3-4 dakikanızı alacaktır.</p>	<p>Fikirlerini söyle veya diğer fikirleri değerlendir Katılım süresi sizin terahiniz doğrultusunda değişecektir.</p>	<p>Deneyimini bizimle paylaş Ortalama 5-7 dakikanızı alacaktır.</p>
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! Çalışmanın toplam süresi ortalama 30 dakika olduğu için, **TEK SEFERDE** bitirmenize **GEREK YOKTUR**. Çalışmayı bitirmeniz için en az 3 fikri değerlendirmenizi ve 1 fikir oluşturmaınızı rica ederiz.

En çok puan alan ilk 5 kişiye akıllı bileklik hediye edilecektir.

Figure 3. Introduction page

4.1.3 Task environment

The literature emphasizes the importance of gamification in increasing consumer engagement. Thus, the platform involved gamification elements to provide an innovation-friendly environment. Avatars and masked email addresses were used to provide distinction between the users. They could earn game points for their actions to depict their performance in respect to others. Additionally, the main page displayed high-performing users called leaderboards (see Figure 4). Users could view the number of participants registered on the platform and the number of ideas generated and evaluated on the platform.

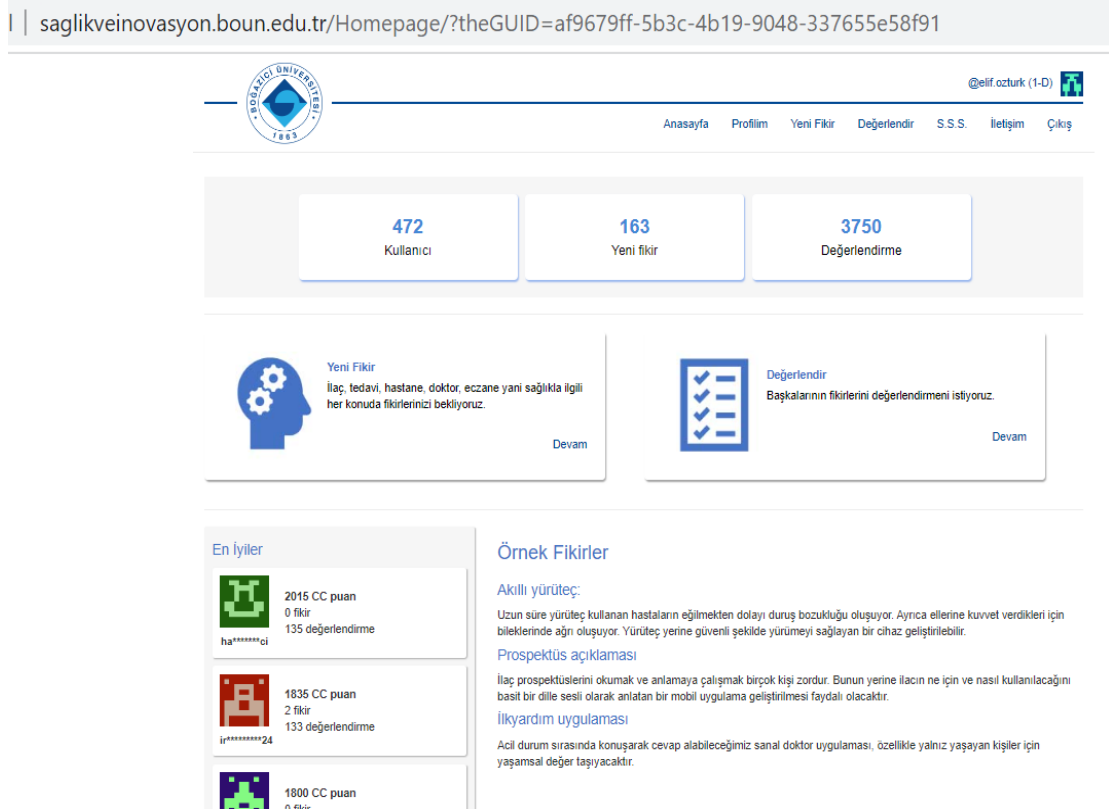


Figure 4. Main page

4.1.4 Sample ideas

Prior to data collection, ten new ideas about healthcare innovations were developed with different user profiles to demonstrate that it was a dynamic platform. These ideas are provided in Appendix A. Judgmental sampling technique was used and three ideas among them were displayed on the main page to inspire the participants, as shown in Figure 5.

Örnek Fikirler

Akıllı yürüteç:

Uzun süre yürüteç kullanan hastaların eğilmekten dolayı duruş bozukluğu oluşuyor. Ayrıca ellerine kuvvet verdikleri için bileklerinde ağrı oluşuyor. Yürüteç yerine güvenli şekilde yürümeyi sağlayan bir cihaz geliştirilebilir.

Prospektüs açıklaması

İlaç prospektüslerini okumak ve anlamaya çalışmak birçok kişi zordur. Bunun yerine ilacın ne için ve nasıl kullanılacağını basit bir dille sesli olarak anlatan bir mobil uygulama geliştirilmesi faydalı olacaktır.

İlkyardım uygulaması

Acil durum sırasında konuşarak cevap alabileceğimiz sanal doktor uygulaması, özellikle yalnız yaşayan kişiler için yaşamsal değer taşıyacaktır.

Figure 5. Sample ideas on the main page

4.1.5 Idea generation menu

The users were asked to generate a new idea with a maximum length of 500 characters.

Participants had to first specify a subject and then write a detailed opinion about healthcare innovations, as shown in Figure 6. The system showed a pop-up message which displays “Thank you for your participation” when a user generated a new idea.

The screenshot shows a web interface for generating ideas. At the top left is the logo of B.Ü.Ğ. F. İ. C. İ. Ü. N. İ. V. E. R. S. İ. T. İ. and the text '@elif.ozturk (1-D)'. The navigation menu includes 'Anasayfa', 'Profilim', 'Yeni Fikir', 'Değerlendir', 'S.S.S.', 'İletişim', and 'Çıkış'. The main content area is titled 'Yeni Fikir' and contains a form with two fields: 'Konu' (Subject) and 'İçerik' (Content). Below the 'İçerik' field is a 'Kaydet' (Save) button. To the right of the form is a pop-up message box with the text: 'İlaç, tedavi, hastane, doktor, eczane yani sağlıkla ilgili herşey', 'yenilikçi', 'faydalı', 'yapılabilir', 'anlaşılır', and 'fikirlerinizi bekliyoruz'.

Figure 6. Idea generation menu

4.1.6 Idea evaluation menu

Peer rating availability has a negative impact on decision quality and does not increase user engagement (Benz et al., 2018). Thus, in this study, peer idea ratings were not displayed to the users to prevent a negative impact on idea evaluation quality. Users were asked to evaluate the ideas of others based on the idea's “novelty”, “relevance”, “feasibility” and “specificity” as shown in Figure 7. Participants could also evaluate the idea as “repeated” or “not related” according to the user-generated content.

venli değil | saglikveinovasyon.boun.edu.tr/RateIdea?pk=1135&theGUID=af9679ff-5b3c-4b19-9048-337655e58f91

@elif.ozturk (1-D)

Anasayfa Profilim Yeni Fikir Değerlendir S.S.S. İletişim Çıkış

Hekimler için Yapay Zeka

Dünyanın her yerinden hastaların tahlil bilgileri hasta gizliliğine uyulacak şekilde bir sistemde depolanıp tüm değerleri ve hastalık teşhisi makinelerle öğretilir. Online bir platform aracılığıyla hekimler sisteme üye olur ve kendi hastalarının tahlillerini sisteme yüklediklerinde yapay zeka metotlarıyla hastalık tanısı, teşhis, tedavi yöntemleri, kullanılan ilaçlar, örnek hasta öyküleri gibi bilgiler sistem tarafından hekimlerin bilgisine sunulur.

ut*****34

Değerlendirme

Katılımcıların yazdığı fikirlerin kalitesini dört başlık altında ölçmenizi ve 1'den 5'e kadar bir değer vermenizi bekliyoruz.

Eğer daha önce başka biri tarafından belirtilmiş bir fikir ise "Tekrar edilmiş" ya da sağlıkta inovasyonla ilgili değil ise "Değerlendirmeye gerek yok" seçeneklerini işaretleyiniz.

Tekrar edilmiş
 Değerlendirmeye gerek yok (Örneğin konuyla ilgili değil, anlaşılmıyor vb. gibi)

		Kesinlikle Hayır		Kesinlikle Evet			Ağırlık %
		1	2	3	4	5	
Yenilikçi	Bu fikir orijinal midir?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	25%
Faydalı	Bu fikir sağlık alanında faydalı mıdır?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	30%
Yapılabilir	Bu fikir uygulanabilir mi?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	35%
Anlaşılır	Bu fikir anlaşılır mı?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10%
Fikrin kalitesi	Bu fikrin kalitesine verdiğiniz toplam değer 100 üzerinden						

Değerlendirmeyi Kaydet

Figure 7. Idea evaluation menu

4.1.7 Order of ideas

Ideas were ordered in ascending order by the number of evaluations and date of idea generation. If the two ideas had the same number of evaluations, the old idea was

displayed before the recent idea. This ranking method ensured that the number of evaluations per idea was approximately the same.

Participants had the authority to select the idea that they wanted to evaluate. Ten ideas were displayed per page, and users could navigate to subsequent pages to see other ideas. Figure 8 shows the ideas generated by participants and the order of the ideas according to aforementioned criteria.

The screenshot displays a list of five ideas generated by participants, each presented in a card format. Each card includes a profile picture, a title, a description, the user's name (partially redacted), the date of submission, and a blue button labeled 'Değerlendir' (Evaluate).

- Idea 1:** Title: 'Hekimler İçin Yapay Zeka'. Description: 'Dünyanın her yerinden hastaların tahlil bilgileri hasta gizliliğine uyulacak şekilde bir sistemde depolanıp tüm değerleri ve hastalık teşhisi makinelere öğretilir. Online bir platform aracılığıyla hekimler sisteme üye olur ve kendi hastalarının tahlillerini sisteme yüklediklerinde yapay zeka metotlarıyla hastalık tanısı, teşhis, tedavi yöntemleri, kullanılan ilaçlar, örnek hasta öyküleri gibi bilgiler sistem tarafından hekimlerin bilgisine sunulur.' User: 'ut*****34', Date: '3.08.2022'.
- Idea 2:** Title: 'Sağlık'. Description: 'Klinik klinik deneyleri yürüten klinik operasyonculara, tıbbi kodlamanın araştırılmasını ve doğrulamasını hızlandırmak için yapay zeka işlevini kullanabilir. Bu da klinik çalışmaların tamamlama süresini azaltmaya yardımcı olur.' User: 'er*****an', Date: '28.08.2022'.
- Idea 3:** Title: 'Tedavi başvurularında derecelendirme'. Description: 'Sağlık Ocağı, aile hekimliği müesseselerinin etkili hale getirilmesi gereklidir diye düşünüyorum. En basit rahatsızlıklar da dahi üst seviyede tıbbi yardım talebinde bulunabilmeleri, hem hekimleri hem de gerçekten üst seviye de gözleme ve tedaviye ihtiyacı olan insanları olumsuz yönde etkilenmesine sebep olmaktadır.' User: 'bj*****si', Date: '27.08.2022'.
- Idea 4:** Title: 'Akıllı Sağlık Sistemleri'. Description: 'Teknoloji döneminde yaşadığımızın farkında varıp sağlık alanında da bu fikrin benimsenmesini ve hayata geçinmesi gerektiğini düşünüyorum. İlaç tedarikleri, uygun muayene gün, doktor ve bölüm takibi, hastaneler arasında bilgi akışının, verilerin sorunsuz ve güvenilir paylaşılabilirliği, radyolojik ve nükleer tıp alanında ki çekimlerde sıra ve kalabalıklığın azaltılması ve düzenli bir şekilde hekim, hasta, tekniker başta olmak üzere herkesin düzenini rahatlatacak bir akıllı sağlık sistemleri.' User: 'se*****44', Date: '18.08.2022'.
- Idea 5:** Title: 'Kuryeli/Ödüllü Kan Bağışı'. Description: 'Maalesef kan bağışı insanlar için sadece acil durumlarda önemli hale geliyor. Fakat düzenli kan vermek birçok insanın hayatını kurtarabileceği gibi bağışlayanın da faydasına olup bazı hastalıkların önüne geçebilir ya da erken teşhis şansı yaratabilir. İnsanların, evinde kan vermesini sağlayacak bir kurye sistemi ile istense bile zaman ve ulaşım kısıtlamalarından dolayı kan bağışlayamama problemi çözülebilir. Bu bağışın karşılığında da bir teşvik ya da hak alınırsa, kan verme talebi artacaktır.' User: 'eg*****en', Date: '3.08.2022'.

Figure 8. Order of ideas

4.1.8 Video tutorial

A video tutorial was prepared to enhance the participants' domain knowledge about ongoing technological advances and their impact on healthcare. The tutorial lasted 15 minutes where the link can be found at https://youtu.be/jJQ36B4J_Wc. The tutorial content was related to the domain knowledge scale; therefore, seven concepts were briefly explained. Figure 9 displays the first page of the video tutorial, and the flow is as follows:

- *Introduction*. The impact of the digital age and social media on consumer and company behavior,
- *Big Data*. Volume, velocity, and variety dimensions of big data and the differences between big data technologies and traditional architecture,
- *Cloud Computing*. Infrastructure as a service, platform as a service, software as a service, and advantages of cloud computing,
- *Artificial Intelligence*. Examples of machine learning algorithms and natural language processing tools,
- *Internet of things*. The communication among objects through internet of things,
- *Three-Dimensional (3D) Printing*. The stages of 3D printing,
- *Blockchain technology*. The hashing method and security implementation,
- *Industry 4.0*. The integration between physical objects through industry 4.0,
- *Conclusion*. The relation of each technology with healthcare innovations.



Figure 9. Video tutorial

4.1.9 Participant performance

Users could earn game points for their actions throughout their experience. The performance menu presented in Figure 10 shows the ideas generated and evaluated by the participants and the game points earned by these actions.



Figure 10. Performance menu

4.2 Research procedure

First, the users were registered to the platform with their e-mail addresses and submitted their demographic information. Questionnaire of the registration process is given in Table B1. The participants were randomly assigned to either a base or role-based model after the enrollment process. Once their e-mail addresses were verified respondents were asked to answer surveys on innovativeness and domain knowledge. The scores of the

two surveys were used to determine the role of the respondents. Median values were used to categorize participants, and the threshold scores were 22 for domain knowledge and 60 for innovativeness.

In the second phase of the study, participants were asked to generate a new idea or evaluate other users' ideas. The new idea generation menu was activated according to the assigned group and role. Idea generation was determined to be a voluntary task for both the control and experimental groups. However, the participants were required to perform three idea evaluations to complete the experiment.

In the last phase of the study, participants were asked via an online questionnaire about their co-innovation experience, the benefits they expected from collaboration, and their future intention to participate in such co-innovation environments. The flow diagram of the study is shown in Figure 11.

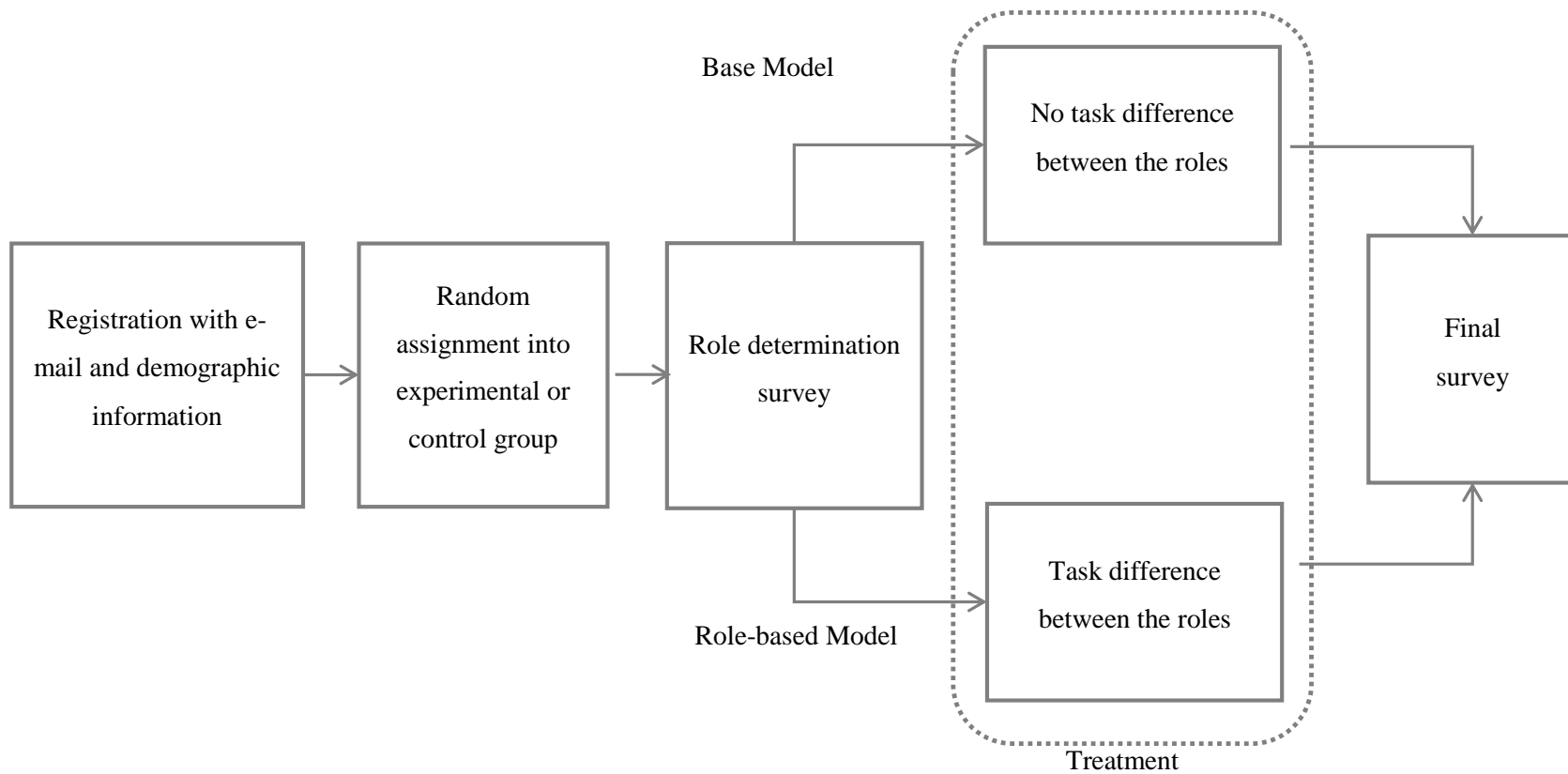


Figure 11. Process flow diagram of the study

4.3 Measurement scales

The measurement items for the surveys were adapted from the literature and are presented in Table 5. The weights of the idea quality dimensions were determined using the Analytic Hierarchy Process technique. For this reason, five academicians and five business professionals with experience in NPD and technology participated in the study. The weights of the idea quality dimensions were 25% for novelty, 30% for relevance, 35% for feasibility, and 10% for specificity. Table 6 displays the results of the internal consistency of the questionnaire, demonstrating high reliability scores for the constructs used in the current study.

The Turkish translation of the innovativeness scale was adapted from Kiliçer and Odabaşı (2010) which is given in Table B2. The Turkish translation of domain knowledge, overall experience, perceived benefits, and future intention to participate are provided in Table B3, B4, B5, and B6, respectively. The Turkish translation of idea evaluation scale is given in Appendix C. The approval of ethics committee for all measurement scales is provided on Appendix D.

Table 5. Measurement Scales

Variable	No	Measurement item	Source	Scale
Innovativeness (IN)	IN1	My peers often ask me for advice or information.	(Hurt et al., 1977)	Seven-point Likert scale: 1-Strongly disagree 7- Strongly agree
	IN2	I enjoy trying new ideas.		
	IN3	I frequently improvise methods for solving a problem when an answer is not apparent.		
	IN4	I am suspicious of new inventions and new ways of thinking. (Reverse Coded)		
	IN5	I rarely trust new ideas until I can see whether the vast majority of people around me accept them. (Reverse Coded)		
	IN6	I feel that I am an influential member of my peer group.		
	IN7	I consider myself to be creative and original in my thinking and behavior.		
	IN8	I am reluctant about adopting new ways of doing things until I see them working for people around me. (Reverse Coded)		
	IN9	I tend to feel that the old way of living and doing things is the best way. (Reverse Coded)		
	IN10	I am challenged by ambiguities and unsolved problems.		
	IN11	I must see other people using new innovations before I will consider them. (Reverse Coded)		
	IN12	I am receptive to new ideas.		
Domain Knowledge (DK)	DK1	Blockchain	Authors	Five-point scale: 1- I have no idea. 2- I have heard the concept but have limited knowledge. 3- I have heard the concept and can briefly describe it. 4- I have adequate knowledge and following the concept. 5- I have high level of competence of the concept and superior knowledge about the improvements.
	DK2	Cloud Computing		
	DK3	Big Data		
	DK4	Industry 4.0		
	DK5	Internet of Things		
	DK6	Artificial Intelligence		
	DK7	3-D Printing		
Overall Experience (OE)	OE1	Dissatisfactory - Satisfactory	(Verleye, 2015)	Seven-point semantic differential scale
	OE2	Negative - Positive		
	OE3	Poor - Excellent		
	OE4	Disappointing - Delightful		
	OE5	Difficult - Easy	Self-developed	
	HB1	Spend some enjoyable and relaxing time.		

Hedonic Benefits (HB)	HB2	Derive fun and pleasure.	(Nambisan & Baron, 2007)	Seven-point Likert scale: 1-Strongly disagree 7- Strongly agree
	HB3	Entertain and stimulate my mind.		
	HB4	Derive enjoyment from problem-solving, idea generation, and so on.		
Cognitive Benefits (CB)	CB1	I can improve my skills.	(Verleye, 2015)	Seven-point Likert scale: 1-Strongly disagree 7- Strongly agree
	CB2	I gain new knowledge/expertise.		
	CB3	I can test my capabilities.		
	CB4	It allows me to keep up with new ideas and innovations.		
	CB5	It enables me to come up with new ideas.		
Social Benefits (SB)	SB1	I wonder what other people said.	(Ko <i>et al.</i> , 2005)	Seven-point Likert scale: 1-Strongly disagree 7- Strongly agree
	SB2	To keep up with what's going on.		
	SB3	To express myself freely.		
Personal Benefits (PB)	PB1	I can make a good impression on others.	(Jahn & Kunz, 2012)	Seven-point Likert scale: 1-Strongly disagree 7- Strongly agree
	PB2	I can improve the way I am perceived.		
	PB3	I can present others who I am.		
Economic Benefits (EB)	EB1	I hope to get a monetary compensation according to the effort made.	(Füller, 2010)	Seven-point Likert scale: 1-Strongly disagree 7- Strongly agree
	EB2	I want to get paid for the effort.		
	EB3	I expect an appropriate reward for my support in return.		
Future Intention to Contribute (FI)	FI1	I intend to keep using [...] in the future	(Chang, 2018)	Seven-point Likert scale: 1-Strongly disagree 7- Strongly agree
	FI2	If possible, I would like to continue my use of [...].		
	FI3	It is likely that I will continue using [...] in the future		
Idea Quality	Novelty	How novel do you think this idea is?	(Blohm <i>et al.</i> , 2011)	1- Absolutely no 5- Absolutely yes
	Relevance	What do you think is the value of this idea if implemented?		
	Feasibility	How easy is it to implement this idea?		
	Specificity	Is the idea well elaborated?		
	Repeated idea		Self-developed	
	Not related with healthcare innovations			

Table 6. Results of Reliability Analysis

Variable	No	Factor loadings	Cronbach's α
Innovativeness (IN)	IN1	0.68	0.89
	IN2	0.85	
	IN3	0.76	
	IN4	0.48	
	IN5	0.63	
	IN6	0.61	
	IN7	0.78	
	IN8	0.69	
	IN9	0.58	
	IN10	0.77	
	IN11	0.43	
	IN12	0.84	
Domain Knowledge (DK)	DK1	0.76	0.88
	DK2	0.81	
	DK3	0.83	
	DK4	0.83	
	DK5	0.83	
	DK6	0.71	
	DK7	0.53	
Overall Experience (OE)	OE1	0.74	0.87
	OE2	0.79	
	OE3	0.78	
	OE4	0.80	
	OE5	0.65	
Hedonic Benefits (HB)	HB1	0.78	0.95
	HB2	0.79	
	HB3	0.79	
	HB4	0.71	
Cognitive Benefits (CB)	CB1	0.75	0.92
	CB2	0.82	
	CB3	0.80	
	CB4	0.68	
	CB5	0.71	
Social Benefits (SB)	SB1	0.88	0.87
	SB2	0.85	
	SB3	0.76	
Personal Benefits (PB)	PB1	0.84	0.92
	PB2	0.78	
	PB3	0.82	
Economic Benefits (EB)	EB1	0.94	0.97
	EB2	0.96	
	EB3	0.94	
Future Intention to Contribute (FI)	FI1	0.87	0.94
	FI2	0.88	
	FI3	0.84	

4.4 Data collection and sampling

Data were collected from graduate-level students on a voluntary basis during online or site courses at state and foundation universities which were Boğaziçi University, İstanbul University, Galatasaray University, Bahçeşehir University, Turkish German University, Maltepe University and Anadolu University. The purposive sampling method was used, and the participants were selected with academics at various universities with whom the researchers had connections. In addition, e-mails were sent to individuals with at least undergraduate degree from different disciplines. Data collection began in November 2021, and was completed in August 2022. Ultimately, 460 subjects participated in the research; however, 11.7% did not complete the study, and 406 valid observations were obtained.

There were slightly more female participants ($n = 212$) than male participants ($n = 194$). In terms of age distribution, the participants were mostly between the ages of 26 and 35 years ($n = 185$). As the study sample consisted of at least undergraduate degree, the participants between the age of 18 and 25 were only twelve percent of whole sample. In terms of education level, participants with a graduate degree ($n = 218$) were higher than those with an undergraduate degree ($n = 188$). The occupations of the participants were information systems professionals ($n = 47$), healthcare industry professionals ($n = 45$), finance professionals ($n = 36$), engineers ($n = 36$), business management professionals ($n = 36$), academics ($n = 33$), teachers ($n = 33$), sales and marketing professionals ($n = 30$), operations executives ($n = 25$) and others ($n = 85$). The respondents' demographic profiles are presented in Table 7.

Table 7. Demographic Profile of the Respondents

Demographic variable	Classification	N	%
Gender	Male	194	48%
	Female	212	52%
Age	18-25	47	12%
	26-35	185	46%
	36-45	138	34%
	46+	36	9%
Education	Undergraduate	188	46%
	Graduate Degree	218	54%
Occupation	Academician	33	8%
	Business Management Professional	36	9%
	Engineer	36	9%
	Finance Professional	36	9%
	Healthcare Industry Professional	45	11%
	Information Systems Professional	47	12%
	Operations Executive	25	6%
	Other	85	21%
	Sales and Marketing Professional	30	7%
	Teacher	33	8%

4.5 Experimental design controls

The experimental procedure provided control for sources over spurious variations that could potentially have an impact on the results. The random allocation of subjects to the task design models enabled the control of size and entry to the platform. Second, the subjects were informed of the same instructions and were unaware of the experiment.

As demonstrated in Table 8, there was no significant difference between domain knowledge and innovativeness (Mann-Whitney U, $p > .10$) between experimental and control group. In terms of demographic information, there were no significant differences in terms of gender, age group, and education (see Table 9). The equality test results indicated that the randomization procedure was effective.

Table 8. Group Equality Test Results for Innovativeness and Domain Knowledge

	Base model			Role-based model			Significance
	n	M	SD	n	M	SD	(p-value)
Innovativeness	205	60.79	12.75	201	61.99	11.88	0.357
Domain Knowledge	205	20.34	6.20	201	20.98	6.30	0.376

Table 9. Group Equality Test Results for Gender, Age-group, and Education

	Pearson Chi-Square	df	Asymptotic Significance (2-sided)
Gender	,345	1	0.557
Age-group	7,645	4	0.105
Education	1,462	1	0.227

CHAPTER 5

FINDINGS OF THE STUDY

In this chapter, the findings of the study in terms of contribution quantity, contribution quality, overall experience, perceived benefits, and future intention to participate are presented.

5.1 Idea contribution quantity

The number of participants in the base model (control group) and role-based model (treatment group) were 205 and 201, respectively. In the base model, 70 participants generated 84 ideas and, in the role-based model 48 participants generated 59 ideas. Sample ideas of each user group are given in Appendix E. In the base model, 205 participants made 1701 evaluations and, in the role-based model 201 participants made 1984 idea evaluations.

User behavior in the non-treatment group showed that observers (low innovativeness, low domain knowledge) did not generate or evaluate ideas compared to other roles in the same group. Only 19.2% of the observers generated an idea and evaluated 7.0 ideas on average. Conversely, innovators (high innovativeness, high domain knowledge) contributed more than other roles, as indicated in the literature. Half of the innovators (50.9%) generated an idea and evaluated 9.6 ideas on average.

Contribution quantity was defined as the sum of the number of ideas generated and the number of ideas evaluated. The user behavior in the treatment group showed that the participants who watched video tutorial (knowledge miners and observers) contributed more than other roles. Knowledge miners made 11.7 idea contributions and

observers made 9.9 idea contributions. The performance details of participants are demonstrated in Table 10.

Table 10. User Performance in Terms of Contribution Quantity

	Innovators	Scorers	Knowledge Miners	Observers	Total
Number of participants	115	75	116	100	406
Base model	57	37	59	52	205
Role-based model	58	38	57	48	201
Number of participants generated ideas	56	13	37	12	118
Base model	29	11	20	10	70
Role-based model	27	2	17	2	48
% of participants generated ideas	48.7%	17.3%	31.9%	12.0%	29.1%
Base model	50.9%	29.7%	33.9%	19.2%	34.1%
Role-based model	46.6%	5.3%	29.8%	4.2%	23.9%
Number of ideas	73	13	44	13	143
Base model	41	11	21	11	84
Role-based model	32	2	23	2	59
Average number of ideas	1.30	1.00	1.19	1.08	1.21
Base model	1.41	1.00	1.05	1.10	1.20
Role-based model	1.19	1.00	1.35	1.00	1.23
Number of idea evaluations	1056	651	1143	835	3685
Base model	547	293	499	362	1701
Role-based model	509	358	644	473	1984
Average number of evaluations	9.2	8.7	9.9	8.4	9.1
Base model	9.6	7.9	8.5	7.0	8.3
Role-based model	8.8	9.4	11.3	9.9	9.9
Number of contributions	1129	664	1187	848	3828
Base model	588	304	520	373	1785
Role-based model	541	360	667	475	2043
Average contribution quantity	9.8	8.9	10.2	8.5	9.4
Base model	10.3	8.2	8.8	7.2	8.7
Role-based model	9.3	9.5	11.7	9.9	10.2

5.2 Idea contribution quality

Contribution quality was calculated according to the idea quality scores determined by other participants. Approximately, one idea was evaluated by 21 participants. Idea quality scores did not represent normal distribution; therefore, median value was computed for each idea to handle outliers.

The performance of users in terms of idea contribution quality is given in Table 11. The quality score of treatment group was slightly higher than control group (Base model: 73.8; Role-based model: 76.0). The user behavior in the non-treatment group showed that contribution quality was not in line with roles. While idea quality scores of observers (low innovativeness, low domain knowledge) were expected to be the lowest compared to other roles, their performance was approximately the same as others.

Table 11. User Performance in Terms of Contribution Quality

	Innovators	Scorers	Knowledge Miners	Observers	Total
Contribution Quality	77.4	75.8	69.8	75.5	74.7
Base model	76.9	75.1	67.8	75.2	73.8
Role-based model	77.9	80.0	72.2	77.5	76.0

5.3 Contribution performance

The Mann-Whitney U non-parametric test was used to test any significant differences between the groups for contribution quantity and quality, as the values were not normally distributed (see Table 12).

Table 12. Normality Test Results

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Contribution Quantity	0.345	406	0.000	0.406	406	0.000
Contribution Quality	0.144	118	0.000	0.865	118	0.000

The two groups did not differ significantly in terms of contribution quantity; therefore, H_{1a} was rejected (see Table 13). Although participants in the role-based model generated high-quality ideas, the two groups did not differ significantly in terms of contribution quality; thus, H_{1b} is rejected.

Additionally, the relationship between domain knowledge and innovativeness with contribution performance was analyzed for the control group. As demonstrated in Table 14, there was a significant but weak correlation between domain knowledge and the number of new ideas and idea novelty. In terms of innovativeness score, there was a significant but weak correlation with the number of new ideas and evaluations, but there was no significant correlation with any idea quality parameters.

Table 13. Comparison of Base and Role-based Model on Contribution Performance

	Base Model			Role-based Model			Significance
	Number	Mean	Stand. Dev.	Number	Mean	Stand. Dev.	(p-value)
Contribution Quantity	205	8.71	15.56	201	10.16	16.62	0.81
Innovators	57	10.32	18.32	58	9.33	15.44	0.15
Scorers	37	8.22	16.05	38	9.47	11.16	0.17
Knowledge Miners	59	8.81	17.44	57	11.70	20.48	0.76
Observers	52	7.17	8.19	48	9.90	16.87	0.85
Contribution Quality	70	73.78	11.96	48	75.96	15.32	0.08
Innovators	29	76.91	11.35	27	77.91	16.70	0.30
Scorers	11	75.09	9.13	2	80.00	8.49	0.37
Knowledge Miners	20	67.83	13.81	17	72.21	14.35	0.17
Observers	10	75.15	9.32	2	77.50	6.36	0.67

Table 14. Correlation between Domain Knowledge, Innovativeness, and Contribution Performance in the Control Group

	Number of Ideas	Number of Evaluations	Contribution Quantity	Novelty	Relevance	Feasibility	Specificity	Contribution Quality
DK	.200**	- 0.008	0.065	.294*	0.142	0.129	0.094	0.161
IN	.139*	.194**	.225**	0.086	- 0.032	- 0.134	- 0.124	0.032
DK x IN	.230**	0.057	0.128	.318**	0.178	0.078	0.055	0.231
Significant at the *0.05 level, **0.01 level								

5.4 Overall experience, perceived benefits, and future intention to participate

An independent sample t-test was used to test the hypotheses regarding overall experience, perceived benefits, and future intention to participate. Respondents in the role-based model had significantly better overall experience than those in the base model; therefore, H₂ was supported (see Table 15). In terms of perceived benefits, respondents had better hedonic and cognitive experiences in the role-based model than in the base model, and the test result was significant. Although there were no significant differences between the groups in terms of social and personal benefits, respondents with low innovativeness scores (scorers and observers) had worse social and personal experiences owing to task limitations. The content of the platform was healthcare innovations, which were non-commercial content. Therefore, respondents in both groups gave lower scores for economic benefits, and there was no significant difference between the groups. As a result, H_{3a} and H_{3b} were supported but H_{3c}, H_{3d} and H_{3e} were rejected. In terms of future intention to participate, the results revealed that respondents in the role-based model had a higher future intention to participate than respondents in the base model, and the test result was significant; therefore, H₄ was supported.

Table 15. Comparison of Base and Role-based Model from User Perspective

	Base Model			Role-based Model			Significance
	Number	Mean	Stand. Dev.	Number	Mean	Stand. Dev.	(p-value)
Overall Experience	205	5.73	1.03	201	6.19	0.95	0.000*
Innovators	57	6.03	0.90	58	5.99	0.95	0.825
Scorers	37	5.59	0.95	38	6.03	1.11	0.071
Knowledge Miners	59	5.76	0.97	57	6.46	0.79	0.000*
Observers	52	5.47	1.20	48	6.23	0.93	0.001*
Hedonic Benefits	205	5.29	1.34	201	5.75	1.22	0.000*
Innovators	57	5.61	1.17	58	5.59	1.22	0.948
Scorers	37	4.88	1.37	38	5.34	1.25	0.136
Knowledge Miners	59	5.50	1.27	57	6.07	1.08	0.011*
Observers	52	5.00	1.47	48	5.88	1.24	0.002*
Cognitive Benefits	205	4.77	1.41	201	5.15	1.32	0.006*
Innovators	57	4.68	1.35	58	4.53	1.26	0.530
Scorers	37	4.90	1.08	38	5.00	1.32	0.729
Knowledge Miners	59	4.54	1.42	57	5.59	1.24	0.000*
Observers	52	5.04	1.63	48	5.48	1.19	0.119
Social Benefits	205	5.63	1.21	201	5.47	1.24	0.181
Innovators	57	5.75	1.27	58	5.60	0.91	0.482
Scorers	37	5.48	0.86	38	4.84	1.16	0.009*
Knowledge Miners	59	5.71	1.02	57	6.08	0.88	0.039*
Observers	52	5.53	1.54	48	5.08	1.62	0.158
Personal Benefits	205	4.19	1.62	201	4.06	1.52	0.411
Innovators	57	3.88	1.44	58	3.77	1.31	0.662
Scorers	37	4.48	1.40	38	4.09	1.60	0.266
Knowledge Miners	59	3.93	1.63	57	4.16	1.64	0.459
Observers	52	4.63	1.85	48	4.29	1.55	0.328
Economic Benefits	205	3.63	2.00	201	3.83	2.10	0.334
Innovators	57	3.58	1.90	58	3.62	2.09	0.911
Scorers	37	3.92	1.83	38	4.35	2.01	0.333
Knowledge Miners	59	3.36	2.03	57	3.42	2.15	0.867
Observers	52	3.79	2.21	48	4.15	2.05	0.413
Future Intention to Participate	205	5.06	1.45	201	5.45	1.31	0.005*
Innovators	57	5.42	1.49	58	5.41	1.28	0.978
Scorers	37	4.71	1.49	38	5.32	1.64	0.099
Knowledge Miners	59	5.15	1.25	57	5.62	1.14	0.035*
Observers	52	4.82	1.50	48	5.39	1.29	0.046*
Significant at *.05							

5.5 Summary of results

5.5.1 Innovators

There was no treatment difference between the base and role-based models for innovators (high domain knowledge and high innovativeness). Thus, contribution performance, overall experience, perceived benefits, and future intention to participate did not show significant differences (see Table 16).

Table 16. Results of Innovators

	Base Model	Role-based Model	Difference	Sign of Significance
Contribution Quantity	10.3	9.3	-1.0	↔
Contribution Quality	76.9	77.9	1.0	↔
Overall Experience	6.0	6.0	0.0	↔
Hedonic Benefits	5.6	5.6	0.0	↔
Cognitive Benefits	4.7	4.5	-0.2	↔
Social Benefits	5.7	5.6	-0.1	↔
Personal Benefits	3.9	3.8	-0.1	↔
Economic Benefits	3.6	3.6	0.0	↔
Future Intention to Participate	5.4	5.4	0.0	↔

5.5.2 Scorers

Limitations on idea generation had an adverse impact on social benefits for scorers (high domain knowledge and low innovativeness), as these users could not express their ideas or present themselves. Although slight improvements were observed for other parameters, the results did not differ significantly, as shown in Table 17.

Table 17. Results of Scorers

	Base Model	Role-based Model	Difference	Sign of Significance
Contribution Quantity	8.2	9.5	1.3	↔
Contribution Quality	75.1	80.0	4.9	↔
Overall Experience	5.6	6.0	0.4	↔
Hedonic Benefits	4.9	5.3	0.5	↔
Cognitive Benefits	4.9	5.0	0.1	↔
Social Benefits	5.5	4.8	-0.6	↓
Personal Benefits	4.5	4.1	-0.4	↔
Economic Benefits	3.9	4.4	0.4	↔
Future Intention to Participate	4.7	5.3	0.6	↔

5.5.3 Knowledge miners

Knowledge miners (low domain knowledge and high innovativeness) had to watch a video tutorial to improve their domain knowledge. As shown in Table 18, this task had a positive impact on overall experience and hedonic, cognitive, and social benefits. These users had a higher future intention to participate in such co-innovation platforms.

Table 18. Results of Knowledge Miners

	Base Model	Role-based Model	Difference	Sign of Significance
Contribution Quantity	8.8	11.7	2.9	↔
Contribution Quality	67.8	72.2	4.4	↔
Overall Experience	5.8	6.5	0.7	↑
Hedonic Benefits	5.5	6.1	0.6	↑
Cognitive Benefits	4.5	5.6	1.0	↑
Social Benefits	5.7	6.1	0.4	↑
Personal Benefits	3.9	4.2	0.2	↔
Economic Benefits	3.4	3.4	0.1	↔
Future Intention to Participate	5.1	5.6	0.5	↑

5.5.4 Observers

Observers (low domain knowledge and low innovativeness) had to watch a video tutorial to improve domain knowledge and make ten idea evaluations to generate new ideas. As shown in Table 19, these tasks had both positive and negative effects on these users.

Table 19. Results of Observers

	Base Model	Role-based Model	Difference	Sign of Significance
Contribution Quantity	7.2	9.9	2.7	↔
Contribution Quality	75.2	77.5	2.3	↔
Overall Experience	5.5	6.2	0.8	↑
Hedonic Benefits	5.0	5.9	0.9	↑
Cognitive Benefits	5.0	5.5	0.4	↔
Social Benefits	5.5	5.1	-0.4	↔
Personal Benefits	4.6	4.3	-0.3	↔
Economic Benefits	3.8	4.1	0.4	↔
Future Intention to Participate	4.8	5.4	0.6	↑

5.5.5 Hypotheses

Although task differentiation based on users' domain knowledge and innovativeness improved the number of contributions and enhanced the quality of ideas, the results were not significant (see Table 20). Participants in the role-based model had better overall experience and hedonic and cognitive experiences. In terms of future intention to participate, participants in the role-based model were more interested in a co-innovation task than those in the base model.

Table 20. Summary of Hypotheses

	Base Model	Role-based Model	Difference	Sign of Significance	Result
Contribution Quantity	8.7	10.2	1.5	↔	Not supported
Contribution Quality	73.8	76.0	2.2	↔	Not supported
Overall Experience	5.7	6.2	0.5	↑	Supported
Hedonic Benefits	5.3	5.7	0.5	↑	Supported
Cognitive Benefits	4.8	5.1	0.4	↑	Supported
Social Benefits	5.6	5.5	-0.2	↔	Not supported
Personal Benefits	4.2	4.1	-0.1	↔	Not supported
Economic Benefits	3.6	3.8	0.2	↔	Not supported
Future Intention to Participate	5.1	5.4	0.4	↑	Supported

CHAPTER 6

CONCLUSION

The study contributes to the co-innovation literature by providing a comprehensive perspective for investigating the impact of customized task design on contribution performance in the context of users.

The findings of the role-based model showed that the prerequisite task for participants with high domain knowledge and low innovativeness scores (scorers) was not appropriate. Thus, the hypothesis test result was not significant for contribution quantity or overall experience, perceived benefits, or future intention to participate. Second, the prerequisite task for participants with low domain knowledge and high innovativeness scores (knowledge miners) satisfied user needs, and their overall experience, hedonic benefits, cognitive benefits, social benefits, and future intention to participate in such co-innovation platforms were improved. Third, although the learning task satisfied some user needs for participants with low domain knowledge and low innovativeness scores (observers), the evaluation task had a negative impact on personal and social benefits. Finally, because there was a significant but weak correlation between domain knowledge and idea novelty, the learning task did not sufficiently improve the contribution quality of knowledge miners.

6.1 Theoretical contributions

This study provides four key implications for academics interested in co-innovation platforms. Previous research found that individuals with high domain knowledge and innovativeness scores contribute more to co-innovation communities (Zhang et al., 2019;

Shen et al., 2018; Füller et al., 2008). This study found similar results, with some differences. Users with high domain-specific skills were more oriented towards showing their expertise instead of evaluating others' performance. Users with high innovativeness scores not only showed their knowledge but also participated in any co-creation process. This enhances our understanding and offers insights into user behavior from the perspective of agency and communion theory (Bakan, 1966). Agency describes “a desire for independence and separation from other organisms” and communion describes “a striving for connection and unity with other organisms” (Kurt & Frimer, 2015, p.1). People with high domain knowledge presented agency-oriented behavior to demonstrate their competence, while people with high innovativeness scores presented communion-oriented behavior and exhibit interest in other users' outputs. Therefore, the former can be categorized as a competitor, whereas the latter is a co-competitor (Leclercq et al., 2017).

Second, the results of the study showed that contribution quality did not present significant variations between roles, and there was a weak correlation only between domain knowledge and idea novelty. Jahanmir and Lages (2015), demonstrated that lag-users who were defined as “being suspicious about new technologies, being resistant to change” could generate incremental innovations. Therefore, this study has validated that while domain knowledge can be used as categorization criteria to improve the quality of outcomes, innovativeness does not have the same impact.

Third, the study demonstrated that compatibility between demands and abilities and the compatibility between supplies and needs should be evaluated together to improve the effectiveness of co-innovation platforms. Thus, this study contributes to literature by providing insights into task compatibility with user needs.

Finally, a prominent contribution of this research is a comprehensive analysis of co-innovation platforms from both the company and consumer perspective and contributes to the fields of information systems and management science. Current literature does not present the impact of task differentiation on consumers overall experience, perceived benefits, and future intention to participate. Thus, this research provides insights about the consequences of customized design on consumer behavior, and also identifies potential avenues for future research.

6.2 Managerial implications

The study offers several implications for managerial practice. First, the results of the study provide a guide on how to categorize users and define their roles accordingly to obtain high-quality contributions. Managers should determine competitive tasks for users with high domain-specific skills and collaborative tasks for users with high innovativeness scores.

Second, the study showed that learning should be a prerequisite task for improving contribution quality, and that companies should focus on various training strategies. Contribution quality can only be enhanced by addressing relevance, feasibility, and specificity as much as idea novelty. Thus, company professionals should provide examples that better explain each component to obtain the greatest benefit from the crowd.

Third, the study demonstrated that managers should define better empowerment strategies in terms of expected benefits, as participants have different types of motives. As this study found, limitations on idea generation can damage participants' social and

personal benefits, which reinforces the need to adopt tasks in which users can show their expertise, such as idea integration.

Finally, a prominent inference of this study is that company professionals should focus their attention on building value-added consumer interaction tasks. It is especially essential for companies to grasp the importance of task customization according to user segments and building value-added interaction activities rather than targeting specific user groups with standard co-innovation tasks.

6.3 Limitations

This research is limited by certain constraints that may be addressed in future studies. The first limitation was related to the participant recruitment stage. The study approximately took 30-40 minutes, and it was difficult to convince users to engage. Future studies should explore better design structures to comprehensively analyze the environment.

The second limitation is that the number of ideas generated by users in the experimental group with low innovativeness scores was not sufficient to analyze the impact of the treatment. Therefore, the study could not demonstrate the impact of more idea evaluations on idea quality which may be investigated in future studies.

The last limitation is related to the limited number of tasks. The idea limitation and presentation of a video tutorial were the two task differentiations provided to users. Therefore, future research can study different tasks, such as commenting or idea integration, which may add value to improving the effectiveness of co-innovation platforms.

6.4 Future research directions

This research lays the groundwork for future research to improve the effectiveness of co-innovation platforms. In addition to limitations that may be addressed in future studies, three emergent research themes are identified based on the results of the study.

6.4.1 Task matching process

While there are many successful implementations of co-creation projects, there are also examples in which the co-innovation initiative has failed because of the small number of potential contributors (Akman et al., 2019). The study results showed that limiting idea generation is not an appropriate task for users with high domain knowledge. Future studies can investigate new methodologies that explore the task-matching process to improve the compatibility between the user and task.

6.4.2 Training methodologies

The study validated that not only the quality of the outputs but also the quality of the assigned tasks is important. The tutorial improved the idea quality and enhanced the contribution of participants, especially for knowledge miners. Providing support to non-experts can ameliorate disadvantages associated with member diversity and solve cognitive fixation problems. Future research is required to explore new methodologies that can help non-experts improve their domain knowledge.

6.4.3 Interactive design elements

Consumers expect different benefits from co-innovation experiences, in return for their time and effort. The results showed that limitations on idea generation had an adverse

impact on social benefits, which is a critical perceived benefit that users expect during collaboration. More research is needed to identify new design elements that can enhance interactivity among members and improve their social benefits, while disabling idea generation.

APPENDIX A

GENERATED IDEAS ON THE PLATFORM

Subject	Content
Prospektüs açıklaması	İlaç prospektüslerini okumak ve anlamaya çalışmak birçok kişi zordur. Bunun yerine ilacın ne için ve nasıl kullanılacağını basit bir dille sesli olarak anlatan bir mobil uygulama geliştirilmesi faydalı olacaktır.
İlaç geri dönüşüm programı	Çoğu hasta kullandığı ilaçları tamamiyle bitirmiyor. Örneğin ilaç yan etki gösteriyor ya da hasta bu ilaçtan fayda sağlamıyor. Pahalı ilaçların geri dönüşümünde yararlı olacak bir sistem geliştirilebilir.
Akıllı yürüteç	Uzun süre yürüteç kullanan hastaların eğilmekten dolayı duruş bozukluğu oluşuyor. Ayrıca ellerine kuvvet verdikleri için bileklerinde ağrı oluşuyor. Yürüteç yerine güvenli şekilde yürümeyi sağlayan bir cihaz geliştirilebilir.
Konuşma zorluğu tedavisi	Kekeleyen kişiler için yapılmış "konuşma terapisi uygulaması" yararlı olacaktır. Uygulama, kişilerin ses kayıtları üzerinden gelişim durumlarını gösterebilmelidir. Böylece terapiye gidemeyen hastalar uygulama ile tedavi olabilirler.
Obezite tedavisi	Obezite hastaları için daha fazla kalori yakmayı sağlayan sanal gerçeklik oyunları bulunuyor. Bu uygulamalara ilaveten, tokluk hissi veren ve yeme isteğini ortadan kaldıran VR gözlük geliştirilmesi diyet yapmayı kolaylaştıracaktır.

İlk yardım uygulaması	Acil durum sırasında konuşarak cevap alabileceğimiz sanal doktor uygulaması, özellikle yalnız yaşayan kişiler için yaşamsal değer taşıyacaktır.
Test hatırlatma uygulaması	Kronik rahatsızlığı olan kişilerin belli periyotlarla yaptırması gereken, ayrıca check-up amaçlı belli aralıklarla yapılması istenen kan tahlili, röntgen, ultrason vb. testler bulunmaktadır (tiroid testi, kan şekeri ortalaması kontrolü, meme ultrasonu gibi). Bu testleri hatırlatan bir mobil uygulama geliştirilmesi kişilerin kendi sağlık takibini yapmasını kolaylaştıracaktır.
Fizik tedavi uygulaması	Kişiye özel fizik tedavi hareketlerini belirleyen bir mobil uygulama ve bu hareketleri doğru yapmadığında hastayı uyararak bir VR gözlük geliştirilebilir. Özellikle evde bakım hastaları için böyle bir uygulama ve gözlük çok faydalı olacaktır.
Tedavi öneren mobil uygulama	Hasta şikayetlerini sesli olarak alan ve hastanın geçmiş verilerine bakarak ve tıbbi bilgileri kullanarak alınması gereken aksiyonlarla ilgili öneriler sunan bir uygulama geliştirilebilir.
Ambulansın gecikmesinin önlenmesi	Geçmiş yılın verilerine bakılarak, mahalle bazında acil durum için çağırılan ambulans sayısı ve sıklığı belirlenebilir. Bu mahallelere yakın hastanelerdeki ambulans sayısı bu analiz sonucuna göre değiştirilebilir. Böylece ambulansın gecikme durumu önenebilir.

APPENDIX B
QUESTIONNAIRE (TURKISH)

Table B1. Registration questions – Turkish

E-Posta Adresiniz	
Şifreniz	
Şifreniz (Tekrar)	
Yaş Aralığınız	18-25, 26-35, 36-45, 46-55, 56+
Cinsiyetiniz	Erkek, Kadın, Belirtmek istemiyorum
Eğitim Durumunuz	İlköğretim, Lise, Ön Lisans / Lisans, Yüksek Lisans / Doktora
Mesleğiniz / İşiniz	

Table B2. Innovativeness scale – Turkish

No	Lütfen aşağıdaki ifadeler için uygun olan seçeneği işaretleyiniz.	Kesinlikle katılmıyorum			Ne katılıyorum/ Ne katılmıyorum			Kesinlikle katılmıyorum
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Yenilikleri takip ettiğim için arkadaşlarım sık sık benden bilgi ve öneri alırlar.							
2	Yeni şeyleri denemekten hoşlanırım.							
3	Problemleri çözmek için genellikle yeni yöntemler bulurum.							
4	Yeni bakış açıları ve yeni buluşlara şüphe ile bakarım.							
5	Çevremdeki insanların kabul ettiğini görene kadar yeni fikirleri benimsemem.							
6	Yenilikçilik konusunda insanları kolay etkileyen bir kişi olduğumu düşünürüm.							
7	Düşünce ve davranışlarımın yaratıcı ve özgün olduğunu düşünürüm.							
8	Çevremdeki insanların işine yaradığını görünceye kadar yenilikleri kabul etmede isteksiz davranırım.							
9	Alışıl gelmiş yaşam tarzının ve işleri geleneksel yöntemlerle yapmanın en iyi yol olduğunu düşünürüm.							
10	Problemlere ve belirsizliklere karşı mücadele ederim.							
11	Yenilikleri dikkate almadan önce diğer insanların o yeniliği kullandığını görmek isterim.							
12	Yeni fikirlere açık biriyim.							

Table B3. Domain knowledge scale – Turkish

No	Aşağıda belirtilen teknolojik gelişmeler hakkında ne ölçüde bilgi sahibi olduğunuzu lütfen belirtiniz.	Hiç fikrim yok.	Kavramı duydum ancak ne olduğu hakkında kısıtlı bilgim var.	Kavramı duydum, ne olduğunu kısaca anlatacak kadar biliyorum.	Bu kavram hakkında oldukça bilgiliyim ve konuyu takip ediyorum.	Bu kavram hakkında çok bilgiliyim, konuyla ilgili çoğu gelişmeye hakimim.
1	Blok Zinciri					
2	Bulut Bilişim					
3	Büyük Veri					
4	Endüstri 4.0					
5	Nesnelerin İnterneti					
6	Yapay Zeka					
7	3 Boyutlu Yazıcı					

Table B4. Overall experience scale – Turkish

No	Bu platforma katılarak, sağlık alanındaki yeniliklerle ilgili fikirlerinizi paylaşma ya da başkalarının fikirlerini değerlendirme deneyiminiz oldu. Genel olarak bu deneyiminiz						
1	Tatmin edici değil	...	...	...	...	...	Tatmin edici
2	Olumsuz	...	...	...	...	...	Olumlu
3	Sıkıcı	...	...	...	...	...	Keyifli
4	Başarısız	...	...	...	...	...	Başarılı
5	Zor	...	...	...	...	...	Kolay

Table B5. Expected benefits scale – Turkish

No	Aşağıdaki ifadeler bu platforma katılımınızdan elde edebileceğiniz çeşitli faydalarla ilgilidir. Lütfen uygun seçeneği işaretleyiniz.	Kesinlikle katılmıyorum			Ne katılıyorum/ Ne katılmıyorum			Kesinlikle katılıyorum
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
	<i>Eğlenme Deneyimi</i>							
1	Keyifli ve dinlendirici zaman geçirdim.							
2	Eğlendim ve zevk aldım.							
3	Hoş vakit geçirdim ve zihnim canlandı.							
4	Problem çözmeye, fikir üretme gibi eylemler eğlenmemi sağladı.							
	<i>Öğrenme Deneyimi</i>							
1	Becerilerimi geliştirebildim.							
2	Yeni bilgi/uzmanlık kazandım.							
3	Yeteneklerimi test edebildim.							
4	Yeni fikirler ve yeniliklere ayak uydurma fırsatı buldum.							
5	Yeni fikirler geliştirdim.							
	<i>Sosyal Deneyim</i>							
1	Başkalarının ne dediğini merak ettim.							
2	Neler olup bittiğini takip etmekten hoşlandım.							
3	Kendimi özgürce ifade edebilmekten mutlu oldum.							
4	Benimle benzer ilgi alanları olan insanlarla tanıştım.							
	<i>Kişisel Deneyim</i>							
1	Başkaları üzerinde iyi bir izlenim bırakabildim.							
2	Algılanma şeklimi geliştirebildim.							
3	Kim olduğumu başkalarına anlatabildim.							
	<i>Ekonomik Deneyim</i>							
1	Bu tarz platformlarda yer aldığımda maddi kazanç sağlamayı beklerim.							
2	Bu platformlardaki faaliyetlerin karşılığını maddi olarak almak isterim.							
3	Böyle bir platformda gösterdiğim gayretin karşılığında uygun bir ödül beklerim.							

Table B6. Future intention to participate scale – Turkish

No	Aşağıdaki ifadeler gelecekte bu tür platformlara katılımınız ile ilgilidir. Lütfen uygun seçeneği işaretleyiniz.	Kesinlikle katılmıyorum			Ne katılıyorum/ Ne katılmıyorum			Kesinlikle katılmıyorum
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Gelecekte bu tür platformlara katılabilirim.							
2	Mümkün olduğunda, bu tür platformlara katılmaya devam etmek isterim.							
3	Gelecekte bu tür platformlara daha sık katılacağımı düşünüyorum.							

APPENDIX C

IDEA EVALUATION SCALE (TURKISH)

Katılımcıların yazdığı fikirlerin kalitesini dört başlık altında ölçmenizi ve 1'den 5'e kadar bir değer vermenizi bekliyoruz.

Eğer daha önce başka biri tarafından belirtilmiş bir fikir ise "Tekrar edilmiş" ya da sağlıkta inovasyonla ilgili değil ise "Değerlendirmeye gerek yok" seçeneklerini işaretleyiniz.

- Tekrar edilmiş
- Değerlendirmeye gerek yok (Örneğin konuyla ilgili değil, anlaşılmıyor vb. gibi)

		Kesinlikle Hayır				Kesinlikle Evet	Ağırlık
		1	2	3	4	5	
Yenilikçi	Bu fikir orijinal midir?						25%
Faydalı	Bu fikir sağlık alanında faydalı mıdır?						30%
Yapılabilir	Bu fikir uygulanabilir mi?						35%
Anlaşılır	Bu fikir anlaşılır mı?						10%
Fikrin kalitesi	Bu fikrin kalitesine verdiğiniz toplam değer 100 üzerinden						

APPENDIX D

APPROVAL OF ETHICS COMMITTEE



T.C. BOĞAZIÇI ÜNİVERSİTESİ
Sosyal ve Beşeri Bilimler İnsan Araştırmaları Etik Kurulu (SBİNAREK)

18.11.2019

Prof. Dr. Hande Türker
Boğaziçi Üniversitesi,
Uygulamalı Bilimler Yüksekokulu,
Yönetim Bilişim Sistemleri Bölümü,

Sayın Araştırmacı,

"Comparison of Base-model and Role-Based Model in Virtual Co-creation environment: Innovations in Healthcare Industry." başlıklı projeniz ile Boğaziçi Üniversitesi Sosyal ve Beşeri Bilimler İnsan Araştırmaları Etik Kurulu (SBİNAREK)'e yaptığınız 2019-31 kayıt numaralı başvuru 15.11.2019 tarihli ve 2019/08 sayılı kurul toplantısında incelenmiş ve projeye etik onay verilmesi uygun bulunmuştur.

Saygılarımızla, bilgilerinizi rica ederiz.

Doç. Dr. Osman Sabri Kıratlı (Başkan)
Uygulamalı Bilimler Yüksek Okulu
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APPENDIX E

USER GENERATED IDEAS

No	Participant	Experimental Group	Role	Subject	Content
1	ni***39	Base Model	Innovator	Kapıda Eczane	Getir gibi bir uygulamanın eczanelere uyarlanması.
2	ed***in	Role-based Model	Innovator	online prospektüs kütüphanesi	ilaçların prospektüslerini içerdiği bir uygulamada, kullanıcılar ilaç isimlerinden hızlıca ilaç detaylarına ve önemli bilgilere ulaşabilirler. ayrıca belli filtrelemeler yaparak(örneğ kalp rahatsızlığı, hamilelik vb.) ilaç uygunluklarını ve yan etkilerini hızlıca tarayıp uygun ilacı tespit edebilirler.
3	ha***em	Base Model	Scorer	Hastane	Online randevu alırken en uygun zamandaki hastanelerin listesi kullanıcının ekranına gelsin
4	ub***on	Role-based Model	Scorer	Alzheimer Hastaları	Hastalar bazen kaybolabilmekte, bu nedenle vücutlarında görmedikleri yerlerde, çıkarmayacakları şekilde taşıyabilecekleri bir aygıtla (örneğin bant) gibi izlenebilme ve kaybolma olasılığının ortadan kaldırılması gibi bir olasılığın olabileceğini düşünüyorum.
5	se***93	Base Model	Knowledge Miner	Sağlık	Hastanelerde işlemlerin çoğu dijital ortamlara taşınmalı ve hızlı duruma getirilmelidir.

6	ha***ta	Role-based Model	Knowledge Miner	İlaç Sistemi	İlacı biten bir hastanın tekrar ilaç yazdırması için doktor randevusunun hastaya otomatik sistemin vermesi, hastanın bu sayede randevu almak için uğraşmaması veya ilacı sistemde doktor yazar, hasta doktora gitmeden ilacının devamını tekrar eczaneden gider alır. Bu ilaç randevu sistemi ile ilgili bir yenilik olabilir. Doktor randevusu almak için de uzun yıllardır bir doktora kontrole giden bir hasta sistemde farklı tanımlanıp randevu alması kolaylaştırılabilir. Sistem hastaları puanlayabilir.
7	ci***ar	Base Model	Observer	Ürün Orjinalliği	Bandrollu olsa dahi özellikle internetten alınan ürünler sahte olabiliyor. Bununla ilgili daha özel bir uygulama yapılabilir
8	na***ar	Role-based Model	Observer	Günlük kullanılan ilaçların hatırlatılması	Kronik hastalıklara sahip kişilerin gün içinde farklı zamanlarda birden fazla ilaç kullanma durumu olabiliyor. Bir mobil uygulama ile belirlenen saatlar de hangi ilacı ve ne dozda kullanacağını belirten bir bildirim yapılabilir. Uygulama üzerine de ilacı alıp almadığını bir tuş ile kayıt edip ilacı ne kadar düzenli alıp almadığını gösteren bir rapor çıkarabilir

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