

# Innovation process model based on the sharing economy concept

Anna Veretennikova, Kseniya Kozinskaya

Institute of Economics, Ural Branch of Russian Academy of Science, Yekaterinburg, Russia

**Abstract**—The transformation of socio-economic relations due to the rapid development of digital technologies, the exposure to social and environmental problems, and the change in market behavior models lead to the need to design organizational processes based on continuous changes. Under these conditions, social relationships, effective models of cooperation, as well as the availability of resources become the most significant for the development of the innovative activity. This study aims to develop a model of the innovation process based on the concept of a sharing economy. The information base of this study was scientific sources presented in the Scopus database, revealing approaches to innovative development and the formation of the concept of a sharing economy. The research procedure included analysis of models of the innovation process, substantiation of the potential for using the sharing economy in increasing the efficiency of resource use, directly demonstrating the proposed model, as well as the potential for its use. The proposed innovation process model is based on the principles of cooperation, peer-to-peer relationships, and the potential of using blockchain technology. The innovation process model also considers the current formal and informal environment that determines all stages of the reproduction process. In addition, using the eEPC process modeling notation, we developed an algorithm that allows us to decide on the appropriateness of applying this model. This algorithm takes into account the type of activity, as well as the specificity of the required assets. The results obtained make it possible to expand the provisions of the innovation theory, taking into account the transformation of the resource consumption model. We believe that the proposed application model will unlock the sharing economy's potential to drive innovation and serve as a driver for developing a circular economy that can also use this model.

**Keywords**— *sharing economy, innovation process, digital platform, model.*

## I. Introduction

The sharing economy that serves as a new model of business organization introduces significant changes in creating products or services. At the same time, these changes concern both individual elements of the value chain and entire markets, which also arise during the development and spread of the sharing model (Botsman & Rogers, 2010). Incumbent firms are increasingly incorporating SE principles into their business models. Referring to the classification of innovations by J. Schumpeter, it should be noted that the model of the sharing economy covers three types of innovations: new processes, new markets, and new organizational forms (Schumpeter, 1934). When considering the sharing economy as a component of the circular economy, one can also testify to its participation in creating new materials or sources of raw materials.

At the same time, the formation of the sharing economy model itself is also innovative. This type of innovation can be considered an institutional innovation (Lu, Wang, Zhang, 2021) that introduces changes in the behavior of economic agents. The developing digital environment creates the context for developing a sharing economy, and the use of digital technologies makes it possible to accelerate the consolidation of a new behavior model.

The formation and transformation of innovation process models are evolutionary due to the complication of the configuration of innovation processes. In particular, the transition from a linear model of the innovation process to a conjugated and network one, on the one hand, creates conditions for the development of a sharing economy, on the other hand, allows this model to be used to optimize costs in the development of innovative activities.

In addition, the development of the sharing economy from the transactional sector to the transformational sector makes it possible to associate this model with marketing activities. For example, Snyder et al. (2016) believe that the sharing economy will force marketing scientists to rethink innovation based on its unique characteristics. However, the impact of the sharing economy is much broader. Its development and consolidation testifies to the presence of institutional voids. Closing these voids, the sharing economy becomes an institutional innovation. Also it creates new opportunities for the economic development providing new approaches to the organization of production.

This study aims to develop a model of the innovation process based on the concept of a sharing economy.

For achieving the goal, a review of the models of the innovation process identified in the scientific literature was carried out; it was shown that individual elements of the sharing economy could be built into existing models of innovation processes and also serve as the basis for the development of the author's model of the innovation process based on the principles of the sharing economy.

## II. Innovation process models and the sharing economy concept

The formation of models of the innovation process in the research literature is closely related to the development of management theory, innovation theory, systems theory, and institutional economics.

J. Schumpeter views innovation as new combinations that can lead to new products, markets, production methods, suppliers, and forms of organization (Schumpeter, 1934). Porter argues that innovation is a new or better way to compete, manifesting in a new product design, a new manufacturing process, a new marketing approach, or a new way of delivering training (Porter, 1990). The Oslo Management defines innovation as an activity that results in a new or improved product or process (or a combination of both) that is significantly different from previous products or processes of a division, and that has been made available to potential users (product) or put into service by a unit (process) (OECD, 2018)

Models of the innovation process are divided into a linear, integrated, network and others. Among the linear models, the technology push (science-push) model should be noted (Bush, 1945). The innovation process in the linear model is a causal chain, starting with discoveries. As a result, new knowledge is transformed into new products, passing through certain stages. The result obtained from each stage becomes the input resource of the next stage, and subsequent stages do not provide feedback to the previous ones.

The change in emphasis in management led to the development of the second linear model of the innovation process, "demand-pull." (Chidamber; Kon, 1994). In this model, innovation was driven by demand, which influenced the direction and scale of technological development.

R. Cooper's Stage-gate model is the most well-known version of the linear model of the innovation process. The model divides the process of developing a new product into five consecutive stages with intermediate decision points called "gates." Each stage is a set of parallel actions performed by the project team, formed of representatives of different functional areas of the company. "Gates," serving as "gates" between the stages of the project, are a particular set of results or criteria based on which the management (meeting of managers) determines the quality of work performed by the completed stage and the appropriateness of allocating resources for the next stage (Rothwell, Zegveld, 1985).

The «coupling model» integrates the approaches described above and focuses on the process of establishing feedback. In the coupled model, ideas come from R&D results and market needs. This approach to the organization of the innovation process allows enterprises to reduce the product development time while reducing costs and significantly increasing horizontal cooperation (creation of joint ventures, strategic alliances)

Systems integration and networking model allows firms which do not have sufficient resources to create innovations to develop by integrating with a network of other firms and organizations (suppliers, research laboratories, universities, consumers, and other institutions) (Preez & Louw, 2008)

The development of the digital economy has created new opportunities for developing models of innovative processes based on the transformation of interaction participants, including the development of digital platforms. This leap in

technological development and the development of relationships on digital platforms has made it possible to consider more complex relationships in developing innovative activities.

Innovative business models using different digital platforms differ what is determined by the different type and functionality of these platforms. De Marco et al (2019) distinguish such platforms as platforms for platforms, platforms that make available digital tools and help with the creation of other platforms/marketplaces, platforms mediating work, retail platforms, and service-providing platforms. Researchers also identify the following types of platform business models: Integrator, product and two-sided (or multi-sided) platform business models (De Marco et al, 2019).

The development of the sharing economy model can be considered in the context of the development of the platform economy, as well as a separate area that has had a significant impact on innovation development. First, this model has incorporated elements of conjugated and network models. Consumers and users of the platform create a network, and horizontal peer-to-peer relationships reduce transaction costs. The digital aspect has made it possible to expand the scale of its distribution and use significantly.

The sharing economy, in turn, can be examined as a separate institutional innovation and can act as a basis for developing an innovation process model based on the use of the sharing economy (Brugnoni, Polzonetti, Sagratella, 2016).

The attribution of the sharing economy model to institutional innovations is due to the direct transformation of the norms and rules of production and consumption based on cooperation and the use of digital technologies, which not only changes formal institutions but also contributes to the formation and development of informal institutions (Ko et al, 2021; Räisänen, Ojala, Tuovinen, 2021). The innovation process model based on the application of the sharing economy can be applied to the entire value chain or its elements.

### III. Methodology

The information base of the study was the publications presented in the Scopus database. We used the queries "Innovation AND Sharing economy" and "Innovation AND Collaborative economy".

At the first stage of the study, it was shown that analysis was made of the use of sharing economy tools at various stages of value creation, according to M. Porter.

In the second stage, a model of the innovation process was directly presented, based on the concept of sharing economies. This model includes two contours - institutional and digital. The digital circuit is the basis for fixing the principles of the sharing economy in the projected process. The institutional outline defines the behavior patterns that define the main phases of the innovation process.

When forming the author's innovation process model, based on the application of the concept of a sharing economy, it is necessary to determine the limits of applicability and the principles for constructing this model. The choice of applicability limits is determined by the purpose, scope, specific characteristics of the product, service, technology, or process being created, and the type of proposed innovation. The principles that underlie the innovation process model should be based on the fundamental postulates of the development of a sharing economy, including 1) the principle of cooperation and sharing; 2) the use of digital platforms; 3) peer-to-peer relationships; 4) providing access to resources.

In the «Discussion», using the eEPC process modeling notation, we presented an algorithm that allows us to decide on the appropriateness of applying this model. This algorithm takes into account the type of activity, as well as the specificity of the required assets

|                           | <b>contour</b>                                 |   |
|---------------------------|--|---|
| Inbound Logistics         | Equipment and premises rental                  | Applications and digital platforms for equipment and premises rental  |
| Operations                | Equipment rental                               |   |
| Outbound Logistics        | Vehicle rental                                 | Applications and digital platforms for vehicle rental   |
| Marketing and Sales       | Marketplaces                                   | Applications and digital platforms for sharing items; Blockchain technology, Tokenization, Financial technologies |
| Service                   | Crowdworking                                   | Digital Platforms   |
| Procurement               | Vehicle rental, crowd lending, crowd investing | Blockchain technology, Tokenization, Financial technologies   |
| Technology Development    | Sharing centers                                | Digital Platforms   |
| Human research management | Crowdworking                                   | Digital Platforms   |
| Firm infrastructure       | Crowd lending, crowd investing, crowd working  | Digital Platforms   |

### iv. Results

The design of the innovation process model based on the concept of a sharing economy was based on the following theses:

- in the sharing economy model, there is a redistribution of the roles of consumers and producers of economic goods;
- the use of digital technologies contributes to the consolidation of the institutions of the sharing economy;
- economic benefit (including innovation) is the result of the joint activities of stakeholders and the sharing of resources.

When using the sharing economy model, the role of marketing is transformed. On the one hand, this model can be used to promote products and services. On the other hand, the orientation towards creating joint activities leads to the fact that this function is transformed as such. Distributors of information are network members involved in the creation of this product. finish writing

The transformation of connections, roles, and behavior patterns in the sharing economy model indicates the need for accelerated institutionalization of new norms and rules, which is possible by reducing transaction costs through digital technologies.

Thus, the transformation of values in the direction of the sharing development generates a willingness to cooperate and design new forms of interaction. Table 1 shows how the sharing economy model can be used at various stages of the M. Porter value chain. The institutional contour describes process and tools that can be manifested in the value creation process. The digital contour contains information about the digital technologies and infrastructure that support the functioning of the institutional contours.

At the same time, the analysis was carried out by highlighting and disclosing the digital and institutional contour (fig.1).

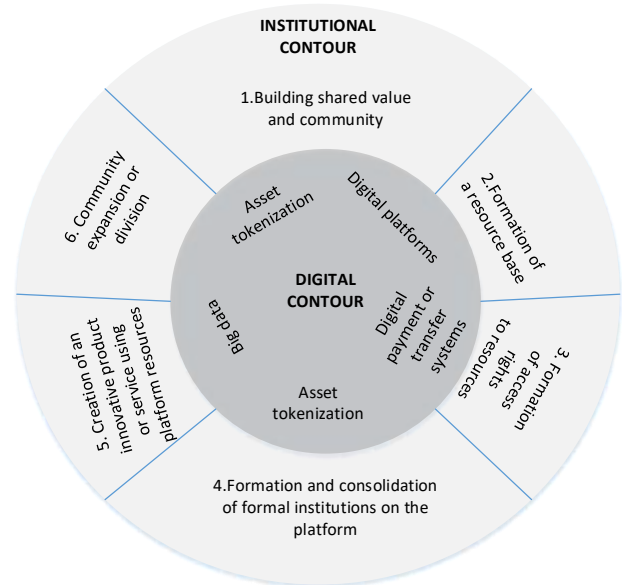


Figure 1. The innovation process model based the sharing economy

In the first stage, based on the sharing values or goals of stakeholders, a community is formed that is ready to create a new product or service with a typical value. The formation of this community can be formed based on a different digital platform, as well as using social networks. In addition, this community, which can later be transformed into a project team, can also be formed through crowd-editing platforms. It should be noted that the roles performed by community members are closely intertwined. For example, in some cases,

TABLE I. INSTITUTIONAL AND DIGITAL CONTOURS IN PORTER'S VALUE CHAIN

| Process | Institutional | Digital contour |
|---------|---------------|-----------------|
|---------|---------------|-----------------|

we can discuss mixing the roles of the customer, consumer, producer, and resource supplier.

In the second stage, when forming the resource base, such forms of the sharing economy as crowdfunding (Ahlers, 2015), crowdinvesting (Borello, De Crescenzo, Pichler, 2019) and crowdlending (Maier, 2016) can also be used to attract financial resources, crowd working to attract labor resources, etc.

The third stage is the transfer of access rights or ownership of resources. In some cases, this process can be optimized through blockchain technology. At the same time, the second and third stages are closely intertwined and can be considered together.

In the fourth stage, more stable ties are formed between economic agents or members of the community. The nature of these relationships can be both formal and informal. At the same time, it should be noted that the provision of these institutions is closely intertwined. For example, trust on the platform can be organized through an explicit algorithm for protecting the rights of participants, implemented through digital algorithms. In other words, formal norms and rules contribute to forming a trust, which characterizes the already informal institutional environment. The reverse mechanism of formation of the institutional environment is also possible - from informal to formal. In this case, the need to transform institutions is due to the community's growth.

In the fifth stage, the innovation process is directly implemented, that is, the process of creating an innovative product or service. Existing models of the innovation process can be applied within this stage.

In the sixth stage, we should discuss the distribution of the resulting product or the product creation model itself. When applying the concept of the sharing economy, this can be expressed in the expansion of the number of users of the digital platform, the growth of the community, and also in the division of the community if this is presented as a separate stage of development.

The sequential placement of these sectors is conditional. It is necessary to talk about the penetration of one sector into another. In addition, individual sectors may be absent or implemented without applying the concept of a sharing economy.

The digital contour contains a set of digital technologies that can be used.

## **v. Discussion**

The presented description of the innovation process model based on the sharing economy indicates that the sharing economy provides a new context for the development of innovation, providing new tools and access rights to resources.

However, this model does not imply a consistent movement from one stage to another. Depending on the project's specific characteristics, individual phases of the

presented model can be implemented through the sharing economy. For example, an innovative project in industrial sectors can be implemented by attracting investments through crowdfunding platforms. R&D development activities can be implemented through the use of sharing centers. In addition, at present, in the scientific literature, both at the national and international levels, there is a discourse regarding the creation of digital platforms that allow the exchange of databases, specifically in the scientific field.

Separate processes of the innovation process associated with the provision of material resources can be implemented by gaining access to certain production facilities.

The limitation of applying the sharing economy model may be the spatial aspect and the specificity of the required assets.

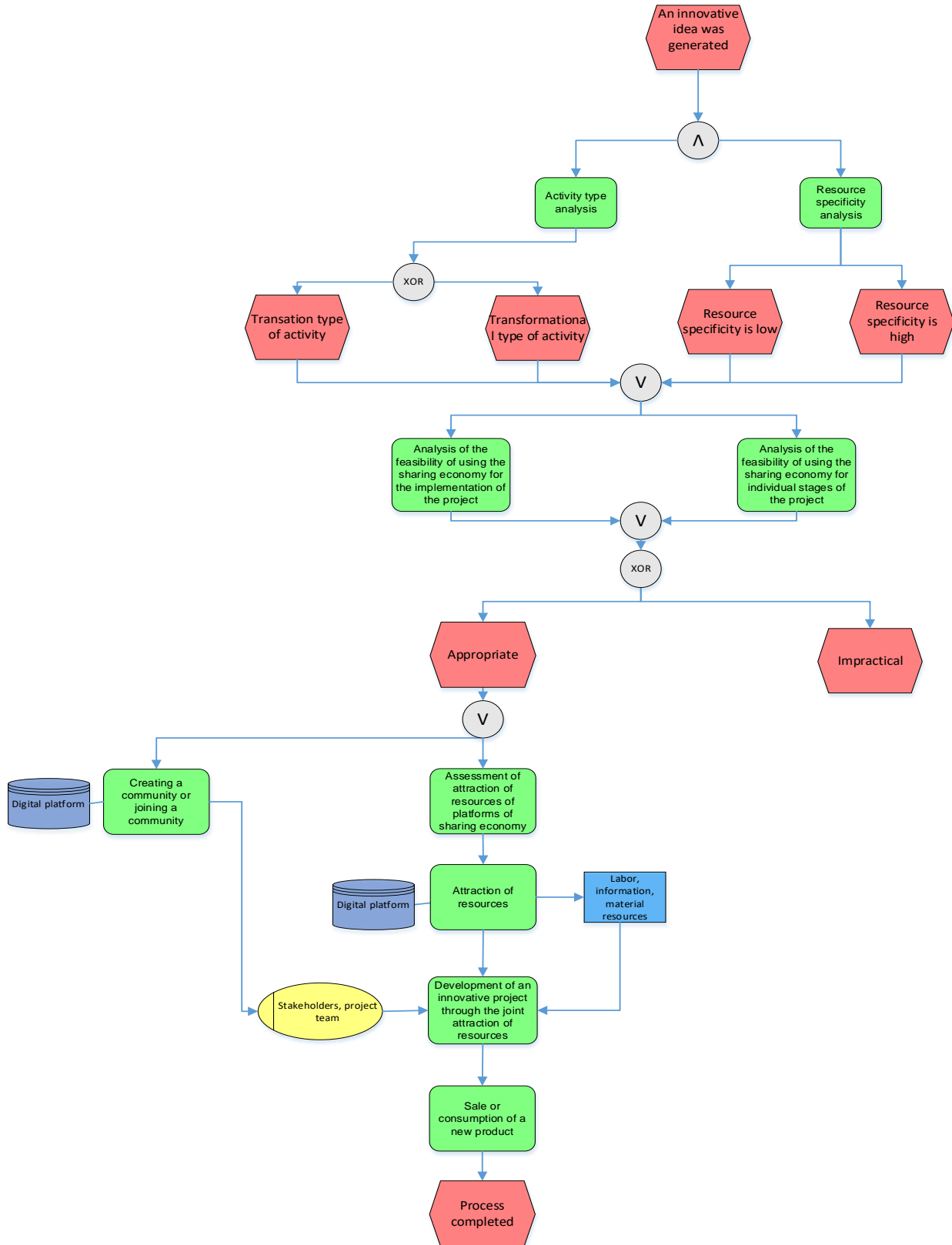
The spatial aspect is due to the possibility of access to specific resources due to their possible territorial remoteness. Asset specificity limitations often relate to access to material resources. At the same time, if it is necessary to consider the specificity of human resources, this model does not present any limitations.

Applying this model can be represented in the following diagram (Fig. 2). The figure shows that to decide on the application of the model presented above, one should evaluate the type of activity and the specificity of assets.

The application of the tools developed in this study is based on the socio-economic and technological, as well as institutional changes that have taken place, which, on the one hand, have provided new opportunities, on the other hand, have significantly transformed socio-economic processes.

In terms of comparing the obtained results with the existing research background in this area, we should mention the works of the Nobel laureate E. Ostrom. E. Ostrom, in her works, revealed the importance of collective, coordinated actions for developing socio-economic processes. The sharing economy, at its core, seems to be an example of a model based on concerted actions using digital technologies. Accounting for the specificity of assets refers us to another Nobel laureate in 2009 - O. Williamson. A digital platform that is inherently hybrid can help mitigate asset-specific risks.

Concerning models related to the sharing economy, it should be noted that the scientific literature considers models that can be applied to individual processes. For example, Grieco& Iasevoli (2022) show that the paths and patterns of value capture innovation using the sharing economy model include the following phases: network, monetization, lock-in. In addition, it is possible to analyze models of different kinds of activities such as transport, hospitality, finance, labor market and others.



## VI. Conclusion

The model of the innovation process presented in this article, based on the use of a sharing economy, shows the importance of institutional changes in innovation development. In addition, the paper shows that the high rate of transformation of the institutional environment is due to the development of digital technologies, which in this case act as the basis for securing new institutions. In addition, the innovation process within this model includes an increasing number of participants who are united in communities. Moreover, the composition of the community can be determined by values, common goals, spatial features, and other factors.

Regarding the development of this area of research, we believe that the ever-deeper penetration of the sharing economy into production processes and the daily life of citizens is one of the deepest stages in the transformation of socio-economic systems as a whole. Developing innovative activity through the sharing economy application is only a tiny part of the ongoing transformation.

We see the prospects for continuing this research in the design of more complex, innovative systems, a more detailed consideration of the relationships implemented within the framework of this approach, as well as in the adaptation of this model for the development of innovative projects in socially significant areas of activity.

The theoretical significance of the results obtained lies in the development of the theory of innovation and the concept of a sharing economy in terms of finding areas of their intersection and developing general theoretical provisions.

The study's practical significance lies in the possibility of using the presented model and the algorithm for developing innovative projects using the sharing economy model.

## Acknowledgment

The study was supported by the Russian Science Foundation grant No. 22-28-01830, <https://rscf.ru/project/22-28-01830/>

- [1] G. Eason, B. Noble, and I. N. Sneddon, "On certain integrals of Lipschitz-Hankel type involving products of Bessel functions," *Phil. Trans. Roy. Soc. London*, vol. A247, pp. 529–551, April 1955. (*references*)
- [2] J. Clerk Maxwell, *A Treatise on Electricity and Magnetism*, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68–73.

## References

- [3] G.K.C Ahlers., D.Cumming, C.Günther, D. Schweizer, "Signaling in Equity Crowdfunding", *Entrepreneurship: Theory and Practice*, 2015, No.39, pp. 955–980.

- [4] G. Borello, V. De Crescenzo, F. Pichler, "Factors for success in European crowdinvesting", *Journal of Economic and Business Studies*, 2019, Vol.106, 105845.
- [5] R. Botsman, R. Rogers, *What's mine is yours: The rise of collaborative consumption*, New York: HarperBusiness, 2010. – 304 p.
- [6] E.Brugnoni, A.Polzonetti, M.Sagratella, "Innovation and Governance: The Role of Sharing Economy", In Mata, F., Pont, A. (eds) *ICT for Promoting Human Development and Protecting the Environment*. WITFOR 2016. IFIP Advances in Information and Communication Technology, 2016, Vol. 481, Springer, Cham. [https://doi.org/10.1007/978-3-319-44447-5\\_18](https://doi.org/10.1007/978-3-319-44447-5_18)
- [7] C.Grieco, G.Iasevoli, "Paths and patterns of value capture innovation in sharing economy", *Journal of Revenue and Pricing Management*, 2022, Vol. 21, pp. 255–261. DOI: 10.1057/s41272-022-00374-x
- [8] S.R.Chidamber.; H.B.Kon, (1994). A research retrospective of innovation inception and success: the technology-push, demand-pull question, *International Journal of technology Management*, Vol.9, No. 1, pp. 94-112.
- [9] R.G. Cooper, "Stage-gate systems: A new tool for managing new products", *Business Horizons*, 1990, Vol. 33(3), pp. 44–54.
- [10] C. De Marco, A.Di Minin, C.Marullo, D Nepelski, "Digital platform innovation in European SMEs. An analysis of SME Instrument Business Proposals and Case Studies". Publications Office of the European Union, 2019, Luxembourg, EUR 29690 EN, doi:10.2760/57240, JRC115240
- [11] G.Ko, J.Amankwah-Amoah, G.Appiah, J. Larimo "Non-market strategies and building digital trust in sharing economy platforms", *Journal of International Management*, 2021, 100909.
- [12] B.Lu, Z.Wang, S.Zhang, "Platform-based mechanisms, institutional trust, and continuous use intention: The moderating role of perceived effectiveness of sharing economy institutional mechanisms", *Information & Management*, 2021, Vol. 58, No. 7, November, 103504 <https://doi.org/10.1016/j.im.2021.103504>
- [13] E.Maier, (2016) "Supply and demand on crowdlending platforms: Connecting small and medium-sized enterprise borrowers and consumer investors", *Journal of Retailing and Consumer Services*, Vol. 33, pp.143–153.
- [14] N. Preez, L.Louw, "A framework for managing the innovation process", *Conference: Management of Engineering & Technology, PICMET 2008*. Portland International Conference, 2008, August. DOI: 10.1109/PICMET.2008.4599663
- [15] M.E. Porter, (1990, 1998) *The Competitive Advantage of Nations*, Free Press, New York, 1990.
- [16] J.Räisänen, A.Ojala, T. "Tuovinen Building trust in the sharing economy: Current approaches and future considerations", *Journal of Cleaner Production*, 2021, Vol. 279, 123724.
- [17] G.Remane, A.Hanelt, J.F.Tesch, and L.M. Kolbe "The business model pattern database—A tool for systematic business model innovation, *International Journal of Innovation Management*, 2017, No. 21 (01), 1750004.
- [18] R.Rothwell, W.Zegveld, *Reindustrialization and technology*. London: Longman Group Limited, 1985.
- [19] J. Schumpeter, *Theory of Economic Development*, Cambridge. Cambridge, MA, 1934.
- [20] H. Snyder, L.Witell, .Gustafsson, P.Fombelle, P. Kristensson, "Identifying categories of service innovation: A review and synthesis of the literature", *Journal of Business Research*, 2016, No. 69(7), pp. 2401–2408. DOI: 10.1016/j.jbusres.2016.01.009