Step-by-Step Model for Implementing Open Innovation

Subjects: Others | Operations Research & Management Science
Contributor: Chrysostomos Stylios, Agapi Dima, Vagelis Papadakis

Open innovation has attracted wide interest since it first appeared in the 2003 book by Chesbrough. It proposed that companies combining internal and external ideas when innovating would benefit more than by adhering to the traditional research and development model. As many definitions have been proposed for this term since then, it appears that open innovation is not something stationary and is constantly evolving. At this time, the most prevalent definition seems to be that open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. This means that firms wanting to advance their technology can and should use both internal and external ideas. Even though there are several definitions for open innovation, their common thread is the creation of relations and collaborations in order to create something new with the resources at hand. The differences in the definitions usually refer to different scopes concerning resources, the degree of openness, etc.

Keywords: open innovation ; SMEs ; research centers ; growth

1. The Importance of Open Innovation

The traditional research and development model was beneficial to large companies that could afford an in-house R&D department that also gave them full control in whatever innovation it produced as well as all the profits that were turned out. In contrast, open innovation promotes collaboration between companies, research centers, universities and even individuals that can bring different ideas forward to help solve problems that would otherwise be very difficult to manage.

The research institutes participating in open innovation reaped many benefits as it was found that open innovation strengthened the position of the public research institute, increased internal networking and broadened and improved the capabilities and knowledge of the involved researchers [1]. Furthermore, research consistently shows that open innovation has been beneficial to firms that have used it [2].

As new technology appears to need multidisciplinary development, open innovation can help, as a single organization may find it hard to be able to provide what is needed, especially if it is a smaller one [3]. Small research institutes, that are usually dedicated to one discipline, even if they produce quality research, will have limited viewpoints on things concerning other parts of science. Similarly, an industry with in-house research and development department, even if it is well established and has produced valuable assets for its owner, will probably face troubles when trying to expand its research to subjects beyond its expertise, as the research teams usually prefer to focus on one specific area of expertise. As open innovation helps the collaborators to work in a complementary way, there is a significant reduction in the use of resources needed for a project. For example, if one of the collaborators has already the infrastructures needed for the project ready, the rest of the partners will have to simply use it instead of spending their resources. The resources that are saved by this approach can then be used for something else that is needed maybe even another project.

It has been found that in open innovation collaborations the diversity of the people working on the project has a positive effect as the different perspectives that everyone involved lead to the creation of better products, services, or research [4].

The fact that open innovation leads to less time needed for the project's actualization has many advantages for the company, such as finishing projects before the competition.

Furthermore, open innovation has also shown societal benefits. Open access, open source and open-source science, which are open innovation tools, can provide societal benefits. A wider pool of participants is established through open innovation. The results produced can be shared even with those that would have been excluded otherwise, as they are accessible to all. The risks of this endeavor are mitigated due to the number of participants [5].

Moreover, there is evidence that innovation can promote economic as well as sustainability results at the same time [6][7], as open innovation has also been proven to have important connections with sustainability. A very large part of open innovation studies has been found to touch upon several sustainability issues [7].

Additionally, this connection has shown beneficial effects as new products and services produced through open innovation have been replacing older, costlier, and sometimes more environmentally unfriendly ones. The replacement of petrochemicals with other bio-based substances that were developed through open innovation is an example of this [8]. These beneficial effects have also been observed when firms are trying to focus more on sustainability. It has been found that during the new product development phase, better results are achieved, a fact that becomes even more evident if the consumers' concerns are taken into account by using open innovation practices [9]. Both the firms, as well as the consumers, can make an environmentally beneficial impact by using open innovation in order to minimize costs regarding pollution and manufacturing [10]. Sustainability combined with open innovation has also helped firms expand. Alibaba, for example, used a sustainable open innovation model which led to the rapid expansion of the company [11]. An offshoot of open innovation is open social innovation. Open social innovation is what takes place when open innovation and its principles are used for social issues and challenges. As of now, there are projects that use open social innovation in regions of Europe in order to promote innovation in these areas [12]. The use of IT solutions has been found to have a beneficial effect on open social innovation as it has the ability to bring together citizens and the issues they have with the rest of the collaborators [13].

2. Step 1: Interest in Working with Open Innovation

Firstly, interest must be shown in order to adopt open innovation. As firms, research centers, etc., realize the benefits of open innovation, they want to be a part of it.

Research centers, by nature, were already connected to different partners in the innovation systems as they were acting as intermediaries. Nevertheless, there is pressure to make them even more interconnected in different ways with different partners in order to transfer knowledge [1].

Many questions arise about the implementation of open innovation in research institutes, mainly in the aspect of what open innovation offers to these institutes and what conditions have an impact on the success of open innovation. By analyzing the effects that open innovation had on different cases that pertained to public research institutes, it was found that open innovation had a beneficial effect on all examined [1][14].

It was also found that, for several projects pursued using open innovation, the networks that were created using this approach helped the generation of more and better ideas for innovation. As there were many participants in these processes more and more diverse ideas were presented, which in turn made it easier to select the best ones for each project. Furthermore, the created networks provided resources that could complement shortages that appeared in other participants. Lastly, it was found that these networks helped create legitimacy and support for the project and its results [1].

Another thing to keep in mind is how open the collaboration will be in terms of breadth and depth. Innovation performances tend to be hindered when a plethora of outside sources are used (breadth), while at the same time when not using a source efficiently enough, the benefits of the collaboration are being minimized [15].

3. Step 2: Capital for the Expenses Involved

Of course, for anything to begin, funding must be secured. Companies and industries have budgets specifically for research and development that can be spent for R&D either in-house or on collaborating projects with other organizations. However, some research institutes, universities, and other actors participating in an open innovation scheme might not have that luxury. In particular, universities can be notoriously underfunded and that can lead to severe problems relevant to their operation as research facilities, leading them to be constantly on the lookout for funding. There can be intervals where no funding is provided leading to issues with personnel retainment and leaving research unfinished [16]. Other extra costs can be attributed due to the lack of funding, e.g., equipment that remains unused for long periods can break down and without funding it can be impossible to fix.

If the different partners are not interested in ensuring financial compensation for everyone involved in the project, some of the participants might not engage fully or even drop out [17].

If one of the entities is dependent on the resources that someone else in the collaboration is providing, the receiving partner might change focus to primarily aid the giving partner. This might help the collaboration up to a point, but it can

also be detrimental [18].

When public funding is involved, more problems can arise. Firms usually have very clear goals for their research, they want a successful outcome that will bring value to the company. However, the fact that research created with public funds should benefit the whole society instead of a single organization, can create a conflict of interest. Furthermore, there is always a risk of privatizing the research created with public funds when industries are involved. The private sector benefiting from public research organization outcomes can lead to severe consequences in the future when affecting downstream research [19]. Nevertheless, it has been shown that public funding mostly has a promotional effect on innovational pursuits [6].

Moreover, companies that participate in open innovation might create a fund for these reasons in order to bankroll their collaborators so that the research process goes more smoothly, as Huawei did [20].

Another aspect of finding funds when open innovation is concerned is crowdfunding. During crowdfunding, besides the funds that are gathered for the projects, there is almost always a back and forth between the project originators and the funders leading to a further beneficial collaboration [21].

4. Step 3: Pinpointing Projects That Will Be Pursued

Choosing which projects will be pursued in any kind of research is a difficult task. When different partners are trying to collaborate, there has to be a common goal for attempted research. However, even if the partners are pursuing a common goal, their motives for the research might be misaligned, a fact that can threaten the partnership. Since the partners are of different natures, there probably can be different motives as to how the research will be used. An industry wants to gain profit from whatever outcome occurs, while a university or a research center might want to do research in order to pursue purely academic interests, as it has been found that profit organizations have different criteria in selecting projects [22]. In any case, the projects that will be selected must be compliant with the participating members' criteria, as well as be feasible with the resources available or be abandoned [23].

Research has shown that open innovation has usually a positive effect for all participants [14]. However, some research topics cannot be pursued while using open innovation. Companies that have been protective with their Intellectual Property (IP) might be unwilling to bring in outside help for fear of their internal secrets being leaked to the competition. All collaborations need an amount of trust between partners: if that does not exist it is impossible to have a positive outcome [24]. Even though the partners can have different motives for which to pursue collaborations and open innovation, there has to be a common ground especially when referencing the research that will go into the project.

For example, an industry desiring a partnership with a university would want the final product to be something from which can gain profit. A university might only want to further its research and might not be concerned if the result has a major practical use. Nevertheless, the partners must communicate their needs and wants, and find a project that can be followed through without though threatening each other's success. When partners have overlapping interests, a project that might be just beneficial for one of the partners, might be one of the partners' whole business model and pursuing it through open innovation will have devastating effects on them. Moreover, a situation such as this will cause the partners not to give their best selves, out of fear of destroying their own business or research [25].

5. Step 4: Finding the Right Partners

The search for partners can go both ways. One of the future partners can have a project that they need support, therefore they search for others for help, or the future partners can have some similar interests and decide to pursue a common goal.

As in all collaborations, open innovation partnerships included, it is very important to find the right partners.

When different kinds of partners from different disciplines or different kinds of organizations are trying to cooperate, even more problems can arise. The clashing of different perspectives from different partners can lead to issues, such as who can provide the necessary solutions for each step of the collaboration [17]. Furthermore, research organizations and institutes might be unaware of the problems that are pertinent to industries and vice versa [17].

Another issue is that the different partners can contribute to the project in varying degrees meaning that some partners might complete the bulk of the work while other partners do the bare minimum [17]. This can lead to even more problems

during the project implementation, especially when the partners are trying to benefit from whatever the partnership has produced.

Some of these issues have been solved with the use of intermediaries that can create broad networks, improve the conditions for a successful interaction, making it easier for compatible collaborators to find each other [26].

6. Step 5: Creating a Communication Channel between Partners

Proper communication channels must be established and maintained throughout the partnership from the initial steps to the final result. Communication is key in open innovation as it brings the collaborators closer to their cooperation. The partners can discuss the issues of the projects so they proceed on a timely manner and produce good grade results [20].

However, managing and organizing cooperation, especially when different disciplines are involved, has been proven to be difficult and complex, which in turn shows the need for new and improved procedures for collaborations [27]. It appears that knowledge sharing, and the collaborations needed for open innovation are becoming more and more complicated as time goes by [27].

7. Step 6: Negotiations for All Pertinent Partners

Every collaboration of this kind needs negotiations every step of the way. As there can be many partners from different backgrounds, several managerial, cultural, and other differences can be present, a fact that can hinder any kind of relationship [28][29].

Negotiations are vital for subjects concerning the collaboration, such as the division of labor among the partners, as it is very important to determine the responsibilities of everyone concerned to avoid overlaps and delays [30].

The subject of the utmost importance concerning these negotiations is how the intellectual property of everyone involved will be protected. During the collaboration process, the sharing of knowledge is essential for its smooth continuation. The openness of the collaborators, as well as internal managerial factors, can determine how the intellectual property can be protected [31], as many companies adhere to secrecy in order to protect their innovations [32]. Where open innovation is concerned, there is a paradox as the partners are trying to protect their knowledge that have to share at the same time, which shows a need for a specific knowledge exchange strategy [33]. Negotiations are critical in terms of what will be shared with whom, how the end results will be deployed and who will have the rights of the product. To this end, tools such as NDAs (Non-disclosure agreements) are usually signed. Other tools can be MOUs (memorandums of understanding) that can also define other aspects of the collaboration, copyright, licensing, patents, etc. [30][33]. All of this makes negotiations complex and long lasting and, in many cases, the negotiations take place from the beginning to the end of the collaboration [28].

8. Step 7: Organizing the Partnership

As for organizing the partnership, there is not any typical procedure to follow. How the collaboration will be organized is affected by who the partners are and what they are trying to accomplish. A platform must be established, based on which the partners will work together. It would also be prudent to estimate the capabilities of the concerned partners in terms of open innovation in order to see how and with what this collaboration can be beneficial [34]. Decisions will have to be made depending on the project as to how the collaboration will proceed. The delegation of staff in the corresponding aspects of the project and how the communication among partners will be established are issues that will have to be solved in this stage of the collaboration so that the project will be concluded on time with the desired results. Outside factors, which could even be localized, must also be considered as they can affect the project considerably [35]. Changes must be made depending on the characteristics of each actor and the nature of the project [36]. This can mean anything from changing a few policies to a complete restructuring if needed. In any case, opening a previously closed-off section requires much more than just eliminating a few boundaries. When all the above issues have been resolved, the partners can apply themselves to the collaboration and move forward with the research needed for the project.

9. Step 8: Researching Projects Using Open Innovation—Project Management

When all the above issues have been clarified, it is time for the partners to start working towards the completion of the project. All the partners begin to provide input towards the completion of the project. Depending on the circumstances, it

can be either a completely new project or the continuation of an existing one that now has the assistance of all the other partners. By combining everyone's resources, hopefully, a result can be produced.

10. Step 9: Evaluation of Project Outcomes and Their Adoption

In the end of the collaboration, hopefully, there is a final product. Each project must be evaluated to be adopted or released. All research has the potential to give false positives or false negatives. A false positive is a project that seemed successful but did not have the value that it was initially assessed as having. An example of this can be the creation of a consumer good that seemed promising, but the consumers rejected it for unforeseen reasons.

Additionally, false negatives are projects that seem to be a failure at first glance, have minor success or appear not to have great value, while the opposite is true. The collaboration must have a proper management division that will be able to correctly assess the value of all projects and decide the next steps needed. This can mean, depending on the project and the outcome, to use the result as it is, continue the research in order to improve it, send it to an entity that it will be better suited for it, or abandon it completely [37].

Thanks to the negotiations that took place in the previous steps, there is a structure in place as to how this product will be used and by whom. If the collaboration is successful, the outcome is evaluated and then, depending on what it is, it is either adopted by the partners or sent out to the market [20]. A positive outcome in these collaborations makes the partners more open to engage in future collaborations [38].

References

1. Van Lancker, J.; Wauters, E.; Van Huylenbroeck, G. Open innovation in public research institutes -success and influencing factors. Int. J. Innov. Manag. 2019, 23, 1950064.
2. Lu, Q.; Chesbrough, H. Measuring open innovation practices through topic modelling: Revisiting their impact on firm financial performance. Technovation 2021, 102434.
3. Uribe-Echeberria, R.; Igartua, J.I.; Lizarralde, R. Implementing open innovation in research and technology organisations: Approaches and impact. J. Open Innov. Technol. Mark. Complex. 2019, 5, 91.
4. Tang, T.; Fisher, G.J.; Qualls, W.J. The effects of inbound open innovation, outbound open innovation, and team role diversity on open source software project performance. Ind. Mark. Manag. 2021, 94, 216–228.
5. Eppinger, E. How open innovation practices deliver societal benefits. Sustainability 2021, 13, 1431.
6. Costa, J.; Matias, J.C.O. Open innovation 4.0 as an enhancer of sustainable innovation ecosystems. Sustainability 2020, 12, 8112.
7. Payán-Sánchez, B.; Belmonte-Ureña, L.J.; Plaza-úbeda, J.A.; Vazquez-Brust, D.; Yakovleva, N.; Pérez-Valls, M. Open innovation for sustainability or not: Literature reviews of global research trends. Sustainability 2021, 13, 1136.
8. Kennedy, S.; Whiteman, G.; van den Ende, J. Radical Innovation for Sustainability: The Power of Strategy and Open Innovation. Long Range Plan. 2017, 50, 712–725.
9. Du, S.; Yalcinkaya, G.; Bstieler, L. Sustainability, Social Media Driven Open Innovation, and New Product Development Performance. J. Prod. Innov. Manag. 2016, 33, 55–71.
10. Yang, J.Y.; Roh, T. Open for green innovation: From the perspective of green process and green consumer innovation. Sustainability 2019, 11, 3234.
11. Yun, J.J.; Zhao, X.; Park, K.B.; Shi, L. Sustainability condition of open innovation: Dynamic growth of alibaba from SME to large enterprise. Sustainability 2020, 12, 4379.
12. Arvaniti, E.N.; Stylios, C.D.; Papadakis, V.G. Open Social Innovation: Challenges and Opportunities. Int. Conf. Entrep. Innov. Reg. Dev. 2017, 36, 17–25.
13. Arvaniti, E.N.; Stylios, C.D.; Papadakis, V.G. Methods To Enhance Local Communities Contribution Towards Open Social Innovation. In Proceedings of the International Conference Fifty Years of Local Governance 1980–2030 Institute of Geography and Spatial Planning, Lisbon, Portugal, 4–5 September 2018.
14. Zhang, Y.; Chen, K.; Fu, X. Scientific effects of Triple Helix interactions among research institutes, industries and universities. Technovation 2019, 86–87, 33–47.
15. Bernal, P.; Salazar, I.; Vargas, P. Understanding the open innovation trends: An exploratory analysis of breadth and depth decisions. Adm. Sci. 2019, 9, 73.

16. Glied, S.; Bakken, S. Institutional Challenges of Interdisciplinary Research Centers. J. Res. Adm. 2007, 38, 28–36.
17. Şendoğdu, A.A.; Diken, A. A Research on the Problems Encountered in the Collaboration between University and Industry. Procedia-Soc. Behav. Sci. 2013, 99, 966–975.
18. Hoppmann, J. Hand in hand to Nowhereland? How the resource dependence of research institutes influences their co-evolution with industry. Res. Policy 2021, 50, 104145.
19. Arza, V.; Vazquez, C. Interactions between public research organisations and industry in Argentina. Sci. Public Policy 2010, 37, 499–511.
20. Yan, X.; Huang, M. Leveraging university research within the context of open innovation: The case of Huawei. Telecomm. Policy 2020, 46, 101956.
21. Chu, C.C.; Cheng, Y.F.; Tsai, F.S.; Tsai, S.B.; Lu, K.H. Open innovation in crowdfunding context: Diversity, knowledge, and networks. Sustainability 2019, 11, 180.
22. Jeng, D.J.F.; Huang, K.H. Strategic project portfolio selection for national research institutes. J. Bus. Res. 2015, 68, 2305–2311.
23. Bai, L.; Bai, J.; An, M. A methodology for strategy-oriented project portfolio selection taking dynamic synergy into considerations. Alex. Eng. J. 2021, 61, 6357–6369.
24. Kuo, T.H. How expected benefit and trust influence knowledge sharing. Ind. Manag. Data Syst. 2013, 113, 506–522.
25. Ollila, S.; Elmquist, M. Managing Open Innovation: Exploring Challenges at the Interfaces of an Open Innovation arena. Creat. Innov. Manag. 2011, 20, 273–283.
26. Schepis, D.; Purchase, S.; Butler, B. Facilitating open innovation processes through network orchestration mechanisms. Ind. Mark. Manag. 2021, 93, 270–280.
27. Shmeleva, N.; Gamidullaeva, L.; Tolstykh, T.; Lazarenko, D. Challenges and opportunities for technology transfer networks in the context of open innovation: Russian experience. J. Open Innov. Technol. Mark. Complex. 2021, 7, 197.
28. Barchi, M.; Greco, M. Negotiation in Open Innovation: A Literature Review. Gr. Decis. Negot. 2018, 27, 343–374.
29. Hofstede, G.J.; Jonker, C.M.; Verwaart, T. Cultural Differentiation of Negotiating Agents. Gr. Decis. Negot. 2012, 21, 79–98.
30. Manzini, R.; Lazzarotti, V. Intellectual property protection mechanisms in collaborative new product development. R D Manag. 2016, 46, 579–595.
31. Hagedoorn, J.; Zobel, A.K. The role of contracts and intellectual property rights in open innovation. Technol. Anal. Strateg. Manag. 2015, 27, 1050–1067.
32. Bos, B.; Broekhuizen, T.L.J.; de Faria, P. A dynamic view on secrecy management. J. Bus. Res. 2015, 68, 2619–2627.
33. Bogers, M. The open innovation paradox: Knowledge sharing and protection in R&D collaborations. Eur. J. Innov. Manag. 2011, 14, 93–117.
34. Jun, Y.; Kim, K. Developing an Open Innovation Attitude Assessment Framework for Organizations: Focusing on Open Innovation Role Perspective and Locus of Activity. Behav. Sci. 2022, 12, 46.
35. de Melo, J.C.F.; Salerno, M.S.; Freitas, J.S.; Bagno, R.B.; Brasil, V.C. From open innovation projects to open innovation project management capabilities: A process-based approach. Int. J. Proj. Manag. 2020, 38, 278–290.
36. Gianiodis, P.T.; Ellis, S.C.; Secchi, E. Advancing a typology of open innovation. Int. J. Innov. Manag. 2010, 14, 531–572.
37. Chesbrough, H. Managing open innovation. Res. Technol. Manag. 2004, 47, 23–26.
38. De Silva, M.; Rossi, F.; Yip, N.K.T.; Rosli, A. Does affective evaluation matter for the success of university-industry collaborations? A sentiment analysis of university-industry collaborative project reports. Technol. Forecast. Soc. Chang. 2021, 163, 120473.