Open Innovation Maturity in Companies

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Abstract: Using open innovation approach instead of closed innovation approach improves productivity. To successfully implement the open innovation approach in a company, it is important to evaluate its maturity and readiness to use this approach. The aim of this study is to explore the open innovation maturity and readiness of Finnish and Greek companies. Hence, this study follows a quantitative approach and uses a 13-item survey to explore the open innovation maturity levels. A total of 81 participants from different companies and with different expertise and backgrounds participated in the survey. In addition to the survey, to examine the open innovation maturity of the companies the maturity model for open innovation which consist of five levels with level 5 depicting the highest maturity level was used. The aim was to examine the open innovation maturity of the companies participating in the study. Based on the results, the studied companies were found to mainly achieve level 3 regarding open innovation thinking. More attention and effort should be given to achieve levels 4 and 5. Due to the importance of achieving maturity levels 4 and 5 and their complexity, the need for companies to understand the significance of strategic thinking and for aligning their general strategy with their innovation strategy was highlighted. Additionally, it was evident that to achieve higher levels of maturity, open innovation approaches should be followed and changes in the organizational management should be implemented. Concluding we claim that for companies to adopt an effective open innovation culture, it is essential to integrate appropriate models, methods, and practices starting from lower maturity levels.

Keywords: Innovation, open innovation, maturity, companies.

1. Introduction

As modern society evolves, environmental changes occur and technological advances drastically affect several domains and industries, the need to promote innovation is imperative. According to Jelonek (2015), the key point in innovations is the implementation of new mixtures of resources and creative forces. Innovations are essential for the economic growth of countries. The statistics of WorldBank show that there is a correlation between Gross Domestic Product (GDP) and innovation investments. According to Schumpeter (1934), the core in the innovation concept is using existing resources in new ways to design and create novel products and services. Diaconu (2011) noted that innovation starts from an idea, also called the stage of ideation (Siakas & Siakas, 2016) and the result of an innovation process is an innovation which can be commercialized. Innovations can be either based on closed innovation concepts or open innovation concepts (Chesbrough, 2003).

Companies used to encourage closed innovation within their ecosystem (Kanakaris et al., 2019; Makkonen et al. 2019) but nowadays to stay ahead of competition and to address the dynamically changing market needs, companies adopt open innovation practices while overcoming the difficulties which are associated with its effective implementation and management (Lichtenthaler, 2011). Open innovation builds upon the need of companies to open up their solid boundaries to allow for new ideas and knowledge to flow in from outside sources (Gassmann & Enkel, 2004). Particularly, open innovation is a term coined by Chesbrough (2003) which is based on the fact that valuable ideas can originate from both inside and outside the company and refers to distributed innovation processes based on purposively managed knowledge flows (Chesbrough and Bogers, 2014), the use of pecuniary and non-pecuniary mechanisms which follow the company's business model and valuable ideas which derive from extensive interactions within a company's internal and external environment (Chesbrough, 2006a). In particular, it can be regarded as a sustainable development approach which focuses on empowering a company's internal knowledge basis using external knowledge exploration, retention and exploitation as well as external technologies and resources (Lichtenthaler, 2011). Open innovation systematically encourages and explores various internal and external sources (West and Gallagher, 2006), thus, it can either be inbound (outside-in) or outbound (inside-out) (Piller & West, 2014) with the intentional inflow and outflow of ideas and knowledge to promote innovation and expand market potentials (Chesbrough, 2006b). Moreover,

open innovation encourages the use of dynamic business models and the combination of both internal and external ideas to create the appropriate for each case systems, processes, architectures, mechanisms and platforms which, in turn, will generate value for the companies (Bogers et al., 2018).

Open innovation is characterized by its multi-dimensional nature, its various application domains and its diverse processes and activities (Huizingh, 2011). Additionally, the characteristics and principles of each entity (Huggins et al., 2020) as well as its cultural aspect, such as entrepreneurship, intrapreneurship or organisational entrepreneurship leading culture (Yun et al., 2020) are crucial in the realization of true open innovation as different cultures affect it in a different way. As a result, the effect that the integration of open innovation practices has on designing and developing new products and services differs drastically from one company to the other (Grönlund et al., 2010; Rubera et al., 2016). Hence, it is vital for a company to fully comprehend how and where open innovation can add value to knowledge-intensive activities and processes (Enkel et al., 2009; Siakas et al., 2014). Within this context, the innovation process, ideation, and collaboration of product and service development is becoming more interactive and permeable (Thrift, 2006). Hence, using the appropriate for each case collaboration tools and creating motivating environments that foster equality, cultivate a sense of belonging and support open communication is vital (Antikainen et al., 2010; Lampropoulos and Siakas, 2018). Therefore, open innovation is based on the fact that in order for a company to stay abreast of competition, it should not simply follow the linear model of innovation (Hippel, 1988) but instead, it has to engage in and collaborate with diverse external stakeholders and partners, to iteratively exchange ideas and knowledge and to come by resources and technologies from the external environment (Bigliardi et al., 2021). The critical organizational practices which a company should adopt to foster and promote innovation and sustainability according to Kennedy et al. (2017, p. 722) are: "i*) technology super-scouting throughout the value chain, ii) search heuristics that favor radical sustainability solutions, ii) integration of sustainability performance metrics in product development, iv) championing the value chain to build demand for radical sustainability oriented product innovation, v) and harnessing the benefits of open innovation*".

Furthermore, open innovation can improve productivity in different industries as it enables value co-creation. In particular, it has been showcased that open innovation supports the vision of Industry 4.0. and improves productivity operation industries (Aliasghar et al., 2019; Cincera et al., 2003; Lampropoulos, 2022; Lööf and Heshmati, 2002). Greco at al. (2021) showed that using the open innovation concept improves productivity in construction industry while Obradović et al. (2021) demonstrated the merits of adopting and implementing open innovation in the manufacturing industry.

The number of companies implementing open innovation is increasingly growing. However, there is a potential that innovative customers could become a scarce resource in the future, for which companies have to compete in order to get them on-board, thus adding a new side to competition among customers (Siakas & Siakas, 2016).

Nonetheless, to reap the benefits of open innovation, companies should create and adopt flexible business models and processes and encourage all the involved members to pursue innovation. The aim of this study is to showcase the necessity for companies to be aware of their maturity level and understand the need to adopt open innovation as well as to identify key aspects and elements which foster and promote the successful adoption and implementation of open innovation. The results provide guidelines to the companies to promote and improve the adoption of the open innovation approach.

2. Maturity in open Innovation context

Maturity means that a company is more dedicated to run innovation work for developing new products and services. An open innovation maturity framework has been developed to illustrate the innovation expertise and capabilities of an organization, by combining metrics in a number of areas of open innovation revealing, thus, areas of excellence and also areas for possible enhancement so as to attain the next level of maturity (Enkel et al. 2011).

The open innovation concept is a strategic option for a company. Samsung has created a network of four levels for innovating new products (Kim, 2013). In order for a company to become more successful, a road map is essential. Rozenfeld et al. (2006) emphasized that the role of the management is essential to upgrade the maturity of open innovation in companies. The management should guide product development process to the direction in which all stakeholders are involved.

Maturity models can offer crucial guidance to companies which in turn can lead to their business becoming more mature to successfully meet challenges and overcome competition. The maturity model examines the maturity level of open innovation in any company (Enkel et al. (2011). The maturity model includes five levels as follows:

"Level 1 —Creative individual attempts are dismissed. The organization focuses on day-to-day operations. Innovation output is inconsistent and unpredictable".

"Level 2 —The need to innovate is identified; innovation is clearly defined. There is a basic understanding of the influential factors. Innovation output is inconsistent but traceable".

"Level 3 —Appropriate practices, procedures and tools are in place, innovation is encouraged among employees. Outputs are consistent and ensure sustained market share and positioning".

"Level 4 —Practices, procedures and tools for integrating innovation activities are used. A deep understanding of the internal innovation model and how it relates to business requirements has been established. Innovative outputs are consistent, diverse and a source of differentiation"

"Level 5 —Practices, procedures and tools are institutional. Individuals are encouraged to innovate. Synergy is achieved through the alignment of business *and innovation strategy and synchronization of activities. Outputs provide sustained competitive advantages in existing and new markets."*

The aim of this study was to explore and reveal the maturity and readiness of Finnish and Greek technology companies to adopt and integrate open innovation by using the maturity model. Paulk et al. (1993) argued that the maturity models are needed to reach better performance in the efforts of innovating.

3. Our Study

Using the maturity model as a basis for examining the innovation levels a survey was conducted over the time period of spring 2022. The aim of the survey was to reveal the status of the open innovation maturity in the companies especially in Finland. The participants received a set of claims in the open innovation context. It is worth noting that claims regarding maturity level 1 were not included as no innovation activities occur at this level. Hence, the claims were related to the maturity levels 2 to 5. Three innovation related claims were made for each maturity level. The claims were as follows:

1. "*The necessity of innovation is identified in your organization*" (level 2)
2. "*The meaning of the word Innovation is clearly defined in your organization*" (level 2)
3. "*There is a basic understanding of the influential innovation factors in your organization*" (level 2)
4. "*Appropriate practices, procedures and tools are applied*" (level 3)
5. *"Innovation is encouraged among employees*" (level 3)
6. "*Innovation outputs are consistent and ensure sustained market share and positioning*" (level 3)
7. "*Practices, procedures and tools for integrating innovation activities are used*" (level 4)
8. "*Internal innovation model has been established in your organization which is deeply understood and it relates to the needs of your business*" (level 4)
9. "*Innovative outputs are consistent, diverse and a source of differentiation*" (level 4)
10. *"Innovative practices, procedures and tools are institutional*" (level 5)
11. "*Individuals are encouraged to innovate*" (level 5)
12. *"Collaboration is achieved through business and innovation strategy alignment as well as synchronization of activities*" (level 5)
13. *"Innovation outputs provide sustained competitive advantage in both existing and new markets*" (level 5)

After being given the above-mentioned claims, the participants were able to provide their comments on promoting open innovation. Particularly, the focus was on which aspects and elements promote open innovation and which hinder it.

In total, 81 master students, 35 females and 46 males who had a mean working experience of 12 years, took part in this anonymous survey. Particularly, 48 of the students who participated were from three different higher education institutes in Finland while the other 33 were from a higher education institute in Greece. The participants worked in different technology companies and they provided help to mid-career engineering positions in these companies. The industries included sawmills, ICT, steel and zinc industries, and public rescue services.

The data collection process involved the use of an online questionnaire which was uploaded on the Webropol platform as well as the use of a paper-based one. The participants rated each item (variable) of attributes on a Likert scale of 1 to 5 where 1 mean "Not at all important" and 5 meant "Extremely important". Statistical analysis was carried out using the Statistical Package for the Social Sciences (SPSS).

4. Data analysis

As previously mentioned, questions regarding the maturity level 1 were not included as it does not show any proof related to open innovation adoption in companies. Hence, a total of 13 claims are presented and analyzed. Three claims are defined for each of the maturity levels 2 to 4 while 4 claims are defined for maturity level 5 due to its higher complexity. More specifically, a 5-point Likert scale was used to assess each of the claims. Tables 1-4 depict the participants' average score for each claim as well as the mean value of the claims defining each maturity level. Finally, the distribution of the participants' responses is presented in Figure 1.

Based on the results, it can be concluded that within the companies, innovation was clearly defined, the necessity to innovate was above average, and employees had a basic understanding of the factors that influence innovation within their organization (Table 1, level 2). Additionally, companies' abilities to apply appropriate tools, processes, and practices, to promote and encourage innovation, and to ensure that innovation outputs lead to sustained market share and positioning were above average (Table 2, level 3). The companies' capabilities of using appropriate practices, procedures, and tools to adopt and integrate innovation, of effectively applying an internal innovation model, and of ensuring that innovative outputs are consistent, diverse and a source of differentiation were slightly above average (Table 3, level 4). Finally, the claims about the maturity level 5 were also average with the participants highlighting the fact that innovative practices and innovation outputs can result in a sustained competitive advantage in existing and new markets (Table 4, level 5).

Table 1: Level 2 claims

Claim	Average
"The necessity of innovation is identified in your organization"	3.64
"The meaning of the word Innovation is clearly defined in your organization"	3.19
"There is a basic understanding of the influential innovation factors in your organization"	3.38
Mean of responses at level 2	3.40

Table 2: Level 3 claims

Claim	Average
"Appropriate practices, procedures and tools are applied"	3.46
"Innovation is encouraged among employees"	3.54
"Innovation outputs are consistent and ensure sustained market share and positioning"	3.47
Mean of responses at level 3	3.49

Table 3: Level 4 claims

Claim	Average
"Practices, procedures and tools for integrating innovation activities are used"	3.36
"Internal innovation model has been established in your organization and it is deeply understood and it relates to the needs of your business"	3.27
"Innovative outputs are consistent, diverse and a source of differentiation"	3.20
Mean of responses at level 4	3.28

Table 4: Level 5 claims

Claim	Average
"Innovative practices, procedures and tools are institutional"	3.23
"Individuals are encouraged to innovate"	3.35
"Collaboration is achieved through business and innovation strategy alignment as well as synchronization of activities"	3.42
"Innovation outputs provide sustained competitive advantage in both existing and new markets"	3.57
Mean of responses at level 5	3.39

Based on the mean value of the responses in each of the maturity levels, it can be inferred that the open innovation thinking capabilities for most companies at level 2 and 3. Hence, it is clear that companies should look at the actions at level 4 and 5 to further develop their organizational cultures and innovation competences to obtain competitive advantages in relation to their competitors. Since everything starts from the strategic planning level 4 and level 5 are possible if these strategies are changed by companies.

Figure 1 shows participants' response distribution.

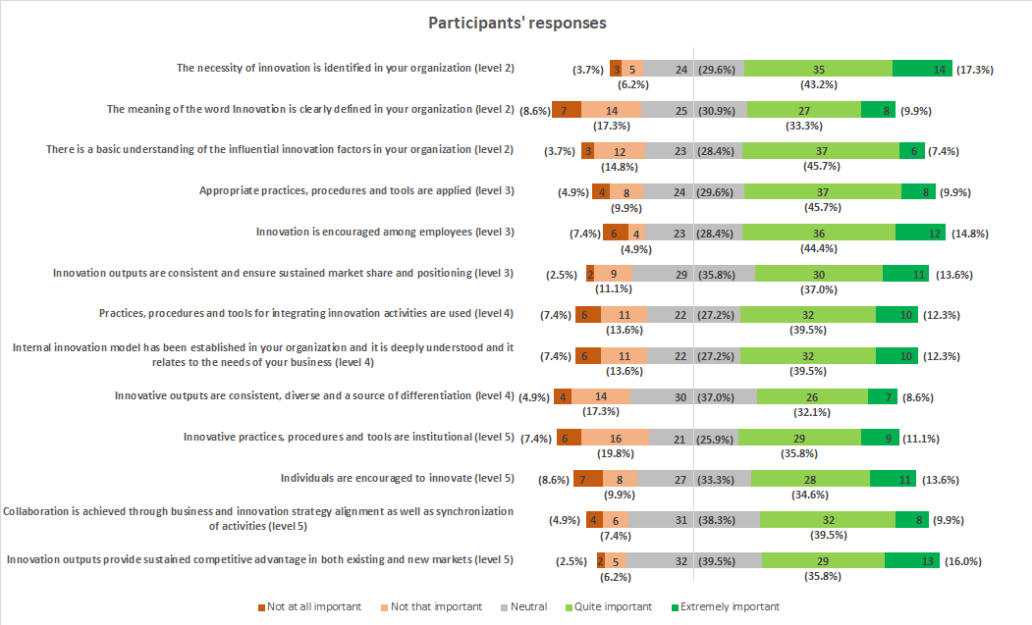

Figure 1: Distribution of responses

5. Discussion

In general, the results show that the open innovations concept has been moderately accepted in companies. This reflects that in the target companies, strategy-driven innovation work should be introduced. Creating policies is needed in which both internal human resources and external partners should be included. Samsung's example can work as a template for this work (Kim, 2013). Inside a company, individuals should be encouraged to freely express their ideas. Brainstorming is a technique that could be used as a group activity for gathering spontaneously and freely expressed and contributed ideas by the participants. Brainstorming is considered to remove inhibitions; hence it capitalizes on the experiences and ideas of the involved participants.

To realize this concept at level 4 or 5, it is important to understand two main starting points. First, companies should understand that strategic thinking is in the core of level 4 and 5 of the maturity model. Thus, their general strategy and innovation strategy should be aligned and interrelated. Second, companies should comprehend the significance of corporate change management. In order for companies to adopt an open innovation culture, drastic changes in the organizational management are required. For this transition to be successful, companies should follow appropriate approaches and methods that motivate and reward employees and that clearly introduce and present both short-term and long-term benefits, such as the one presented in Kotter (1996).

6. Conclusion

Developing new approaches to innovation is a 21st century imperative. The process of ideation is a key element of any strategy building on innovation. Open innovation is about expanding the innovation potential and extending the innovation process into new ways of working with external partners. Whether this manifest itself as new collaboration agreements, approaching start-ups with contemporary ideas and technologies, or spinning out new developments into external companies the ultimate goal is the same, namely to increase innovation and realize increased value as a result.

As innovations emerge increasingly from inter-organizational cooperation in the context of new product or service development also customers and users are increasingly invited to co-creation thus signifying an active, creative and social collaboration process. Crowd-sourcing is a contemporary tool for reaching out to potential customers and users through social networking.

In order to reap the benefits of open innovation, flexible business models and processes should be created, adopted and encouraged to all stakeholders with an interest in certain innovations. The aim of this study was to demonstrate the necessity for companies to be aware of their maturity level and to understand the need to adopt open innovation including the identification of key aspects and elements which foster and promote the successful adoption and implementation of open innovation. The results of our study aimed at providing guidelines to companies regarding how to promote and improve the adoption of the open innovation approach.

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