

# ENABLERS AND CONSEQUENCES OF INTERFIRM CO-PRODUCTION

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## Abstract

*As contemporary firms increase their reliance on information technology (IT) and are increasingly turning their attention to jointly creating value with their primary stakeholders, there is a growing need to understand what enablers promote from interfirm value co-creation from co-production in supply chains, how the co-production can be realized and what value can be created through the co-production. We integrate systems theory and the relational view perspectives to develop an explanatory model to explain how co-production mediates the impacts of enablers on the reciprocal benefits created in the global supply chain context. Drawing upon systems theory, we identify three constructs: platform compatibility (i.e., compatibility), co-production (i.e., synergy), and collaborative governance (i.e., integration effort). We draw on the relational view to identify two activities: process alignment and resource sharing for co-production, conceptualize three basic types of reciprocal benefits: market, innovation and anshin value, and theorize co-production—the synergy of process alignment and resource sharing activities—as key to the realization of synergy, thereby contributing to the reciprocal benefits in the context of interfirm supply chain. Based on survey data collected from 464 senior management representatives from 230 high-tech manufacturing firms from within Taiwan and China, we found 1) collaborative governance has a positive effect on platform compatibility, 2) both collaborative governance and platform compatibility promote co-production, 3) guanxi has a positive effect on collaborative governance and has a positive moderating effect on collaborative governance and co-production, and 4) co-production positively affects reciprocal benefits. Our findings highlight 1) the important role of co-production in mediating the platform compatibility and collaborative governance effects on reciprocal benefits, and 2) the complementary role of guanxi in strengthening the collaborative governance effect on co-production. These results provide insights into how firms can co-create value through enhanced interfirm co-production.*

**Keywords:** Co-production, Value co-creation, IT-enabled value, Relational view, Reciprocal benefits

## 1. INTRODUCTION

Over the past decade, particularly with the Internet, networks and platform-based technologies, the electronic business environment has undergone radical shifts and unleashed a new digital collaboration era (Whitley & Willcocks 2011). IT platforms are enabling cross-boundary industry disruptions, and thus inducing new forms of business models, supply chains and value networks (Markus & Loebbecke 2013). Empowered by emerging IT, a dramatic transformation has been taking place, where multiple firms collectively leverage IT platforms to shape collaborative networks across firms, thereby creating more transparent and open ecosystems (Bharadwaj et al. 2013). Along with the increasing digitization of global supply chains, firms adopt a co-productive logic (Ramirez 1999) and move toward the strategies of developing alliances, collaborations and partnerships with their suppliers, partners and customers (Whitley & Willcocks 2011). Today, firms with their primary stakeholders have started to see the advantages of jointly working towards successful supply chains, thereby fuelling a growing trend towards co-production and value co-creation (Kohli & Grover 2008; Kauffman et al. 2010).

Co-production means that multiple firms proactively work together and share risks in flexible, integrated ways, to jointly create value (Ramirez 1999). Contemporary firms are simultaneously implementing co-production strategies to improve their endowment of external resources and expand substantial value (Rai et al. 2012). For example, Apple, Foxconn and other electronic firms have developed a cooperative Apple supply chain that is able to collectively design and produce new products efficiently, thereby creating win-win benefits for each other. Prior research has also shown that an effective interfirm co-production can enable partner firms to jointly exchange supplementary resources and create relational value (Saraf et al. 2007; Rai et al. 2012; Wang et al. 2013).

As an increasing number of firms are using IT platforms to improve interfirm co-production in supply chains, with attention devoted towards understanding what enabling factors promote value co-creation within supply chains (Kohli & Grover 2008). More recently, several information systems (IS) studies have focused on understanding IT-enabled value co-creation (Kohler et al. 2011; Grover & Kohli 2012; Ceccagnoli et al. 2012; Rat et al. 2012; Wang et al. 2013). However, we still have a limited understanding of the sources and processes of IT-enabled value co-creations (Grover & Kohli 2012). In the context of supply chains it is unclear what factors influence interfirm co-production, how the co-production can be realized and what new value can be created through co-production (Sarker et al. 2012). Our research objective is therefore to develop an empirically based understanding of enablers and the consequences of interfirm co-production. With this objective, we propose an explanatory model to address the following research questions: (i) what factors enable interfirm co-production (i.e. process alignment and resource sharing activities) (ii) what role does *guanxi*—the durable connections and interpersonal ties among the top management staff of partner firms—play in influencing co-production, and (iii) what primary value (i.e. reciprocal benefits) can be co-created through co-production within partner firms.

## 2. THEORETICAL FRAMEWORK

We draw on two complementary theoretical perspectives—relational view and systems theory—to develop an explanatory model and a set of hypotheses to address the above research questions.

### 2.1 Theoretical Foundation: Relational View and Systems Theory

Relational view (Dyer & Singh 1998) is a theoretical perspective on how relational value can be generated through interfirm relationships. It argues that a firm's resources may span firm boundaries and may be embedded in its relationship with outside partners. Relational value is created from cooperative relationships with partnering firms. This view posits four components that determine relational value: relationship-specific assets, knowledge sharing routines, complementary resources/capabilities, and governance (Dyer and Singh 1998). Following the relational view, Grover & Kohli (2012) further defined the four determinants that frame the IT-enabled value co-creation within multiple firms, each

of the four determinants of value present a value creation layer and is enabled, expanded or created by IT. The IT assets involve relationship-specific IT skills or assets that enhance the interfirm relationship of the partner firms. The knowledge sharing routines involve regular interactions and the sharing of information and know-how among partner firms. The complementary resources/capabilities are the distinctive resources provided by the partners that collectively create greater value than the sum of those obtained from the individual endowment of each partner. Finally, governance plays a key role in integrating the IT assets, complementary capabilities and knowledge sharing routines. Effective governance minimizes transaction costs and risks, thereby enhancing the willingness of partners to engage in value co-creation. These four components are synchronic and interactive and their integration presents an IT-enabled value co-creation system (Grover & Kohli 2012). Increasingly, IT is being used to share information and coordinate external processes that can be leveraged in relationships to help generate relational value (Saraf et al. 2007). Systems theory, expanded by Nevo and Wade (2010), suggested a path from IT assets to strategic potential, then to sustainable competitive advantage and proposed a unified model to explain how IT-enabled value is created. The model argued that the mere combination of IT assets and organizational resources forms potential synergy, which is not sufficient to guarantee a synergistic outcome. Instead, the realization of synergy depends on two enabling conditions: compatibility and integration effort. Among them, compatibility is a precursor of synergy and positively affects synergy; while integration effort has a positive effect on both compatibility and synergy. Compatibility is an emergent capability that represents the feasibility of IT and organizational resources to form an interacting relationship. Synergy is defined as positive capabilities that accrue from the relationship between IT and organizational resources. Integration effort represents resources and activities undertaken by management to support, guide and help with IT integration into organizational resources. Systems theory perspective has emerged as a powerful explanation to account for the influence of IT, especially on IT-enabled value creation (Kohli & Grover 2008; Navo & Wade 2011).

## 2.2 Model Development

This study draws upon the relational view and systems theory to develop a research model to explain how firms can co-create benefits through interfirm co-production in supply chain environments. Specially, the relational view is applied to justify why interfirm co-production is important for supply chain firms to generate relational benefits and then identify the key enablers of co-production. The system theory is utilized to explain the relationships between the enablers and how they can enable co-production and realize reciprocal benefits. We argue for integrating the compatibility, integration effort and synergy concepts from systems theory and the concepts of IT assets, governance, and knowledge sharing routines, complementary resources /capabilities from relational view, respectively. First, we use platform compatibility to represent the compatibility that is the ability of organizational resources to apply an IT platform in its regular cooperative activities and routines. Second, in our research context two types of governance mechanisms: collaborative governance and *guanxi*. The collaborative governance and *guanxi* represent the integration effort that is a governance mechanism taken by the agreements to guide and manage the IT asset implementation within the organizational resources. Finally, the co-production, including two synergistic activities: process alignment and resource sharing, represents the synergy that is the capabilities of enabling co-production activities and realizing reciprocal benefits. Accordingly, we theorize that greater collaborative governance (i.e. integration efforts) enhances platform compatibility and both collaborative governance and platform compatibility collectively enhance co-production (i.e., synergy). *Guanxi* plays a moderating role in influencing the relationship between collaborative governance and co-production. Finally, the co-production enhances reciprocal benefits (i.e., value creation).

### 2.2.1 Co-Production and its Enablers

Co-production is defined as a positive co-operative arrangement in which two or more joint firms (suppliers, customers, and stakeholders) collectively work and share resources, in integrated ways, to achieve relational benefits that are greater than the firms would achieve individually (Ramirez 1999; Dyer et al. 2008). Drawing on the literature on IT-enabled value co-creation (Saraf et al. 2007; Kohli & Grover 2008; Kauffman et al. 2010), we elaborate that co-production as a synergy can be conceptualized as two distinct activities: process alignment and resource sharing. Process alignment refers to the degree to which a firm's processes coordinate interdependent activities and optimize co-operation with its partners (Rai & Tang 2010). It provides a firm with the ability to establish operational routines to coordinate processes efficiently and collaborate closely with its partners. Resource sharing refers to the extent to which the critical and proprietary resources such as information, knowledge and assets about its business context are shared between a firm and its partners. The joint effect of these activities represents a coherent depiction of the multidimensional nature of co-production. The process alignment and resource sharing activities are important for interfirm co-production context because multiple firms work together aligning business process and sharing a variety of information, knowledge and assets in order to work as a whole.

IT platform refers to the IT-based collaboration infrastructure that enables business networks, supply chains and ecosystems to be executed effectively. Platform compatibility also makes it possible for IT platforms and interfirm resources to interact, thereby facilitating the business collaborations and co-production activities (Ceccagnoli et al. 2012). We define platform compatibility as the capacity of the IT platform functionality that is compatible with the changing supply chain routines (Tiwana & Konsynski 2010). In the context of supply chains, platform compatibility is an important factor that enables interfirm process alignment and resource sharing activities (Saraf et al. 2007). Therefore, we propose the following hypothesis:

***H1a: Platform comparability is positively associated with process alignment in co-production between supply chain partners.***

***H1b: Platform comparability is positively associated with resource sharing in co-production between supply chain partners.***

Effective governance can reduce transaction costs and risks in business networks, thereby prompting partners to engage in value co-creation (Rai et al. 2008). Governance refers to how a firm integrates and structures assets and resources with its external partners in executing collaboration initiatives, developing future collaborations, and incentivizing new value co-creation (Dyer & Singh 1998). It can be viewed as an enforcement mechanism that can counter the threat of opportunism inherent in an alliance and safeguards partners' interests. An imperative for co-creation initiatives is to choose an effective governance structure that minimizes transaction costs and enhances efficiency and thereby influences the willingness of alliance partners to engage in co-creation initiatives (Rai et al. 2008). In this research, we use collaborative governance to represent the governance structure with characteristics of both collaboration and empowerment (Rai et al. 2008). We define collaborative governance as a co-managed mechanism taken by partners with agreements on the goals, joint actions and safeguards that facilitate required collaboration between partners (Mani et al. 2012). It reflects the extent to which a firm and its partners jointly participate in the development of the collaboration based on congruent goals (Poppo & Zenger 2002).

Collaborative governance can be viewed as an integration effort that integrates and coordinates internal and external IT assets, knowledge sharing and complementary resources to incentivize value co-creation (Grover & Kohli 2012). According to Nevo & Wade (2011), integration effort positively influences impacts on compatibility. Thus, the two concepts are related logically. Specifically, the co-production supported by collaborative governance help with the IT integration into the organizational resources can also have a positive effect on their platform compatibility. Hence, we propose the following hypothesis:

***H2: Collaborative governance is positively associated with platform comparability.***

According to the relational view, firms must create effective governance that can enable them to design clauses and procedures to mitigate the risks that arise from the uncertainties in how processes and resources are combined with existing resources and how well the renewed resources perform co-production. Well specified collaborative governance may actually promote more cooperative, long-term, trusting collaboration relationships (Poppo & Zenger 2002). Thus, while risks and conflicts may occur in co-production, it is necessary for firms to build collaborative governance that effectively coordinate and co-manage the co-production activities among partner firms to achieve value co-creation (Sarker et al. 2012). Collaborative governance can provide firms with the capabilities needed to integrate the IT assets, complementary resources and resource sharing routines in a cooperative arrangement, which in turn leads to greater integration effort as well as more efficient co-production activities (Tiwana et al. 2013). Accordingly, we propose the following hypotheses:

***H3a: Collaborative governance is positively associated with process alignment in co-production between supply chain partners.***

***H3b: Collaborative governance is positively associated with resource sharing in co-production between supply chain partners.***

### 2.2.2 *The Interaction of Guanxi and Collaborative Governance*

*Guanxi* is defined as the durable social connections and networks a firm uses to exchange favors for organizational purposes (Gu et al. 2008). At the firm level, *guanxi* can enhance dialogues and trust and facilitate business networks and provide partner firms with necessary bases for mutual trust or credit for interaction and governs relationships on a long-term basis (Hoskisson et al. 2000). In the Chinese business world, building *guanxi* with partner firms and other institutions is critical, it can take more partners to get anything done there than anywhere else in the world (Wong & Tjosvold 2010). Chinese executives usually see conducting personal relationships with their stakeholders as an essential way for facilitating mutually beneficial transactions (Hout & Michael 2014).

In this research, *guanxi* refers to the durable connections and interpersonal ties among the top management of partner firms. *Guanxi* is a relational governance mechanism that is associated with trust-based relationships; it can improve firm's ability to work together by exchanging valuable information, resources and approvals from partners to ensure successful business collaboration (Benkler 2011). *Guanxi* can be also viewed as a relational norm regarding the potential for interfirm partnerships, while collaborative governance is the agreement and contact performed to facilitate co-production activities. Both relational and collaborative governance are arguably important for business collaboration (Huber et al. 2014). According to Aoki & Lennerfors (2013) and Huber et al. (2014), *guanxi* between partner firms has a positive effect on their formal governance structure. Therefore, we propose the following hypothesis:

***H4: Guanxi is positively associated with collaborative governance.***

Poppo and Zenger (2002) suggested that relational governance and formal governance function as complements. Relational governance may help overcome the adaptive limits of contractual governance. Relational governance also enhances a firm's ability to evaluate and acquire pertinent information and knowledge (Cao et al. 2013). Thus, when a firm has better relationships with its partners in supporting work and obtaining more information or resources, that firm will have stronger willingness to cooperate with the partners who may promote the refinement of collaborative governance and in turn to facilitate co-production activities (Huber et al. 2014). Thus, we consider *guanxi* to have a complementary effect on collaborative governance in influence co-production. Due to this this complementarity, we hypothesize:

***H5a: The relationship between collaborative governance and process alignment is moderated by***

*guanxi such that the relationship is stronger when guanxi is higher.*

**H5b: The relationship between collaborative governance and resource sharing is moderated by guanxi such that the relationship is stronger when guanxi is higher.**

### 2.2.3 Co-Production and Reciprocal Benefits

Co-production can be considered a main catalyst in stimulating collaborative innovations and value expansion (Kohli & Grover 2008). A value creation system can enhance value with positive return economics (Ramirez, 1999). In our research, co-production is defined as the synergy of process alignment and resource sharing activities across firms. Adopted from Nevo and Wade (2010), greater synergy is positively related to the IT-enabled value creation. Hence, the co-production—the synergy of process alignment and resource sharing activities—could realize value co-creation.

From the co-productive view, value is co-invented and established interactively within partners. As the net-enabled world changes, increasing specialization and demands for shorter concept-to-market time frames make it difficult for a single firm to excel at designing new products and services and to quickly bring them to market. Firms are increasingly looking to partner firms with whom they can jointly create products and services. Typically, this involves interfirm co-production that leverages process alignment and resource sharing activities. In addition, the co-production can reinforce partners' goodwill and genuine efforts and confidence for long-term partnerships and collaborations. As a result, it is critical for firms to create new value such as developing new innovations and opportunities, creating better partnerships with stakeholders and hence generating long-term relational value (Barua et al. 2005; Rai & Tang 2010).

By emphasizing how IT value is co-created, IS research has evolved from the singular firm perspective and begins examining how multiple firms with IT can join together and create new value that either organization is unlikely to create on its own. In the context of supply chains, some researchers have assessed value by focusing on the profitability derived from meeting goals or on the longevity of the collaboration (e.g., Barua et al. 2005), others have noted that value must be assessed “in terms of the ability of the partners to earn relational rents over and above what could have been achieved in the absence of the partnership” (e.g., Dyer et al. 2008). It is necessary to assess intangible value and to form better metrics that inform how the value is derived from new domains of value by overemphasizing pure financial post hoc metrics or even *ex ante* market value in multifirm environments (Kohli & Grover 2008). Accordingly, we focused on what relational value is co-created by co-production. Therefore, the relational value was defined as reciprocal benefits that refer to supernormal returns jointly generated from co-production that cannot be generated by either firm in isolation and can only be created through the joint contributions of the specific partners (Dyer & Singh 1998). We propose innovation value, market value and *anshin* value as the three metrics of reciprocal benefits in this study. Innovation value measures the levels in the development of new processes, products/services and technical knowledge. Market value measures the trends in market agility, insights and opportunities development. *Anshin* value means “peace of mind” that captures and measures a firm's confidence that as long as it makes genuine efforts to help partners, the long-term relationship will be sustained. That stability of partnership can benefit partner firms mutually (Aoki & Lennerfors 2013). Therefore, the following hypotheses are proposed.

**H6: Process alignment is positively associated with reciprocal benefits.**

**H7: Resource sharing is positively associated with reciprocal benefits.**

## 3. RESEARCH METHODOLOGY

A cross-sectional mail survey was administered to collect data from selected large and medium-sized high-tech manufacturing firms in Mainland China and Taiwan. Our sampling frame included firms from five manufacturing industries (i.e. semiconductor, communication equipment, electronic components, machinery and emerging energy industries) that have a distinctive and broad presence in the Greater China economy. We distributed a mail survey in 2014 to collect data from 480 firms selected

from the annual directory of *Electronic and Information, Machinery and Emerging Energy Industry Yearbook* published by *Industrial & Technology Intelligence Services* electronic database ([www.itis.org.tw](http://www.itis.org.tw)).

We followed the key informant approach (Bagozzi et al. 1991) to collect data from the targeted senior managers (including TMT members, CEO, CMO, CIO, R&D managers, supply chain and logistical managers, etc.) at each firm. Overall, we sent 1440 questionnaires to the sampled firms, 483 questionnaires were returned, 464 of which were usable for subsequent analysis, representing an effective response rate of 32.22%. We checked for non-response bias by comparing respondents and non-respondents in terms of industry type, number of employees and firm size between early and late respondents. The results indicate that none of the Chi-square tests or t-tests values were statistically significant, suggesting that non-response bias was not a serious concern (Armstrong & Overton 1977). The unit of analysis for this study is the firm. Thus, we further aggregated multiple respondents from the same firm by averaging the responses across all items. After this process the 464 responses were aggregated as 230 data points for the subsequent analysis.

Considering that our research model contained a large number of latent constructs and that constitute a relatively small sample size, the partial least squares (PLS) method was applied for data analysis (Chin et al. 2003). We used SmartPLS 3 v.3.1.9 (Ringle et al. 2015) to evaluate the measurement quality (measurement model) and test research model (structural model). Although multiple respondents were used to collect survey data to minimize the threat of systematic respondent error, one concern with all self-reported data is the possible presence of common method bias existing in the data. We adopted two statistical tests to evaluate whether a significant amount of common method bias existed. A Harman's single-factor test was conducted to examine whether a significant amount of common bias existed in the data (Podsakoff et al. 2003). The results indicate that common method bias was not a likely contaminant of our research.

## 4. RESULTS

### 4.1 Measurement Model

Second-order construct—reciprocal benefits were modelled as a reflective construct consisting of three sub-constructs as indicators: market, innovation and *anshin* values. All of these constructs and sub-constructs were modeled as being reflectively measured using multiple indicators. Instrument item reliability, convergent validity and discriminant validity, and construct reliability served to evaluate the PLS measurement properties. Individual item reliability can be examined by observing the loadings of the item-to-construct. The results show that all items have loadings that exceed the 0.707 threshold and indicate an acceptable quality of item reliability.

Convergent validity can be examined in terms of construct reliability, construct composite reliability, and average variance extracted (AVE) by constructs (Fornell & Larcker 1982). Cronbach's alpha can be utilized to assess construct reliability, which measures the homogeneity of items in a construct based on the assumption that each item in the scale contributes equally to the latent construct. Accordingly, we assessed convergent and discriminant validity for construct scales before testing the hypothesized structural relationships. Table 1 shows the descriptive statistics, composite reliability, Cronbach's alpha and AVE for all constructs in the research model. The Cronbach's alpha values and composite reliabilities were all higher than the recommended 0.7 (Nunnally 1978), and the AVE values were all above 0.50 (Fornell & Larcker 1982), confirming satisfactory internal consistency and convergent validity. As seen in Table 1 discriminant validity was also supported because 1) all indicators loaded more strongly on their corresponding construct than on other constructs in the model,

and 2) the square root of the AVE for each construct was larger than the inter-construct correlations (Chin 1998).

Table 1. Inter-Construct Correlations

Construct	Mean	S.D.	G	CG	PC	PA	RS	MV	IV	AV
Guanxi (G)	5.37	.928	<b>.82</b>							
Collaborative governance (CG)	5.36	.853	.50	<b>.87</b>						
Platform compatibility (PC)	4.92	.957	.35	.41	<b>.89</b>					
Process alignment (PA)	5.05	.947	.38	.43	.58	<b>.87</b>				
Resource sharing (RS)	4.99	1.032	.54	.55	.58	.64	<b>.79</b>			
Market value <sup>+</sup> (MV)	5.09	.859	.55	.49	.48	.49	.67	<b>.84</b>		
Innovation value <sup>+</sup> (IV)	5.12	.858	.45	.51	.58	.70	.71	.76	<b>.84</b>	
Anshin value <sup>+</sup> (AV)	5.18	.856	.60	.52	.51	.54	.64	.74	.71	<b>.86</b>
<b>Composite Reliability</b>			.89	.87	.94	.92	.90	.92	.90	.92
<b>Cronbach's Alpha</b>			.84	.71	.91	.89	.86	.89	.86	.88

Note: Diagonal elements (bold value) are the square roots of the average variance extracted shared (AVE) among the constructs and their respective measures. Off-diagonal are elements are correlations among constructs. <sup>+</sup>First-order sub-constructs

The results also show that the composite reliability and Cronbach's alpha for the second-order construct were 0.95 and 0.94, respectively. As shown in Table 1 the correlations among the three first-order sub-constructs were 0.76, 0.74, and 0.71, all of which were below the limit of 0.90 (Bagozzi et al. 1991); thus, a second-order factor model comprising a reflective latent representation of reciprocal benefits is useful in explaining such correlations.

## 4.2 Structural Model

Based on a bootstrapping procedure with 500 samples, *t*-statistics and standard errors were generated systematically (Chin 1998). Figure 1 presents the estimated path coefficients, significance levels and explained variances ( $R^2$ ) shown in the structural model. In terms of the second-order model, three first-order sub-constructs (market, innovation and anshin value) had significant reflective weights, such as 0.929, 0.901, and 0.894 ( $p < 0.01$ ) for reciprocal benefits, respectively. Furthermore, all other path coefficients were positive and significant except hypothesis H5a. These results provide support for the nine hypotheses: H1, H2a, H2b, H3a, H3b, H4, H5b, H6, and H7 exhibiting positive effects. However, the path posited by H5a was not supported. The predictive power of the model was assessed by the percentage of variance attributed to the explanatory variables, as shown in Figure 1. These results provide support for our proposed research model and hypotheses.

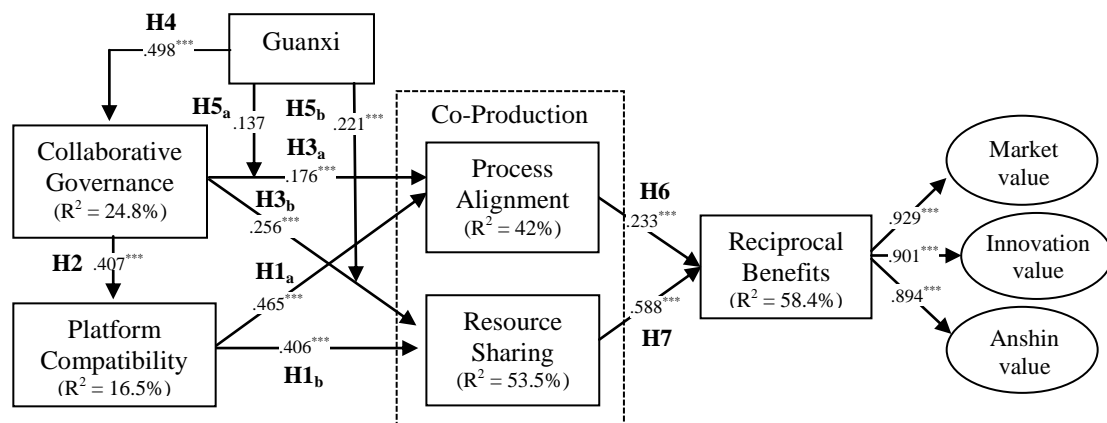


Figure 1. Research Model and Results for PLS Analysis



## 5. DISCUSSION AND CONCLUSION

### 5.1 Contributions to Research

This study was motivated by the need for a theoretical explanation of what factors enable interfirm co-production in supply chain environments, and what value can be co-created by the co-production. Building on the relational view and systems theory perspectives, this research empirically investigates whether platform compatibility and collaborative governance can serve as enablers of co-production by facilitating process alignment and resource sharing activities, leading to realized reciprocal benefits. Our study also demonstrates the complementary role of *guanxi* in strengthening the collaborative governance effect on resource sharing activities. Prior research pointed out interfirm collaborations can exhibit different levels of relational value creation (Dyer et al. 2008; Grover & Kohli 2012). In this study we identified three metrics of reciprocal benefits such as market, innovation and *anshin* value as proxies for relational value. These measures adequately capture multi-dimensional relational value, including indirect and intangible values.

Overall, this research contributes to the empirical literature on examining how supply chain firms can work together through the use of IT platforms, *guanxi* and collaborative governance mechanisms to facilitate interfirm co-production and realize relational value co-creation. The empirical results show: first, platform compatibility can enable process alignment and resource sharing activities across firms by improving the flexibility and adaptability of IT platforms. Second, collaborative governance can improve platform compatibility by improving joint goal setting, conflict resolution and enable co-production. Third, *guanxi* is an important foundation for inducing collaborative governance and is effective in positively influencing the collaborative governance effects on resource sharing activities. Finally, the synergy of process alignment and resource sharing is essential for realizing co-production and value co-creation and confers reciprocal benefits to partner firms.

### 5.2 Implications for Practice

Our results have several practical implications for supply chain firms. First, increasing platform compatibility can enable process alignment and resource sharing activities, implying that it is important to facilitate interfirm co-production by utilizing adaptable IT platforms that are malleable to changing supply chain requirements (Sarker et al. 2012). Second, collaborative governance contributes to co-production and also enhances platform compatibility. Thus, developing appropriate governance mechanisms with collaboration and empowerment characteristics are necessary to facilitate co-production. Third, greater *guanxi* can support collaborative governance and strengthen the influence of collaborative governance on co-production. This means *guanxi* is an important complementary resource and social capital to facilitate effective co-production. Overall, this study demonstrated that co-production involves the synergy of process alignment and resource sharing activities, which can generate reciprocal benefits and realize value co-creation. Hence, firms should think about the synergy and efforts in integrating interfirm processes and resources in a manner that is conducive for the realization of value co-creation.

### 5.3 Limitations

Systems theory and the relational view provide a theoretical foundation for us to develop a research model to explain how effective IT platforms and governance mechanisms (*guanxi* and collaborative governance) can lead to value (reciprocal benefits) co-creation through facilitate interfirm co-production activities in supply chain environments. However, this study has several limitations. The usual caveats about the use of single informants and self-reported data apply to this study. Some

caution should be applied when generalizing the findings to other industry contexts. Additionally, data from convenient sampling approach do not represent entire populations and may limit the generalizability of this study. Further studies might need to expand the boundaries of the analysis to other populations. The user responses in this study are cross-sectional data. Time and resource constraints did not allow the iteration of data collection to observe top management intention over time and determine any long-term effects of the discussed factors. Future research should consider a longitudinal approach to validate and extend the co-production model as proposed in this current research.

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