Article

How to Find the Right Partner? Open Innovation Partner Selection Process

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Abstract: The aim of this paper is to gain an understanding of the partner selection process for open innovation. The inability to choose partners can lead to problems such as opportunistic behavior, the failure of open innovation, and a reluctance to collaborate. Therefore, partner selection is crucial in open innovation. Attention is directed to the determining factors that must be considered in the selection of a partner. The contents of the paper are mainly based on in-depth interviews with experts and practitioners who represent both organizations and individuals as actors in open innovation activities. The results show that complementarity, compatibility, and trust are important considerations in selecting the right partner. The implication of this research is that a managerial approach is needed that supports the company's ability to find and evaluate external sources of knowledge to support innovation. The originality of this article is to provide an understanding that the existence of an organization in a network helps organizations access external knowledge resources. Involving external parties in the company's innovation process accelerates innovation. In this case, getting the right partner is very important.

Keywords: open innovation; collaborative innovation; partner selection process; managerial approach

1. Introduction

The increasing degree of technological change and economic globalization demands constant innovation so that companies can excel in competition (Donate et al. 2016). In the context of such rapid innovation, the open innovation (abbreviated OI) approach (vs. closed innovation) is considered more relevant (Lopez-Vega et al. 2016) and has been considered one of the most influential trends within the theory and practice of innovation management. OI emphasizes that firms should acquire valuable resources from external firms and share internal resources for new product/service development, but the question of how a firm finds the right partner is less clear. Value creation and value capture in OI involve partnering firms with the perfect blend of complementary and compatible traits. Meanwhile, there are so many choices of alliance partners that managers are vulnerable to the risk of selecting inappropriate partners, especially external ones. The consequences of this can possibly lead to irregular coordination and failure in the OI activities and projects (Manotungvorapun and Gerdsri 2016). Furthermore, the process by which firms select partners for OI is not well understood (de Groote et al. 2022). Therefore, it is necessary to explore in depth how the partner selection process is carried out to obtain the right partner for an organization.

Based on the existing literature, the success of OI requires alignment between the parties involved (Zacharias et al. 2020). This can be achieved through compatibility and complementarity between each party thereby helping to integrate desired technologies and embrace shared values, cooperative norms, and a sense of reciprocity (Zacharias et al.

2020). Managers can estimate compatibility through the similarity of capabilities and value creation from the combination of these shared capabilities (Mitsuhashi and Greve 2009), however, in interactive OI activities (cocreation, cooperation with research institutes, or collaborative innovation) the issue of trust cannot be ignored. Trust in an open and dynamic environment is needed due to partners joining and leaving at will and behavior change is possible. Trust is a prerequisite and is often a factor influencing the quality of the relationship (Li et al. 2008; Li and Piezunka 2020), as it could have an impact on the willingness of each party to be open and share with external parties. Unfortunately, it is still ignored in the partner selection process for OI activities.

This paper uses the context of collaborative innovation between an organization and its partner, as a form of involving the external parties in the organization's innovation process. External partners are regarded as one of OI's key success factors and the selection of the right partners as co-creation becomes crucial (Chesbrough 2006; Bogers et al. 2018). Even so, collaborative innovation as an alternative to finding external knowledge resources is not always easy and safe to implement.

As the outcome of the aforementioned exploration, the new main research question has been identified: How do companies select collaborative innovation partners? Compared to previous studies examining the partner selection factors of OI as an innovation strategy (Zacharias et al. 2020; Wei et al. 2020), the emphasis of the research shifts to a process-oriented approach that aims to build a bottom-up understanding of the partner selection process for initiating collaborative innovation.

2. Literature Review

OI complements traditional innovation logic when knowledge is widely distributed and available. Generally speaking, the different logic of closed innovation challenges organizational management to use internal and external knowledge resources simultaneously by involving external partners in the company's innovation process. It requires the organization's ability to manage collaborative innovation and starts with how to select the right partners.

In general, opening an innovation process may be much harder than it might seem. It starts with an innovation project to be completed, which needs complementary resources from an external party or parties. It does not always run smoothly from the beginning until the end of the collaborative innovation (Mäkimattila et al. 2013). The process of interaction with external parties through trust-based collaboration which has been achieved in the beginning can change completely by the end. This is also related to the selection of organizations as partners in OI. Even so, OI as an alternative to finding external sources of knowledge for innovation is not always easy or safe to implement.

A number of studies have found that the excessive seeking of external knowledge has potential problems such as the difficulty of finding the right partner (Laursen 2017; Laursen and Salter 2006), which in turn will hamper innovation performance. In reference to various problems in the implementation of OI, the problem of finding a suitable partner is still ignored (de Groote et al. 2022), even though finding the right partner can have an impact on the quality of interactions and strong social bonds between the companies, which will then have an impact on the success of knowledge transfer (Darr and Kurtzberg 2000; Reagans and McEvily 2003) and success post-collaboration (Kim and Olsen 1999). In this case, the value creation and value capture in OI involve partnering firms with the perfect blend of complementary traits, compatible characteristics, and trust. Therefore, the process of partner selection is crucial in building inter-organizational relationships (Li et al. 2008; Li and Piezunka 2020).

2.1. OI Partner Selection

Selection of OI partners is an important step because managers have multiple choices of partners that have heterogeneity in profiles and characteristics available in an OI market (Appleyard and Chesbrough 2017; Chesbrough and Crowther 2006), and this choice will

determine the continuing cooperation between the organizations or not (Emden et al. 2006). In addition, alignment with partners also determines the success of OI itself.

Firms are more likely to enter into partnerships if external partners have complementary resources, which the firm can use in addition to its own resources (Chung et al. 2000). However, the success of collaborative innovation development does not depend only on the integration of technical aspects such as knowledge, competencies, and technology. The alignment of non-technical variables such as strategic goals, culture, and ways of working are determinants of the success of collaborative innovation. Performing highly interactive OI activities (co-creation, co-operation with research institutes, or collaborative innovation) should prompt high partner alignment to enhance technology and market adaptiveness (Zacharias et al. 2020). In line with this, choosing the right partner for cooperation means finding desirable matches between the resources, goals, and strategies of those partners (Das and He 2006; Das and Teng 2003).

Based on what has been described, most of the criteria for partner selection can be allocated to two main clusters, namely "complementarity" and "compatibility". However, in a competitive and dynamic environment, collaborative innovation requires trust between all parties involved. Trust is a prerequisite and is often a factor influencing the quality of the relationship (Li et al. 2008; Li and Piezunka 2020). Furthermore, "trust" could have an impact on the willingness of each party to be open and share with external parties.

2.1.1. Complementarity Factor in OI Partner Selection

Different sets of criteria for partner selection have been found in the OI literature. Some researchers use only technical criteria to evaluate such as product experience, expected knowledge, and expected technological capabilities (Guertler and Sick 2021). As another example, Yoon and Song (2014) use the measurement of the two criteria of technological capability and cooperative capability, while others proposed a way to explore potential partners with technological knowledge complementary (Yoon and Song 2014; Wang et al. 2014).

What is described above can be understood because the initial stage of collaboration is a preliminary selection that aims to form an open "Resource Pool" (Wei et al. 2020), thus the factor of complementarity is considered in the selection of partners. Tanriverdi and Venkatraman (2005) give the definition of the term complementarity as "complementary resources are not identical, but they are interdependent and mutually supportive". In other words, partner complementarity is typically defined as the extent to which a partner contributes resources and capabilities to the partnership that the other partner lacks (Manotungvorapun and Gerdsri 2016; Dyer et al. 2007). For example, Rothaermel and Boeker (2008) find that established technology firms (pharmaceutical sector) prefer to cooperate with new technology firms (biotechnology sector) who possess the complementing competencies. Companies are more likely to enter into a partnership if the external partner has complementary resources, which the company can use in addition to its own resources (Chung et al. 2000). Therefore, OI managers should be concerned about how to foster and maintain the participation and the contribution from outsiders and how to smoothly run an OI project (Appleyard and Chesbrough 2017). The complementarity of external resources potentially synergizes the novelty of product or service innovation but it cannot guarantee the smoothness of interactions throughout the course of an OI project.

2.1.2. Compatibility Factor in OI Partner Selection

Another criterion to consider in the selection of OI partners is a set of non-technical criteria. For example, (Guertler and Sick 2021) proposed non-technical aspects in the screening of potential OI partners such as strategic and relational (i.e., compatible cultures) long-term orientation. Managers can estimate the compatibility through the similarity of capabilities and value creation from the combination of these shared capabilities (Mitsuhashi and Greve 2009; Laursen 2017). Partner similarity is typically investigated regarding cultural and organizational characteristics (Russo and Cesarani 2017) and, in particular, the content

dimensions of values, norms, and mindsets (Yoon and Song 2014). Through building up a shared understanding and common ways of working together, they are able to build and sustain virtuous exchanges and collaboration with external actors in innovating (Laursen 2017; Laursen and Salter 2006). Although much research has been conducted to test the role of couple similarity in partner selection and predicting relationship satisfaction, previous research was limited to couples in well-established relationships (Luo 2009).

The compatibility between the collaborating parties is formed from time to time to achieve harmony. In fact, interpersonal interactions can also shape the performance of collaborative relationships. Thus, the relationship between partners becomes a strong criterion in partner selection (Seabright et al. 1992) and can be built through experience in exchange relationships and as a result of investments made in the relationship over time (Seabright et al. 1992). Such methods can help in maintaining the existing relationship even when more attractive alternatives are available thereby reducing the chances of breaking up halfway. The existence of social ties, network membership, and provision of resources are determinants in building relationships between organizations (Aiken and Hage 1968; Van de Ven et al. 2017).

Compatibility between companies and partners is considered in building relationships between parties because it can affect how each party perceives that partner's knowledge as valuable or not (Simonin 1999). The more different, the more difficult it is for each member to see or appreciate the potential benefits that can be obtained from partners (Szulanski 1996). Therefore, compatibility between each party is needed in order to maintain the alignment of each party involved in collaborative innovation. Compatibility between partners becomes an indicator of the stability and organizational harmonization of a strategic partner and it generates trust and commitment (Kwon 2008).

2.1.3. Trust Factor in OI Partner Selection

When people share their information or knowledge or data with other parties they do it for a reason. That reason can color what is shared (and how), and demonstrating trust in this context is needed, as it will make the relationship run well. When people behave, interact, and share in ways that matter to them, they use trust to do so. Inserting trust will make the relationship run well (Marsh et al. 2020).

Likewise, trust is needed in a cooperative relationship in an open and dynamic environment because it has the potential to help manage the challenges of uncertainty when relationships with other parties are used to achieve goals. In a collaborative innovation context, trust is a prerequisite and is often a factor influencing the quality of the relationship (Li et al. 2008; Li and Piezunka 2020; Mohr and Nevin 1990). Therefore, trust is an important factor in the early stages of the collaborative innovation process between companies and partners. In the early stages of collaborative innovation, trust is placed as one of the determining factors in partner selection (Bürger and Roijakkers 2021). It can be interpreted that high trust tends to result in a decision to work together.

Trust can be built through direct interaction with other parties such as previous experience, general judgments about the reliability of the other party regardless of the particular situation, and situational trust. Similarly, the trust that exists between the company and partners can be built due to repeated previous positive experiences with those partners. That means trust is based on predictability, and past behavior (Daronnat et al. 2021). Trust also considers reputation which models trust from direct experience. However, this limits the information available for trust evaluation, particularly in cases where direct interaction is insufficient or non-existent (Keung and Griffiths 2008; Reusen and Stouthuysen 2020).

Thus, trust can not only be a determining factor in initiating the collaborative innovation process, but trust can also be the result (effect) of the collaboration performance itself or be a collaboration performance measurement itself (Doney et al. 1998). With this perspective, trust can lead to reduced opportunistic behavior among the transacting parties.

What is described above shows that in general in the selection of collaborative innovation partners there is a tendency to use close relationships such as "friendship" rather than "strangers" (Li et al. 2008; Li and Piezunka 2020). However, according to Keung and Griffiths (2008), apart from direct interaction in building trust, third-party recommendations can assist companies in gathering information related to partners (Keung and Griffiths 2008). With accurate information from a trusted party, it can become a recommendation so that it can potentially change the status of "stranger" to "like friends" and have an impact on the tendency to work together.

3. Materials and Methods

In this study, an exploratory qualitative case study was conducted in a very formal organization. This approach is used to explore the partner selection process in collaborative innovation implementation as the specific context of the OI approach. As this was not immediately apparent in the literature, we felt that an in-depth study of multiple case studies would help to uncover the partner selection process as the first stage in collaborative innovation. Multiple case studies were conducted on the collaborative innovation of two companies and one university to reveal the process of partner selection in order to obtain the right partners to initiate the collaborative innovation process. Case 1 is a collaborative innovation between an automation technology development company and a biotechnology company (automated biotechnology laboratory technology development), case 2 is a collaborative innovation between a university and a manufacturing company (bio-plastic development), and case 3 is a collaborative innovation between a manufacturing company and a retailer (new products development). The selection of case companies takes into account the differences in company backgrounds in order to capture an overview of the partner selection process. Qualitative research is considered appropriate because it focuses on developing models using a process approach (Ellis et al. 1992). In addition, this study focused on determining factors that must be considered in the partner selection process and developing managerial support that can enable the finding of the right partner. It is performed by exploring from the ground up, the emergence of collaborative innovation partner selection determinants. The case company selection process uses several criteria, including that the organization has produced or is currently producing commercial innovations and involves external parties in the process, has R&D activities, and managerial practices that support the collaborative innovation process. The interview process was carried out for approximately six months starting from the end of May 2021 until the middle of November 2021. A number of resource persons who had direct knowledge and experience related to collaborative innovation activities carried out by the company and partners were involved in the interview process. The resource persons involved in the in-depth interview process are listed in Table 1 below.

Interviews are designed to gain an overview of their work or role in product development projects through the company's collaborative innovation with partners, including exploring practices such as with whom they interact and how social integration processes were developed so as to support collaborative innovation activities. There were three major themes that were proposed to the speakers, namely (1) interviews related to the beginning of collaborative innovation activities carried out between companies and partners. Some questions were asked, such as: Why do companies collaborate on innovations with external parties? How do companies choose partners? How are teams formed? (2) The interview is related to how the organization's efforts support this process. Additional documents that are relevant for analysis include the company's vision and mission statements, the results of innovation publications carried out, company profiles, and collaborative innovation programs or activities carried out by the company. This documentation study was conducted by seeking information about the company through the company's website. Furthermore, data analysis from field research is broadly divided into three main parts, namely preparing data, analyzing data, and concluding the data obtained.

Table 1. Profile of key informants.

Organization Type	Key Person	Professional Background
Research-based company	Assistant Division Manager or Product Manager Deputy	• Project Manager Deputy to manage the project internally (in Indonesia). • Directly involved in managing the Rover project, especially in designing the Rover track.
	Team Leader	• Mechanical Engineering (hardware specialist). • Coordinator of human resources for mechanical engineering and involved in collaborative innovation projects.
	Project Leader	• Software Engineering. • Coordinator of human resources for project team.
	HR Manager	• General HR specialist.
	HR Staff	• Staff recruitment specialist.
University	Project LeaderLaboratory StaffStudents	• Researcher • Chemist • Coordinator of project lead • Team member
Manufacture company	OwnerThird-Party	• Project Lead • HR Project Coordinator • FSC (Forest Stewardship Council) as connector between producer and consumer

Resources: Processed research data.

4. Results

Based on the results of field research, a bottom-up exploration of the collaborative innovation partner selection process in two companies and one university can reveal a number of factors that are considered in the selection of collaborative innovation partners. In Table 2 below, some examples of the data obtained can provide an overview of the process of partner selection in collaborative innovation.

Table 2. Example of exploring the bottom-up emergence of partner selection determinants.

Selective Empirical Evidence	First-Order Categories	Second-Order Dimensions	Third-Order Themes
" … Two companies with a symbiotic background of knowledge … , (and another side) … they got benefits from us … , they saw that rover could be the solution for their problem, we also see this is an opportunity for us to know, learn, or get an idea … which corresponds to the real case" (case 1)	The need to access external resources (knowledge, competence and technology)	Complementarity	Partner selection process
" … we are capable, but that's in lab conditions … , and Hitachi supports … tools (technology) to scale up to pellets" (case 2)			
"In Indonesia … which is rarely able to supply regularly … , they (intermediary) then directed them (partner) to us … , then we (company) were contacted from them (partner), Their outlet (partner) are available all over Indonesia … In the long-term, through co-branding, people can see us (company), … then go to our website and so on … , it's profitable" (case 3)			
"They (partners) shared their idea with us. The rover was actually more suitable with their case, than the cell culture project. … We have a lot in common with what partners want" (case 1)	Goal similarities	Compatibility	

Table 2. *Cont.*

Selective Empirical Evidence	First-Order Categories	Second-Order Dimensions	Third-Order Themes
"They (university) are working on this (bioplastic), he said that . . . it is made from casava. You see . . . it fits exactly what I'm looking for . . . Then I ask . . . where has this gone, do you have a prototype yet? when this raw material has become plastic . . . We can develop it . . . " and at the other side "Unintentionally, we (university) are also developing it. Well, we at the university are also happy to have an industry that wants to invite cooperation" (case 2)			
"The owner (partner) from Belgium, standardized, the wood must be affiliated with FSI (the institution that issues wood certification). He (partner) has a duty to find companies that can be cooperated, affiliated with FSI, also local products. (Company) logically, that this can be sold throughout Indonesia, we have the opportunity to be seen by many people" (Case 3)			
"(choose to become a member of FSC) FSC understands much more, pays attention to, not only the legal aspects but the sustainability of the flora and fauna that exist there" (Case 3)	Policy similarity		
"They (partner) . . . prioritizes local product, zero carbon food print. . . . the orientation is sustainability and accountability" (Case 3)			
" . . . because that is also one of the policies issued by our company, coincidentally their policy (partner) is the same as ours . . . " (Case 2)			
"We exhaustively consider solutions and bring technologies from outside of the industry to create novel out-of-the-box solutions . . . , (in other side) . . . consumers of automation products, . . . they (partner) saw the useful system in this rover, the initial process was more or less like that, now they (partners) have expressed their desire to cooperate with us" (Case 1)	Value similarity		
"We (university) think, starting from the same value, it's better to talk, connect . . . " and in another side " . . . actually we (partner) want to improve the standard of living . . . , not just the environment. The reason why we (partner) do this project" (Case 2)			
" . . . this is nature, so the wood is alive. When it is prayed for well done . . . it will be good. . . . I have to have a rule (becoming a member of the FSC) . . . always be audited" (Case 3)			
"They (company) have high sustainability . . . and their partner . . . has a sustainability policy, and looking for sustainable products" (Case 3-FSC)			
"He (partner) has always been an early adopter of technology, not just Rover, which means he has been before . . . and they (partner) seems satisfied . . . So every time there is new technology from us, he (partner) is excited for an early adopter . . . maybe that's why he believes. So even though it hasn't been released yet, he is willing to spend money to use it at his place for the purpose of his experiments" (case 1)	Previous (positive) experience	Trust building	
"You could say that actually this Rover is still researching . . . , so it hasn't been released yet, that means it is still under development research . . . but somehow they (partner) accepts it . . . , but they (partner) doesn't mind . . . " (case 1)			

Table 2. *Cont.*

Selective Empirical Evidence	First-Order Categories	Second-Order Dimensions	Third-Order Themes
"They (partner) has cooperated with us before, . . . cooperative materials analysis" (case 2)			
"The name of the product Fast (company's previous product), it was for suctioning liquids . . . and he seems satisfied with that" (case 1)	Third-party recommendation		
" . . . he's also a previous customer of us (for different product) which is seems like he's also satisfied, maybe that's why he believes". (case 1)			
" . . . FSI talked to me, I don't prefer to give it to another party . . . I should direct it to you (company)" (case 3)			

Resources: Processed research data.

Table 2 shows the bottom-up process of initiating collaborative innovation by finding the right partners through the partner selection process. It can be understood that the process of selecting collaborative innovation partners is carried out by considering a number of elements such as; complementarity, compatibility, and trust. The three main factors will be explained below.

4.1. Explaining Complementarity, Compatibility, and Trust in Partner Selection

Summarizing the findings of the study, a number of key factors to be considered in partner selection were found in the three cases studied. These factors are complementary resources, compatibility, and trust between the company and partners. Complementarity is one of the factors considered in the selection of partners to initiate the collaborative innovation process. For example, the knowledge and competencies possessed by the company and partners are complementary. Existing complementarity reflects how each party contributes to innovation. Meanwhile, the compatibility factor focuses more on finding compatibility between the company and its partners, such as aligned goals, appropriate policies, and values. The existence of compatibility between companies and partners can help them to stay in line. Therefore, these factors are taken into consideration in partner selection. Furthermore, trust is the third main factor found in the results of this study. Trust is a prerequisite for collaborative innovation. The existence of trust can encourage each party to be willing to share their knowledge and competencies. In particular, in cases 1 and 2, the company already has previous cooperation experience with partners, so trust can be built more easily between the company and partners. However, in case 3, the company and partners have never had previous cooperation experience. This collaborative innovation (in developing kitchenware) is the first experience they have had. In this context, the process of building trust between them requires the role of other parties to provide recommendations that can be used in partner selection. How these three main factors are taken into account in partner selection will be explained in the section below.

4.1.1. Complementarity in Partner Selection Process

The research based on the results of the three cases shows that the company's limitations are one of the factors prompting the company to involve external parties in the innovation process. For example, in the case of developing bio-plastic raw materials (in case 2), collaborative innovation between universities and industry is carried out due to the limitations of each party such as knowledge, competence, and technology possessed in developing bio-plastic raw materials. In terms of developing bio-plastic raw materials, universities have internal limitations such as knowledge and competence about the bio-plastic manufacturing process (the process of making plastic products with industrial machines) to produce plastic products that are biodegradable (environmentally friendly), strong and

economical. In addition, the existence of a technological gap between universities (technology for small scale/laboratory) and industry (technology for large scale/industry), is also a challenge in the downstream process of higher education innovation results. Therefore, universities need collaborative innovation with industry to develop bio-plastic raw materials to complement the lack of knowledge, competence, and technology they possess. This is implied in the following expression:

> "According to my field . . . I'll just show you . . . plastic is like that (in a small size). But if it is produced for a big machine, is it possible? Now, there's one point, which one is . . . let's say they (partners) are more skilled, so later they definitely need what additives were drawn, it doesn't dissolve in water but can be decomposed . . . " (Case 2)

On the other hand, the industry has limitations in internal R&D to obtain formulas from bio-plastic raw materials. Collaborative innovation with universities is considered an attractive option for the industry over acquiring other companies. This has prompted the industry to cooperate with universities to develop formulas for bio-plastic raw materials. In this case, resource complementarity becomes an important factor in partner selection.

While the collaborative innovation carried out by research-based companies in the development of Rover (in case 1), partners' knowledge, competence, and technology are needed to help develop interfaces that can integrate Rover systems and partner companies' operating systems. Developing Rover into a "transportation" that supports the automation of work in the production line of a biotechnology company, not only requires an "interface" but also requires the development of Rover's infrastructure. Therefore, the presence of partners in the development of Rover is needed to gain various knowledge and competencies in order to repair and develop Rover so that it becomes a compatible product in the related industry.

Likewise, in the case of kitchenware product development (in case 3) which is made from certified wood raw materials by the company, it requires knowledge from partners, especially related to markets such as product types, models, colors, sizes, and relevant market prices. The information and knowledge are used by companies in developing kitchenware products. The innovations prevented the company from experiencing a decline in sales during the COVID-19 pandemic. In contrast, they actually received increased demand.

The results of field research show that complementary resource factors are a consideration in the selection of collaborative innovation partners. Furthermore, the results of this study are in line with the existing literature which explains that a number of "resources complementarity" attributes that underlie the interrelationship between companies are technical capabilities, technical assets (technical assets), and the application of research discovery (Sarkar et al. 2001).

The understanding that every organization has limited knowledge, competence, and technology encourages organizations to find collaboration partners to complement deficiencies in innovation. In general, it occurs because of the need for each other. Tanriverdi and Venkatraman give the definition of the term complementarity as "complementary resources are not identical, but they are interdependent and mutually supportive" (Tanriverdi and Venkatraman 2005). For example, Rothaermel and Boeker find that established technology firms (pharmaceutical sector) prefer to cooperate with new technology firms (biotechnology sector) who possess complementary competencies (Rothaermel and Boeker 2008).

Although the complementarity of external resources has the potential to synergize the novelty of product/service innovations, it cannot guarantee smooth interactions during the open innovation project. Appleyard and Chesbrough state that open innovation managers must pay attention to how to foster and maintain participation and contributions from outsiders and how to run open innovation projects smoothly (Appleyard and Chesbrough 2017).

4.1.2. Organizational Compatibility in Partner Selection Process

The results of field research show that in collaborative innovation between companies and external parties, the suitability factor is an important part of the partner selection

process, such as the compatibility of goals, policies, and values between the company and partners when starting the collaborative innovation process.

Referring to case 1, collaborative innovation was carried out to develop "Rover" into a transportation tool that helps move work processes from one production line to another automatically. This is done so that the work process is more efficient and minimizes human error. Along the way, Rover's development process required a "real case company" as part of the standard process of developing the technology before it was launched to the market. Finding a "real case company" is not an easy thing. Therefore, the company is trying to find partners who have the same goals, policies, and values in terms of developing high-tech-based work automation systems such as "Rover". Learning from this case, it was found that there are common goals, policies, and values towards the development and utilization of automation technology innovations between companies and partners to implement innovations in the life science industry. The similarity of their goals, policies, and values has brought t technology development companies and life science companies together to jointly develop "Rover" in order to support the work processes of life science companies. The compatibility of the goals, policies and values that are owned can keep each party in line.

The similarity of goals is also found in case 2 with collaborative innovation between universities and companies developing environmentally friendly bio-plastic raw materials. The common goal of reducing the use of plastics and shifting to the use of bio-plastics has prompted innovative collaborations between universities and companies. In addition to common goals, the common policies of empowering cassava farmers (as providers of materials used to produce bio-plastics) and policies that pay attention to resource sustainability have encouraged collaboration between the two parties. In case 3, however, there is a common goal, namely, to develop kitchen utensils products that can be widely accepted by the market by using certified wood raw materials as a joint policy.

In addition to the similarity of goals and policies, the result of this study found that the companies have relatively the same values as their partner. In case 1, this involves shared values in terms of innovation, such as the importance of openness, innovation, and the courage to try new things. The similarity of values is also inseparable from the similarity of "business nature" between the two, namely, both development companies are always open to collaborating with other companies that are considered to have a symbiosis of knowledge. As innovation-based companies, both companies place innovation as the main basis in their work processes so that they are not reluctant to adopt new things. Their suitability encourages them to provide mutual support for the development of "Rover" technology for the purpose of building work automation in life science laboratories. This is what underlies the collaborative innovation between them. In case 2, the shared values between the company and their partner are shown in the desire of each party to participate in improving the standard of living of small farmers. Further, in case 3, the shared value to produce wood products sustainably also underlies the desire to collaborate in developing new products.

Based on the results of this study, it can be seen that the common goals and policies of each party are important factors in building harmony or compatibility between the company and partners so that they jointly provide support in developing technology. In line with this, Sarkar et al. explained that the existence of common goals and similar procedures can have an impact on the suitability of alliance performance between companies (Sarkar et al. 2001). The importance of getting a partner who is compatible with the company can affect the quality of the interactions that are built between companies (Ring 1994). However, some researchers add a set of non-technical aspects in considering potential partners. For example, there is relational dimension compatibility (i.e., compatible culture) in the screening of potential OI partners. Values compatibility fosters cooperation, which makes interaction rewarding and helps smooth over difficulties when they arise. Similarity provides common ground for initial social engagement (Laursen 2017).

What is explained above is that the compatibility between the collaborating parties is formed from time to time to achieve harmony. In fact, interpersonal interactions can also shape the performance of collaborative relationships. Thus, the relationship between partners becomes a strong criterion in partner selection (Seabright et al. 1992) and can be built through experience in exchange relationships and as a result of investments made in the relationship over time. Such methods can help in maintaining the existing relationship even when more attractive alternatives are available thereby reducing the chances of breaking up halfway. The existence of social ties, network membership, and provision of resources are determinants in building relationships between organizations (Aiken and Hage 1968; Van de Ven et al. 2017).

Compatibility between companies and partners is considered in building relationships between parties because it can affect how each party perceives that partner's knowledge as valuable or not (Simonin 1999). The more different, the more difficult it is for each member to see or appreciate the potential benefits that can be obtained from partners (Szulanski 1996). Therefore, compatibility between each party is needed in order to maintain the alignment of each party involved in IC. Compatibility between partners becomes an indicator of the stability and organizational harmonization of a strategic partnership and it generates trust and commitment (Kwon 2008).

4.1.3. Trust

Trust is needed in a cooperative relationship in an open and dynamic environment because it has the potential to deal with the challenges of uncertainty when relationships with other parties are carried out to achieve their own goals. This is implied in the expression of one of the informants who said:

" . . . we feel that their (partner) orientation, always want to protect us, like NDA, because we are laboratory people, . . . the goal is to produce innovations, which are useful, . . . well at that time they asked sample, . . . only a small amount of 100 gr, . . . we're happy, isn't it . . . our sample was brought, but they (partner) saw that everything could be exposed, it must be protected, this makes us feel that they (partner) are always something . . . acting to protect us, so with them (partner) I can be very open". (Case 2)

What has been explained above shows that there is a possibility that the company will face rapid and unexpected changes in the behavior of partners, where partners can join or leave at will because there is always the possibility that partners are more selfish. Therefore, trust becomes important in fostering a relationship, especially in situations of uncertainty. It is also implied from the statement of the resource persons as follows:

"The main thing is trust, so that trust becomes our consideration for partnering . . . " (Case 2)

Based on the existing literature, in general, trust can be interpreted as the beliefs and expectations of individuals or organizations towards the possibility of the desired action to be taken, the goodwill and reliability of the other party who is trusted in the context of a risky exchange (Sitkin and Roth 1993). Trust is needed in a cooperative relationship in an open and dynamic environment because it has the potential to face challenges of uncertainty when relationships with other parties are carried out to achieve their goals. In a collaborative innovation context, trust is a prerequisite and is often a factor influencing the quality of the relationship (Mohr and Nevin 1990). Therefore, trust is an important factor in the early stages of the collaborative innovation process between companies and partners. In the early stages of collaborative innovation, trust is placed as one of the determining factors in partner selection. It can be interpreted that high trust tends to result in a decision to work together.

- Trust building by previous (positive) experience

The results of field research show how trust is built from previous positive experiences. This can be seen from statements such as the following:

> "He's (partner) . . . not just Rover, meaning that he's been before . . . the name of the product "fast" is for the suction of the liquid, . . . it seems that he is satisfied with the product. So every time there is a new technology from us (company), he is excited for an early adopter. He is also a good customer who seems satisfied, maybe that's why he believes that even though it (Rover) hasn't been released, he is willing to spend money to use it at his place for his experimental purposes". (Case 1)

This is also reinforced by a statement from another source as follows:

> "You could say that this Rover is actually still researching . . . , because the status of this Rover is still in alpha, so it hasn't been released yet, that means it's still under development research . . . , but they (partners) don't mind . . . " (Case 1)

Based on the data above (case 2), it can be seen that the trust held between the company and partners is built on repeated positive experiences. In that case, trust can be based on the predictability of past behavior (Rempel et al. 1985). Thus, trust can not only be a determining factor in initiating the collaborative innovation process, but trust can also be the result (effect) of the collaboration performance itself or be a collaboration performance measurement itself (Doney et al. 1998). From this perspective, trust can lead to reduced opportunistic behavior among the transacting parties. This is evident from the statement below:

> "With (partner) I have known for a long time before, in previous research . . . , . . . from that . . . trust emerges . . . or he can be trusted. Include when we reveal the secret of the formula". (Case 2)

What is described above shows the importance of organizations in maintaining the performance of collaborative relationships because it can have an impact on building trust which leads to further collaboration. Marsh explains how trust is built because of direct interactions with the other party such as previous experience, a general assessment of the reliability of the other party regardless of a particular situation, and situational trust. Thus, the trust that exists between the company and partners can be built because of previous repeated positive experiences with partners. That means trust is based on predictability, and past behavior (Rempel et al. 1985). However, Marsh's approach does not take into account reputation and only models trustworthiness from direct experience. This limits the information available for trust evaluation, especially in cases where there are insufficient or no direct interactions (Keung and Griffiths 2008).

- Trust building by third party's recommendation

In the situation where the company does not have experience dealing with partners, trust is built by seeking information regarding partners which can not only be obtained through direct experience but can also be obtained through recommendations from other parties who have such experience. Although there is a tendency for companies to choose "friends" at first, if they have never been friends, they use recommendations from other parties who have been "friends" to get information about partners. Sharing recommendations, which include up-to-date and relevant information, is used by companies to help build trust in selecting partners. From the results of the collaborative innovation case study (case 3), there are witnesses to the "reputation" of the partners communicated by third parties (indirect recommendations). This is reflected in what was conveyed by the resource persons as follows:

> " . . . the collaboration happened because of the FSI. . . . they (partners) belong to a Belgium company, the process is standardized . . . , the wood products are affiliated with FSI, well, that are what they are required to do. . . . they (partners) have a duty to find out which companies can . . . be invited to cooperate, the condition is that one FSI, the other is a local product. . . . . . . FSI gave them recommendations . . . , and FSI told me, I don't prefer others, I directed them (partner) to us (company)". (Case 3)

What is stated above shows that in the process of finding the right partner, the companies need relevant information to use in selecting partners. To find manufacturers of kitchenware products made from certified wood, the consumer side tries to seek information from the third party as an institution for certification that oversees various companies including kitchenware manufacturers. In addition, they also have a network of both producers and consumers of various certified wood products. Based on the perspective of a third party or intermediary between the company and partners, suppliers who are considered to have value to sustainability in the wood industry, it was stated in interviews that:

> "They (company) has a high commitment to sustainability". (Case 3)

Thus the third party considers that the distributor company for kitchenware products also has the same value on sustainability. It is stated as follows:

> "Their partner . . . has a sustainability policy, now they are looking for sustainable products. They are looking for many items such as tissue, rubber, kitchenware and others. For kitchenware, we distribute it to several suppliers, in the end it is filtered, this company is chosen . . . local products . . . So, one of the roles of FSC is to bridge demand with supply, supplier demand". (Case 3)

Similar efforts were also made in case 2, as stated below:

> "So we really asked for data from the company . . . then from the third party, from the consultant . . . what kind of data . . . is this company healthy or not. . . . initiate to do business like that".

Based on this study, it is explained that when the company has too little interacting experience with partners or is too obsolete, companies will seek opinions from third parties who have interacting experience with partners or have information about partners, to obtain a more accurate assessment to build trust. Direct and indirect recommendations can provide useful information in building trust and commitment.

The lesson learned from case 3 where a collaboration between a company and their partner, with no previous experience of working together and no experience of partner behavior, was that they obtained information from third parties, and then followed up by seeking information directly. This is implied in the statement of the resource person below:

> "Initially . . . our product was considered suitable for the market, because it was almost the same as the existing product "brand x", . . . a difference of five minutes, they (the third party) called . . . , five minutes later, we got a call from partners . . . ". (Case 3)

Although in general, the selection of partners tends to use close relationships such as "friendship" rather than "strangers" (Li et al. 2008; Li and Piezunka 2020). However, with accurate information from a trusted party, it can become a recommendation and has the potential to change the status of "stranger" to "like friends" and have an impact on the tendency to cooperate.

What is described above shows that in general in the selection of collaborative innovation partners there is a tendency to use close relationships such as "friendship" rather than "strangers" (Li et al. 2008; Li and Piezunka 2020). However, according to Keung and Griffiths, apart from direct interaction in building trust, third-party recommendations can assist companies in gathering information related to partners (Keung and Griffiths 2008). With accurate information from a trusted party, it can become a recommendation so that it can potentially change the status of "stranger" to "like friends" and have an impact on the tendency to work together.

Based on this study, it can be understood that collaborative innovation requires a high commitment from all members. Therefore each party is willing to share knowledge and core competencies for their joint innovation. Similarly, in building a relationship or "engagement" then each partner will try to find a similarity between them. An "engagement" is not only performed with the reason of complementing each other but also requires a stronger bond between the two parties to keep both of them committed and in line to achieve a

common goal. The bond is built based on the compatibility they have and the existence of trust in each other. An "engagement" of both parties is carried out within a certain period of time before finally deciding to move on to the next level of the relationship.

4.2. Towards a Model of OI Partner Selection

In this section, we now continue to discuss bottom-up research results on how to select collaborative innovation partners, and this has resulted in the emergence of key indicators, namely complementarity, compatibility, and trust. In addition to proposing an emergence-based approach with bottom-up analysis in modeling collaborative innovation partner selection, (see Figure 1), we are also guided by the principles of the existing theory.
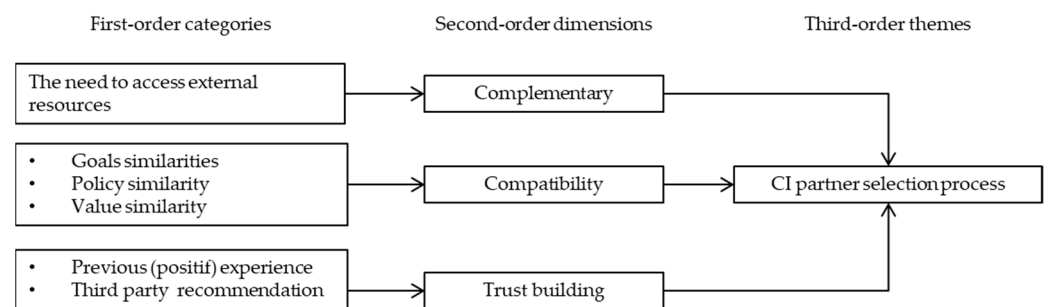
Figure 1. Data structure with first-order, second-order, and third-order. Resources: Research data process.

Cross-boundary collaborative interactions are reported as facilitating the inflow of external knowledge to support firm innovation performance (Laursen and Salter 2006). The involvement of external parties in a company's innovation is a form of utilizing external knowledge and expertise resources to overcome limited internal knowledge resources. Likewise, open innovation has been considered as a company's solution to its limited capacity of human resources in producing innovation (Spithoven et al. 2013). External knowledge is a complementary resource to optimize internal innovation capacity to support firm competitiveness. However, it may also pose organizational challenges, which might potentially impede open innovation success. The search for external knowledge has the potential to cause a problem in finding the right partner (Enkel et al. 2009) and requires a large allocation of time, effort, and the manager's attention to maintaining the relationship with external parties. Lacking understanding of the costs and effort or the lack of careful management will result in the search effort spreading over many channels and will deter the company from innovation performance itself.

Through the empirical study, it can be understood that in the beginning, the collaborative innovation was carried out because of the limitation of the resources (knowledge, competence, and technology) of each party, so other parties were needed to complement each other's shortcomings. This is in line with the previous literature which explains that the existence of partners is a complementary resource both in terms of technical capabilities and technical assets (Sarkar et al. 2001). Complementary factors are the main determinants for conducting collaborative innovation. However, in an open and uncertain environment, collaborative innovation requires stronger ties so that they are not only technically complementary.

In the context of collaborative innovation, it is possible that the project objectives will change over time, therefore the existence of a shared vision is a key factor in the success of future collaborative projects (Sailer et al. 2014). Although collaborative innovation is temporary, the results of empirical research show that there are similarities in the goals and policies of each party. This is needed in building a shared vision. In line with the results of previous studies, the study of Sarkar et al. (2001) shows that the existence of common goals and similar procedures contribute to explaining the impact of congruence on the performance of alliances between firms (Sarkar et al. 2001). As well, the issue of the similarity of partners is considered because it allows knowledge sharing to occur (Darr and

Kurtzberg 2000). The similarity between partners can affect how each party perceives that the knowledge of the partner is valuable or not (Simonin 1999). The more different, the more difficult it is for people to see or appreciate the potential benefits that can be obtained from partners (Szulanski 1996). It is important to build harmony or compatibility so that together they provide support in carrying out joint innovations. In this case, the compatibility between companies and partners can affect the quality of interactions that are built between companies (Ring 1994). Therefore, finding a suitable partner between the parties who want to collaborate is very important in the partner selection process before starting the collaborative innovation interaction. Compatibility factors between partners can also be an indicator of harmonization between organizations and can lead to trust and commitment (Kwon 2008) which in turn can support the success of collaborative innovation.

Based on the explanation above about the importance of complementarity and compatibility factors in partner selection of collaborative innovation, more broadly, Chesbrough and Appleyard recommend that companies in the network must clearly define and align business goals and models among organizations (Appleyard and Chesbrough 2017). It is useful for sharing and building innovation capacity together. Therefore, having a shared vision can reduce uncertainty in an open relationship.

Given that collaborative innovation requires openness from each party to be willing to share their core competencies, trust is a prerequisite for collaborative innovation. Even in collaborative innovation, trust is often a factor that affects the quality of relationships (Mohr and Nevin 1990). Therefore, trust is an important factor in the early stages of collaborative innovation between companies and partners. At the initiation stage of collaborative innovation, trust is placed as one of the determining factors in partner selection. Thus it can be interpreted that high trust tends to result in a decision to work together. Therefore, the presence or absence of trust will affect the success or failure of initiating collaborative innovation between organizations.

In that case, trust can be based on the predictability of past behavior (Rempel et al. 1985). Through this perspective, trust can lead to reduced opportunistic behavior among the transacting parties (Hasche et al. 2017) because of their previous track record. Thus, trust can not only be a determining factor in initiating the collaborative innovation process, but trust can also be the result (effect) of the collaboration performance itself or be a measure of the collaboration performance itself (Doney et al. 1998). As a result, trust is not only a determinant in initiating collaboration but trust can also be related to the process of further relationship development.

5. Discussion

Based on the RBV, that view emphasizes the acquisition of resources (such as human resources, technology, and other assets) in building the company's competitiveness. However, without ignoring the RBV perspective, reality shows that the organization is an open system, and resources can flow freely across the organization. Thus, the existence of organizations in the network helps access various external resources (Lavie 2006) by building connectivity such as alliances, collaborations, and other inter-organizational forms such as collaborative innovation. Likewise, organizations always try to utilize various internal and external resources in the innovation process (Enkel et al. 2009; Lavie 2006; Gassmann et al. 2010; Inauen and Schenker-Wicki 2011; Kondev et al. 2014; Mowery et al. 1996; West and Lakhani 2008). Even large organizations no longer rely on their internal innovation capabilities. They try to utilize resources such as external technology through the use of licensing, R&D outsourcing, corporate ventures, and acquisition for the development of internal technology capability. Some examples of large companies such as GE, Cisco, Lucent, Alcatel, and Nortel do not innovate on their own, and Microsoft, up until 1991, also did not have its own R&D (Gassmann 2006; Getz and Robinson 2003).

Although at the beginning when RBV was introduced, it received a lot of criticism, in its development, it emphasizes how the company uses all resources together so as to achieve the "unique" criteria (valuable, rare, imperfectly imitable, and non-substitute)

to support the company's competitive advantage (Teece 2018). Therefore, the existence of the organization in an open, collaborative and competitive environment must be able to maintain the uniqueness of its resources and capabilities so as not to lose its core competencies and competitiveness. Thus, it is important to understand that in an open and collaborative era, it is important for companies to maintain openness in order to be able to utilize external knowledge resources to support company innovation, but they must also maintain core competencies (Kale et al. 2000) or experience opportunistic behavior from partners (Zahra and George 2002).

Based on the above understanding, intersections between organizations are built on a number of similarities that are the basis for collaborative innovation. Therefore, the selection of partners needs to consider the similarities they have. In building inter-organizational relationships the issue of the similarity of partners is considered because it allows knowledge sharing to occur. The resemblance between partners can affect how each party perceives that knowledge from partners is valuable or not (Simonin 1999). The more different, the more difficult it is for people to see or appreciate the potential benefits that can be obtained from partners (Szulanski 1996; Kostova et al. 2008). This is supported by the results of empirical research that the complementarity factor is the main determinant in choosing collaborative innovation partners. With its complementarity, each party can contribute to sharing knowledge, competence, and technology for the purpose of mutual innovation. However, fundamentally, differences in values, goals, and beliefs can underlie organizational practices leading to the closing or opening of each party (Vaara 2003). The more different will hinder the openness in the sharing of knowledge or hinder the absorption of knowledge, which in turn has an impact on the innovation performance of the team. The existence of commonalities such as shared values, norms, and patterns of behavior can facilitate the sharing process and the emergence of trust, so at the same time, it can reduce the potential for conflict among the members involved (Darr and Kurtzberg 2000; Sitkin and Roth 1993; Björkman et al. 2007).

What is described above shows a number of factors to consider when choosing a partner. However, from the results of this study, it can be understood that in collaborative innovation, the complementarity aspect is often the starting factor in the partner selection process, but compatibility and trust aspects are often the main determining factors in partner selection. Furthermore, trust itself is not only placed as a determining factor in choosing partners but also as an effect resulting from collaboration performance that can have an impact on the next collaboration process. That is why trust is not only a prerequisite for initiating collaboration but also for maintaining the continuity of the collaboration itself.

This empirical research is still exploratory in identifying the main determinants in choosing collaborative innovation partners. Meanwhile, innovation can be described as an information-creation process that arises out of social interaction. These interactions provide the opportunity for thoughts, potential ideas, and views to be shared and exchanged. This requires the organization's ability to build relationships with the relevant external environment by increasing the relational capacity of employees. The relational capacity of employees will help in assessing external resources that can be integrated with their knowledge base or internal competencies (Lichtenthaler 2010). The ability to integrate diverse but relevant expertise can help in the creation of ideas for new products (Dodgson et al. 2006). However, attention to the HRM aspect to support this is lacking. Therefore, further study is needed to see the impact of organizational differences on this.

6. Conclusions

Generally speaking, the different logic of closed innovation, challenges organizational management to use internal and external knowledge resources simultaneously by involving external partners in the company's innovation process. It requires the organization's ability to manage open innovation and starts with how to select the right partners.

While on the other side, opening the innovation process is much harder and does not always happen smoothly throughout the collaborative innovation (Mäkimattila et al. 2013).

Opening the process of trust-based interactions with external parties at first can change completely by the end. Therefore, OI as an alternative to finding external knowledge resources in innovation is not always easy and safe to implement. Referring to the various potential problems in the implementation of OI (Laursen 2017; Laursen and Salter 2006), it is shown that getting a suitable partner is not a simple matter. Unfortunately, the process of choosing the right partner is still being ignored, while on the other side, finding the right partner can have an impact on the quality of interactions and strong social bonds between the companies, which will then have an impact on success in knowledge transfer (Darr and Kurtzberg 2000; Reagans and McEvily 2003) and success post-collaboration (Kim and Olsen 1999). In this case, value creation and value capture in collaborative innovation involve partnering firms with the perfect blend of complementary traits, compatible traits, and trust. Therefore, the process of partner selection is crucial in building inter-organizational relationships (Li et al. 2008; Li and Piezunka 2020).

In addition, project-based job design that is temporary and very specific makes the role of the HR function shift from HR specialist managers to innovation project managers or non-HR specialist managers. Therefore, they are not only required to have technical competence related to projects but are also required to carry out HR functions that are not simple. Fostering and securing the relationship with external parties are regarded as the primary challenges for managers who have multiple choices of partners with heterogeneity in profiles and characteristics available in an OI market (Chesbrough and Crowther 2006).

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