

Orchestrating to shape a service ecosystem: An empirical investigation

(Work-in-Progress)

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Abstract

Purpose – This research aims at exploring the orchestration process in the emergence of a service ecosystem. By drawing a theoretical linkage between the service-dominant logic, existing studies of business ecosystems and the literature of orchestration, we attempt to address this research question: how actors are orchestrated to shape a service ecosystem.

Methodology – This research employs a qualitative case study to investigate the research question. Following a theoretical sampling, the case under study is the emergence of Taoyuan Smart City, in which Taoyuan is one of the six special municipalities in Taiwan and has been a benchmark in the smart city development. The data for analysis includes archival materials and depth interviews, especially with the Ministry of Economic Affairs (MOEA), the focal actor of the case.

Findings – The orchestration process of the service ecosystem of Taoyuan Smart City comprised four interconnected phases, each of which was presented in line of structuring, bundling and leveraging the resources spanning the organizational boundaries within the system.

Implications – (Since the intellectual conservation between theory and practice (the case) remains continuing, we are not able, tentatively, to provide theoretical as well as practical implications)

Keywords: Service-dominant Logic, Value Co-creation, Service Ecosystem, Orchestration, Case Study

1. INTRODUCTION

With decades of development, the sharing of individual resources for others (Belk 2014, Sundararajan 2016), have vividly marked the business and economic environments nowadays. Facing the drastically changing environments, value co-creation has emerged as a dominant logic that determines the strategic advantage of firms and organizations and their resulting survival and prosperity (Prahalad and Ramaswamy 2004, Vargo and Lusch 2008, Kohtamäki and Rajala 2016). Within the emerging paradigm of value co-creation, the development of “ecosystems” has attracted increased attention from scholars, policy makers and practitioners (Moore 1996, Iansiti and Levien 2004, Winn and Pogutz 2013, Lusch, Vargo et al. 2016).

Emphasizing the symbiosis of interconnected and interdependent actors, an ecosystem not only prescribes the scope of a firm’s action but also provides important ingredients on which the firm’s operation relies (Ansari, Garud et al. 2016). Being able either to develop an ecosystem or to leverage ecosystem advantage thus becomes a pivotal issue. Despite its importance, the present understanding into ecosystems remains constrained, particularly in terms of how actors and subsystems are attracted, linked and coordinated in the emergence of an ecosystem. The extant literature of value-based ecosystems tends to focus attention on resource integration across organizational boundaries (Jaakkola and Alexander 2015, Frow, McColl-Kennedy et al. 2016, Vargo and Lusch 2016), but neglects the fact that actors who contribute their resources in interaction need to be coordinated and orchestrated so that they could enact their roles on performing adequate activities in the co-creation practices. Additionally, although an ecosystem can be seen as aggregation of interconnected systems or subsystems (Vargo and Lusch 2011, Akaka, Vargo et al. 2013, Porter and Heppelmann 2015), few efforts are devoted to investigate how these subsystems are orchestrated to shape an ecosystem.

This paper aims at exploring the orchestration process in the emergence of a service ecosystem. We draw a linkage between the research stream of service-dominant logic (e.g. Vargo and Lusch 2017), existing studies of business ecosystems (e.g. Iansiti and Levien 2004, Winn and Pogutz 2013), and the literature of orchestration (e.g. Helfat et al., 2007; Sirmon, Hitt, Ireland, & Gilbert 2011), to lay the theoretical foundations. We explored this research issue through a case study that looked at the emergence process of the ecosystem of Taoyuan smart city, with a time-span of three years, detailed the development process of how key stakeholders, including those from public and private sectors, such as central and local government entities, telecom companies, universities and schools, commercial stores, and so on were orchestrated by the focal actor- the Ministry of Economic Affairs (MOEA), and how the emergent system was coordinated and orchestrated, evolving towards a mature service ecosystem. The research findings permitted us to enrich the understanding into ecosystems from an orchestration perspective. We were also allowed to develop implications for practitioners as well as policy makers.

2. LITERATURE REVIEW

2.1 Literature Review of Orchestration

An emerging research stream termed resource orchestration, which extends the understanding of resource-based theory (RBT) by explicitly addressing the role of managers' actions to effectively structure, bundle, and leverage firm resources (Sirmon, Hitt, Ireland, & Gilbert 2011) First, the researchers reviewed this emerging stream by comparing two related frameworks, resource management (Sirmon et al. 2007) and asset orchestration (Helfat 2003). This comparison led to their integration, which enables a more precise understanding of managers' roles within RBT. Then what is known and what remains to be known about resource orchestration has also been discussed. This led to in-depth reviews of three areas where research on resource orchestration can be used to extend RBT. These areas are (1) breadth (resource orchestration across the scope of the firm), (2) life cycle (resource orchestration at various stages of firm maturity), and (3) depth (resource orchestration across levels of the firm).

Resource Management and Asset Orchestration

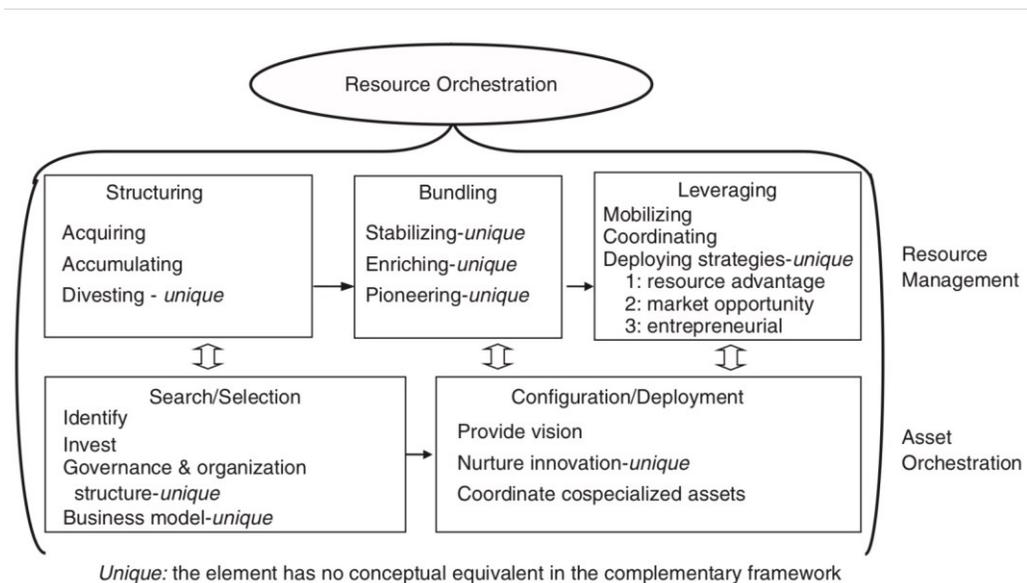
Sirmon et al. (2007) developed a resource management framework that focused on the actions of managers. They defined resource management as the comprehensive process of structuring, bundling, and leveraging the firm's resources with the purpose of creating value for customers and competitive advantages for the firm. Each of these three processes has three subprocesses. *Structuring* involves acquiring, accumulating, and divesting resources to form the firm's resource portfolio. *Bundling*, which refers to integrating resources to form capabilities, has three subprocesses: (1) stabilizing, or minor incremental improvements to existing capabilities; (2) enriching, which extends current capabilities; and (3) pioneering, which creates new capabilities. *Leveraging* involves a sequence of processes to exploit the firm's capabilities and take advantage of specific market opportunities; it includes (1) mobilizing, which provides a plan or vision for capabilities needed to form requisite capability configurations; (2) coordinating, which involves integrating capability configurations; and (3) deploying, where a resource advantage, market opportunity, or entrepreneurial strategy is used to exploit capability configurations formed by the coordinating subprocess. While each process and its subprocesses are important, several different paths can be pursued in the resource management framework; however, creating value and developing competitive advantages requires synchronization of the processes (Sirmon et al., 2007).

Concurrent to the development of the resource management stream of research, Helfat et al. (2007) produced a related framework based on asset orchestration. These scholars argued that asset

orchestration consists of two primary processes—search/selection and configuration/ deployment. The search/selection process requires managers to identify assets, make investments concerned with them, and design organizational and governance structures for the firm as well as create business models. The configuration/deployment process requires the coordinating of co-specialized assets, providing a vision for those assets, and nurturing innovation.

The complementarities of these frameworks suggest that integrating them will facilitate research of managers’ actions within capability and resource-based logics. To support this integration, we adopt the term resource orchestration (please see Figure 1). In the context of the work presented here, resource orchestration draws upon both resource management and asset orchestration and focuses on how managers affect a resource-based competitive advantage. To further explore this integration and develop a research agenda for resource orchestration, we address issues not previously considered, including the firm’s breadth (scope of the firm), depth (levels within the firm), and life cycle. In doing so, we add richness to resource orchestration and provide a road map for future research.

Figure 1: Comparing Resource Management and Asset Orchestration Framework



Resource Orchestration Breadth

Corporate Strategy

Hill et al. (1992) indicate that managers must integrate across diverse business divisions to promote cooperation among them and achieve synergy. Such integration often requires that managers create special liaison units or liaison positions that facilitate the flow of information, encourage joint decision

making, and attempt to build trust between key managers in each of the units represented. To accomplish such coordination, changes that affect the firm's governance and incentives may be required. When effective, the coordination allows various units to work together to share newly acquired or accumulated resources. Moreover, this knowledge facilitates enriching and pioneering bundling activities, which can then be leveraged by each unit appropriately. In other words, it facilitates resource orchestration.

Business Strategy

Differentiation and cost leadership are two primary business strategies commonly used to gain a competitive advantage. Sirmon and Hitt (2009) found that each of these strategies required different types and levels of resources for effective implementation resulting in an advantage over competitors and earning positive returns.

Differentiation strategy. Firms using a differentiation strategy commonly try to develop innovation and marketing capabilities that help them differentiate their goods (products or services) from those of competitors. As such, dynamic managerial capabilities (Adner & Helfat, 2003) are needed. Managers must fit the level and type of resources needed for implementation with the particular strategy employed, which requires resource orchestration (Helfat et al., 2007). For example, Sirmon and Hitt (2009) found that high investments in resources, which lead to both resource acquisition and accumulation, best supports a leveraging strategy providing sophisticated services relative to those offered by competitors. When synchronized, these actions maximize returns to differentiation.

Cost leadership strategy. Firms implementing a cost leadership strategy build capabilities that help them achieve efficiencies and maintain lower costs relative to competitors. In recent years, many firms have outsourced a number of functions to external suppliers who can perform those activities more economically (Holcomb & Hitt, 2007). As resources, these relationships must be managed effectively to ensure that the external suppliers provide products that meet the firm's quality standards and provide the appropriate quantities and timing to support the firm's advantage over competitors. Essentially, firms must be able to offer their final products to consumers at a cost that is lower relative to their quality than competitors can do. This strategy also requires investments in specific resources to build capabilities that produce efficiency while simultaneously minimizing investments in other resources that do not help them meet their efficiency goals (Sirmon & Hitt, 2009).

Competitive Dynamics

Beyond these basic business-level strategies, firms commonly are engaged in a complex and dynamic competitive landscape. Therefore, they must take specific competitive actions and effectively respond to

their rivals' actions in order to develop and maintain a competitive advantage. Firms must build strategic flexibility to respond effectively to competitors' actions and other major changes in the competitive environments (Combs, Ketchen, Ireland, & Webb, 2011).

Strong competitive rivalry. This type of environment often requires continuous change and therefore necessitates dynamic managerial capabilities (Adner & Helfat, 2003) to maintain strategic flexibility that supports such agility. Firms gain strategic flexibility by moving beyond incremental bundling activities to processes used to enrich existing capabilities and to pioneer new capabilities (Sirmon et al., 2007). Moreover, appropriate governance structures are needed to support and incentivize such behaviors throughout the organization. And if firms cannot develop such a capability internally, they may be able to gain access to appropriate complementary resources through strategic alliances and/or acquisitions (Harrison, Hitt, Hoskisson, & Ireland, 2001; Makri et al., 2010; Sirmon & Lane, 2004). In fact, access to such complementary resources may be necessary to create novel innovations and to sustain a competitive advantage.

Modest competitive rivalry. Oftentimes, these are relatively mature markets and/or those with more regulation. When rivalry is modest and the competitive environment is less complex, the competitive landscape tends to be stable and, thus, more predictable. Thus, stabilizing or enriching bundling actions along with a resource advantage leveraging strategy may be sufficient. Knowledge must be updated and incrementally enhanced capabilities developed and used as the basis for competing with (and winning) rivals. And over time, managers need to develop new capabilities, which requires pioneering bundling, in order to sustain a competitive advantage or build a new one (Lei, Hitt, & Bettis, 1996).

Conclusions on Resource Orchestration Breadth

To implement corporate- and business-level strategies that earn positive returns, managers must orchestrate the firm's assets and configure the capabilities to achieve a competitive advantage. However, because competitive environments are rarely static, changes are required. As such, all competitive advantages are temporary, meaning that firms must orchestrate their resources to implement strategies that help them achieve a series of temporary competitive advantages over time (Sirmon et al., 2010).

Resource Orchestration and Firm Life Cycle

With managerial action being essential for realizing competitive advantage from resources a firm owns (Ndofor et al., 2011), and these resources somewhat dependent on the firm's stage of development, it is important to explore resource orchestration efforts across the life cycle of a firm. In each stage, the transitioning firm's governance structure is important to ensure proper incentives for continued innovative efforts (Zahra, Filatotchev, & Wright, 2009). Given that the resource orchestration actions

needed to not only survive but thrive in each stage must be prioritized, each of the actions may require varying forms of governance. Different resource orchestration processes in the start-up, growth, maturity, and decline stages of a firm are discussed as below.

Resource Orchestration in the Start-up Stage

Viability is a primary objective during a venture's start-up phase (Miller & Friesen, 1984). This stage requires resource-structuring behaviors that support the firm's business model, including obtaining financing (Jawahar & McLaughlin, 2001) and hiring and training employees (Rutherford, Buller, & McMullen, 2003). For some ventures, external partnerships are established to counter the limited number of employees and enable the start-up to build the economies of scale needed to survive and prosper (Miller & Friesen, 1984). This process may require the establishment of alliances early in the start-up's existence in order to acquire critical resources, potentially by leveraging advisors or board of directors to aid in efforts to acquire critical resources (Zahra et al., 2009).

However, the structuring of resources during the start-up stage also involves creating flexibility, allowing adaptation to new situations and competitive contexts (Cainarca, Colombo, & Mariotti, 1992). To establish a start-up as a viable operating entity, experimental resource allocation patterns are commonly undertaken to select valuable and potentially rare operational and product configurations that enable the venture to establish competitive advantage in the marketplace (Morrow et al., 2007). Thus, in the start-up stage, an entrepreneur concentrates on structuring the firm's resource portfolio as the foundation for subsequently bundling resources to form the capabilities on which the venture's business model will operate.

Resource Orchestration in the Growth Stage

As a start-up begins to grow, managers acquire or develop enhanced skills to help spur growth (Gilbert, McDougall & Audretsch, 2006; Lumpkin & Dess, 2001). Growth requires an entrepreneur to structure the organization with increasingly formalized procedures and a managerial hierarchy necessary to effectively manage a larger firm. Using external expertise to select and manage the firm in value-creating ways is particularly valuable for growth-stage firms (Daily & Dalton, 1992). Moreover, managers' bundling actions may focus on pioneering capabilities that are new to the firm and enable the internalization of previously outsourced functions, such as human resources, legal, and so on. As such, employment growth requires employees to be adequately trained and ultimately retained by the firm (Rutherford et al., 2003).

Importantly, a growing firm often requires the accumulation of debt or external equity to sustain it. Connections to special stakeholders, from both managers and board members, who have network

relationships are important because they enable resource acquisition and innovation that help increase shareholder value and wealth (Zahra et al., 2009). Thus, the growth stage may require managers to develop skills in accessing and building relationships with creditors, investors, suppliers, and perhaps trade associations, which may be instrumental in fostering continued growth (Jawahar & McLaughlin, 2001). In total, these activities permit a growing firm to mobilize and leverage its resource portfolio to support competitive advantage (Sirmon et al., 2010).

Resource Orchestration in the Mature Stage

Over time, firms begin to mature in the strategies used and operating procedures applied, thereby achieving greater clarity in their internal and external environments. Mature firms are also able to hire experienced human capital to help refresh and improve their resource portfolios and to build capabilities that support new innovation efforts. Maintaining a competitive advantage requires mature firms to pursue innovation in order to minimize the adverse effects of increased competition in the marketplace (Agarwal & Gort, 2002). Managers must address or otherwise overcome the bureaucratic structure that was developed to manage and sustain growth and that may subsequently suppress innovation (Miller & Friesen, 1984).

As such, in the mature stage, it is important for managers to orchestrate resources to achieve a balance between innovation and efficiency. Strategic entrepreneurship fosters ambidexterity because both exploration and exploitation are simultaneously engaged (Ireland, Hitt, & Sirmon, 2003). In exploration efforts, the firm identifies new ways to diversify its product offerings or develop new uses for existing resources. In exploitation efforts, the firm pursues efficiency in its existing operations. Naturally, these activities require differing emphases in terms of resource orchestration.

Resource Orchestration in Decline-Stage Firms

A firm entering the decline stage must conserve resources in order to survive. Identifying and divesting resources that no longer help the firm create value and develop a competitive advantage is critical. In fact, Sirmon et al.'s (2010) results suggest that a firm's capability weaknesses can undermine the benefits provided by capability strengths. Thus, even with capabilities that contribute to competitive advantage, a firm could experience a competitive disadvantage because of its capability weaknesses. As such, resource divestments are often required, but divestments must be carefully executed to avoid losing strengths along with the weaknesses (Nixon, Hitt, Lee, & Jeong, 2004). Moreover, evidence suggests that divestment may need to be coupled with new innovation efforts, either internal or external. This action may require changes in the governance structure that permitted the firm to fall into a state of decline. Given that the ties were originally established to aid firm objectives (Daily & Dalton, 1992),

severing the relationships may create difficult political and social situations for managers in the declining firm (Smith et al., 1985).

Table 1: Resource Orchestration and Firm Life Cycle

Stage	Start-up	Growth	Mature	Decline
Objective	<ul style="list-style-type: none"> ● Viability ● Legitimacy ● Understanding & conforming to formal institutional rules and regulations as well as the informal institutional norms and values of its target customers 	<ul style="list-style-type: none"> ● Acquiring or developing enhanced skills to help spur growth 	<ul style="list-style-type: none"> ● Increasing the efficiency of current operations and innovating to create new areas of growth ● Achieving a balance between innovation and efficiency (both exploration and exploitation are simultaneously engaged) 	<ul style="list-style-type: none"> ● Conserving resources in order to survive
Structuring (of resource) Acquiring Accumulating Divesting	<ul style="list-style-type: none"> ● Creating business model ● Obtaining financing (Jawahar & McLaughlin, 2001) and hiring and training employees 	<ul style="list-style-type: none"> ● Structuring the organization with increasingly formalized procedures and a managerial hierarchy necessary to effectively manage a larger firm ● Requiring the accumulation of debt or external equity to sustain 	<ul style="list-style-type: none"> ● Exploration- t acquiring and accumulating new sources of knowledge that contribute to the development of new innovations and integrating this knowledge into the firm's operations ● Exploitation- restructuring resources to identify and replace inefficient capabilities with more efficient ones 	<ul style="list-style-type: none"> ● Identifying and divesting resources that no longer help the firm create value
Bundling (of resource) Stabilizing Enriching Pioneering	-	<ul style="list-style-type: none"> ● Using external expertise to select and manage the firm in value-creating ways 	<ul style="list-style-type: none"> ● Exploration- creating capabilities that enrich existing products and technologies and enabling the firm 	<ul style="list-style-type: none"> ● New innovation efforts to developing a competitive advantage are required

		<ul style="list-style-type: none"> ● Developing skills in accessing and building relationships with creditors, investors, suppliers, and perhaps trade associations, which may be instrumental in fostering continued growth 	<p>to pioneer products for new markets</p> <ul style="list-style-type: none"> ● Exploitation-stabilizing a firm's operations based on newly identified resources 	
<p>Leveraging (of resource)</p> <p>Mobilizing Coordinating Deploying</p>	<ul style="list-style-type: none"> ● leveraging advisors or board of directors to aid in efforts to acquire critical resources 	<ul style="list-style-type: none"> ● Utilizing existent accumulated capabilities to explore more market opportunities 	<ul style="list-style-type: none"> ● Exploration-coordinating and deploying resources to new locations as well as to existing markets ● Exploitation-extending the firm's reach in its external environment to exert greater influence and to stabilize its position in the competitive environment 	-
Organizational structure	<ul style="list-style-type: none"> ● Newly established ● Organizational structure is flat 	<ul style="list-style-type: none"> ● Growing and getting mature ● Increasing in number of employees ● Organization structure getting more sound 	<ul style="list-style-type: none"> ● Become mature and stable ● Bureaucratic structure 	<ul style="list-style-type: none"> ● Mature ● Large number of employees ● Complex hierarchies
Focused orchestration action	<ul style="list-style-type: none"> ● Structuring the firm's resource portfolio as the foundation 	<ul style="list-style-type: none"> ● Bundling actions focusing on pioneering capabilities 	<ul style="list-style-type: none"> ● Leveraging resource to increase the efficiency of existent products 	<ul style="list-style-type: none"> ● Structuring resource to divest capability weakness and rebuild capability strength

	for subsequently bundling resources to form the capabilities on which the firm's business model will operate	that are new to the firm and enable the internalization of previously outsourced functions	and to innovate in creating new growth	
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Resource: Sirmon et al., 2011

Resource Orchestration Depth

Because firms vary in size and in the complexity of their organizational structures, multiple levels of managers coexist, with each level contributing, in different ways, to the achievement of a competitive advantage (e.g., Holcomb et al., 2009; Sirmon et al., 2008). As such, the structuring, bundling, and leveraging subprocesses of resource orchestration likely differ by managerial level. Moreover, when managerial hierarchies exist, the quality of information transferred between managers commonly decays (Teece, 2007; Teece, Pisano & Shuen, 1997); such decay can disrupt managerial incentives and alignment. While many differences exist between these levels, the most fundamental differences involve focus (variance in behaviors) and the amount and type of information each manager holds (Floyd & Lane, 2000; Ireland, Hitt, Bettis, & de Porras, 1987). Typically, operational managers focus on the day-to-day activities of specific groups within the firm, while top-level managers are more focused on the firm as a whole. Middle managers are often broadly understood to be “managers located below top managers and above first-level supervision in the hierarchy.” Therefore, synchronizing resource orchestration actions across levels is more complex than existing work suggests.

For example, collaborating with top-level and operational-level managers increases middle managers’ awareness of the resource orchestration activities taking place in the firm. Through collaborations, middle managers become informed of the isolated, yet successful, accumulation and bundling of resources that operational managers initiate as well as the ideas that top managers advance to increase the firm’s performance through its corporate strategy (e.g., acquiring large-scale resources via mergers and acquisitions) or as a result of novel innovation efforts that are often associated with the firm’s business-level strategies. Thus, as a mediator, middle-level managers have a strong influence on the synchronization of resource orchestration actions in the bidirectional approach. They are critical to ensuring that structuring, bundling, and leveraging actions are congruent. However, effective governance

structures and incentive plans will play an important role in affecting the synchronizing behavior of middle managers.

2.2 Literature Review of Service Ecosystem

The ecosystem perspective, drawing originally on biological eco- systems to describe differences in the nature of industries and also seen as a third mode of economic organizations besides markets and hierarchies (Moore 1993, 1996), has rapidly gained currency in describing collaborative forms of constructing innovations and business coalitions (Adner & Kapoor 2010; Autio & Thomas 2014; Frow, McColl-Kennedy, & Payne 2016). The drawback with the ecosystem's popularity is, as Aarikka-Stenroos and Ritala (this issue) argue is that the term.

“... has become a buzzword, sometimes adding very little to the analysis. Indeed, a critical look at the rapid expansion of B2B studies using the concept reveals that it is used in a variety of ways, ranging from a synonym for business networks to an analogy for interconnected environments, and even to describe a full-fledged theoretical and empirical approach”. Aarikka-Stenroos and Ritala (2017) offer an extensive analysis of how different disciplines use the ecosystem perspective. They distinguish business ecosystem, innovation ecosystem, entrepreneurial and start-up ecosystems, platform ecosystem, and service ecosystem literatures, and their sub-categories. Based on a comprehensive literature analysis, the authors suggest two approaches to ecosystems from the network management perspective: “ecosystem as a new layer” to be managed, adding to Möller and Halinen's (1999) framework of network management levels, and “ecosystem as a novel perspective to business networks, which involves providing an update to current business network frameworks.”

We see that most authors using the ecosystem term combine the “layer” or domain view and the “perspective” view. When treated as a domain, we should ask what are the differences between “sector/cluster”, “field”, “network environment”, and “ecosystem”? What new dimensions or characteristics does the ecosystem description provide? It seems that the broad ecosystem applications (ecosystem as a metaphor for industries, sectors, and clusters) assume that the focal domain is composed of interrelated actors having competitive and collaborative relationships and various aims for influencing and even directing the co-evolution of the focal domain. These larger “ecologies” can comprise several interrelated and competing “business ecosystems” often driven by a hub firm (e.g., Apple's iPhone/iTunes ecosystem, Google's Android ecosystem), and constituting, with an array of technology providers “platform ecosystems” and with even other, non-business actors “mobile phone/services ecosystems”. The mobile phone/services ecosystem may be depicted as part of a more extensive ecosystem comprising all electronic and software fields (and their science and research extensions). This simplified example raises the following observations.

First, all domain-type of ecosystem applications can be described through the actors-resources-activities metalanguage, meaning that the IMP network theory can describe ecosystems. Second, the different views on ecosystems overlap with the other labels; more expansive ecosystem applications (ecologies) seem very similar to the business field conceptualization (DiMaggio & Powell 1991; Kenis & Knoke 2002), while most of the more limited applications are analogous to the strategic nets proposed by Möller et al. (2005). This is clear from Adner's (2006, 98) definition of ecosystems as “the collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution.” This is a neat way to describe a strategic net. Underlying our hint of irony is the worry that those ecosystem enthusiasts that are not familiar with business and innovation network research (or institutional studies) are reinventing the wheel, a serious problem in social sciences and one that is especially pertinent to the silos of business studies.

This does not mean the ecosystem approach is without merit – quite the contrary. The perspective forces us to develop theoretical tools for deeper understanding of the processes and mechanisms that drive the construction and change of business fields, noting both institutions and technologies as part of them (Adner 2017). Institutional theory and evolutionary economics, together with cognitive and learning theory seem useful sources for more advanced studies. The broad ecosystem studies can contribute to the innovation network orchestration research and vice versa, and it seems clear that the more focal-, hub- or coalition- centered ecosystem researchers would benefit from interaction with strategic nets scholars.

2.3 Literature Review of Service-Dominant Logic

Previous research streams of Service-Dominant Logic

Vargo & Lusch(2004) outlined a framework that has become known as “S-D logic”. The core ideas were rather simple and straightforward. First, marketing activity (and economic activity in general) is best understood in terms of service-for-service exchange, rather than exchange in terms of goods- for-goods or goods-for-money. Second, value is cocreated, rather than created by one actor and subsequently delivered. As with all “new” ideas, neither of these was entirely new (c.f. Arthur 2009). For example, Bastiat (1848/1964) had declared that “services are exchanged for services” over 150 years ago. Likewise, Prahalad and Ramaswamy (2000) had been advocating value cocreation for several years prior to Vargo and Lusch (2004) and before them Ramirez (1999) had traced its recognition back at least 300 years. In fact, S-D logic was, from its beginning, more about the identification and extension of apparent coalescence in the ongoing development of marketing thought, as reflected in the title “Evolving Toward a New Dominant Logic for Mar- keting” (Vargo & Lusch 2004; Akaka, Vargo, &

Lusch 2012), than a radically new idea. That is, it has been grounded on a foundation built by many others, as has been its progress.

Since its introduction, the development of this integrated framework has continued, first by inclusion of the other (than service exchange) primary activity involved in value cocreation—resource integration—and then by explication of the idiosyncratic and experiential nature of value (e.g., Vargo & Lusch 2008). More recently, in elaborating this framework, the consideration of the role of institutions in value cocreation has moved to the forefront. All of these developments have been captured in five core foundational premises (FPs, of which there are now a total of 11), which have more recently (Vargo & Lusch 2016) been identified as axioms (see Table 2).

There have been other “turns” that have been somewhat more subtle or at least not fully captured in separate FPs/ axioms—though some have resulted in the rewording of existing FPs—and others are currently in more formative stages. Examples of these are the move to a generic-actor (A2A) orientation and the identification of a service ecosystem as the “unit” of analysis for value cocreation (Vargo & Lusch, 2011). There are others.

Vargo & Lusch (2017) pointed out that S-D logic represents a dynamic, continuing narrative of value cocreation through resource integration and service exchange that has been constructed by an increasingly large number of academics from various disciplines and subdisciplines. During the last decade, service-dominant (S-D) logic (1) has taken a series of significant theoretical turns, (2) has had foundational premises modified and added and (3) has been consolidated into a smaller set of core axioms. S-D logic can continue to advance over the next decade by moving toward further development of a general theory of the market and, even more broadly, to a general theory of value cocreation. To support this theory of the market requires developing more midrange theoretical frameworks and concepts of service exchange, resource integration, value cocreation, value determination, and institutions/ecosystems. These midrange theories can be partially informed by theories outside of marketing, including those under the rubrics of practice, evolutionary, complexity, ecological and structuration theories. Evidence-based research is also needed.

Table 2 : The axioms of S-D logic.

Axiom	
Axiom 1/FP1	Service is the fundamental basis of exchange
Axiom 2/FP6	Value is cocreated by multiple actors, always including the beneficiary
Axiom 3/FP9	All social and economic actors are resource integrators
Axiom 4/FP10	Value is always uniquely and phenomenologically determined by the beneficiary
Axiom 5/FP11	Value cocreation is coordinated through actor-generated institutions and institutional arrangements

Foundations, bifurcations, and conceptual turns

At the heart of S-D logic is the identification of service exchange. Vargo & Lusch (2017) especially noted the primary role of operant resources (such as knowledge and skills) that can act on other resources to create a benefit, rather than the role of the relatively static, operand resources (such as natural resources), which are more commonly considered. The S-D logic solution was a transcending conceptualization of service (a process, usually expressed singularly)—i.e. as noted the use of one's resources for another actor's benefit—that depicted service as superordinate to goods and services (units of output, usually plural). In other words, as Gummesson (1995) had noted some years before, “activities render services, things render services.” Given that it is redundant to speak of intangible units of output, called “services,” as being created to provide service, the former is generally not a concept used in S-D logic. Instead, the framework suggests that service can be provided either directly or indirectly (e.g., through a good).

Zooming out: from resource application to resource integration

Partly due to the editorial focus of the *Journal of Marketing* (Vargo & Lusch, 2004), as well as to the latent influence of traditional models, the initial perspective was relatively dyadic and micro-level focused and somewhat managerially oriented. A major turn occurred therefore with the attempt to zoom out to reveal the bigger picture. Initially, that zooming out exposed other actors, at first generally seen as other firms (e.g., “competitors” and “suppliers”). It then extended to customer connections (e.g., family, peers, etc.), all involved in service-for-service exchange, thus, at least part of the broader context (Akaka, Vargo, & Lusch 2013). But closer examination revealed that all of these actors exhibited foundational commonalities in addition to service-for-service exchange—resource-integration activities. That is, the (especially operant) resources used in service provision were both the source and the combined outcome of service-for-service exchange. This led to the identification of FP 9, later designated Axiom 4 (Vargo & Lusch 2008), an FP/Axiom that seems to have resonated particularly strongly among S-D logic scholars and others. It also revealed a network structure (Chandler & Vargo 2011), but one that had dynamic, recursive properties beyond those typically attributed to networks. It was becoming increasingly apparent that the key to value co-creation was the ongoing interplay of resource creation and application afforded through reciprocal exchange and differential access and integration.

Full realization of this dynamism, however, required an additional turn. As we argued in Vargo and Lusch (2011), an essential step toward fully grasping the process and extent of value cocreation is the “need to overcome (mis)conceptual problems associated with the notion of a ‘producer,’ as a creator of value, and a ‘consumer,’ as a destroyer of value. Briefly stated, all actors (e.g. businesses, individual customers, households, etc.) engaged in economic exchange are ‘similarly’, resource-integrating, service- providing enterprises that have the common purpose of value (co)creation. This had been

partially reflected in the wording of FP9: “all social and economic actors are resource integrators” (Vargo & Lusch 2008) but more fully captured in the somewhat tongue-in-cheek proclamation that “it’s all B2B” (Vargo & Lusch 2011), which was subsequently rephrased ‘more neutrally’ to “A2A” (actor to actor). In addition, it also moved the network orientation to at least a rudimentary conceptualization of a service ecosystem, as will be discussed.

Service ecosystems

As one zooms out from dyadic interactions and discreet transactions, the first thing noticed is that these dyadic interactions do not take place in isolation, but rather within networks of actors, of which the dyad is just a part. These networks can be seen at various levels of aggregation (e.g., macro, meso, micro). Structurally then, these networks reflect what S-D logic captures axiomatically in the resource-integration specification of Axiom 3. Likewise, they emphasize that the benefit (value) realized by a beneficiary (e.g., a “customer”) does not occur in isolation either, but rather through integration of the resources from many sources, thus best understood as holistic experiences (FP9/Axiom3 and FP10/Axiom4).

At first glance, it might appear that there is little new here, just the acknowledgement that service provision, value cocreation and value realization take place in networks, as sociologists Granovetter (1973), Burt (1992) and various scholars in marketing (e.g., Achrol & Kotler 1999) have been telling us for some time. Partially, this would be a correct evaluation. However, the S-D logic framework adds several key characteristics that are not in all cases typical of these network conceptualizations. Most obvious among these is that the connections represent service-for-service exchange, rather than just connections of resources, people, or product flows; thus, in S-D logic, network actors are linked by common, dynamic processes (service provision). Second, the actors are defined not only in terms of this service provision (resources applied for benefit) but also in terms of the resource-integration activities that the service exchange affords. Finally, the network has a purpose, not in the sense of collective intent but rather in the sense of individual survival/wellbeing, as a partial function of collective wellbeing. The study of purpose or purposeful behavior has a long history in philosophical thought concerning concepts of teleology and, more contemporarily, teleonomy (Pittendrigh 1958). The latter focuses more on complexity, emergence and self-organizing systems (Christensen, Anthony Scott, Berstell, & Nitterhouse 2007), which are crucial characteristics of service ecosystems. This literature fits well as we try to understand how wellbeing of individuals is both contingent on and contributes to a dynamic network, in which the resources of the actors are being continually updated. It also indicates the need for a subtle but significant shift in orientation among actors, away from the primacy of conflict and toward the primacy of cooperation and coordination. Unpacking how this “purposeful,” cooperative activity

leads to value co-creation will be a major underlying theme for the next 10 years, as will be discussed below.

Institutions

This coordination for value co-creation implies mechanisms for the facilitation of these resource integration and service-for-service exchange activities. As partially discussed in Vargo and Lusch (2016), this is the role of institutions and institutional arrangements. Institutions are the humanly devised rules, norms, and beliefs that enable and constrain action and make social life at least somewhat predictable and meaningful (Scott 2008), what North (1990) calls “rules of the game.” Institutional arrangements refer to higher-order assemblages of interrelated institutions (sometimes referred to as “institutional logics”). Thus, S-D logic has recently identified the service ecosystem, partially conceptualized in terms of institutions, as the unit of analysis for value co-creation. Service ecosystems are defined as “relatively self-contained, self-adjusting system of resource-integrating actors connected by shared institutional arrangements and mutual value creation through service exchange” (Vargo & Lusch, 2016, p. 161).

With the addition of institutions and service ecosystems to S-D logic's foundational concepts, we believe S-D logic can begin to be something more than the lens, framework, and perspective, as we have characterized it up to now. That “something more” can take several forms, each with its own potential impact. At a minimum, it affords the completion of a relatively coherent narrative of value co-creation through resource integration and service exchange, coordinated by shared institutional arrangements that define nested and overlapping service ecosystems (see Figure 2).



Figure 2 The narrative and process of S-D logic. Note: Vargo and Lusch (2016).

3. Method

3.1 Qualitative Research Method

This study employs qualitative research method and uses a case study as the research method. The reason why this study applies qualitative research is to explore the questions of “how” and “why”. Doing qualitative research depends on researchers’ observation on phenomenon and deep interaction with facts so that the meanings of problem will be comprehensively and deeply analyzed and examined to conclude applicable implications. In addition, this research studies “process” which focuses on actors’ experiences and developing process of the cases.

3.2 Case Study

This study also utilizes a case study with 3-year time-span to look at the emergence process of a smart city ecosystem (namely, Taoyuan Smart City) in Taiwan and to explore two questions: 1) how key stakeholders, including private and public organizations and citizens, were orchestrated by the Ministry of Economic Affairs (MOEA), and 2) how the emergent systems were linked and coordinated, evolving towards a smart city ecosystem.

3.3 Data Collection

The data that this study collects is from two parts: interviews and secondary data. Four interviews have been conducted, which takes around 6 hours in total. The interviewees are from different organizations and different positions. On the other hand, the secondary data includes actors' social network sites, speeches, videos, articles, community newspaper, media and academic reports. All these materials are used to help form thorough understanding of the case and know its developing process and operation clearly.

4. FINDINGS

This research selects Taoyuan smart city in Taiwan as an example for case study. Through interviews with 4 officials and experts from different organizations and positions who had engaged in the development and implementation of Taoyuan smart city project and secondary data, the findings are elaborated as below(see Table 3).

The Ministry of Economic Affairs(MOEA) of Taiwan, in order to promote the development of smart cities, had initiated a 3-year time-span “Funding program of the Application of 4G broadband to the Development of Smart Cities in Taiwan”(thereafter named “the smart city funding program”), which encouraged the local(city and county) governments in Taiwan in collaboration with licensed telecom companies to apply for the funding and utilize the financial support from the MOEA to develop and implement 4G telecom infrastructure constructions towards the creation of comprehensive smart cities in Taiwan.

Taoyuan City is one of the 6 major municipality cities in Taiwan with international airport and airport Mass Rapid Transit(MRT) in its territory, therefore selected by the MOEA to be one of the main targeted cities for the promotion of the smart city funding program. The process for the MOEA to carry out the Taoyuan smart city project can be described from the following different periods and stages.

4.1 Period July 2014- December 2014

The MOEA announced the “Funding program of the Application of 4G broadband to the Development of Smart Cities in Taiwan” after collecting advisory opinions form its hired advisors and experts and created the business model to be a collaboration of central government (the MOEA), local government (Taoyuan City Government, the TCG, in this case) and telecom company (Chunhua Telecom, in this case) to achieve smart city constructions. In this period, the MOEA, except for ensuring the funding budget, had also held many seminars to explain the rules of the funding program and make sure the

conformance by all stakeholders, encourage the participation of new employees, and provide training for participating employees from central, local governments and telecom companies.

At this time, an ecosystem composing of stakeholders of the MOEA, the TCG, and Chunghua Telecom and their resource had been gradually formed. The focal actor-the MOEA encouraged the TCG and Chunghua Telecom to provide their expertise and resource for integration. Because the structure of the ecosystem was still very simple, the MOEA also tended to seek for external partnership, such as with industrial associations and research institutes, to acquire and accumulated critical opinions and resources.

4.2 Period January 2015- December 2015

In this period, in order to attract more participation to the Taoyuan Smart City project, the MOEA had helped the TCG to incorporate its 29 bureaus and departments to establish a Taoyuan Smart City Taskforce and then jointly identified 16 smart city application items, in order, including smart transportation, smart commerce, smart education, smart medical, smart home, smart travel, smart government, and so on. This taskforce and identified application items serve as a managerial structure and formalized procedures for the expansion of the project.

Moreover, the MOEA, jointly with the TCG and Chunghua Telecom, also invited more than 90 related foreign and Taiwanese companies with qualified expertise and reputation in ICT and smart city industries to set up the “Taiwan Intelligent Aerotropolis Alliance”(TIAA). The TIAA hold meetings and conferences periodically to provide advises on advanced industrial standards and smart city applications, which also acted as an external expertise to help the MOEA, the TCG, and the Chunghua Telecom to gain enhanced knowledge and skills to co-create value and spur growth.

The MOEA played an increasingly important role in building relationships with different stakeholders as the ecosystem getting enlarged and expanded. In order to manage and stabilize the ecosystem, the MOEA hold meetings periodically through its taskforce to make sure the identified application items are well implemented and potential new items can also be explored and developed. The MOEA also found out the platform communication was the pioneer capability in the ecosystem and started to internalized it to replace previous outsourcing.

4.3 Period January 2016- December 2016

Over this time, the Taoyuan Smart City ecosystem was getting mature in operation strategies and procedures applied, thereby more experienced employees and participants joined to help refresh and improve the resource portfolios of the ecosystem and to build capabilities that support new innovation

efforts. Most of the 16 identified and existent application items were under implementation, the main point of this period for the MOEA is to exploit the most successful and efficient items, such as smart transportation, as the competitive advantage of Taoyuan smart city development, and explore innovative items for future application by using the existent ecosystem resource.

On the other hand, due to the increasing number of taskforces, alliances, and meetings with more and more actors to participate in the process of decision making, the MOEA started to take measures to streamline the management structure to overcome the effect of bureaucracy. By doing so, the MOEA can ensure a balance between fulfilling old tasks effectively and innovating new opportunities effectively.

4.4 Period January 2017- June 2017

In this period, facing the upcoming closure of the funding program, some actors and stakeholders within the ecosystem, such as some company members of the TIAA that had not acquired adequate opportunities to participate in the smart city project, may leave the ecosystem. The task of the MOEA is to identify and divest resources that no longer help the ecosystem co-create value and conserve resources that remain valuable.

The MOEA also endeavored to ensuring the proof of business for those implemented application items, especially the items performed very well and selected as competitive advantages in this project to continue their success in operation even when in future no-funding situations.

Table 3: Orchestration Process in the Service Ecosystem of Taoyuan Smart City

Stage	Start-up	Growth	Mature	Decline
Period	July 2014-Dec. 2014 (0.5 year)	Jan. 2015-Dec. 2015 (1 year)	Jan 2016-Dec.2016 (1 year)	Jan 2017-June 2017 (0.5 year)
Objective	<ul style="list-style-type: none"> The MOEA announced the “Funding program of the Application of 4G broadband to the Development of Smart Cities in Taiwan” after collecting advisory opinions from its hired advisors and experts 	<ul style="list-style-type: none"> The MOEA, jointly with the TCG and Chunhua Telecom, also invited more than 90 related foreign and Taiwanese companies to set up the “Taiwan Intelligent Aerotropolis Alliance” (TIAA) The TIAA acted as an external expertise to help gain enhanced 	<ul style="list-style-type: none"> To refresh and improve the resource portfolios of the ecosystem and to build capabilities that support new innovation efforts 	<ul style="list-style-type: none"> To conserve resources that remain valuable for survival

		knowledge and skills to co-create value and spur growth		
<p>Structuring (of resource)</p> <p>Acquiring Accumulating Divesting</p>	<ul style="list-style-type: none"> Created the business model to be a collaboration of central government (the MOEA), local government (Taoyuan City Government, the TCG) and telecom company (Chunhua Telecom) to achieve smart city constructions ensured the funding budget and hold seminars to provide training for participating employees 	<ul style="list-style-type: none"> the MOEA helped the TCG to incorporate its 29 bureaus and departments to establish a Taoyuan Smart City Taskforce The taskforce then jointly identified 16 smart city application items in order This taskforce and identified application items serve as a managerial structure and formalized procedures for the expansion of the project 	<ul style="list-style-type: none"> The ecosystem is getting mature in operation strategies and procedures applied, thereby more experienced employees and participants joined to help refresh and improve the resource portfolios of the ecosystem and to build capabilities that support new innovation efforts. 	<ul style="list-style-type: none"> Facing the upcoming closure of the funding program, some actors and stakeholders within the ecosystem, such as some company members of the TIAA that had not acquired adequate opportunities to participate in the smart city project, may leave the ecosystem To identify and divest resources that no longer help the ecosystem co-create value
<p>Bundling (of resource)</p> <p>Stabilizing Enriching Pioneering</p>	-	<ul style="list-style-type: none"> In order to manage and stabilize the ecosystem, the MOEA hold meetings periodically through its taskforce to make sure the identified application items are well implemented 	<ul style="list-style-type: none"> To exploit the most successful and efficient items, such as smart transportation, as the competitive advantage of Taoyuan smart city development To explore innovative items for future application 	<ul style="list-style-type: none"> The MOEA endeavored to ensuring the proof of business for those implemented application items, especially the pioneering items performed very well and selected as competitive advantages in this project to continue their success in operation even when in future no-funding situations

<p>Leveraging (of resource)</p> <p>Mobilizing Coordinating Deploying</p>	<ul style="list-style-type: none"> ● An ecosystem composing of stakeholders of the MOEA, the TCG, and Chunghua Telecom and their resource had been gradually formed ● The MOEA encouraged the TCG and Chunhua Telecom to provide their expertise and resource for integration 	<ul style="list-style-type: none"> ● the MOEA played an increasing important role in using the existent ecosystem resources to explore and develop potential new application items 	<ul style="list-style-type: none"> ● Due to the increasing number of taskforces, alliances, and meetings, the MOEA started to take measures to streamline the management structure to overcome the effect of bureaucracy ● By doing so, the MOEA can ensure a balance between fulfilling old tasks effectively and innovating new opportunities effectively 	<p>-</p>
<p>Management Structure</p>	<ul style="list-style-type: none"> ● The structure of the ecosystem was still very simple 	<ul style="list-style-type: none"> ● The structure of the ecosystem was enlarged and expanded 	<ul style="list-style-type: none"> ● Became mature and stable ● Bureaucratic structure 	<ul style="list-style-type: none"> ● Mature ● Complex hierarchies
<p>Focused Orchestration Action</p>	<p>(Structuring)</p> <ul style="list-style-type: none"> ● The MOEA tended to seek for external partnership, such as with industrial associations and research institutes, to acquire and accumulated critical opinions and resources 	<p>(Bundling)</p> <ul style="list-style-type: none"> ● The MOEA found out the platform communication is the pioneering capability in the ecosystem ● Internalized the platform communication to replace outsourcing 	<p>(Leveraging)</p> <ul style="list-style-type: none"> ● Coordinated and deployed resource to increase the efficiency of the operation of existent application items and to innovate in creating new growth 	<p>(Structuring)</p> <ul style="list-style-type: none"> ● identify and divest capability weaknesses and conserve capability strenghts

5. DISSCUSSION AND IMPLIMENTATION

5.1 Theoretical Implication

Researches of service-dominant logic have mentioned actors, through services exchange in the process of resource integration, gradually form a service ecosystem under the arrangement and impact of institution (Vargo & Lusch 2017). However, how actors in a service ecosystem are coordinated and orchestrated to participate in resource integration have seldom been explored. This paper borrowed the research stream of orchestration, through linking with the theories of service-dominant logic and service ecosystems to address the questions.

Our analyses suggest that how actors in a service ecosystem are coordinated and orchestrated to participate in resource integration involves managerial action regarding structuring the portfolio of resources, bundling those resources into capabilities, and leveraging the capabilities to realize competitive advantage (Helfat et al., 2007; Sirmon et al.2007) in a service ecosystem. This article also explains how resources are managed or orchestrated for different strategies and in different stages of a service ecosystem's life cycle. The findings provide midrange frameworks and concepts to S-D logic theory.

5.2 Managerial Implication

The findings from the comparison of the resources structuring, bundling, and leveraging in four development stages of a smart city ecosystems can also serve as helpful reference for smart city policymakers to make decisions more correctly and precisely.

6. LIMITATION AND IMPLIMENTATION FOR FUTURE STUDIES

As the service-dominant (S-D) logic, with particular emphasis on the co-creation of value and the resulting service ecosystems, has become a main research stream, it shows a need for mid-range researches to make contributions by exploring and experimenting with under-addressed problems in existing literature.

The objective of this research is to add richness to the S-D logic by explaining how actors in a service ecosystem are coordinated and orchestrated to participate in resource integration. Due to time and data constraints, only one case study has been conducted. Future studies can extend multi cases comparisons of different service ecosystems.

Future studies might also consider to analyses how resource orchestration differs in each life cycle stage. For example, given that the resources available to a service ecosystem in the start-up stage can differ from resources available to the mature phase, there is a need for researches to understand how actors orchestrate the transition from one portfolio to a different but more useful portfolio. It will help develop a deeper understanding on orchestrating behavior in a service ecosystem.

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