Assessing the Importance of TOE Openness for Firm Performance: Does Co-Production Matter?

Hung-Tai Tsou Department of Marketing and Logistics Ming Dao University No. 369, Wen-Hua Road, Changhua, Taiwan 52345, ROC Tel: +886-4-887-6660#2310 Daber520530@yahoo.com.tw

Sheila Hsuan-Yu Hsu Institute of Service Science National Tsing Hua University No. 101, Section 2, Kuang-Fu Road, Hsinchu, Taiwan 30013, ROC Tel: +886-3-516-2520 <u>r9121001@gmail.com</u>

ABSTRACT

Empirical studies do not examine openness' effects on coproduction. The present study adopts a technology–organization–environment (TOE) framework to discuss the effects of TOE openness (openness of technology, openness of corporate culture, and openness to external environment) on coproduction. In addition, coproduction is central concerns in fast changing manufacturing and services environments. Yet, very few collaboration research studies have examined the impact of coproduction on firm performance, especially in financial and non-financial performance. This study further proposes coproduction mediates the relationship between TOE openness and firm performance. The discussion and conclusions will lead to a stronger understanding of TOE openness and coproduction.

Keyword: Openness, TOE framework, Coproduction, Performance

Introduction

The customer becomes engaged as an active participant in a joint production process and service offering with the business [42] [67], in which the customer and the business' employees interact and participate [48]. Although deepening commitments to customer relationship have advanced businesses from seeking to satisfy their customers to building and strengthening customer bonds to gain their lasting loyalty, they must also develop competencies that form, maintain, and optimize profitable relationships with customers (e.g., consumers or business clients) and encourage them to adopt an advisory or coproducer role. It behooves businesses to form collaborative partnerships with their customers and view them as coproducers.

Seeing the customer as a coproducer (i.e., coproduction) is frequently discussed in new product development (NPD). Customers become involved in each NPD stage for the business to gain greater insights into their thoughts and opinions through input and feedback. Until recently, the predominant thinking (i.e., logic) was that customer value creation accompanies the product. However, the service dominant (S-D) logic proposed by Vargo and Lusch [64] provides an alternative view to the traditional goods-dominant logic, and suggests service provision rather than goods is the basis for economic exchange. They propose goods are distribution mechanisms for service provision and the customer is always a coproducer. Their logic recognizes how customer collaboration affects customer business coproduction (e.g., [4] [5] [22] [44]) and identifies its primary benefits as lower costs, customized service offerings, and increased productivity [2] [49]. Especially, many studies of coproduction focus on the implications of coproduction for the supplying firms, discussing its contribution to firms' productivity gains [49]. Yet, very few research studies have examined the impact of coproduction on financial and non-financial performance. Thus, the underlying objective is to boost

coproduction to co-create effective values, which reflect in firm performance.

Organizations can be viewed as open systems [55]. The idea of an "open system" or "openness" has been broadly used to analyze business conduct and benefits as a means of expanding value creation for organizations [21]. It seems likely that a firm gains advantage from using external sources of knowledge. For openness, firms may develop open model to create new products and services from internal collaboration and external cooperation with downstream or upstream partners. Although openness issues have manifested in several different areas (e.g., technology, strategy, process, culture, experience, relationships, communication), it is unclear whether and how openness initiatives in the contexts of technology, organization, and environment that are able to improve collaboration.

A technology-organization-environment (TOE) framework [62] tends to incorporate three categories to develop a coproduction research. Reviewing the TOE's studies, most of them focused on the e-business and innovation adoption scopes (e.g., [68] [69] [70] [71]), seldom had been done to do with the operating mechanism based on strategic perspectives. As a result, this study connects the characteristics of openness with the TOE framework (hereafter *TOE openness*) and proposes that three critical contexts were involved to identify the openness, including a) technological context in terms of the adoption of open systems [17]; b) organizational context with respect to possessing innovation and globalization culture [24]; c) environmental context in regard to opening boundaries to external environment [20] [30]. To fill this gap, this study intends to examine the impacts of TOE openness on coproduction and examines whether and how TOE openness promotes firm performance. This is captured in the research framework shown in Figure 1.



The model suggests that TOE openness has a direct impact on coproduction, which in turn has impact on firm performance. In doing so, three specific questions are addressed: 1. Whether and how does TOE openness impact coproduction? 2. Whether and how does coproduction impact firm performance? and 3. Whether and how does coproduction mediate the relationship between TOE openness and firm performance? The purpose of this article is to provide an integrative framework of analysis of relationship between TOE openness, coproduction, and firm performance that addresses these issues. The article first discusses several important issues in the study of TOE openness, and then it presents a framework and its components, explains their definitions and impact on coproduction and performance and, finally, discusses some of the implications. Also, the model has the potential to contribute in both the theoretical and managerial realms. It presents a coherent analytical framework which can help managers and researchers to better comprehend TOE openness situations and analyze them as distinct coproduction-led strategies. Managers can use the model to design appropriate openness strategies according to their propensities to engage in coproduction, to select appropriate partners, and to design appropriate different marketing offers of coproduction opportunities.

Theoretical Background

Contingency Theory

Contingency theory has been used in many contexts, particularly in the field of strategic actions and organizational structure [31]. It also examines related variables' (such as strategy and business model) contingent effects on firm performance [72]. Based on the arguments of de Luca and Atuahene-Gima [25], this study notes one of fundamental strands of contingency theory [27]. It is the "fit-as-mediation" view [65], which posits that managers choose or adopt organizational structures, processes, and strategies that reflect the particular circumstances of their organizations [31]. This study shifts the focus from corporate to TOE openness strategies and focuses on a structural construct that captures the firm's collaboration practices with external parties, namely, coproduction. The mediation perspective specifies the existence of a significant intervening mechanism (e.g., organizational structure) between an antecedent variable (e.g., strategy) and the consequent variable (e.g., performance) [65]. When faced with keen competition, one of an organization's predominant approaches is to pursue superior firm performance and competitive advantage through TOE openness strategies. However, drawing on the above discussion, this study concentrates on the salient aspect of a firm's collaboration mechanism, namely coproduction that accounts for the effect of collaboration behavior on firm performance. Thus, coproduction as the way to mediate the link between TOE openness and firm performance. Given the limited attention the mediating view of coproduction had received, this study focuses on this perspective. The answers to these arguments are central to the understanding of how firms that co-product in competitive open environments to attain superior firm performance.

Literature Review and Hypotheses Development

Coproduction

Coproduction is such as the joint production which is a situation of the customer and the firm's contact employees' interaction and participation in the production [8]. Bovaird [11] points that the coproduction between service providers and service users or other community members is viewed as the supply of service through stable and long-term relationships and all members make substantial resource contributions. Gruen et al. [33] describe that coproduction behaviors included participating in related efforts, making suggestions to improve process, service or product, and proactively communicating problems. During service production process, customers provide resources to service organization in the form of either information or effort [39]. Hsieh and Yen [36] define coproduction as the extent to which customers give assistance to service providers to create the service. Lusch et al. [44] point that coproduction is involving the participation in the creation of the core offering, and happens with customers and any other partners in the value network even in many situations which includes through shared inventiveness, co-design, or shared production. This study defines coproduction as all participants including service providers and customers that involve in service production process, information and resources sharing, decision-making process, related co-meetings, response accurately and timely for requesting information.

Although many fields are involved in coproduction, the point is an emphasis on front-stage consumer participation in service production. Through interaction with consumers, firms can coproduce new service via knowledge and information exchange. However, we find the lack relationships between coproduction and partners of firm side. Fewer researches focus on coproduction in the supplier side or even all related parties in the process. In addition, in early stages most notions about coproduction were conceptual view rather than empirical study. Therefore, we want to strengthen the empirical studies to explore coproduction. Based on the notion of coproduction which is applied by consumer side and we want to probe and explore the role of partner of firm side to extend in coproduction.

TOE openness

Kandemir and Hult [38] indicated that openness was the level to which parent organization(s) promoted information exchanging/sharing with their partners. This study compresses previous papers concerning

openness into three main categories as a whole. They were standardization of platform technologies [13] [17] [19], organizations with open culture or open-mindedness [10] [14] [23] [57], and open boundaries to external environment [30] [38] [41] [56]. They were relevant to the TOE framework [62]. This study extends TOE framework in openness, among them (a) technological context: refers to the compatibility and standardization of open systems which helped reduce operating hindrance and paper-based operations among functions or companies, and enlarge the working efficiency [17]; (b) organizational context: refers to both innovation and globalization culture of a company which assisted in bringing new opportunities and initiating new service [24]; (c) environmental context: refers to a set of processes including searching, screening, and signaling for fostering partner collaboration in R&D projects [30].

Technological Context: Openness of Technology

Openness of technology concerns the adoption of open systems technology to enhance compatibility over internal (or external) applications, as well as to promote data communication and cooperative computation among private processes. Open systems technology is defined as an approach to operate a set of standardised interfaces across all platforms and vendors that empowers the flexibility of IT infrastructure and allows network users to work together [47]. Open systems technology is characterised by providing a sufficient *interoperability* environment that enables two distributed processes to share selective data with one another and enhances coordination among their process operation, implying that a cooperative computation is occurring [17] [52]. At the same time, *interconnectivity* is another characteristic that favours the existence of open systems technology by bridging the gaps between the islands of private information to contribute information sharing and applications across different companies [17] [46]. Both of these capabilities shine a spotlight on the importance of open systems technology.

With the dramatic reduction of costs in communications and the associated development of open standards [58], firms are increasingly deploying interorganizational systems to facilitate collaboration with their suppliers and trading partners [34]. Since the adoption of open systems enabled different parities or partners communicate effectively, speeded up organizational computing, and assisted in IT resources allocation [13] [17]. If firms adopt open systems technology to offer IT and functional standards, it will become easier to make technology interoperate and enable information to be more portable [18]. Thus, the feasibility and success of coproduction are shaped by the use of open system technology.

Hypothesis 1: Firms with a higher degree of openness of technology will have better coproduction.

Organizational Context: Openness of Corporate Culture

Corporate culture is defined as a set of board, tacitly understood rules which presented fuzzy guidelines for employees to behave and make a decision under different environment [16]. An innovation culture was one way under particular consideration to express the concept of corporate culture [24]. It was a subculture possessing open-mindedness in a company's core value and so as to be comfortable with any new ideas, opportunities, or even failure and defects [53]. It referred to the companies' receptivity to any novel ideas or organization's operational routine [15] [50]. Employees staying in the climate around openness atmosphere tended to generate new ideas or courage to invite new inventions [24]. When a group composed of diverse individuals with different cultural backgrounds, it was a good chance to stimulate intellectual conflict (resulted from different perspectives) which access new ideas to the enterprise [43]. The firms brought up diversity and openness internally to encourage new ideas and ignore punishment when unexpected results happened. This would enhance the willingness of members to foster innovative collaboration [29] [53]. With this openness of corporate culture, a firm can use the interchange of information among members to develop and create more collaboration.

Hypothesis 2: Firms with a higher degree of openness of corporate culture will have better coproduction.

Environmental Context: Openness to External Environment

Opening to the external environment was considered as a set of activities including not simply various information collection from but also inner knowledge disclosure to the outside world [30]. In this respect,

openness to external environment refers to the degree of willingness to interact and involve with outside environment, characterized by three chief process components: searching, screening, and signaling.

Searching was described as an attitude of seeking out useful information or knowledge from a wide variety of fields. Searching process involved the search for solutions of existing problems, new product/service ideas, and suitable channels for knowledge acquisition [40]. *Screening* implied to an open behavior of a firm and its insight into partner selection and resource identification [30]. Right partner selection and new/unutilized sources interaction stood an important status in maximizing the opportunities of firms' operation performance and success, especially for whom allied with partners or cooperated in R&D [6]. *Signaling* was activities prepared to reveal knowledge with particular competences from whom possessed more information to those whom were less informed [60]. It was important that a firm should possess practical knowledge associated with market opportunities. They would be more experienced in gathering sufficient sources and better organizing operation process to commercialize the research outcomes into real innovations [7].

Nevertheless, firms might lack of completely information about external environment. Firms and government initiatives necessitated collaboration with external parties for involving them into innovation process and product improvement [45]. Firms may combine the screening activity with a strategic signaling of their range of competencies to the external world. By signaling their competencies, firms will attract potential partners and thus open new opportunities for collaboration. From this viewpoint, firms more open to external environment should be more likely to engage in collaborative agreements.

Hypothesis 3: Firms with a higher degree of openness to external environment will have better coproduction.

Firm Performance

Prior research has studied business performance from different perspectives, such as financial performance, business unit performance, or organizational performance [66]. To measure performance, one must consider the financial and non-financial performance of a firm [3] [32]. *Financial performance* refers to a measure of how well a firm uses assets from its primary mode of business to generate revenues. *Non-financial performance* is a long-term operational objective that emphasizes the importance of increasing customer loyalty, attracting new customers, and enhancing the image and reputation of a firm [9].

Many scholars contend that both customer and supplier firms seek collaborative relationships with each other as a way of improving performance [28] [59]. Supplier firms can obtain high sales and earn great returns from resources invested in maintaining long-term relationships with their customers [37]. Stank et al. [61] suggest that both internal and external collaboration are necessary to ensure performance. Partnerships can improve profitability, reduce purchasing costs, and increase technical cooperation [1] [35]. In addition, Perks [54] described that the advantage of collaboration can shared the costs and risks of research and development (R&D). Furthermore, collaboration leads to raise the speed to enter market [12] [26]. This study discovers that the key point of collaboration with others is creating a win-win situation which makes both sides gain more benefits. Therefore, in order to adapt the complex and changeful environment, it is necessary for firms to sustain their competitive advantage via collaborating with partners outside. Moreover, Lusch et al. [44] proposed that through involving customers and value network partners in coproduction activities, firms can gain competitive advantage.

Hypothesis 4: Firms with a higher degree of coproduction will have better firm performance.

The Mediating Role of Coproduction

The preceding hypotheses link the relationships among TOE openness, coproduction, and firm performance. They suggest that TOE openness affects firm performance through the coproduction process. That is, firms can use openness strategies to cultivate a certain level of capacity in collaboration behavior, which in turn will attain firm's superior performance. Thus, this study argues that coproduction plays a mediating role in the relationship between the independent variables of TOE openness and the dependent variable of firm performance.

Hypothesis 5: Coproduction mediates the influence of a) openness of technology; b) openness of corporate culture; c) openness to external environment on firm performance.

Discussion and Conclusions

Implications to Research

This study makes four primary theoretical contributions. First, it contributes to the theoretical development of a conceptual model for explaining the relationships among TOE openness, coproduction, and firm performance. Despite the increasing importance of openness and coproduction, few studies in the literature have discussed these relationships and this deficiency is serious because of the increasing importance of coproduction. Accordingly, from the contingency view, this study builds up the conceptual model and hypotheses to indicate the mediating role of coproduction between TOE openness and firm performance. Second, this study contributes to the literature by examining the relationships among TOE openness, coproduction, and firm performance. This study proposes that coproduction is a critical mediator through which openness of technology, openness of corporate culture, and openness to the external environment positively affect firm performance. However, for coproduction to succeed, they still must be addressed since they are foundational.

Third, the model presents a coherent analytical framework which can help researchers to better comprehend TOE openness (openness of technology, openness of corporate culture, and openness to the external environment) and analyze them as distinct coproduction-led enablers. In particular, this study offers robust insights into the effects of TOE openness on coproduction. This study adds to the growing volume of research on TOE framework impact that advocates the necessity of incorporating openness–related coproduction into examinations of the impact of TOE openness. Specifically, TOE openness is important because it helps firms continually transform their capabilities and resources and focus on open model to shape their coproduction strategies and tactics. Fourth, the framework developed in this study provides a starting point for empirical research about coproduction and be used for developing testable research hypotheses. Thus research should determine empirically the relative importance of each of the various openness preconditions, or of the various drivers that induce firms to engage in coproduction. In sum, coproduction is recognized as the method of choice for generating superior performance to improve a firm's competitive advantage.

Implications to Practices

The study has four practical implications for management. First, managers must actively change their companies' business models to ones of openness to stimulate their firms' capabilities in terms of managing collaboration. Managers are advised to put more effort into preparing for and using open system technologies. In so doing, they can remove the restrictions of private proprietary systems so as to remain flexible enough to coordinate with the dynamic business environment. In terms of corporate culture, firms can reward entrepreneurships, engage in international interflow, and encourage the submission of new ideas. Moreover, managers should remain highly sensitive to competition and the macroenvironment while encouraging coproduction with partners and consultants, such as by cooperating with universities or participating in government-funded research and development projects.

Second, a greater level of coproduction can stimulate creative and innovative practices that may eventually lead to better firm performance. Managers need to build up proper knowledge platforms that help nurture tacit and explicit knowledge interaction. In addition, they must provide greater incentives to motivate employees to exchange, learn, translate, and absorb knowledge to access innovations [51] [63]. Hence, to exploit the link between TOE openness and firm performance, managers first need to recognize the importance of—and then cultivate—coproduction.

Third, the three antecedents provide a mechanism to assess the business' strengths and weaknesses. The strengths identify the leadership role (s) the business can assume in a coproduction relationship as they represent the competencies it has built over time. On the other hand, weaknesses signal areas that need to be addressed either internally through improvement plans or externally through partnerships. In seeking partners and customers who cannot only offset weaknesses but provide a distinguishable advantage, the business must also consider their long-term fit and the desired image produced through the association. In

business-to-customer relationships, addressing the strengths and weakness will vary, depending on the type of collaboration.

Fourth, the model provides a basis for developing appropriate coproduction based TOE openness strategies. It can be used for facilitating firm performance according to according to the characteristics of coproduction. It can help managers to determine within which TOE openness strategies and use situations coproduction offers may succeed more. In addition, it may also help to design diverse types of coproduction offers and stipulate the values that such offers may provide to customers (or partners) in terms of benefits (or superior performance). In conclusion, this study wants to examine the relationships among TOE openness, coproduction, and firm performance. In the future, this study hopes that empirical evidence could support a contingency view and indicates that TOE openness can facilitate firm performance, primarily through improving coproduction.

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