

Service learning and alumni-granted industry-academic collaborations

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Abstract. Service learning students can be seen as customers that make consumption for learning experiences from the service products. Service is hard to capture, and service production relies on the interaction between the user and the provider for simultaneous co-production. Also, knowledge and learning is difficult to procure, as it is intangible and rarely transmitted unless the consumer has specific needs that are not being adequately met by the provider. Incorporating the customer in innovation leads to novel ideas for service and also verifies the acceptance and usability of the service. To capture customer knowledge, the employee (and, by extension, firm) awareness of customer needs should be treated as the first priority.

Keywords. Service-learning, Higher education, Academic collaborations Southeast Asia.

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1. Introduction

Collective knowledge structure may offer a reasonable explanation for the potential connection between service learning and its innovative consequences. Knowledge is a central construct in understanding modern management and organization under knowledge economy, and given the multidisciplinary nature of Knowledge Management. In such premise, it would also be relevant and practical to study knowledge heterogeneity (Galunic & Rodan, 1998; Tsai, Baugh, Fang, & Lin, 2014), since the underlying tenet for the strategic innovation (e.g., product differentiation or technological diversification) is the knowledge heterogeneity that makes up the essence of products, services, or technologies.

Another significant one explanatory factor is social capital. An increasing number of studies have proven the robustness of researching knowledge from sociological perspectives (e.g., Reagans & Zuckerman, 2001; Tsai, 2001). Reagans & Zuckerman (2001) indicate that demographical diversity may influence collective productivity through the embedded forms of social capital. Beyond this, there are few works directly linked to the triplet of knowledge heterogeneity, social capital and innovation, built on an assumptive basis that collective knowledge heterogeneity may be fundamentally distinctive from demographic diversity (though they may be interrelated).

One important innovative consequences that is important but may be neglected is the alumni-granted industry-academic collaborations, which refers to the collaboration between a university and companies funded by the university's alumni. Industry-academic collaboration is an important form of inter-

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organizational innovation that utilize different but complementary resources of higher education and industry sectors (Arvanitis, Kubli, & Woerter, 2008; D'Este & Patel, 2007; Giuliani & Arza, 2009; Kodama, Yusuf, & Nabeshima, 2008; Meyer-Krahmer & Schmoch, 1998). With broad interests and studies conducted, less have paid attention to a university's partnership with an industrial organization that is funded by its alumni.

In sum, this conceptual article discusses an integrative model that offers explanations of why service learning at students' education stages could latter influenced the industry-academic collaborations funded by alumni. Two significant reasoning are implemented upon the discussions of knowledge heterogeneity and social capital.

2. Literature review

2.1. Service learning

Service learning is an experiential mode of education – through good planning and design, students become service providers to the community or society, and reflect and learn from their journey of services (Jacoby, 1996). Service learning is transformed from earlier community service or volunteering initiatives, with a spirit to encourage youth to participate in social service while learning knowledge and envision their life. In such premise, service learning is a critical mechanism that facilitate the linkage of universities to the wider society (Astin, Vogelgesang, Ikeda & Yee, 2000).

Service learning can be implemented in many forms. A most widely seen form of service learning is to combine course implementation and service conduct (Julie, 2000). Service learning increase the likelihood that students would develop additional quality by knowing more extra-core-expertise knowledge, such as that in civic or societal affairs (Enos & Troppe, 1996). It is important for universities to consider factors like geographic location, administrative support, professor engagement, curriculum design, community needs, etc. (Enos & Troppe, 1996).

An important consequence of service learning is that educated students may grow their habit in continuous participating in public affairs but not just live for self-interests (Elwell, 2001). Moreover, it encourages students to apply what they have learnt from the classroom into practices and problem-solving (Elzinga, 2001). Such spirit could increase the degree of educated students, also the prospect social actors (e.g., businessmen, government workers, and so on), to explore more opportunities for creating larger-scope welfare beyond their core business and jobs.

2.2. Knowledge heterogeneity and social capital as collaborative innovation bases

Heterogeneity may be systematically constructed to fit the different needs and contexts by configuring the personnel and their intellectual resources. The ability to understand and assess the degree and state of collective knowledge heterogeneity leads to better knowledge management and social capital configurations that respond to different project situations.

Knowledge heterogeneity

Innovation is influenced by many factors that could be categorized into contextual antecedents (e.g., vision, leadership, culture, or norms (Chatman & Flynn, 2001; Collins & Porras, 1996; Nadler & Tushman, 1990)), structural variables (e.g., formalization or standardization (Damanpour, 1991, 1996)), and strategies (Kim & Mauborgne, 1997; Teece *et al.*, 1997). Beyond these conventional considerations, knowledge is emerging as one of the most critical antecedent for innovation across levels of analysis (Argote, McEvily, & Reagans, 2003; Berends *et al.*, 2006; Caloghirou, Kastelli, & Tsakanikas, 2004; Collinson, 2001; Díaz-Díaz *et al.*, 2006; Darroch, 2005; Galunic & Rodan, 1998; Hall & Andriani, 2003; Leonard-Barton, 1995; Nonaka, 1991; Powell, Koput, & Smith-Doer, 1996; Segelod & Jordan, 2004; Spencer, 2003; Tsai, 2001; Verspagen, 1999;

Von Hippel, 1994). Studies have contributed to understand the essence of differentiated knowledge and their configuration as a whole for the pursuit of successful innovation (Damanpour & Gopalakrishnan, 2001; Damanpour *et al.*, 1989; Damanpour *et al.*, 2009).

An organization with a high level of knowledge heterogeneity is equal to having a knowledge base with highly diversified pools of source domains and characteristics of epistemology and knowing skills (Littlepage, Robinsoon, & Reddington, 1997; Reagans & Zuckerman, 2001). Such argument implies that the 'face' of collective knowledge in terms of its composition/configuration may be constantly changing. Exchange and learning of different knowledge from that possessed by oneself are major stimuli for members to engage in knowledge governance activities. The configuration of collective knowledge may represent an important feature of community capability localization. Hence, it is always beneficial for practitioners and executives (e.g., the chief knowledge officers) to know how knowledge is distributed within *and* across innovative communities. What is more critical is the implication regarding the management of the diversity in knowledge embedded or generated on such valuable personnel (Alexiev *et al.*, in press; Smith *et al.*, 2005). There has been a contributive stream of research that discusses the more surface-level knowledge heterogeneity from demographic perspective by researching on the educational, functional or other indices (Ancona & Caldwell 1992; Pelled *et al.*, 1999; Smith *et al.*, 2005; Smith *et al.*, 1994).

The knowledge for organizational innovation should be transferred across the entire organization to form common understandings (Szulanski, 2000). Though important, common knowledge sometimes impedes innovation, because of limited information and creativity sources. Thus, others also advocate creating a heterogeneous knowledge base inside organization purposefully to increase both of the stock and the scope of knowledge. However, prior research have demonstrated a conservative view on heterogeneous knowledge, especially about the potentially costly nature of coordination and conflict management among members possessing differentiated knowledge (e.g., Pelled, Eisenhardt, & Xin, 1999). With an integrative view, the finding from Tsai *et al.*, (2014) that either extremely high or low degree of knowledge heterogeneity benefits innovation implies a potential research venue for the dynamic development of the state of knowledge heterogeneity. An important lack of consideration, however, is that existing literature on knowledge heterogeneity relatively focused on domain areas specific composition of collective knowledge, while the processing methods or contextual elements were neglected when reflecting on the reason for successful innovation implementation (Tsai, 2016).

These results shed light on such paradoxical issues in that they demonstrate the balanced view of knowledge base accumulation and its effect on innovation. Tsai (2016) indicated that knowledge heterogeneity benefits innovation to an upper limit while it may produce costs for innovation. Therefore, successful ideas should simultaneously reflect balance between novelty and familiarity in knowledge it presents - they need to be new and different enough to capture a consumer's attention and also familiar enough to prevent from being misunderstood or rejected out of hand as too radically different. A system of knowledge evaluation is suggested to assess the balance between pluralism and congruency of knowledge.

Practitioners and researchers have attempted to find suitable ways to manage knowledge and generate sustainable values (Martin-Castilla & Rodriguez-Ruiz, 2008). However, surplus degree of diversity may sometimes hurt innovation because of the lack of sufficient mutual or multi-party understanding across expertise or knowledge (Brusoni, Prencipe, & Pavitt, 2001; Postrel, 2002).

Diverse knowledge sources enable multiple and non-repetitive idea generation, while on the other hand this diverse set of sources may result in communication and decision inconsistency or conflicts (Reagans & Zuckerman, 2001). However, diverse knowledge may introduce additional needs and costs of coordination for the non-redundant pool of thoughts, that lacking of common grounds of knowledge

processing potential should be considered. The composition of human and human attributes should not be equal to the composition and configuration of knowledge (Tsai, 2016, 2018; Tsai *et al.*, 2014). To discuss the real state of knowledge stake on innovation more directly, recent research provides insightful hints. Rodan & Galunic (2004) put a large step forward by proposing that to the degree focal actor's (i.e. the managers in firm) connected they have diverse knowledge categories that are positively related to that focal manager's innovation performance at an individual level. However, innovation is merely one composing factor, although critical, the portion of the organization is a higher level. As higher-level innovation often possesses more meaningful implications for the organization as a whole, the lack of discussion in this vein of knowledge heterogeneity and innovation leaves room for further research effort.

Every detail regarding the emergence of knowledge heterogeneity involves both efforts of cost and benefits terms. Sometimes the invested effort has to be constantly measured to check up on its utility to prevent cost. For instance, Nonaka *et al.*, (2000) argue that the cost of maintaining the knowledge-enabling *Ba* (i.e. a knowledge-creating platform) is not small. Beyond the financial aspect, knowledge heterogeneity of organization's knowledge bases could be two sides of the coin. As managing knowledge and innovation is costly during the activities such as exchange and transactions of knowledge, the more dispersed and heterogeneous knowledge generates higher cost payouts for the expected innovative outcome. Thus, a more balanced view, challenging the 'the more the better' myths in organizational knowledge management by imposing the notion of 'too much more stems incontrollable difficulties', implicates here that the state of knowledge heterogeneity should be as moderate to range in the intersection of efficiency and effectiveness.

Social Capital

Note that knowledge heterogeneity is not always an infinite panacea for organizational innovation. Collective knowledge evolves and we should understand the micro-foundation for such dynamics (Turvani, 2001). Thus, knowledge development is always influenced by its embedded environment, such as social capital in the social networks. For instance, in contrast to the widespread managerial belief that most knowledge procedures conducted by organizational members in social networks help organization create or add values, relatively little has been systematic investigated about how knowledge imperatives are influenced by network structure and processes (Uzzi, 1996).

Not merely happening at group levels, embeddedness is also a phenomenon at and beyond organization level. Gulati (1998) discussed the effects of relational and structural embeddedness for inter organizational advantages. In sum, social capital is a multidimensional and multilevel construct (see further review of Inkpen & Tsang, 2005).

Further, Nahapiet & Ghoshal (1998) integrated a three dimension- structural, relational, and cognitive - taxonomical framework (see also Adler & Kwon, 2002). To include all three dimensions is necessary, at least it guarantees and completeness in concerning about an integrative construct, as well as in avoiding investigating social capital from purely structuralism perspective (Inkpen & Tsang, 2005). Such integrative framework not only help investigation of various facets but is also useful for empirical examination of social capital in other organizational settings (e.g. Bolino *et al.*, 2000).

3. Industry-academic collaboration (IAC)

Industry-academic collaboration is crucial for the long term success and survival of both the universities and their cooperative partners in business. For example, those who have had training in public relations possessed different knowledge from the person who is mainly trained in electronic chip design. But these two persons have the chance to be gathered in new product development and

implementation committee someday, then that committee could have an overall knowledge base with at least two different domains of expertise.

Although tasks are more or less *designed* to reflect what members can do with existing knowledge, it is common that members' original knowledge stock is not matched with ongoing needs for task implementation (Tsai, 2016). Members' knowledge portfolio thus changes constantly. So it is more practical, and critical, to investigate on collective knowledge stock's changes in its own attributes and contents with, for example the heterogeneity perspective proposed here. Such investigation may improve assessment of the fit between the intended project goal and the realized capability (De Boer *et al.*, 2005), including the technological level and the knowledge capabilities. It is also essential for fulfilling the normative purpose of the 'knowing who knows what' theorem (Lewis *et al.*, 2005; Moorman & Miner, 1998; Paoli & Prencipe, 2003; Wegner, 1986). In some company like Eriksson, they are continuously (re-)evaluated to guarantee their effectiveness for new product development (see Olin & Shani, 2003).

4. The proposition

Knowledge constitutes the basis for knowledge management and innovation processes (Díaz-Díaz, Aguiar-Díaz, & Saá-Pérez, 2006). For instance, the knowledge spiral theory proposed by Nonaka and colleagues (Nonaka, 1994; Nonaka & Takeuchi, 1995; Nonaka *et al.*, 2000; Nonaka *et al.*, 2002; Nonaka *et al.*, 2006) has identified a set of transforming mechanism that now only explains the knowledge attributes between tacit and explicit forms, but also offers explanation for knowledge mobilization in the ontology aspect of organizations.

The developed or acquired knowledge systems for organizational innovation are often transferred to different units of the organization at different locations to form a common basis of knowledge understanding and usage (Szulanski, 2000), or they are transferred to other organizations as commercialized service and products. It is the diverse cognition and knowledge processing styles, as compared to diverse backgrounds or heterogeneous knowledge structure, that more directly influence knowledge-based innovation (de Visser, *et al.*, 2014).

Nonetheless, when a knowledge base is accumulated, it inevitably grows diversely. Many researchers eulogize the benefit of the diversification of expertise or human resources for innovation at multiple levels including the sub-organizational (Fichman & Kemerer, 1997), organizational (Acs, Anselin, & Varga, 2002; Kimberly & Evanisko, 1981) or inter-organizational context (Hall & Andriani, 2003). Slack in strategic resources, such as knowledge, can lead organizations to take risk in originally unfamiliar innovation forms (Steensma & Corley, 2001). Better understanding of the collective and post-organising diversity in knowledge makes the internal governance for the context-embedded and co-evolutionary collective knowing for innovation easier, while maintaining external imitation to be difficult.

An organization with a high level of knowledge heterogeneity is equal to having a knowledge base with highly diversified pools of source domains and characteristics of epistemology and knowing skills (Littlepage, Robinsoon, & Reddington, 1997; Reagans & Zuckerman, 2001). Such argument implies that the 'face' of collective knowledge in terms of its composition/configuration may be constantly evolving. Exchange and learning of different knowledge from that possessed by oneself are major stimuli for members to engage in knowledge governance activities.

Service-oriented or service-based innovation frequently rely on changes introduced by its personnel. However, change may also encounter resistance due to the personnel's strong interests in upholding the status quo (Borovac *et al.*, 2015). One critical reason is that service-based innovation is highly dependent on all employees and especially on the employees' techniques and knowledge of processes and successful techniques (Borovac *et al.*, 2015). Fischer stated that people inside the firm must be motivated toward the firm's service innovation

initiatives and must share new knowledge. Additionally, knowledge managers should consider the corporate culture to reinforce innovation in service because, as he stressed, a good innovation culture demands organizational members to question the status quo and open-minded for changing.

Take knowledge sharing among members as an instance, the diverse sets of knowledge or skills belonging to each member constitute a real 'motivator' to engage in sharing for members because the sharer expected far more diverse returns of knowledge that he could learn (Hendricks, 1999; Quigley, Tesluk, Locke, & Bartol, 2007). This motivator triggers actors in the network to participate in collective innovation -- no matter if one specific person is originally the knowledge searcher or giver.

Therefore, knowledge heterogeneity and social capital of employees that might form a base for innovation may in turn be vital in stimulating shared consensus for innovative projects with external collaborations. Because externally collaborative projects, such as the industry-academic collaboration discussed in this paper, often involve the dissemination of knowledge and service innovations from one firm to another. Especially, when sourcing labor from outside the company may be the only solution when a firm has a shortage of qualified applicants, the firm's knowledge management system including the overall knowledge structure must be ensured to be reusable and transformable from individual to organizational then to inter-organizational levels.

Proposition: Service learning generates a shared knowledge base with diverse domain between universities and their alumni (i.e., the prospect partner organizations); such shared knowledge structure benefits collective innovation and thus facilitates the formation of alumni-granted industry-academic collaborations

5. Conclusion

This article is among the first to discuss the potential influence of service learning as an educational mechanism utilized in higher education stage but can endure to be effective when educated students become potential leaders or key persons that might suggest their organizations to form collaborative relationships with the universities. We offer explanation for such linkage from the heterogeneous knowledge base for innovation perspective. Theoretically, future studies can try to empirically test for more detailed hypotheses developed among the relationships between service learning, knowledge, innovation, and industry-academic collaboration. Practically, when universities are offering service learning education, they must develop an approach to maintain student relationship as their role could gradually turn from students to entrepreneurs/managers/leaders in companies that might become a partner for industry-academic collaboration.

We suggest that with considerable degree of co-existence of knowledge heterogeneity shared by its alumni and the university, a portfolio method is suitable for governing the implementation of industry-academic collaboration projects. Past research celebrated the importance of portfolio management in innovative companies and industries (Cooper, Edgett, & Kleinschmidt, 2001; Jordan, Hage, Mote, & Hepler, 2005) with a sense from knowledge management. For deeper anatomy, products and processes embody knowledge and technology (Madhavan & Grover, 1998). The 'behind-the-scene' essence of portfolio management for various products and processes is the management of heterogeneous exploration and exploitation of differentiated knowledge. High-dependence on specific sorts of knowledge or technology may generate special niches, but can also regenerate risks of over-reliance and inertia (Cooper *et al.*, 2001; Leonard-Barton, 1992).

This article also sheds light on the implication of reflective learning for innovation during industry-academic collaboration. Service learning in the higher education domain may play a role just like reflective learning in the business domain and include imperatives like pre-developmental strategic brainstorming (Argote, 1999; Sutton & Hargadon, 1996), on-going collective inquiry and reflection in NPD actions (Hoegl & Parboteeah, 2006) or reviews in mid-to-latter

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stages of innovation (Lilly & Porter, 2003; von Zedtwitz, 2002; Wheelwright & Clark, 1992). It is suggested that future studies look into both theoretical and practical implications of the role that knowledge heterogeneity plays in reflective learning. In any sense, a knowledge heterogeneity perspective is especially important and useful when we can identify and govern it well.

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