The impact of open innovation on product development: innovation versus creative ecosystems

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Abstract. Developed business ecosystems exhibit open innovation as the most relevant booster of organizational development. Also, from a combined approach to innovation perspective, using collaboration among different stakeholders in order to achieve competitive advantages, open innovation serves as an important technique for new business model creation. Thus, it is especially important to enhance the impact of open innovation on organisational processes as the main driver for organizational higher performance and development. Based on literature review this paper aims at exploring the main transition from product development processes to co-creation products through implementation of open innovation, in highlighting key differentiating aspects by different types of ecosystems. Consequently, a comprehensive framework for co-creation processes in innovation and creative ecosystems, in terms of product development stages, is provided based on specific adopted criteria, emphasising the open innovation impact within innovation versus creative ecosystems.

1. Introduction
The current research in technological and organisational growth suggests the increasing trend for the use of open innovation [1]. There are provided various examples from industry of how companies achieve competitive advantages by extending organisational limits and opening up their product development processes to various internal and/or external stakeholders [2]. Hence, it is relevant to understand and to draw attention on the implementation context of open innovation within and outside the organisational boundaries.

The increasing use of open source technologies and open innovation mechanism are especially valuable in terms of Internet of Things ecosystems [3,4], providing the opportunity to create and to ensure connectivity among different type of actors as an important factor for open innovation implementation. Therefore, the innovation processes developed within companies can be seen as relevant mechanisms in value orchestration.

In this view, the paper aims at highlighting the relevance and the impact of open innovation implementation on product development processes, as well as its further impact on organisational growth within the larger context innovation ecosystems.
2. Open innovation and innovation processes

Open innovation has been defined by various authors as the main trigger for organizational change [5], [6]. It has also been demonstrated as an efficient method and technique which implies knowledge transfer and innovation at organizational level, essential processes for opportunity exploration [7]. From this perspective, open innovation implementation marked the transition from closed to open to unlimited type systems. At the same time, it is important to highlight the transition from closed innovation (individual effort) to co-innovation (collective effort), as it is presented in figure 1.

![Figure 1. Transition from closed innovation to co-innovation](image)

However, the implementation of open innovation requires the development of organisational capabilities through specially designed processes. Thus, in practice, companies choose to implement co-creation in order to ensure collaborative and collective efforts especially concerning product development processes. From this point of view there can be distinguished three main directions:

- **Outside-in innovation** – which suggests the use of external knowledge and innovation sources [9, 10];
- **Inside-out innovation** – which implies the dissemination of internal unused ideas based on licencing or intellectual property rights in order to enhance profitability [9-11];
- **A combined approach to innovation** – which implies also the use of complementary sources [9, 10].

The relevance of this type of approach can be perceived through the lens of knowledge base creation. Thus, companies follow the direction according to which in order to acquire necessary knowledge different stakeholders should be involved. From this point of view, the use of open innovation offers a wide range of advantages especially in product development process.

2.1. Product development processes in terms of open innovation

According to Wlazlak et al [11], a product development process (NPD) represents a stage-based process, rarely being an individual effort. According to Alexa, Avasilcai and Bujor [12], the engagement of multiple stakeholders in NPD can be identified from idea generation to product delivery to the market [12].

By using open innovation, companies are engaging in the transition from manufactured goods to co-created products. The transition from individual to collective effort, especially in terms of open innovation implementation, is relevant for increasing organizational performance and avoiding potential risks associated with individual new product development processes (presented in table 1) [13].
Table 1. Transition from manufacturing to product co-creation.

| Key Aspects       | Manufactured Products | Co-created Products |
|-------------------|-----------------------|---------------------|
| Type of effort    | Individual            | Collective          |
| Developed process | Production            | Co-creation         |
| Involved actors   | Predominantly         | Predominantly       |
|                   | manufacturers         | customers           |
| Relevant unit     | Supply chain          | Value network       |
| Type of innovation| Closed                | Open                |

Chang suggests that customer engagement in each stage of the NPD process does not provide positive benefits. However, customers’ involvement in specific stages avoids/diminishes potential risks and increases product financial performance [13].

Also, it was pointed out that [14] customer engagement in different stages of product development should be realized simultaneously, efficiently and dynamically. Furthermore, there are suggested synergistic features in the relationships between producers and existing and potential users [14]. Song et al [15] defined new product development stages as: market analysis, planning, product development, pretesting and product launching. Other authors emphasise especially internal and cross-functional collaboration between Research & Development (R&D) and Marketing & Manufacturing (M&M) teams [15]. However, by implementing open innovation within the NPD process becomes centred on customer engagement especially in terms of product development. As a result, the new product development processes are transformed into a collaborative and open framework, as it is shown in figure 2.

Figure 2. New product development process in terms of open innovation implementation [13,15-17].
According to Russo-Spena and Mele, the collaborative effort in new product development processes should comprise activities that require customer active participation, in five relevant proposed stages, as follows: co-ideation, co-design, co-evaluation, co-testing and co-launching [16]. Each stage involves and requires specially designed activities, such as: ideas gathering, concept proposal, rating and voting interactive activities, prototype collaborative testing, product collaborative validation, gathering optimised product experience in relation to the final users.

3. New product development processes: Innovation Ecosystem versus Creative Ecosystems

Due to the complexity and dynamics of business environments, the implementation of open innovation became well known as an essential mechanism for customers’ engagement [2]. From this perspective, companies, by opening up product development processes to the external stakeholders, trigger an inter-industry approach in terms of established collaborations [18]. According to Ketonen-Oksi and Valkokari, innovation ecosystems emerge as new collaborative structures, designed to widen companies’ views on innovation and partnership development [18]. The main concern is highlighted by the need to create an innovation. Whereas creative ecosystems are more concerned with the types of creative resources and the enhancement of creative approaches needed in product development processes. This collaborative structure emerges especially within Creative Industries where the main concern is emphasised by exploration and exploitation of creativity as innovation resource, creative design and environment [19].

The main difference between those two structures is the degree of complexity and uncertainty associated within the occupied industries [20]. From this point of view, it is relevant to investigate how companies implement open innovation in their internal practices of new product development according to the specific criteria, such as type of sources, specially designed practices, or developed innovation processes [1, 10, 16]. To exemplify:

- **Type of creative sources**
  
  This criterion is usually associated to the stage of ideas gathering (ideation). Collaborative effort requires specific stakeholder involvement. Such companies as BMW or Electrolux concentrate their attention on predefined type of stakeholders – the product final users [21, 22]. On the other hand, companies from creative industries – Threadless, 99designs, Crowdspring, etc. – choose to explore and exploit creative potential of a wide community, unlimited, with high creative potential (designers, professionals, etc.).

- **Open innovation practices**
  
  The implementation of open innovation in practice is usually associated with development of platforms, which ensure the connectivity between the core company and its customers. Companies from highly technologized industries, such as Electrolux or BMW, create their own platforms based on competition mechanism. These platforms basically specify and reflect the preoccupation for innovation and are based on proposed projects or competitions emphasizing the main directions of development. However, in the case of the creative ecosystems, a particularisation of open innovation is used: the crowdsourcing platforms.

- **Developed innovation processes**
  
  Companies adopt open innovation especially in the ideation stage, where creative potential is required. In some cases, internal human resources are also engaged (BMW, Electrolux, 99designs). Companies adopt specific mechanisms in order to facilitate ideas gathering and transfer: co-creation labs (BMW, Electrolux), competition platforms (99designs, Threadless, etc.), closed contests (Volvo). In the case of creative industries, the innovation processes are based on the initiation and development of specific marketplaces or contest platforms, which offer a wide range of products and services [23, 24]. In figure 3 are presented specific stages of new product development based on relevant cases of innovation and creative ecosystems.
Figure 3. New product development processes in innovation and creative ecosystems [24, 25].

Each stage of the NPD process emphasises the relevance of specially adopted activities and designed requirements [21]. In relation to this, in table 2 is presented the comparative analysis of product development processes in innovation versus creative ecosystems. Each stage is presented in terms of specific requirements for each ecosystem in terms of: type of effort, specific activities (projects or contests), type of evaluation systems and used instruments. According to our analysis the product development process represents a collective effort in collaboration with external or internal stakeholders, usually organised as project or contest (especially in the ideation stage). However, in case of the innovation ecosystem, the collaborative potential is explored especially for ideation and product concept proposal and design. Opposite is the creative ecosystem, where the product development process is developed entirely in collaboration with each involved party, especially the platform owner.

Table 2. Comparative analysis of the NPD process within innovation and creative ecosystems [21-25].

| NPD Stages               | Innovation ecosystem requirements                                                                 | Creative ecosystem requirements                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Ideation                 | Predefined community of contributors                                                               | Wide range of creative contributors                                                                |
|                          | Internal and/or external stakeholders                                                              | External stakeholders                                                                            |
|                          | Proposing concepts                                                                                 | Proposing ideas and graphics                                                                      |
| Design and development stage | Facilitated by the use of platforms                                                                | Entirely conducted through the platforms                                                          |
|                          | Predefined projects: product designs, functionalities, new technologies                             | The use of creative potential of the crowd                                                          |
|                          | Closed type of contest                                                                             | Limited timeline                                                                                  |
|                          |                                                                                                   | Entirely creative contributors’ effort                                                              |
|                          |                                                                                                   | Clients requirements: colours, needs, etc.                                                         |
| Testing and evaluation   | Usually developed by internal R&D facilities                                                       | Evaluated by the client and platform owner                                                          |
4. Conclusions
Open innovation represents the main driver for organizational development, especially for those companies which are affiliated to a specific ecosystem. The implementation of this type of innovation is essential in terms of innovation in business modelling and internal changes that facilitate the transformation of internal product development processes.

This transformation usually requires changing from individual to a collective effort, which often relies on the active engagement of external sources of innovation. Thus, there can be traced important differences between innovation and creative ecosystems.

In the case of innovation companies, they rely on the engagement of their own employees and transfer the responsibility for concept development to the internal stakeholders and a predefined community outside the organizational limits. As for the creative ecosystems, especially developed within the creative industries, the main innovation resource is unlimited, the community of creative stakeholders.

In terms of product development processes, the most relevant stage in both cases is the ideation or collaborative idea gathering. The greatest attention is granted to the specific open innovation developed mechanisms: open innovation or crowdsourcing platforms.

These mechanisms are relevant for:
- facilitation of stakeholder engagement;
- proposing new concepts at ideation stage;
- co-evaluation and validation of concepts;
- creative approach to product development;
- product launching or transfer to the market.

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