

# UNDERSTANDING THE EFFECTS OF TECHNOLOGICAL ADVANCEMENT (INTERNET OF THINGS) ON VALUE CO-CREATION AND FIRM PERFORMANCE

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## ABSTRACT

*Value co-creation is a study on consumer-firm interactions, where consumers can be actively involved with firms in designing, developing, marketing, distributing, and (or) selling of products to personalize their service experiences. In contrast, value co-destruction exists due to imbalance involvement between consumers and firm in co-creating of value as a result of misuse of resources. Previous studies have shown value co-creation will increase firm performance, whereas value co-destruction will reduce the performance. In the meantime, a recent technological advancement with the introduction of IoT has started to influence the process of value co-creation, co-destruction, and firm performance. This paper is discussing on the concept of IoT that can positively increase value co-creation, and reduce the negative effect of value co-destruction on firm performance, explained from the RBV perspective and S-D logic.*

**Key words:** *IoT, RBV, S-D logic, value co-creation, value co-destruction*

## INTRODUCTION

This paper focuses on the effects of technological advancement in the relationships between value creation and firm performance. Specifically, this paper will explain how the concept of internet of things (IoT) can influence value co-creation and co-destruction towards firm performance from the perspective of resource-based view (RBV) and service-dominant (S-D) logic. This paper is motivated to discuss on the mentioned relationships due to four reasons. Firstly, although value co-creation has always been associated with positive implications on consumers (Terblanche, 2014); there are also some possible negative implications related to them (Grönroos, 2012). The same observation could also be happened to firm performance. For instance, increasing consumer participation will reduce firm controls on the outcome of the process. This situation would be ended up co-destructing the value through the very same consumer-firm interactions that are used in value co-creation (Terblanche, 2014). Therefore, the possibility of value co-destruction should not be overlooked (Plé & Cáceres, 2010) as it may as well affect the firm performance (Alexander, 2012). Despite of that, the numbers of studies focusing on both value co-creation and co-

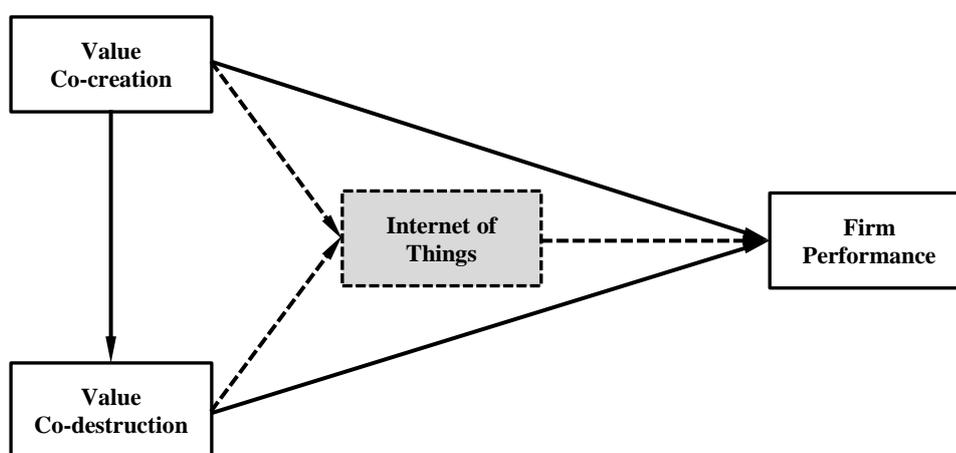
destruction in a single topic is still relatively low. Since the concept of value co-destruction is still in blur (Plé & Cáceres, 2010), the interrelationships between value co-creation and co-destruction need to be further explored.

Secondly, value co-destruction has so far been treated negatively relative to value co-creation (Echeverri & Skálén, 2011; Neuhofer, 2016). However, under certain circumstances, co-destruction can also be a useful strategy for value creation. In fact, from a RBV perspective, firm can renew, redeploys, recombines, replicates, retrenches, or even retires its resources for achieving superior firm performance (Helfat & Peteraf, 2003). This is especially true as some values need to be destroyed and recreated as part of the business strategy (Galván, Pindado, & Torre, 2007). Thirdly, since value co-creation requires direct and active interactions between two parties (Grönroos, 2012), firm should interact with consumers by taking advantages of IoT, which can be useful for understanding how value co-creation (and co-destruction) are assessed and created (Mejtoft, 2011), and influencing firm performance (Hamidi & Gharneh, 2017). Since service innovations can be enabled by IoT (Andersson & Mattsson, 2015), it will be interesting to know either IoT can enhance the positive effect of value co-creation on firm performance, while at the same time reducing (or controlling) the negative effect of value co-destruction. Lastly, in relation to S-D logic, RBV treats firm capacity at providing services and consumer-firm interactions for value creation as intangible resources. Therefore, while co-creation can be considered as a type of resources, co-destruction is also another type of resources (Mele & Corte, 2013). In fact, previous study has discussed RBV with S-D logic in analyzing sourcing decisions for business processes (Dobrzykowski, Tran, & Tarafdar, 2010). Despite of that, there are still much works to be done on the interactive application between RBV and S-D logic (Mele & Corte, 2013). With these four interrelated issues, this paper is focusing on the following questions; (1) how do value co-creation and co-destruction interact with firm performance, and (2) how does IoT influence value co-creation and co-destruction on firm performance?

## **THE CONCEPT OF RBV AND S-D LOGIC**

From RBV perspective, value co-creation (and co-destruction) can be the source of superior performance if the firm is capable of capturing the value with specialized competences (Barney, 1991). Hence, while S-D logic is focusing on value creation processes (Mele & Corte, 2013); RBV on the other hand will enable value co-creation to be associated with firm performance. RBV has a long history where the contributions to the work can be tracked back as early as 1959 by Edith Penrose (Kor & Mahoney, 2004). RBV was then popularized by Wernerfelt in 1984 who has claimed the imperfectly available resources are the firm's position barrier to maintain high returns over long periods of time. The assumptions use in RBV is that firms can create a sustained competitive advantage when possessing heterogeneously strategic resources and these resources are imperfectly mobile. For the firm's strategic resources to become the source of sustained competitive advantage, they have to be valuable, rare among firms, imperfectly imitable, and non-substitutable (Barney, 1991). With RBV in mind, firm performance shall refers to "the extent in which a firm is capable of reaching sustained competitive advantages as leveraged by resources that are valuable, rare, and imperfectly imitable and have no strategically equivalent substitutes" (Hamidi & Gharneh, 2017, p.78).

As a result, emphasizing the link between S-D logic and RBV will not just help us to understand how S-D logic and RBV co-exist at explaining the source of competitive advantage, but also enable us to understand how IoT can provide the platform to manage value co-creation and co-destruction towards achieving better firm performance. Therefore, inspired by the National IoT Strategic Roadmap's (MIMOS, 2014, p. 2-01) definition of IoT as the “intelligent interactivity between human and things to exchange information and knowledge for new value creation”, this paper is treating IoT as a platform for active consumers-firm interaction to achieve firm performance. The concept is suggesting that both value co-creation and co-destruction have direct effects on firm performance. However, with the mediation of IoT, the positive effect of value co-creation can be increased, while the negative effect of value co-destruction can be decreased on firm performance. This concept is highlighted in Figure 1. The discussion of the concept and relationships are provided in the following sections.



**Figure 1**

IoT concept for value creation and firm performance

## VALUE CO-CREATION AND FIRM PERFORMANCE

The notion of co-creation has been appeared in the service marketing research as early as 1970's (Grönroos, 2012). However, the interest on this topic was only started to become popular after the publication of seminal paper by Prahalad and Ramaswamy in 2004 (Leclercq, Hammedi, & Poncin, 2016). In general, the concept of value co-creation can be loosely understood as a joint creation of value between consumers and firms that actively co-construct and personalize the service experiences through continuous dialogue and problem solving (Prahalad & Ramaswamy, 2004a). From the theoretical perspective, this concept has emerged from the S-D logic where the marketing focus has been shifted from tangible (e.g., manufactured goods) to intangible resources (e.g., skills, information, knowledge) with the orientation departed from firms to consumers (Vargo & Lusch, 2004). Co-creation enables new values to be experienced by consumers that cannot be created in silo by the firms alone (Payne, Storbacka, & Frow, 2008). This concept has becoming critical due to the consumers are now more “connected, informed, and active” and they can “access information on firms, products, technologies, performance, prices, and consumer actions and reactions from around the world” (Prahalad & Ramaswamy, 2004b, p.4).

Enabled with the invention of internet, consumers can now actively participate in the development and usage of products and services provided by the firms, in which they have becoming the co-creators of the value (Kambil, Friesen, & Sundaram, 1999). With this in mind, the consumers have to be treated as a source of competency to drive firm products and services offering (Prahalad & Ramaswamy, 2000). Since “the co-creation experience of the consumer becomes the very basis of value” (Prahalad & Ramaswamy, 2004b, p.5), this concept has treated consumers at the utmost importance for achieving superior firm performance (Tijmes, 2010).

Value co-creation is likely to improve firm performance (Restuccia & Ouellet, 2009). Previous study has suggested that value co-creation will have a significantly positive effect on firm performance (Chakraborty, Bhattacharya, & Dobrzykowski, 2014). This suggestion was then supported by an empirical study, which has shown that value co-creation has a significantly positive relationship with firm performance (Chuang & Lin, 2015). Accordingly, another empirical study has also found that firm performance was enhanced by value co-creation (Ren & Li, 2015). Similarly, a recent study has shown that the impact of co-creation on firm performance is greater than innovation capability (Hamidi & Gharneh, 2017). Due to value co-creation has been conceptualized to have consequences on firm performance (Leclercq, Hammedi, & Poncin, 2016), while the previous studies have empirically proven the positive relationship between value co-creation and firm performance, this paper is suggesting that value co-creation relates positively with firm performance. Besides that, a recent study has suggested that ICT will boost the process of value co-creation (Martínez-Cañas, Ruiz-Palomino, Linuesa-Langreo, & Blázquez-Resino, 2016). In a similar vein, ICT has become integral to enhance value co-creation (Neuhofer, 2016). Accordingly, a previous empirical study has shown that e-service innovation has a strong and positive effect on value co-creation (Chuang & Lin, 2015). Since value co-creation can take advantages from IoT development (Mejtoft, 2011), it is suggested that value co-creation will also relate positively with IoT.

## **VALUE CO-DESTRUCTION AND FIRM PERFORMANCE**

Another concept called as value co-destruction was also emerged from S-D logic not so many years ago. This concept was in the spotlight since the publication of the conceptual paper by Plé and Cáceres in 2010. This concept is referred to as “an interactional process between service systems that results in a decline in at least one of the systems’ well-being (which, given the nature of a service system, can be individual or organizational)” (2010, p.431). This concept suggests that consumer-firm interactions may not always end up co-creating the value. Instead, the imbalance level of co-creation can lead to co-destruction of value. One of the possible reasons for such value co-destruction to be in existence is because of the misuse of resources either intentionally or unintentionally from either one or both parties (Plé & Cáceres, 2010). For instance, according to a previous empirical study on public transportation, value co-destruction can happen due to incongruent in five interaction value practices, namely informing (e.g., misinterpretation of information), greeting (e.g., disagreement on how to conduct greeting), delivering (e.g., strict procedure), charging (e.g., complicated payment methods), and helping (e.g., skills and actions of helping do not connected properly with the others’ needs) (Echeverri & Skålén, 2011). Since then, there have been more and more discussions on value co-destruction in various

contexts, such as in the sport management (Stieler, Weismann, & Germelmann, 2014), business-to-business (Marcos-Cuevas, Prior, & Enz, 2015), information systems (Vartiainen & Tuunanen, 2016), interfirm relationships (Prior & Marcos-Cuevas, 2016), and tourism (Neuhofer, 2016).

Based on S-D logic, consumers are treated as co-creators of value (Payne, Storbacka, & Frow, 2008). However, since consumer-firm interactions are not always co-creating value; the possibility of adverse consequences can lead to co-destruction of value (Plé & Cáceres, 2010). This may happen because for the value to be co-created, three components must co-exist, namely the value, actors, and engagement platform. Missing any of these components may cause value co-destruction to exist. Since value co-destruction has always been treated as opposite to value co-creation (Leclercq, Hammedi, & Poncin, 2016), it is suggested that value co-creation relates negatively with value co-destruction. It was argued that “value co-creation explicitly may have both positive and negative impacts on value formation for customers, and it may be instrumentally created or just emerge from customers’ experiences” (Grönroos, 2012, p.1521). Therefore, value co-destruction may happen when the value was not reciprocally created (Leclercq, Hammedi, & Poncin, 2016). As a result, although involving consumers in co-creation of value can be good for firm performance, a negative effect can emerge as a result of consumers’ perception on imbalance relationship with the firm (Martínez-Cañas, Ruiz-Palomino, Linuesa-Langreo, & Blázquez-Resino, 2016). Even though unique value is co-created with consumers (Prahalad & Ramaswamy, 2004b), in which they have been treated as a new source of competency for the firm (Prahalad & Ramaswamy, 2000), there was also a pitfalls of inviting consumers to co-create value with firm (Urban, 2015). With these in mind, it is suggested that value co-destruction relates negatively with firm performance.

## **INTERNET OF THINGS AND FIRM PERFORMANCE**

In the meantime, the term “internet of things” was first coined in 1999 by Kevin Ashton (Gubbi, Buyya, Marusic, & Palaniswami, 2013). A simple search on the terms “internet of things” and “IoT” with Google Trends covering the periods from January 1<sup>st</sup>, 2004 to Jun 30<sup>th</sup>, 2017 has found the attention level on this topic was started to increase from 2013 and has reached the highest peak in October 2016 for the term internet of things and Mac 2017 for the term IoT. The astonishing jump in the attention level is signaling that the topic is currently getting more important. Meanwhile, the numbers of search on IoT was higher than the term internet of things itself implying that IoT is more popular and well accepted acronym for the internet of things (Zaidi, 2017). Since the late 1990’s the IoT definition has evolved to include wider applications (Gubbi, Buyya, Marusic, & Palaniswami, 2013). It is now “comprises an evolving array of technologies that extend the idea of instantaneous connectivity beyond computers, smartphones, and tablets to everyday objects such as home appliances, cars, and medical devices” (Poudel, 2016, p.997).

As the application domains of IoT are wide ranging from personal and home, enterprise, utilities, and mobile (Gubbi, Buyya, Marusic, & Palaniswami, 2013), “the IoT is expected to transform how we live, work and play” (Chase, 2013, p.6). Due to the impacts on time use and community, politics, organizations, and culture (DiMaggio, Hargittai, Neuman, & Robinson, 2001), IoT is proven hard to be simply

ignored by any business firms as it will change the way firms interact with customers (Weichselbaum, 2015), and influencing the future business models (Fleisch, Weinberger, & Wortmann, 2015). Since IoT is argued to improve communication and interaction between consumers and firm, therefore, IoT should be able to enhance value co-creation, while reducing (or controlling) value co-destruction from affecting the firm performance.

Besides value co-creation, value co-destruction can also present in IS (Vartiainen & Tuunanen, 2016). However, there was lacking of knowledge on value co-destruction when comes to ICT (Neuhofer, 2016). Since there are not many studies between value co-destruction and IoT, by default, this paper is suggesting that value co-destruction relates negatively with IoT. Meanwhile, previous study has found that ICT impacts on firm are broader, not just on the performance (De Stefano, Kneller, & Timmis, 2016). Nevertheless, many studies such as a study on broadband have measured the impacts on firm performance (Bertschek, Cerquera, & Klein, 2013). In addition, IT capabilities were also found to be positively and significantly related to the firm performance (Anand, Wamba, & Sharma, 2013). Prior to that, RFID was found to be impacting the firm market value (Jeong & Lu, 2008). Meanwhile, a recent study on big data analytics capability has also found a direct effect on firm performance (Wamba, et al., 2017). Although there are not many studies of IoT on firm performance, based on the effects of ICT, broadband, RFID, big data, etc. (which relate to IoT) on firm performance, this paper is suggesting that IoT relates positively with firm performance.

Previous study has suggested that value creation was shifted to value co-creation under a digital age with big data (ICT) works as the driver of change (Xie, Wu, Xiao, & Hu, 2016). Since ICT can improve value co-creation to enhance firm performance (Ren & Li, 2015), there could be intervening variables (mediator) between value co-creation and firm performance (Restuccia & Ouellet, 2009). In the recent study, marketing and technological capabilities (e.g., ICT) was found to fully mediate service-dominant orientation on firm performance (Wilden & Gudergan, 2017). Since service innovation was enabled by IoT (Andersson & Mattsson, 2015), it was argued that IoT will mediate value co-creation at achieving firm performance. Therefore, it is suggested that IoT improves the positive effect of value co-creation on firm performance. Meanwhile, it was previously suggested that value co-destruction will reduce firm performance. However, since IoT is enabling a more effective communication to take place between consumer-firm, it was argued that value co-destruction can be reduced. With this in mind, it is suggested that IoT reduces the negative effect of value co-destruction on firm performance.

## CONCLUSION

Value co-creation and co-destruction are the two interrelated concepts that look at consumer-firm interactions to jointly create value based on personalize service experiences. Due to incongruent between them, previous studies have shown that while value co-creation could improve firm performance, value co-destruction on the other hand could reduce the performance. In a recent years, many technological advancements have been introduced that could influence how value is co-created. In this case, IoT has started to gain greater attention to address this issue.

Correspondingly, this paper has discussed the IoT concept to enhance our knowledge, and enlighten our understanding on how it can influence value co-creation, value co-destruction, and firm performance. As a result, this paper has promoted IoT and how it can fit well into the current scenario between value co-creation and co-destruction. This paper also highlighted the concept of RBV to demonstrate how the relationships between value co-creation, value co-destruction, and IoT can be understood as a source of superior firm performance. In doing so, this paper has shown that RBV can fit in harmony with S-D logic by treating resources and activities for value co-creation as intangible resource, while the firm's skills and capabilities with IoT as another intangible resource. These intangible resources that are unique, rare, inimitable, and valuable to the firm can lead to superior performance.

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