An open innovation strategy is increasingly being adopted by firms in order to leverage external knowledge sources to solve internal problems. However, there are challenges for firms to implement this strategy such as needing to identify, motivate, and manage external sources of innovation. Thus, innovation intermediaries such as InnoCentive are being established to assist client firms (seekers) in leveraging this strategy through recruiting a large pool of external solvers to solve seekers’ problems. However, there is limited research and understanding of how these innovation intermediaries perform and create value for seeker firms. To address this knowledge gap, we conducted an exploratory case study of 4 innovation intermediaries to identify antecedents of their performance. Based on prior open innovation and knowledge brokering literatures, we conceptualized innovation intermediaries as knowledge brokers. Through the case study, we identified three brokering capabilities that affect innovation intermediaries’ performance in supporting seekers’ open innovation, i.e., problem-defining, problem-solver matching, and proposal-filtering. We thereby develop hypotheses linking these capabilities to innovation intermediaries’ performance. Our results are expected to contribute to the literature by explaining antecedent capabilities of innovation intermediaries’ performance and value creation for seeker firms. This study also provides practitioners with insights on how seeker firms can leverage innovation intermediaries for greater benefit. The plan for continuing the study is discussed.

Keywords: Open Innovation, Innovation Intermediaries, Knowledge Brokering Perspective, Brokering Capabilities, Case Study
Introduction

With IT advances, firms are increasingly opening up their internal R&D to leverage external knowledge for innovation (Laursen and Salter 2006; Boudreau and Lakhani 2009). For example, every year, P&G invests more than 2 billion dollars in innovation and more than half of its innovations derive from a global network of external innovation partners. This process of leveraging external knowledge for internal innovation and commercializing internal innovations through external channels is defined as open innovation (Chesbrough 2006). The open innovation strategy is increasingly being adopted by firms for its potential benefits. These benefits include quickly obtaining advanced technologies and knowledge for firm innovation and production activities (Poetz and Schreier 2012), diversifying the risk of innovation and sharing uncertainty with outside partners (Keupp and Gassmann 2009), avoiding being trapped by previous performance (Valikangas and Gibbert 2005), and obtaining continuous innovation (Boudreau and Lakhani 2009).

However, many firms experience difficulties in adopting an open innovation strategy and benefiting from it (Lichtenthaler 2009; West and Gallagher 2006). Particularly, firms have been struggling to understand how to open up their new product or service development processes and how to motivate and manage outside innovation (Boudreau and Lakhani 2009). This includes concerns about how to find the right partners or knowledge sources and how to transfer the knowledge between parties (West and Gallagher 2006). Also, firms are concerned with the risks related to open innovation such as the loss of knowledge and control and high coordination costs (Enkel et al. 2009).

To mitigate these challenges, innovation intermediaries such as InnoCentive, have been established to support firms in their open innovation efforts (Sieg et al. 2010). In these platforms, “seekers” (firms) post problems that cannot be solved internally, for “solvers” (external knowledge workers) to tackle. The intermediaries help seekers define their problem so that solvers can understand it and propose solutions for it. When posting a problem, a seeker stipulates a time frame for solving it and a financial reward for the winner. Potential solvers are then invited to propose solutions. Consequently, firms are able to obtain innovative solutions from external sources through these intermediaries (Boudreau and Lakhani 2009). However, innovation intermediaries are not always successful in assisting firms.

With the above challenges, previous research has attempted to investigate the role of innovation intermediaries in facilitating seeker firms’ innovation (e.g., Lichtenthaler and Ernst 2008; Sieg et al. 2010; Verona et al. 2006). For example, Verona et al. (2006) conducted a conceptual investigation of virtual knowledge brokers, including online communities of customers interested in a specific product or brand. They suggested that these online communities can help collect the knowledge of customers and distribute the knowledge to clients in order to support their innovation. However, there is a lack of theory-driven empirical research examining how innovation intermediaries support seeker firms to obtain innovative solutions and create value for them (Sieg et al. 2010).

Motivated thus, this paper aims to address the research question: What capabilities determine the performance of innovation intermediaries and how do the capabilities interact in determining performance? To address the research question, we conducted an exploratory case study of 4 successful innovation intermediaries. Drawing on previous open innovation and knowledge brokering literatures, we conceptualized innovation intermediaries as knowledge brokers. By analyzing the case data, we identified three brokering capabilities through which innovation intermediaries perform and create value for seeker firms. Subsequently, a model is proposed linking the capabilities to innovation intermediaries’ performance that will be tested in our future research. The expected contributions of the research are discussed and the plans for continuing this study are outlined.

Conceptual Background

In this section, we describe the knowledge brokering perspective on which our case study is based. It is used to identify the steps that innovation intermediaries (acting as knowledge brokers) would go through in order to perform their role successfully.

Knowledge Brokering Perspective

The knowledge brokering perspective has been proposed to explain the brokering role of individuals or firms in facilitating innovation activities (e.g., Cilio 2005; Hargadon 2002). Originally, this perspective was developed to describe how consulting firms and innovation groups in large multi-

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divisional organizations act as knowledge brokers for innovation of their clients or firms (Hargadon and Sutton 1997). Brokers support innovation by occupying structural holes that bridge gaps in information flow between different groups (Burt, 2004). Specifically, knowledge brokers are suggested to be able to facilitate the transfer of complex knowledge between clients and external sources that are not directly related and rarely interact (Abbate and Coppolino 2011; Hacievliyagil et al. 2007; Verona et al. 2006). By doing so, they can work with their clients to obtain innovative solutions from external sources (Hargadon 2003). As per this perspective, knowledge brokering consists of the steps of gaining access to relevant external sources, bridging (establishing contacts) between their clients and external sources, learning about the domains of client’s problems, linking the client and external source for knowledge transfer, and building environments for innovation (Hargadon 1998, 2002).

Gaining access refers to knowledge broker’s first step of reaching relevant external knowledge sources that would not be accessible otherwise (Hargadon 2002). This allows for knowledge brokers to identify potential solutions in other relevant domains. Bridging refers to the second step of connecting to relevant external knowledge sources and communicating with them. Through the bridging process, knowledge brokers support firms to connect to relevant external knowledge sources. This enables firms to recognize the potential sources where the desired knowledge resides and to bring these sources to work on a particular innovation activity.

The third step of learning knowledge about problems and solutions from diverse domains increases the range of responses of knowledge brokers to the current and future demands of seeker firms (Hargadon 1998, 2002). If knowledge brokers can acquire in-depth knowledge from different domains, they can define firms’ problems that can be comprehended by external parties. Moreover, learning about different problems often gives new meanings to their past knowledge (Hargadon 1998). This will enable knowledge brokers to refine task requirements so that relevant sources from different locations can contribute to client organization’s innovation activities.

Fourth, linking is the step through which knowledge brokers recognize how well the solutions may address new problems (Hargadon 2002). Knowledge brokers link their inventory of existing problem definitions and solutions to the current problem through a process of analogical reasoning. Throughout the problem-solving process, they are drawing on their awareness of past problems and solutions, making analogical links between those existing ideas and the demands of the current project. These linking activities allow multiple evaluation criteria to be employed to effectively remove irrelevant ideas. Finally, building allows the emerging recombination of innovative ideas to be embedded into the firm.

Subsequently, Verona et al. (2006) extended the view of knowledge brokering from consulting firms and groups to virtual knowledge brokers. They suggested that innovation intermediaries are virtual knowledge brokers that identify, connect, and facilitate knowledge transfer to client firms for their innovation. Verona et al. (2006) described how virtual environments can affect the knowledge brokering steps, virtual knowledge brokers’ network areas, and knowledge management processes. Building on their work, researchers have attempted to investigate the role of virtual knowledge brokers in facilitating knowledge transfer for seeker firms’ innovation.

For instance, Abbate and Coppolino (2011) analyzed two knowledge brokers i.e., InnoCentive and YourEncore, and noted how virtual knowledge brokers can adopt different mechanisms for their solver base to provide brokering service. Billington and Davidson (2012) highlighted the need for appropriate organizational learning routines to ensure effective knowledge transfer while emphasizing the importance of leveraging intermediary networks as knowledge brokers to source knowledge. Lichtenthaler and Ernst (2008) qualitatively analyzed innovation intermediaries such as Yet2.com and noted the challenges that they faced. Through a case study of 7 seeker firms, Sieg et al. (2010) observed that the innovation intermediary i.e., InnoCentive, is capable of facilitating seeker firms to overcome the difficulties of adopting an open innovation strategy. However, despite the increasing interest in this area, there is a lack of studies and understanding of how these innovation intermediaries perform and create value for seeker firms. Based on the knowledge brokering perspective, this paper explores how innovation intermediaries perform and their antecedent capabilities through an in-depth case study.

**Research Methodology**

Given that the target phenomenon of our research, the required capabilities and how they interact to impact innovation intermediaries performance, is a newly-emerging and complex practice, we employed a positivist exploratory case study approach to address our research question (Yin 2003).
We used the innovation intermediary website list from openinnovators.net as our sampling frame to select communities for our case study. The innovation intermediaries we selected are those that (1) mainly focused on helping seeker firms solve creative or R&D problems, (2) have been established for a while (>5 years), and (3) have more than 10,000 solvers. Such established and successful innovation intermediaries can provide insights into the capabilities that determine innovation intermediaries’ performance. According to the above criteria and their popularity, 4 websites were selected as the study objects (see Table 1). Several data collection methods were used to allow for triangulation of sources and for increasing reliability of the findings (Dube and Pare 2003). The primary data collection was through interviews of informants from these websites. Objective data that are publicly available (i.e., success rate, solvers’ postings, and seekers’ feedback) were used as secondary data.

From each website, we invited 2 seeker firms, 2 staff members, and 2 solvers through email to be interviewed. Among the seeker firms listed in each website, 2 seekers that have proposed creative or R&D problems were randomly selected and interviewed to obtain an understanding of the objectives, procedures, and outcomes of the knowledge brokering process. For the selection of solvers from each website, we first filtered for experienced solvers who have won a reward at least 5 times with 2 or more years tenure. From the filtered list, we randomly selected 2 solvers from each website to seek their opinion on how innovation intermediaries support them in creating value for seeker firms. Finally, from each innovation intermediary website, 2 staff members who manage the process of open innovation were randomly selected and interviewed on the actual execution of knowledge brokering. The interviews included both structured and unstructured questions, and were conducted through email and instant messenger communication tools. The interviewees were asked to describe their roles in gaining access, bridging, learning, and linking during knowledge brokering. The building step was not included since this was typically performed by the seekers.

Table 1: Interview Information

<table>
<thead>
<tr>
<th>Innovation Intermediary</th>
<th>Interviewee</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NineSigma</td>
<td>Seeker firms</td>
<td>A 10 year old IT firm with more than 2000 employees</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 3 year old pharmacy firm with more than 1000 employees</td>
</tr>
<tr>
<td></td>
<td>Solvers</td>
<td>A 30 year old male solver who has won 5 times with 3 year tenure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 28 year old male solver who has won 6 times with 2 year tenure</td>
</tr>
<tr>
<td></td>
<td>Staff members</td>
<td>A 32 year old male who manages the task solving process with 2 years experience</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 28 year old female who manages the process of seekers’ problem proposing with 2 years experience</td>
</tr>
<tr>
<td>TaskCn</td>
<td>Seeker firms</td>
<td>A 3 year old manufacturing firm with more than 500 employees</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 3 year old IT service firm with more than 100 employees</td>
</tr>
<tr>
<td></td>
<td>Solvers</td>
<td>A 25 year old male solver who has won 7 times with 4 year tenure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 28 year old female solver who has won 6 times with 3 year tenure</td>
</tr>
<tr>
<td></td>
<td>Staff members</td>
<td>A 26 year old male who manages the task solving process with 2 years experience</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 28 year old male who helps seekers to propose problems with 3 years experience</td>
</tr>
<tr>
<td>Wilogo</td>
<td>Seeker firms</td>
<td>A 5 year old internet retail firm with more than 20 employees</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 3 year old bio-technology firm with more than 100 employees</td>
</tr>
<tr>
<td></td>
<td>Solvers</td>
<td>A 34 year old male solver who has won 10 times with 3 year tenure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 28 year old female solver who has won 5 times with 2 year tenure</td>
</tr>
<tr>
<td></td>
<td>Staff members</td>
<td>A 30 year old male who manages the process of logo design and revision with 3 years experience</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 28 year old female who manages the process of contacting seekers with 2 years experience</td>
</tr>
<tr>
<td>InnoCentive</td>
<td>Seeker firms</td>
<td>A 20 year old cosmetic firm with more than 5000 employees</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 13 year old pharmacy firm with more than 1000 employees</td>
</tr>
<tr>
<td></td>
<td>Solvers</td>
<td>A 43 year old male solver who has won 7 times with 2 year tenure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 34 year old male solver who has won 6 times with 3 year tenure</td>
</tr>
<tr>
<td></td>
<td>Staff members</td>
<td>A 32 year old male as a task requirement codification assistant with 2 years experience</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 28 year old female staff member as a solver’s assistant with 1 year experience</td>
</tr>
</tbody>
</table>

Data analysis was conducted by breaking down the process of open innovation brokering into the four steps based on which the interview transcripts were coded. Care was taken to ensure that equal attention was given to all stages (Yin 2003). Transcripts of interviews were scrutinized for patterns and recurring themes (Eisenhardt 1989) regarding the capabilities that impact performance. Triangulation was done between the primary interview and secondary data. An iterative process of

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2 http://www.openinnovators.net/list-open-innovation-crowdsourcing-examples/
comparing empirical evidence with existing literature eventually gave rise to possible theoretical conceptualizations of the knowledge broker capabilities.

Data Analysis and Preliminary Results

Through the case analyses, we confirmed that innovation intermediaries serve as a form of knowledge broker, enabling companies to extend their knowledge seeking to distant knowledge sources for more diverse knowledge for innovation. Classified within the category of innovation broadeners, innovation intermediaries rely on their advantageous network position to facilitate the transfer of complex knowledge between clients and external sources that are not directly related and rarely interact (Gassmann et al. 2011). Table 2 shows the supporting interview quotes for the knowledge brokering steps suggested by Hargadon (2002) and the proposed capabilities that should be important to the performance of the intermediaries based on our analysis.

<table>
<thead>
<tr>
<th>Step</th>
<th>Quote</th>
<th>Proposed Capability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access</td>
<td>“Our company tends to choose TaskCn to solve problems since it has a large pool of solvers” – Seeker in TaskCn</td>
<td>Problem-solver matching</td>
</tr>
<tr>
<td>Bridging</td>
<td>“We will compare the knowledge domain of a problem with solvers’ expertise areas, identify potential solvers for the proposed problem, and send them the problem briefs” – Staff member in InnoCentive</td>
<td>Problem defining</td>
</tr>
<tr>
<td>Learning</td>
<td>“Staff members will help us phrase the problem and elicit our requirements. They also help us redefine the problems” – Seeker in NineSigma</td>
<td></td>
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<tr>
<td></td>
<td>“We need to understand what seekers want and translate the demanded information into a language that can be comprehended by solvers. This will include iterative interactions with seeker firms” – Staff member in Wilogo</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Staff members in InnoCentive help us by explaining problem requirements if there is any confusion. They will try to use different terms to describe the same problem so that I can precisely understand what is wanted by the seeker.” – Solver in InnoCentive</td>
<td>Proposal filtering</td>
</tr>
<tr>
<td>Linking</td>
<td>“Staff members will recommend the relevant proposals for us to select” – Seeker in NineSigma</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“We will recommend seekers the proposed logos that are a best fit to their requirement. If they require revisions, we will ask solvers to customize or revise the logo for their specific requirements” – Wilogo staff member</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“If the seeker is too busy to select the winner, a staff member in TaskCn will help select the winner for the task.” – Solver in TaskCn</td>
<td>Proposal filtering</td>
</tr>
</tbody>
</table>

In our context, gaining access provides opportunities for intermediaries to identify potential solvers for seekers’ problems. As a prerequisite for bridging, innovation intermediaries should maintain a diverse solver base to facilitate seekers’ problem solving. This will allow intermediaries to have a higher chance of identifying suitable solvers to solve problems. We refer to the combined capability during gaining access and bridging to the relevant external knowledge sources as the problem-solver matching capability of the broker, which is likely to be important for innovation intermediaries’ performance.

When innovation intermediaries have in-depth knowledge of different domains, this will enable them to define seeker problems that can be easily comprehended by relevant knowledge sources. As they are exposed to more domains and with more detail, they will be able to learn and give new meanings to their past knowledge. As a result, it will enable innovation intermediaries to refine task requirements so that relevant sources from different locations can contribute to the seeker task better. In the context of our study, we refer to broker’s capability during the learning process as the problem defining capability, which is important for innovation intermediaries to recruit relevant solvers for problems through refining task requirements with a shared language.

During the linking step, innovation intermediaries link their inventory of existing problem definitions and solutions to the current problem through a process of analogical reasoning. Throughout the problem-solving process, intermediaries are drawing on their awareness of past problems and solutions, making analogical links between those existing ideas and the demands of the current project. These linking activities allow multiple evaluation criteria to be employed to effectively remove irrelevant ideas for the seekers’ problems. This capability will enable intermediaries to filter out the irrelevant proposals from the entire set of submissions. Thus, we suggest proposal filtering capability as important for innovation intermediaries to obtain relevant solutions during the linking process.
Thus, according to the case data, the four steps of knowledge brokering, i.e., access, learning, bridging, and linking, are found to be facilitated by the problem defining capability, problem-solver matching capability, and proposal filtering capability of innovation intermediaries, which should be important to the performance of the intermediaries.

Additionally, we found that the three capabilities interact with each other. As a staff member in InnoCentive mentioned:

“If the task requirement is clearly defined and codified, less work will be done in answering solvers’ confusion about the requirement and their subsequent proposal of solutions. Neither is much effort needed in filtering irrelevant solutions.”

Similarly, a staff member in NineSigma noted:

“If the task requirement is accurately translated from seekers’ demand, we do not need to spend much time in recruiting solvers to participate.”

Proposed Hypotheses

Through the case study results, we identify three capabilities that may affect the performance of the innovation intermediary. Based on the previous literature and case study findings, we propose that the problem defining capability, problem-solver matching capability, and proposal filtering capability of an innovation intermediary both separately and jointly determine its performance. The proposed model is shown in Figure 1.

**Problem Defining Capability**

To leverage external knowledge, seekers should be clear about what they want to obtain from such sources, though not all seekers are (Allio 2004). Innovation intermediaries can play an important role to help seekers identify and define their needs. To be competent in this role, sufficient domain-specific knowledge will allow intermediaries to break down the complexity of ill-structured seeker problems that are characterized by uncertain problem-structures (Gasson and Elrod 2006). This can be achieved through learning from multiple solvers and seekers they span, so as to help overcome the cognitive distance of different parties and transform seekers’ problems into a language that can be easily understood by potential solvers, which could result in novel and satisfactory solutions. Thus, the capability to help seekers define their problems and phrase them in a shared language can enable intermediaries to obtain submissions that fit seekers’ needs. Therefore, we propose

H1: Problem defining capability is positively related to the performance of the intermediary

**Problem-Solver Matching Capability**

Problem-solver matching capability is the ability of the innovation intermediary to reach out and connect to possible solvers for seekers’ problems. Prior research suggests that partners in innovation alliances can serve as bridging ties to connect otherwise geographically distant members to work on innovation projects for better performance (e.g., Tiwana 2008). Similarly, if innovation intermediaries have the capability to access and connect to a broad range of knowledge workers, these heterogeneous solvers can provide more useful ideas for problem solving than relatively homogeneous professional employees in the firms. As previous literature (e.g., Boudreau and Lakhani 2009) suggests that diverse knowledge will enhance innovation productivity, innovation intermediaries can foster the
success of problem solving by matching solvers of diverse expertise with the problem. Similarly, when innovation intermediaries have domain-specific knowledge of tasks requiring solutions, they can reach out to solvers with a higher success rate in solving seekers’ problems. Thus, we propose

**H2: Problem-solver matching capability is positively related to the performance of the intermediary**

**Proposal Filtering Capability**

Proposal filtering capability is the ability of the innovation intermediary to assist seekers to screen the proposals sent by solvers. In order to identify possible solutions, innovation intermediaries can filter the proposals by using their inventory of existing knowledge (Allio 2004). With better proposal filtering capability, they can use analogical reasoning to recognize the potential value of proposals by linking current problems with solutions. Therefore, proposal filtering helps seekers to not miss any potential solutions for their problems and saves their time and effort in sifting relevant solutions from a large number of solvers. Therefore, we propose

**H3: Proposal filtering capability is positively related to the performance of the intermediary**

**Interactions Between the Capabilities**

When their problem-defining capability is high, innovation intermediaries can better understand what seeker firms need and transform seekers’ needs into clearly defined task requirements. Prior creativity research (e.g., Ward et al. 2004) suggests that specifically defined tasks are more likely to obtain satisfactory results. In the context of our study, through clearly defined task requirements, solvers can better understand the task and are able to work on it with specific goals. In such a situation, innovation intermediaries may be able to obtain a higher success rate of problem solving. Therefore, innovation intermediaries may have to rely less on their problem-solver matching capability to recruit relevant solvers for task solving. When the problem-defining capability is low, innovation intermediaries may not be able to correctly define the problems that could lead to a poor success rate. In order to guarantee the success of solving problems, they need to depend more on their problem-solver matching capabilities to identify potential solvers. Thus, there may be a substitute effect between problem-defining capability and problem-solver matching capability. Hence, we postulate

**H4: The relationship between problem-solver matching capability and the performance of the intermediary will be weakened when problem defining capability is high**

Correctly solicited needs of seeker firms and clearly defined task requirements will enable innovation intermediaries to form clear and specific evaluation criteria for proposal filtering, which should increase the success rate of problem solving. Hence, innovation intermediaries may rely more on their problem defining capability rather than their proposal filtering capability since there are less irrelevant submissions for clearly defined problems. However, when the problem-defining capability is low, innovation intermediaries may be unable to obtain relevant solutions. Therefore, they will need to depend more on their proposal filtering capability. Thus, there may be a substitute effect between problem-defining capability and proposal filtering capability. Hence, we hypothesize

**H5: The relationship between proposal filtering capability and the performance of the intermediary will be weakened when problem defining capability is high**

When their problem-solver matching capability is high, innovation intermediaries may be able to readily identify potential solvers for task solving and may receive relevant responses from them. Thus, innovation intermediaries may not require a high proposal filtering capability since the proposals are likely to be relevant. In contrast, when their problem-solver matching capability is low, innovation intermediaries may need to rely more on their proposal filtering capability so that they can identify relevant proposals for seekers’ problems. Hence, there may be a substitute effect between proposal filtering capability and problem-solver matching capability. Thus, we postulate

**H6: The relationship between proposal filtering capability and the performance of the intermediary will be weakened when problem-solver matching capability is high**

**Discussion and Implications**

Open innovation is becoming important for firms to obtain competitive advantage. However, implementing the open innovation strategy can be challenging for firms (West and Gallagher 2006). By taking advantage of Internet-based infrastructures, innovation intermediaries have been established to facilitate firms to adopt the open innovation strategy (Sieg et al. 2010). However, not all intermediaries are successful in meeting the needs of seeker organizations. To explore the capabilities of the intermediary that explain their performance, we conducted a preliminary case study of 4
innovation intermediary websites. The results are used to derive hypotheses on the direct and interaction effects of brokering capabilities on the performance of innovation intermediaries.

**Expected Theoretical Contributions**

Theoretically, this paper aims to contribute to the literature in several ways. First, although innovation intermediaries are considered as an important means for firms to adopt an open innovation strategy, few IS studies have explored this phenomenon. To address this gap, we developed a model to examine the influence of capabilities of an intermediary on its performance. We proposed that three capabilities of an online intermediary, i.e., problem defining capability, problem-solver matching capability, and proposal filtering capability, directly and interactively affect its performance. The model extends previous literature (e.g., Sieg et al. 2010) by suggesting the relationship between brokering capabilities of the online intermediary and its performance and proposing testable hypotheses. This could help researchers better understand the role of innovation intermediaries in co-creating value with firms by facilitating them to obtain satisfactory solutions. This also enriches the currently limited understanding on open innovation through innovation intermediaries in the IS field, thereby facilitating future research in this area.

Second, this paper contributes to the knowledge brokering perspective by extending its applicability to explain open innovation through virtual knowledge brokers. It also aims to extend the perspective by extracting important capabilities from the process of knowledge brokering (Hargadon 2002) and proposing that these capabilities can directly and interactively explain the performance of online innovation intermediaries. Our case findings suggest that to better serve seeker firms to obtain satisfactory solutions and hence generate profits, an online innovation intermediary should enhance its problem defining, problem-solver matching, and proposal filtering capabilities.

**Expected Practical Implications**

For practitioners, the study aims to provide insights on how an innovation intermediary can improve its performance. This paper suggests that in order to better leverage the open innovation strategy, firms should select those communities with high intermediation capabilities to ensure maximum return on intellectual capital. In addition, this paper provides suggestions to online innovation intermediary platforms on how to sustain competitive advantage. As the preliminary findings suggest, online intermediary platforms should provide superior capabilities to support firms' adoption of open innovation strategies. Since it is challenging for firms to leverage open innovation strategies for innovation, it is important for online intermediary platforms to provide corresponding support to firms and cultivate their intermediary capabilities. They can train or hire employees to improve these capabilities, set up better IT-based matching mechanisms, and design appropriate tools for filtering.

**Limitations and Future Work**

As a research in progress, this study needs further work and the hypotheses require empirical validation with a large sample size. First, the findings were based on a case study. As a limitation of the methodology, the findings in our study may not be generalizable to other contexts or cases. Future research should collect more data from the remaining websites in the openinnovators list and conduct statistical analyses to test the model. Specifically, future work should develop an instrument for the model constructs and collect data to test the hypotheses. By adopting a sequential, qualitative-quantitative approach (Creswell 2009), we will continue this study by testing the hypotheses through survey and objective data. As the purpose of using the mixed method is to leverage the strengths of each approach (Bergman 2008), we use the qualitative approach first to gain insights into the capabilities that are likely to affect the performance of the innovation intermediary. Subsequently, we will use the quantitative approach to validate our hypotheses.

Second, the model is proposed based on the knowledge brokering perspective in this study. Other perspectives or theories could be applied to examine the performance of online innovation intermediaries. For example, the influence of different kinds of incentives for tasks and tools on the performance of online innovation intermediaries could be examined. Overall, this stream of research can help us to understand the capabilities required of online innovation intermediaries to be successful in serving seekers' needs.
References


