Social capital and Innovation: The role of Co-production

Abstract

Partnerships comprise an important research topic. However, there is a lack of empirical studies that seek to understand how the intensive co-production of firms with alliance partners improves the innovation performance of these firms. Thus, this study integrates the three dimensions of social capital and examines their separate effects on co-production. At the same time, the study incorporates the roles of functional conflict and absorptive capacity as well as their influences on the relationship between co-production and innovation. The findings support the positive relationships among social capital, co-production, and innovation. Meanwhile, functional conflict and absorptive capacity enhance the effect of co-production on innovation.

Keywords: Co-production, Social Capital, Innovation, Functional Conflict, Absorptive Capacity

1. Introduction

In a dynamic and competitive environment, innovation is expected to become an increasingly critical element that enables firms to sustain competitive advantage (Subramaniam and Youndt 2005). Innovation can come from external sources. With external innovation, firms intensively develop partnerships to increase new product development opportunities and improve their innovation performance (Frost and Zhou 2005). To achieve these goals, firms must establish cooperative and collaborative relationships with their alliance partners (Deeds and Rothaermel 2003; Hammervoll 2009; Paulin and Ferguson 2010). For example, many Taiwanese firms have performed innovative tasks for their global partners in the form of outsourcing arrangements. Those firms collaborate with and successfully deploy product design and innovation for their global partners (Jean and Sinkovics 2010). Recent studies have increasingly emphasized the emergence of co-production from the reciprocal interaction processes within the inter-organizational context (Ballantyne and Varey 2006). Specifically, co-production focuses on the collaborative nature of value co-creation, because it shows the desire of both parties to create a partnership function effectively. Therefore, co-production has often been acknowledged as a key successful driver of innovation (Alam 2006). However, empirical research investigating the co-production activities in partner relationships remains scarce (Payne et al. 2008; Vargo et al. 2008). In response to the growing importance of co-production in partnerships, the current study addresses how firms integrate their alliance partners and serve as co-creators in innovation.

Co-production is a complex process involving the integration of resources from diverse networks (Vargo 2009). Thus, the aim of this study is to propose a framework for co-production stemming from social capital approaches to organizing. Through social capital, both parties may increase the depth, breadth, and efficiency of resource exchange (Lane and Lubatkin 1998); thus, as a strategic resource, social capital may exert influence on the motivation of co-production. Such topic is interesting as it provides insight into how partner relationships are managed by an increasing number of firms participating in co-production.

Co-production alone may be insufficient in influencing innovation (Chen et al. 2011). A firm that fosters an atmosphere of functional conflict between firms and their partners can more easily bolster innovation (Andrade et al. 2008). However, existing studies tend to examine the dysfunctional form of conflict, ignoring the functional form (Skarmeas 2006). Our study, therefore, adds to the scarce evidence on this topic. Furthermore, when a firm owns an adequate level of absorptive capacity, it tends to be not only more sensitive to technological opportunities in innovation (Nicholls-Nixon and Woo 2003; Rothaermel and Hill 2005), but also more proactive in exploiting those opportunities. Thus, this study aims to incorporate the roles of functional conflict and absorptive capacity, and their influences on the relationship between co-production and innovation. These two complementary effects are important in partner relationships because they help firms capitalize on alliance partners' strengths and, therefore, achieve innovation more effectively.

2. Literature Review

2.1 Conceptual Framework

This study develops a framework that links social capital, co-production, functional conflict and absorptive capacity to innovation (Figure 1). This framework has three main features. First, it examines the direct effects of social interactions, trust, and shared values on co-production. Second, it examines the direct effect of co-production on innovation. Finally, it investigates the moderating effects of functional conflict and absorptive capacity on the relationship between co-production and innovation.



Figure 1 Conceptual Framework

2.2 Social Capital and Co-Production

Social capital refers to the sum of actual or potential resources embedded within, available through, and derived from the network of relationships possessed by individuals (Nahapiet and Ghoshal 1998). Previous studies indicate that social capital in the network context consists of three dimensions: structural, relational, and cognitive (Nahapiet and Ghoshal 1998; Tsai and Ghoshal 1998). The structural dimension of social capital includes social interactions; the relational dimension of social capital refers to assets, such as trust, that are rooted in these relationships; and the cognitive dimension of social capital is embodied in attributes like shared values (Nahapiet and Ghoshal 1998; Tsai and Ghoshal 1998). In the current study, social capital includes three aspects of social context, namely, social interactions, trust, and shared values.

Co-production refers to constructive participation in the creation and delivery process, and requires meaningful, cooperative contributions to the process (Auh et al. 2007). Co-production enhances the ability of both parties to identify information that needs to be shared and to work more cooperatively. In other words, when one party engages in the other's production process, either party knows the pertinent knowledge possessed by the other. In the following subsection, the relationships between social capital and co-production are discussed in more detail.

2.2.1 Social Interactions

Social interactions are channels through which information and resources flow, and one party can gain access to the resources of the other (Tsai and Ghoshal 1998). Meanwhile, Hansen (1999)

defines social interactions as regular contacts among groups of individuals. In general, the key determinants of effective social interactions include closeness as well as frequent contacts and communication (Becerra and Gupta 2003; Hansen 1999; Tsai 2001).

Obviously, co-production cannot be mandated by either firm but is dependent on the willingness of both parties to cooperate in such joint activities (Selnes and Sallis 2003). In general, social interactions facilitate knowledge transfer between parties, thus establishing the foundation for coordination (Jones et al. 1997). Similarly, Wagner and Buko (2005) suggest that social interactions are vital to the development of a cooperative relationship in a knowledge-sharing network (Zahra and George 2002). Through social interactions, diverse knowledge and knowhow can be collected and integrated. In this case, social interactions increase connectivity and help partner members exchange resources and solve problems mutually (Hoegl et al. 2003). Therefore, social interactions increase the incidence of co-production. Thus, it is hypothesized that:

H1: Social interactions will have a positive effect on co-production.

2.2.2 Trust

Based on the study by Morgan and Hunt (1994), trust is defined as the integrity, honesty, and confidence that one party perceives in the other. Doney and Cannon (1997) state that trust in an organization refers to one party's confidence in the quality and reliability of products offered. Indeed, trust is generally viewed as critical to the development of an enduring desire to maintain a long-term relationship (Doney and Cannon 1997; Morgan and Hunt 1994).

Trust enables the practice of bilateral governance, which accomplishes common goals for both parties through joint achievements and mutual concern for long-term benefits (Uzzi 1996). In contrast, absence of trust gives rise to difficulties in understanding each other, or to costly monitoring of exchanges. Meanwhile, trust facilitates cooperative behavior in the partner relationships (Dwyer et al. 1987). For example, the relationship between trust and cooperation has been empirically verified in channel research (Lancastre and Lages 2006; Morgan and Hunt 1994; Payan and Svennson 2007). Trust fosters an environment in which firms and their alliance partners participate in collective activities and have a collective goal orientation (Leana and Van Buren 1999). Thus, trust serves as a mechanism that facilitates the motivation of co-production. It is hypothesized that:

H2: Trust will have a positive effect on co-production.

2.2.3 Shared Values

Shared values are identified as shared codes or paradigm that facilitate common understanding of the collective objectives and proper ways of acting within a social system (Nahapiet and Ghoshal 1998). Shared values also describe the extent to which goals, policies, and beliefs held by the exchange parties are consistent or compatible (Morgan and Hunt 1994). In general, shared values motivate another party to help achieve mutual goals.

In order to enjoy expected synergies from co-production, firms must have shared values (Saxton 1997). The rationale is that shared values lead to connections, increase mutual understanding, and

facilitate cooperation and collaboration (Emden et al. 2006). Similarly, when alliance partners share the same perceptions about how to act toward others, they can avoid possible misunderstandings and have more opportunities to exchange ideas and resources, allowing them co-produce more effectively (Dyer and Singh 1998). Moreover, shared values may bind a loosely coupled network system and promote co-creation in an inter-organizational context (Molina-Morales and Martínez-Fernández 2010; Tsai and Ghoshal 1998). Thus, it is hypothesized that:

H3: Shared values will have a positive effect on co-production.

2.3 Co-Production and Innovation

Damanpour (1991) defines innovation as the adoption of an internally generated or purchased device, system, policy, program, process, product, or service that is new to the adopting organization. In this respect, innovation is multi-faceted, encompassing the generation of novel ideas for products and services, as well as those related to business processes, technological capabilities, and manufacturing methods. In general, innovation consists of product, process, and administrative innovation (Damanpour 1991; Subramanian and Nilakanta 1996). Product innovation refers to the development and introduction of a new product to the market or the modification of existing products. Process innovation involves creating and improving the method of production, and integrating new elements to the firm's production process. Administrative innovation refers to changes in organizational structure or administrative processes (Damanpour 1991).

Dyer and Singh (1998) argue that a firm's critical resources may span across boundaries, and

become embedded in inter-organizational sources. Superior innovation performance can be achieved through a set of interlinked firm processes and coordination of those resources (Hammervoll 2009). Innovation, in particular, is a social process that involves the implementation of ideas, which relies heavily on the involvement of others (Schilling and Phelps 2007). Therefore, external technical resources can generally come from co-production and technology transfer. Several studies have revealed that collaboration positively affects innovation practices (Deeds and Rothaermel 2003; Faems et al. 2005). The rationale is that cooperation provides access to new resources, abilities, and knowledge required to achieve innovation (Malhotra et al. 2005; Roy et al. 2004; Wang et al. 2008). In the B2B context, a client's co-production in the service process improves the efficiency and efficacy of the innovation process (Chen et al. 2011). Overall, co-production is expected to enhance innovation in the partner relationships. Thus, it is hypothesized that:

H4: Co-production will have a positive effect on innovation.

2.4 Functional Conflict

Functional conflict is defined as an evaluative appraisal of the results of recent efforts to manage disagreements (Anderson and Narus 1990). Although most studies have traditionally viewed conflict in terms of negative behaviors that characterize unhealthy channel relationships (Skarmeas 2006), functional conflict is task-oriented and focuses on judgmental differences about how to achieve common objectives (Mele 2011). In other words, functional conflict involves constructive interactions and partner members freely expressing their opinions, and challenging the ideas, beliefs, and assumptions of others (London and Sessa 2007). Thus, functional conflict contributes to decision quality, because the synthesis that emerges from the diverse perspectives is generally superior to individual perspectives (Amason 1996). Most importantly, functional conflict can help reduce groupthink (Massey and Dawes 2007).

Functional conflict can constructively assist alliance partners in recognizing their mutual goals and stimulating greater creativity and innovation (Andrade et al. 2008). In addition, during the co-production process, members experiencing high functional conflict tend to tolerate differences and disagreement as well as provide constructive feedback to each other. As result, such brainstorming leads to the best resolutions without causing a negative effect. In this case, members' motivation and confidence in participation increases (London and Sessa 2007). In turn, their reinforced participation allows co-production to innovate more effectively (Siguaw et al. 2006). Therefore, a reasonable assumption is that functional conflict strengthens the effect of co-production on innovation. Thus, it is hypothesized that:

H5: Co-production will have a stronger positive effect on innovation when functional conflict is high than when functional conflict is low.

2.5 Absorptive Capacity

Absorptive capacity is defined as the ability to recognize the value of new information, assimilate it, and apply it for commercial purposes (Cohen and Levinthal 1990). Zahra and George (2002) define absorptive capacity as a set of organizational routines and processes, by which firms acquire, assimilate, transform, and exploit knowledge to produce dynamic organizational capability. Following their definition, potential capacity refers to acquisition and assimilation capabilities, whereas realized or actual capacity focuses on knowledge transformation and exploitation.

In support of their innovative activities, firms with a high level of absorptive capacity are likely to exploit new knowledge from alliance partners (Nicholls-Nixon and Wood 2003, Rothaermel and Hill 2005). Tsai (2001) states that absorptive capacity affects both innovation and performance; furthermore, absorptive capacity has moderating effects on the relationships between network position and both innovation and performance. A firm's absorptive capacity also facilitates the effective spanning of organizational and technological boundaries (Rothaermel and Alexandre 2009). This spanning permits a firm to effectively develop innovation practices during co-production. Thus, in the presence of high absorptive capacity, co-production effectively allows firms to contribute innovation by fully absorbing different resources, ideas, and knowledge from the other party (Chen et al. 2011; Hillebrand and Biemans 2004). In contrast, without absorptive capacity, firms cannot easily take advantage of co-production to achieve innovation. Thus, absorptive capacity is expected to positively moderate the relationship between co-production and innovation. Thus, it is hypothesized that:

H6: Co-production will have a stronger positive effect on innovation when absorptive capacity is high than when absorptive capacity is low.

3. Methodology

3.1 Data Collection and Sampling

Questionnaires were completed by senior executives familiar with the topic of the study. Follow-up letters were sent after two weeks. Among the 243 surveys returned, 221 were complete in all predictor and dependent variables, resulting in a 44.2% usable response rate. Non-response bias was not a factor because the t-tests of group means revealed no differences between the nonrespondents and the respondent in the sample (Armstrong and Overton, 1977).

3.2 Measure Development

All the measures used in this proposal will be adapted from existing scales. The innovation, co-production, social interactions, trust, shared values, functional conflict, and absorptive capacity used a five-point Likert-type scale, with the descriptive equivalents ranging from Strongly Disagree (1) to Strongly Agree (5). For the measurement of innovation, five items for measuring product, process and administrative innovation were adapted from Chen et al. (2009), Cordero (1990), and Ibarra (1993). The measure of co-production included five items taken from Auh et al. (2007) and Chan et al. (2010). The four items used to measure social interactions came from Hansen (1999) and Doney and Cannon (1997). The measure of trust included five items taken from Doney and Cannon (1997). Three items to measure shared values were adopted from Tsai and Ghoshal (1998) and Ko et al. (2005). The three items used to measure functional conflict adopted from Menon et al. (1996), while the measure of absorptive capacity included five items taken from Chang et al. (2012) and

Jansen et al. (2005).

3.3 Validation of Measures

The questionnaire was pilot tested to establish face validity with one academics and one manager who are knowledgeable in this area. According to their suggestions, several items were adapted to better suit the airlines context. Finally, confirmatory factor analysis (CFA) was performed to test the measurement model using LISREL 8.52. In assessing reliability, the composite reliabilities and the Cronbach's alpha for each construct were also computed. The Cronbach's alphas of innovation, co-production, social interactions, trust, shared values, functional conflict, and absorptive capacity were all greater than 0.80, supporting the reliability of the measurement. In addition, all composite reliability estimates were greater than 0.80, and all average variance extracted (AVE) estimates were greater than the recommended value of 0.50 (Fornell and Larcker 1981).

As evidence of convergent validity, all the items had significant loadings on their respective constructs (Anderson and Gerbing 1988). Discriminant validity was assessed for two constructs by constraining the estimated correlation parameter between two constructs to a value of 1.0, and then performing a chi-square difference test on the values for the constrained and unconstrained models (Anderson and Gerbing 1988). A significantly lower χ^2 value for the unconstrained model was found, thus indicating that discriminant validity was achieved.

4. Analysis and Results

4.1 Hypotheses testing

The results of the structural model are reported in Table 2. H1, H2, H3, and H4 were tested by Model 1. The fit of Model 1 was acceptable (chi-square (228) = 932.888, p = 0.00, GFI = 0.81, NFI = 0.92, NNFI = 0.92, CFI = 0.94, PNFI = 0.81, RMR = 0.05, RMSEA = 0.09). As can be seen, all four hypotheses are supported. H1 proposed that social interactions would have a positive effect on co-production. Model 1 shows that social interactions have a positive effect on co-production (γ = 0.283, t = 3.448). H2 proposed that trust would have a positive effect on co-production. As shown in Model 1, social interactions have a positive effect on co-production. As shown in model 1, social interactions have a positive effect on co-production, and Model 1 shows that such values have a positive effect on co-production (γ = 0.207, t = 3.342). H4 proposed that co-production would have a positive effect on innovation, and Model 1 shows that it has a positive effect on innovation (β = 0.358, t = 5.779).

H5 proposed that co-production would have a stronger positive effect on innovation when functional conflict is high than when functional conflict is low. Referring to Model 2, the coefficient of the path from co-production to innovation is higher in the high functional conflict subgroup (β = 0.507, t = 5.576) than in the low functional conflict subgroup (β = 0.174, t = 2.269). In addition, the chi-square difference is significant ($\Delta X^2 = 10.933$, df = 1, p < 0.05), thus supporting H5.

H6 proposed that co-production would have a stronger positive effect on innovation when

absorptive capacity is high than when absorptive capacity is low. Referring to Model 3, the coefficient of the path from co-production to innovation is higher in the high absorptive capacity subgroup ($\beta = 0.533$, t = 5.558) than in the low absorptive capacity subgroup ($\beta = 0.254$, t = 3.276). In addition, the chi-square difference is significant ($\Delta X^2 = 8.004$, df = 1, p < 0.05), thus supporting H6.

Model	Path	Coefficient	t	ΔX^2
Model 1	Organization size →Innovation	0.164	3.621	
(N=221)	Firm age \rightarrow Innovation	0.099	2.785	
	Social Interactions →Co-production	0.283	3.448	
	Trust \rightarrow Co-production	0.475	5.728	
	Shared Values→ Co-production	0.207	3.342	
	Co-production→ Innovation	0.358	5.779	
Model 2	Low Functional Conflict Subgroup (N= 1	.09)		
	Co -production \rightarrow Innovation	0.174	2.269	
	High Functional Conflict Subgroup (N=	112)		10.933
	Co-production→ Innovation	0.507	5.576	
Model 3	Low Absorptive Capacity Subgroup (N=	121)		
	Co-production→ Innovation	0.254	3.276	
	High Absorptive Capacity Subgroup (N=	: 100)		8.004
	Co -production \rightarrow Innovation	0.533	5.558	

Table 2 LISREL Results

5. Discussion

5.1 Social capital and Co-production

Social interactions, one of the three dimensions of social capital, have a positive effect on co-production. Generally, firms and their alliance partners interact in order to access complementary resources and capabilities of partners (Lavie 2006). Specifically, social interactions blur the boundaries between organizations (Songailiene et al. 2011). To this end, social interactions stimulate the formation of co-production and result in value co-creation (Hoegl et al. 2003). Second, trust induces co-production. The underlying reason is that trust is essential in overcoming initial suspicions about possible partner opportunism between firms and their alliance partners, which in turn, may prevent effective implementation of their co-production (Kasabov 2007). Most importantly, trust helps create the fundamental relational environment in ensuring cross-border cooperation (Dwyer et al. 1987). Third, consistent with prior research (Emden et al. 2006), the results of this study also indicate that shared values have a positive effect on co-production. The reason is that shared values allow crossing of inter-organization boundaries and accessing of resources by other parties (Dyer and Singh 1998; Molina-Morales and Martínez-Fernández 2010; Tsai and Ghoshal 1998). Such phenomenon generally benefits engagement of co-production.

5.2 Co-production and Innovation

Existing research has focused on motivations for internationalizing innovative activities in the firm's global innovation network (Frost and Zhou 2005). The rationale is that co-production with

partners allows individual firms to co-create value in a way that they could not easily accomplish alone. In line with Malhotra et al. (2005), Roy et al. (2004), and Wang et al. (2008), the results of this study affirm the positive relationships between co-production and innovation. In general, co-production facilitates the development of skills and experience in the actual transfer of knowledge from one party to another (Flint et al. 2002; Frost and Zhou 2005; Vargo and Lusch 2004).

5.3 The Moderating Effects of Functional Conflict and Absorptive Capacity

As one of moderating variables, functional conflict enhances the effect of co-production on innovation. This is because functional conflict involves open discussion of the merit of ideas, thereby improving the range of choices provided to alliance partners (London and Sessa 2007). Functional conflict also produces agreement in the form of a win-win situation for disputants, thus enabling value co-creation (Mele 2011). Therefore, under such conditions, co-production has a stronger effect on innovation.

In addition, firms with greater levels of absorptive capacity obtain commensurately greater benefits from co-production in affecting innovation. The rationale is that such firms are likely to have a greater ability to internally disseminate the information learned from alliance partners, and to incorporate the new technology into their existing routines and processes (Zahra and George 2002). In this case, co-production encourages each party's participation in the innovation process. As a whole, absorptive capacity, as moderator, enables co-production to achieve better innovation performance.

6. Managerial Implication

This study offers practical implications for management. First, firms must adapt their existing infrastructure in ways that facilitate co-production. Thus, firms need to set up a co-production platform, through which they can create direct and indirect windows of opportunity for gaining access to an alliance partner's skills, technologies, and core competencies. In other words, this platform is considered as a communication bridge that allows firms to be more involved in their respective knowledge networks as they engage in the acquisition of knowledge or exchange of resources with partners (Hammervoll 2009).

Second, manages can promote co-production by formulating social interactions, developing inter-organizational trust, and cultivating shared values. Firms should first increase social interactions with their alliance partners. Specifically, social interactions represent the existence of communication channels and the richness and density of communication (Hansen 1999). Thus, managers should increase the frequency of their interactions with partners by organizing regular activities through both formal and informal events. In addition, developing trust proves to be a valuable tool for encouraging co-production with alliance partners, because it creates an environment that affects co-production. Thus, managers must find additional skills and techniques to nurture trust in the partnership relationships. Meanwhile, when forming partner relationships, especially when selecting partners, managers should focus on shared values. The more values partners share, the more solid their foundation for co-production becomes. Every partner member must take ownership of alliance goals versus individual goals as well as clearly understand their roles in achieving alliance goals.

In addition, managers should create an atmosphere of high functional conflict in which partner members feel comfortable raising dissenting viewpoints. Functional conflict also enhances commitment to decisions, that is, as partner members debate their perspectives, they express their voice in the decision process (Amason 1996). In addition, such atmosphere stimulates co-production, which in turn, enhances innovation performance. In contrast, without functional conflict, most participating firms would probably become stagnant. Furthermore, conflict has long been recognized as either functional or dysfunctional (Skarmeas 2006). Thus, managers must not allow functional conflict to become dysfunctional; instead, they need to provide an environment that encourages creative decision-making through functional conflict.

The results of the current study strongly suggest that aside from functional conflict, firms need to raise their absorptive capacities in order to effectively co-produce with alliance partners, and eventually increase their innovation performance. Minbaeva et al. (2003) argue that employee ability and motivation are important aspects of absorptive capacity; therefore, firms should develop an organizational mechanism that raises absorptive capacity by increasing such aspects because employees need skill combinations that enable them to acquire, assimilate, transform, and exploit knowledge.

6. Research Limitations and Directions for Future Research

This study has several limitations, the most significant of which is the cross-sectional and self-reported data that comprise the sample. The use of such data may have led to an overestimation of the relationships considered due to common method variance. Obviously, some managerial and research implications would greatly benefit from a longitudinal investigation.

Second, we collected data from one side of the dyad relationship. Given that evidence based on one side of the dyad may not always be replicated for the other party (Anderson and Narus 1990), future research can explore social capital, co-production, functional conflict, absorptive capacity, and innovation from both sides to confirm the findings of this study as well as to generate additional insights into the dynamic interactions between two parties.

Finally, this study does not consider the roles played by other organizational factors or other knowledge management processes. For example, knowledge management can be viewed as a facilitator of successful technological innovation (Argote et al. 2003). Future studies could gain additional insights from exploring such factors.

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