

Value Creation through Novel Resource Configurations in a Digitally Enabled World

Raphael Amit¹ and Xu Han^{2*}

¹Management Department, The Wharton School, University of Pennsylvania, Philadelphia, Pennsylvania

²Management Department, School of Business, The College of New Jersey, Ewing, New Jersey

Research summary: We propose a conceptual framework for examining the value-creation potential embedded into novel, digitally powered resource configurations. We suggest that business digitization calls for firms to adopt a system-based, value-creation-centric perspective for designing and organizing their resource configurations. Our conceptualization of a firm's resource configuration decisions centers on organizing access to resources controlled by value cocreators. We discuss resource configuration prototypes, value-creation sources, and the underlying resource configuration processes enabled by digitization. Our study contributes to the literature on strategic entrepreneurship by incorporating the ramifications of digitization into the theory on firms' resource configuration and its underlying processes to enable strategic entrepreneurship.

Managerial summary: Digitization has profoundly reshaped the way business opportunities are discovered and exploited. In this article, we suggest that digitization expands the scope of resources firm could utilize while requiring firms to take a holistic approach in considering the resources and addressing the needs of all customers and partners (e.g., resource providers). We highlight the importance of such a holistic approach to enhancing the value creation potential in the digital age for entrepreneurs and managers. In addition, we propose novel ways to connect resources with needs of customers and partners (e.g., enabling transactions and providing bridges) as well as the actionable microprocesses that undergird and enable these novel connections in a digitally enabled world. Copyright © 2017 Strategic Management Society.

The resource configuration of a firm depicts the ways in which it orchestrates and connects the resources it utilizes (Sirmon, Hitt, & Ireland, 2007; Sirmon, Hitt, Ireland, & Gilbert, 2011). The rapidly increasing trend of digitizing companies has reshaped the ways in which firms do business (Weill & Woerner, 2013) and is fostering strategic entrepreneurship by enabling entrepreneurs and managers alike to create

novel configurations of resources and, thereby, enhance their value (Hitt, Ireland, Sirmon, & Trahms, 2011). The substantial advances in computing and communication technologies have expanded firms' reach to resources and enhanced the effectiveness at which resources are exchanged, combined, and integrated. These developments have laid the foundations for the rise of the "born-on-the-cloud" innovators (e.g., Uber, Airbnb) and the sharing economy. Also, the power of individual customers has been elevated as a result of the proliferation of product and service information from digitally enabled platforms (e.g., Groupon) and social interaction (e.g., Facebook, Twitter), which allow exhaustive

Keywords: value creation; resource configuration; digitization; strategic entrepreneurship; organizational design

*Correspondence to: Xu Han, Management, School of Business Building, Room 114, The College of New Jersey, 2000 Pennington Rd, Ewing Township, NJ 08628. E-mail: hanx@tcnj.edu

comparisons of products/services and collective bargaining by customers. Moreover, the potential of individual customers as contributors of value-creating resources (e.g., data) has been unlocked by digitally enabled devices (e.g., mobile phones, wearables, and Internet of Things) and technologies (e.g., big data analytics, image recognition, machine learning, and artificial intelligence). These developments have enhanced the scope and type of resources that the firm can access and utilize which, in turn, can lead to conceiving of and designing novel resource configurations (Afuah & Tucci, 2000; Amit & Zott, 2001).

The profound ramifications of digitization have yet to be incorporated in conceptualizing how firms conceive of, design, and organize their resource configurations. In particular, the extant literatures mostly conceptualize the resource configuration decisions of firms based on the implicit premise of the distinct roles of the focal firm, its partners as resource providers, and its customers as the locus of value creation (Priem, Butler, & Li, 2013). The role of customers as potential resource providers (Shah & Tripsas, 2007) and the role of a focal firm's partners as potential loci of value creation (Afuah, 2000; Chatain, 2011) have received only sparse attention. Indeed, researchers have suggested a shift from a product-based logic to a service-based logic of value creation as a result of digitally enabled information access and networking opportunities, and they have emphasized further the growing importance of customers as "value cocreators" for firms (Prahalad & Ramaswamy, 2004; Vargo & Lusch, 2004). Moreover, recent developments in the strategy and organizational design literatures have increasingly recognized the digitally enabled/enhanced interdependence among firms in value creation and innovation, suggesting a system-based approach toward firms and their value creation (Iansiti & Levien, 2004; Zott & Amit, 2010). In particular, such a system-based approach has explicitly considered the value creation for firms that are either transaction partners in a focal firm's business model (Amit & Zott, 2001, 2015) or parts of the "ecosystem" that enable the focal firms' value creation (Adner, 2006; Adner & Kapoor, 2010). However, these insights have yet to be incorporated into a conceptualization of the value-creation potential that is embedded into the resource configuration of a firm, which undergirds

its strategy, business model, and organization (Sirmon et al., 2007; Zott & Amit, 2007).

In this article, we attempt to address these gaps by asking how firms create value through resource configurations in a digitally enabled world. Building on recent developments in the received research on resource orchestration (Sirmon et al., 2011) and the system-based approach on firms' value creation (Adner & Kapoor, 2016; Lusch, Sagarin, & Tang, 2016; Zott & Amit, 2015; Zott, Amit, & Massa, 2011), we propose a new conceptualization of a firm's resource configuration decisions and the resulting value creation in a digitally enabled world. We suggest that the digitization of businesses calls for firms to conceive of and design their resource configurations based on a system view and value-creation-centric perspective. In particular, this perspective views every potential value-creating participant as both a potential locus of value creation as well as a resource provider. It would help firms reimagine the locus of their value creation and the boundary of value-creating resources they could utilize which, in turn, would enable the design of innovative resource configurations. Hence, it calls for the examination into novel and innovative resource configuration prototypes as well as the associated resource configuration processes that have been largely enabled or empowered by digitization.

There are several contributions we attempt in the paper: First, we incorporate the far-reaching ramifications of digitization as well as recent theoretical developments in organizational design literature into the theory on firms' resource configurations by proposing a new conceptualization that centers on the digital age. Second, we complement the existing firm-based and value-capture-centric perspective on firms' resource configurations with a system-based and value-creation-centric perspective. Third, we illustrate distinct ways to create value with digitally enabled prototypes of resource configuration. In particular, we draw on the received resource orchestration framework and develop a number of digitally enabled resource configuration processes to extend the existing framework to the digital age. Finally, we suggest that value creation enabled by digitally powered resource configuration is centered on organizing access to resources that are owned by a range of value cocreators. Organizing resources is an element of modern organizational design and a manifestation of strategic entrepreneurship (Hitt, Ireland, Camp, & Sexton, 2001; Hitt et al., 2011).

The article proceeds as follows: We first review literatures on resource configuration and recent developments in the literature on organizational design (e.g., business model design) to highlight the importance of advancing theories on resource configuration in a digitally enabled world. We then propose a new conceptualization of a firm's resource configuration decisions and illustrate it with some resource configuration prototypes. We proceed to discuss the impact of digitally enabled resource configuration on value creation. We conclude with a discussion of the implication of our conceptualization and directions for future studies.

Resource Configuration and Value Creation

In the recent decades, we have witnessed a shift of scholarly interest from examining the characteristics of a firm's resources as the source of its competitive advantage (Amit & Schoemaker, 1993; Barney, 1991; Peteraf, 1993) to understanding the managerial actions through which firms could configure and manage their resources to gain competitive advantage (Gruber, Heinemann, Brettel, & Hungeling, 2010; Sirmon et al., 2007). Indeed, how well a firm could access and orchestrate resources is viewed as core to a firm's dynamic capabilities (Helfat & Peteraf, 2003; Helfat et al., 2007). To create an integrated framework, Sirmon et al. (2011) synthesize resource management (e.g., structuring, bundling, and leveraging) with asset orchestration (e.g., search, selection, configuration, deployment) to develop a framework of resource orchestration, which has provided theoretical anchors for subsequent empirical studies that examine how resources could be managed better internally to enhance firm performance (Chadwick, Super, & Kwon, 2015; Chirico, Sirmon, Sciascia, & Mazzola, 2011; Ndofor, Sirmon, & He, 2015).

Deeply rooted in received literatures on the resource-based view (RBV) and dynamic capability (Barney, 1991; Teece, Pisano, & Shuen, 1997), the resource orchestration framework provides guidance on how the focal firm could gain a competitive advantage and capture value through its resource configuration (Hitt et al., 2011; Sirmon & Hitt, 2009). We build on this conceptualization to address the ways in which value is created for a focal firm's partners and customers in a digitally enhanced

environment. Indeed, strategy scholars have noted the importance of first considering a focal firm's total value creation for all of its value-creation partners (e.g., customers, suppliers) in conceiving a focal firm's strategies (Brandenburger & Stuart, 1996; Makadok, 2003).

Priem et al. (2013) suggest that the new world of the "consumer internet" calls for a more balanced view on value creation and value capture of firms. Indeed, the elevated customer power in the digital age results in an increasing amount of scholarly attention shifting to the value-creation potential of firms as well as the heterogeneity of demands (rather than resources) as sources of firms' value creation (Adner & Kapoor, 2010; Priem, 2007; Ye, Priem, & Alshwer, 2012). Moreover, the digitization of businesses has substantially reduced information asymmetry and frictions in markets and enhanced the transparency among partners; these things have greatly increased the efficiency and effectiveness at which resources are exchanged, combined, and integrated (Barua, Konana, Whinston, & Yin, 2004). Hence, it encourages firms to pay more attention to cocreating value with their partners. Importantly, digitization has expanded the scope of resources that are accessible to firms and, therefore, allows them to conceive of and design novel configuration of resources which, in turn, enables value creation with a broader range of partners, including their customers (Amit & Zott, 2012; Prahalad & Ramaswamy, 2004).

Recent developments in the strategy and organizational design literatures have begun to highlight the ramifications of digitization in the design of a business model that centers on value creation (Amit & Zott, 2001, 2015; Zott et al., 2011). Increasingly, scholars emphasize the importance of adopting a system-based view and focusing more on the value creation enabled by the focal firm (Adner & Kapoor, 2010; Zott & Amit, 2010; Zott et al., 2011). Distinct from a firm-based perspective, the system-based view is characterized by considering explicitly the value propositions for all value-creation participants, rather than only those for the customers when designing a system (Amit & Zott, 2015). Thus, it acknowledges the potential multiple loci of value creation enabled by a focal firm in a system in which the focal firm is embedded. Such a system-based view draws on the ecosystem perspective by recognizing the important role of complementary resource providers in a focal

firm's ecosystem in determining its value creation or innovation outcome (Adner & Kapoor, 2010). We note, however, that the system-based view centers on resources in the focal firm's ecosystem that are directly embedded into the focal firm's resource configuration, while the ecosystem perspective encompasses a much broader set of resources, some of which may be indirectly related to the focal firm or not currently related at all. The system-based view also highlights the value drivers that enable value creation (e.g., novelty, complementarity) and also value capture (e.g., lock-in) (Amit & Zott, 2001). Such a balanced view is in line with the strategic entrepreneurship perspective, which advocates a firm's simultaneous pursuit of opportunity seeking (value creation) and advantage seeking (value capture) (Hitt et al., 2001, 2011).

Built on design thinking (Beckman & Barry, 2007; Boland & Collopy, 2004; Brown, 2008, 2009), Zott and Amit (2015) propose a process model that centers on how a business model could be designed to create value. Specifically, the process model consists of five stages in which value could be created by observing, synthesizing, generating, refining, and implementing a system of interdependent activities with other value-creation participants. While scholars have suggested the importance of resources in enabling and undergirding business models in value creation (Johnson, Christensen, & Kagermann, 2008; Zott & Amit, 2007), these insights about the process of designing a value-creating business model have not yet been incorporated in examining value creation through resource configuration.

We suggest that these theoretical developments in the strategy and organizational design literatures represent a system-based, value-creation-centric approach, which complements the firm-based and value-capture-centric approach in the extant literature on resource configuration (Sirmon et al., 2011; Zott et al., 2011). Hence, drawing on these new insights is conducive in advancing our understanding about how resources could be configured to create value in a digital age. In particular, the digital age enables firms to create and manage more complicated systems of activities as well as the resources that undergird the activities (Weill & Woerner, 2013). Thus, it is imperative to take a system-based view to understand how the systems of resources are formed and managed. Also, the digital age has significantly empowered Metcalfe's law

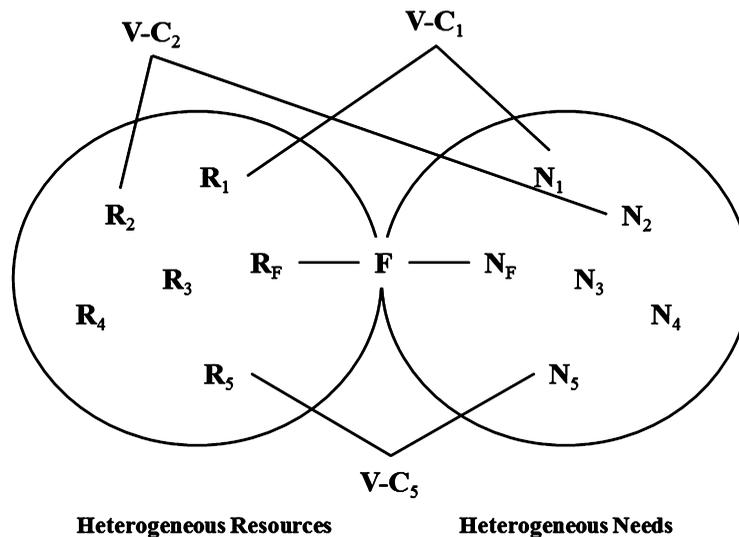
(e.g., the network effect) in driving customer acquisition and business model design strategies (Amit & Zott, 2012). As evidenced by the proliferation of "freemium" models, firms have increasingly prioritized their value-creation strategies for customers and partners over their value-capture strategies in order to gain first mover advantage, which is difficult to dislodge in the digital age. Thus, it calls for more attention to the aspects of a resource configuration that could accommodate and unleash the value-creation strategies.

Conceptual Framework

Drawing on the system-based and value-creation-centric approach, we first conceptualize the setting in which a focal firm's resource configuration decisions are made. A novel strategy boundary model is proposed by Priem et al. (2013), in which they integrate the RBV and the demand-side view and conceptualize the playing field for managers' strategic decisions as a system consisting of "heterogeneous raw materials" and "households" heterogeneous assortments."

Building on Priem et al. (2013), we propose a new conceptualization of a firm's resource configuration decision in a digitally enabled world. In particular, we suggest that in a digital age, every value-creation participant who is involved in the value-creation process, which we term a "value cocreator" (Vargo & Lusch, 2004), has dual identities: the resource provider and the value beneficiary. For instance, while individual customers are viewed mostly as only the beneficiaries of the value created by firms, they have also long been recognized as the providers of resources, such as money (e.g., customers' actual contribution to firms' revenue or their potential purchasing power) (Christensen & Bower, 1995), insights about product innovation (von Hippel, 1976), and customer data (Lengnick-Hall, 1996). The value-creation process is thus the process by which valuable resources of any and all value cocreators are deployed and utilized to address one or more needs of any and all value cocreators.

Figure 1 illustrates our conceptualization of the setting in which firms make resource configuration decisions to create value. The left circle of Figure 1 depicts heterogeneous resources of potential value cocreators and the diameter of the left circle depicts that boundary of resources that the focal firm could



Legend: **F**: Focal Firm; **N**: Need; **R**: Resources; **V-C**: Value Cocreator; **Subscript**: ID of Value Cocreator

Figure 1. The conceptualization of the setting for a firm's resource configuration decisions.

access either physically or virtually. The potential value cocreators' needs are shown in the right circle. Every resource and need is associated with a potential value cocreator (e.g., N₁ and R₁ are associated with V-C₁).¹ For instance, assuming that V-C₁ is a customer of Google, N₁ could be the customer's need for online search services and R₁ could be the customer's data or advertisement eyeballs. The resource configuration decision of a focal firm is, thus, to create a structure that connects and orchestrates a selected group of value cocreators (including the focal firm, customers, and others).

The conceptualization represents a simple yet inclusive way to conceive of a firm's resource configuration decision in the digital age, as digitization enables firms to expand both the scope of resources they could access and utilize, as well as the needs they could address (e.g., the diameter of circles on both sides of Figure 1 are expanded). We suggest that value can also be created with digitally enabled, novel resource configurations, which imply heterogeneous resource inputs being accessed and utilized in novel ways and being transformed into distinct product/service outputs even though they address similar needs. Taking the car rental company Zipcar and the ride hailing company Uber as examples, both companies address the transportation needs of individuals in

metropolitan cities. However, the resource configuration of Zipcar involves obtaining cars from car leasing companies and renting cars to individuals on an hourly or daily basis, while the resource configuration of Uber involves connecting passengers with individual drivers who provide a taxi-like transportation service. In particular, the resource inputs Zipcar utilizes to create value for its users include cars from car leasing companies, parking lots, and insurance plans, while the resource inputs Uber utilizes include (but are not limited to) cars, time, and individuals' driving skills. Moreover, while both resource configurations address similar customer needs, different value cocreators (e.g., resource controllers) are engaged in enabling the resource configurations. Building on the received literature (Sirmon et al., 2011) and our conceptualization as illustrated by the preceding example, we suggest that a resource configuration of a focal firm reflects its decisions on what resources to utilize; what needs are addressed with the resources; and how resources are accessed, connected, and coordinated to address the perceived needs.

As noted, the implications of digitization can be depicted as the expansion of the diameter of both circles in Figure 1. On the resource side, digitization enables the effective commercialization of underutilized resources controlled by individuals and firms alike (e.g., time, vehicles, space, and inventory) and allows the generation of new resources (e.g., data). On the need side, customers have been cultivated to

¹ R_i and N_i may each denote a vector of a set of resources and the associated needs.

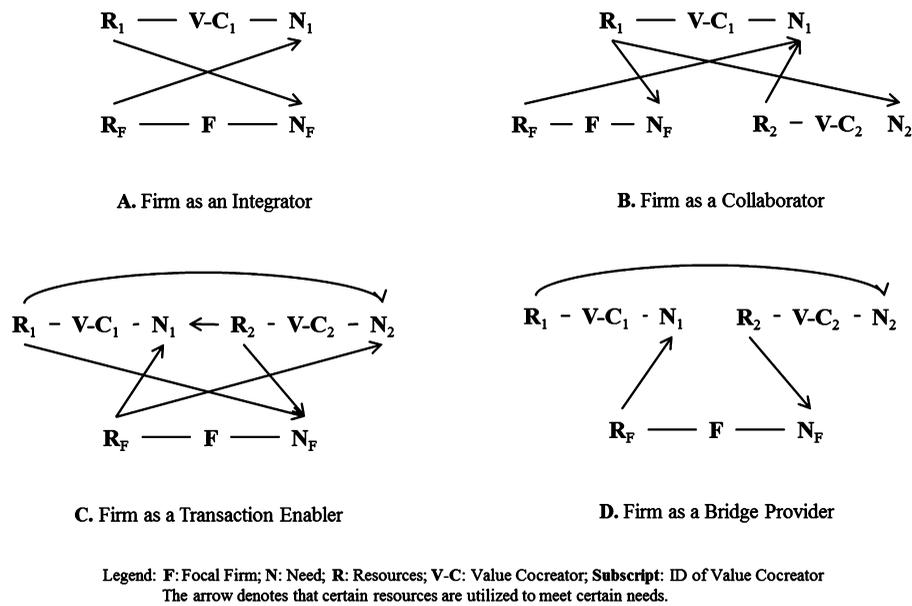


Figure 2. Resource configuration prototypes.

be “digital natives” and increasingly expect digitally enabled product features (e.g., internet, social) and service experience (e.g., real-time delivery). Accordingly, firms have increasingly valued online channels as means to market their products/services and engage with their customers and partners. The Internet of Things is commonly interpreted to imply giving a digital makeover—such as computerizing and connecting to the internet—to all sorts of physical things, including appliances, clothing, watches, cars, jet engines, factory equipment, and more.² Emerging technologies such as artificial intelligence (e.g., IBM’s Watson) will enable reimagining of physical systems functionalities in health care, transportation, energy, and other sectors in ways that were not feasible before and, thereby, create new needs for stakeholders. In other words, the expansion of both accessible resources and addressable needs has increased significantly the variety of possible resource configurations a firm could design and enable in a digital age.

Figure 2 shows some distinct prototypes of resource configurations based on our conceptualization in order to illustrate the differences in resource

configurations as well as the distinct roles of the focal firm. Prototype A illustrates the simplest resource configuration, in which the focal firm transforms the resources (R_F) to address the demand (N_1) and, as an exchange, the customers contribute to the revenue of the focal firm (N_F) with their resources (e.g., money) (R_1). Prototype B illustrates a resource configuration in which the focal firm collaborates with a partner ($V-C_2$) to address the demand (N_1). In particular, the resources that are utilized to address the demand (e.g., R_F and R_2) are not integrated inside the focal firm but are contributed separately by the focal firm and its partner(s). In this case, the partner is a “complementor” in the ecosystem of the focal firm (Adner & Kapoor, 2010) rather than its direct resource provider. The role of the focal firm is not an integrator (or a transformer) as in Prototype A, but a collaborator who discovers and engages other firms (e.g., $V-C_2$) to create value together for customers (e.g., $V-C_1$). Also, the customers contribute to the revenue of both the focal firm and its partner (N_F and N_2) with their resources (e.g., money) (R_1).

Prototype C illustrates the resource configuration in a firm-enabled two-sided market, which has been increasingly adopted by firms in the digital age (Eisenmann, Parker, & Van Alstyne, 2006; Rysman, 2009). Simply put, a firm contributes resources (R_F) to facilitate or enable transactions between two groups of value cocreators whose needs (e.g., N_1 and

² According to the market research firm Gartner, there were 6.4 billion Internet of Things devices in the world in 2016. By 2020, Gartner projects there will be 20.8 billion Internet of Things devices in use (Lohr, 2016).

N_2) can be addressed by the other group's resources (e.g., R_2 and R_1). One example is Lending Club, a debt-based crowdfunding online platform, in which individual lenders provide capital to meet the needs of individual borrowers while individual borrowers pay premium interest to address the return on capital desired by the lenders. The distinct role of the focal firm as the enabler in this prototype is determined by how its resources are deployed. For instance, in the case of Lending Club, its technologies and human capital are utilized to facilitate transactions (e.g., through effective matching) between the two groups of value cocreators rather than directly addressing the needs (e.g., capital need) that resources of other value cocreators (e.g., capital) address.

Prototype D illustrates the resource configuration in a firm-bridged two-sided market. Distinct from the role of the focal firm as a transaction enabler in Prototype C, the focal firm is a bridge provider in Prototype D. As Figure 2d shows, the focal firm uses its resources (R_F) to address the need of one group of value cocreators (N_1). The focal firm further enables the utilization of the resources controlled by that group of value cocreators (R_1) to address needs of another group of value cocreators (N_2) and gets revenue (N_F) from the latter group of value cocreators (R_2). One example is Google's ad-sponsored search engine, in which consumers enjoy the search engine developed by Google for free. Google (F) in turn enables advertisers ($V-C_2$) to leverage the search by consumers ($V-C_1$) to market their products and services, and advertisers pay Google for the marketing. Whether the advertisements add value to customers is arguable and varies with the specific scenarios; for example, Google ads might serve the users' needs for information, yet Spotify's ads during its free music service undermine the users' experience. A major distinction of Prototype D versus Prototype C is that the needs of the focal firm are often satisfied only with the resources from one side of the market (e.g., R_1 is not utilized to satisfy N_F directly). It is possible that a bridge provider (Prototype D) might morph into a transaction enabler (Prototype C) once the focal firm starts to exploit resources on both sides of the market.

Indeed, Prototypes C and D have been largely enabled by the rapid expansion of both circles in Figure 1 as a result of digitization. In particular, firms' broader and easier access to resources in the digital age allows them to build two-sided markets

(e.g., Prototype C) much faster than before. Moreover, the increasing variety of digitally associated needs and virtual resources (e.g., data), together with the unprecedented rate of customer acquisition enabled by digital means, significantly enhance the potential for firms to bridge a novel set of value cocreators (e.g., Prototype D) that have not been connected before. Both of them have increasingly been embraced by companies, especially start-up companies, in the digital age.

Resource Configuration as a Source of Value Creation in a Digitally Enabled World

Building on the system-based and value-creation-centric conceptualization, we explore sources of value creation that may be supported by novel resource configuration in a digitally enabled world. We note that the resource configuration Prototype A in Figure 2, in which the focal firm transforms resources to create value for customers, has been the predominant type of resource configuration for traditional "brick and mortar" firms (e.g., manufacturers) and, hence, has also been addressed by the received theories on resource configuration (Sirmon et al., 2007). Also, the importance of resource configuration Prototype B, in which firms collaborate with partners who own complementary resources, as a value-creating resource configuration has been increasingly recognized by the received literatures on alliances (Lavie, 2007; Wassmer & Dussauge, 2011) and business ecosystems (Adner & Kapoor, 2010; Ceccagnoli, Forman, Huang, & DJ, 2012). Since Prototypes C and D have been adopted by more and more firms in the digital age, particularly the "born-on-the-cloud" start-up companies (e.g., Uber, Airbnb, Snapchat), and have proven to be successful in value creation,³ we focus on these two prototypes (*i.e.*, C & D) to discuss the sources of value creation in a digitally enabled world.

Identifying New Needs and Resources

The identification of new needs enabled by emerging digital technologies can be achieved through a combination of several processes that are high-

³ Among the five highest-valued private companies in United States, Uber and Airbnb are based mainly on Prototype C, and Snapchat is based mainly on Prototype D.

lighted in the received literature; these include *observing* and *synthesizing* the needs of customers and partners (Zott & Amit, 2015), *identifying* the owners of resources, and *selecting* the resources to be utilized (Helfat et al., 2007). Value is created for all value cocreators when new needs, which have not been addressed before, are added or underutilized resources are used in a more effective manner in the resource configuration. For instance, Zappos, the online shoe store, was started as a result of the founder's identification of individuals' unmet needs to compare and buy shoes through the internet, as well as the underutilized inventory of shoe stores. Instacart, the online grocery shopping platform, was started as a result of the founders' identification of the unmet need of working urban residents to save time on grocery shopping as well as the underutilized time and labor of other urban residents (e.g., those who are unemployed). We observe that the importance of identifying unmet needs and underutilized resources in value creation is elevated by digitization, as it has created new needs (which were nonexistent) and expanded firms' reach to underutilized resources (which were inaccessible).

We further suggest that there are two digitally empowered value-creation processes that facilitate the identification of new needs and underutilized resources. The first process is continuous testing, in which firms calibrate their offerings (e.g., products or services) to the unmet and changing needs of their value cocreators (e.g., customers or partners) through testing and modifying/pivoting its offerings with their value cocreators (Vargo & Lusch, 2004). This process is characterized by the fast feedback loop between a focal firm and its value cocreators and the continuous enhancements of the focal firm's offerings (Ries, 2011). It is particularly important when firms take a discovery-driven planning approach to uncover unmet needs (McGrath & MacMillan, 1995). The digitization has largely enabled this process by increasing the number of channels (e.g., APPs or websites) to conduct the testing and easing the collection, analysis, and interpretation of the data (e.g., A/B testing). We suggest that in a digital age, iterative testing enhances the efficiency and effectiveness at which new unmet needs are discovered and, hence, enhances the value-creation potential of resource configurations. Thus, we propose:

Proposition 1a: Continuous testing facilitates the focal firm's identification of new unmet needs of potential value cocreators and enhances the value creation of a focal firm's resource configuration in a digitally enabled world.

The second process is resource crowdsourcing. Afuah and Tucci (2012) have highlighted the importance of crowdsourcing as a problem-solving mechanism in certain circumstances (e.g., when the crowd is large, with some members of the crowd motivated and knowledgeable enough to self-select and solve problems). Building on their insights, we suggest that crowdsourcing might also be a mechanism through which a focal firm discovers and accesses underutilized resources at a large scale. In particular, resource crowdsourcing is characterized by a focal firm amassing a small amount of underutilized resources from a large group of resource providers and is more important when underutilized resources are scattered (or widely distributed) in a large group of value cocreators. For instance, the premise of the sharing economy (e.g., Uber and Airbnb) includes the existence of sufficient underutilized resources as well as individuals' motivation yet incapacity to monetize their underutilized resources (e.g., time or space) on their own. The process of crowdsourcing could quickly amass resources to reach a scale that enables a two-sided marketplace and allows the resource controllers to benefit from the economies of scale, which is often available only for large firms. As digitization has significantly broadened a focal firm's reach to resources and reduced the transaction cost of accessing resources, crowdsourcing is increasingly becoming an important means to discover and acquire underutilized resources. Hence, we propose:

Proposition 1b: Resource crowdsourcing facilitates the focal firm's identification of new underutilized resources of potential value cocreators and enhances the value creation of a focal firm's resource configuration in a digitally enabled world.

Matching Needs with Resources

One profound change in the digital age is the significant decrease in transaction costs due to the

proliferation of information and enhanced transparency. As a result, the roles of traditional intermediaries (e.g., agents) have been reduced and replaced by a new generation of firms that focus on their roles as “enablers” of transactions. In particular, instead of leveraging their information advantage to arbitrage between upstream resources owners and downstream customers, the enablers often directly connect upstream resources with downstream customers (e.g., Prototype C) and leverage their information advantage to facilitate transactions. One such strategy is to enable more efficient and effective matching of transaction parties.

One source of value creation that is depicted by Prototype C is the increased efficiency and effectiveness at which needs are matched with resources. Note that the matching is a two-way process. Taking Lending Club (assuming it is F in Prototype C) as an example, the availability of capital and interest rate required by the lender (R_1) need to meet the demands of the borrower (N_2). Also, the credibility of the borrower and the capacity to return the principal and the interest (R_2) also need to meet the risk and return profile of the lender (N_1). The information and algorithm that Lending Club contributes (R_f) is to locate borrowers and lenders and to enable the match between them more efficiently and effectively. The matching of new needs and resources requires the focal firm to “generate” activities to collect information and categorize transaction partners (Zott & Amit, 2015). It might also require the focal firm to acquire, accumulate (“structure”), and enrich (“bundle”) its resources (e.g., acquire and accumulate data, develop matching algorithm and strategies) (Sirmon et al., 2007). Value is created for all value cocreators when new transactions are enabled through matching and/or the efficiency and effectiveness at which the matching is conducted are enhanced.

We suggest that there are two processes that are critical in matching needs with resources in a digital age. The first is the process of sorting, in which firms develop methods and strategies to categorize both needs and resources so they can be matched in a more efficient and effective manner. For instance, Lending Club develops algorithms to categorize borrowers based on their profile information and, thereby, makes it easier for lenders to select borrowers and price their loans. AngelList, an equity-based crowdfunding online platform,

enables syndication between “star” angel investors and other investors on the platform to alleviate the information asymmetry concerns of other investors and, thereby, facilitate the matching of angel investors with start-up companies. This process is characterized by the focal firm developing and refining the categorization of needs based on different value propositions (e.g., convenience and price) and the categorization of resources based on their (and their owners’) characteristics (e.g., quality and return expectation). This process is particularly important when the markets for needs and resources are very “fragmented.” The digitization has largely empowered this process by enabling the collection and synthetization of more data, as well as more refined and accurate categorizations. Such categorizations could further simplify and accelerate the matching process and enhance the efficiency and effectiveness at which value is created. Hence, we propose:

Proposition 2a: Sorting increases the efficiency and effectiveness in matching unmet needs with underutilized resources of potential value cocreators and enhances the value creation of a focal firm’s resource configuration in a digitally enabled world.

The second process that facilitates the matching of needs with resources is prospecting. It is a process in which the focal firm predicts the needs for certain resources as well as resource controllers’ expectations so that it can *proactively* match them through selective advertising or making recommendations. Entrepreneurship scholars have noted that prospecting activities reflect the proactivity in individuals’ entrepreneurial orientations, which could be a source of value creation (Lumpkin & Dess, 1996). Drawing on their insights, we suggest that such a process could also be a source of value creation at the organizational level. In particular, the prospecting process is characterized by a focal firm analyzing both the needs and resources of its value cocreators based on historical or current data and prioritizing the *most relevant* information when disseminating them to value cocreators. The relevance of the information is determined by its likelihood of leading to a transaction or effective matching. This process is particularly important when value cocreators are overwhelmed by information or have latent needs to be uncovered. For instance, many

online shopping marketplaces (e.g., Amazon or eBay) make recommendations based on customers' purchase history. Online marketplaces for restaurants or food delivery services (e.g., OpenTable or Caviar) promote information about the trending restaurants or dishes, which influences customers' purchase decisions. The capability of firms to conduct prospecting has been largely elevated by big-data analytics and increased computing power made possible by digitization. Such a process not only increases the efficiency at which current needs meet resources, but also may unveil needs that are latent. Hence, it enhances the effectiveness at which existing resources are utilized and unlocks their value-creation potential. Therefore, we propose:

Proposition 2b: Prospecting increases efficiency and effectiveness in matching unmet needs with underutilized resources of potential value cocreators and enhances the value creation of a focal firm's resource configuration in a digitally enabled world.

Bridging Needs and Resources

As noted, digitization has elevated the role of customers as both the locus of value creation and as resource providers. Increasingly, firms in the digital age prioritize value creation for customers in the early stage of their development to establish their first-mover advantage, which is often difficult to dislodge due to network effects and gradually bring in other value cocreators to balance the value equation. Prototype D illustrates one scenario of this customer-centric resource configuration, in which the focal firm uses its resources (R_f) to address needs of customers (N_1) for free. Nevertheless, the focal firm brings in another value cocreator ($V-C_2$) whose needs could be addressed by customers' resources (R_1). The value cocreator ($V-C_2$) pays its resources (R_2) to the focal firm for the focal firm's complementary resources (R_f) that enable the use of customers' resources (R_1).

In Prototype D, the focal firm provides the bridge that "intermediates" two groups of value cocreators; however, unlike traditional intermediaries, who leverage their information advantage mostly to capture value, the focal firm in Prototype

D creates value through digitally enabled novel combination of value cocreators. Prototype D has become increasingly prevalent since being pioneered by Google. For instance, Square Inc. (F) started by providing retail stores ($V-C_1$) with free payment processing machines to help them with their credit card processing (N_1). However, the company later brought in finance providers (e.g., institutional investors) ($V-C_2$) who would like to pay for (R_2) the access to information (R_1) about Square's retail store clients in order to provide cash advance services (N_2). Another example is Pinterest (F), which started as a visual bookmarking tool to address individuals' ($V-C_1$) needs to save and post pictures online (N_1). Yet, the company later brought in fashion brands ($V-C_2$) that would like to pay for (R_2) the views of users (R_1 and R_f), as the brands' marketing could be more effective through pictures (N_2). To bridge two groups of value cocreators, it undoubtedly requires the insights of the focal firms in discovering the needs and resources of customers ($V-C_1$) in the first place; however, what is equally important is bringing other value cocreators (e.g., $V-C_2$) into the process of *refining* and *implementing* the initial resource configuration (Zott & Amit, 2015). Moreover, the bridging role also requires the focal firms to coordinate the resources and activities of all value cocreators (Helfat et al., 2007). Value is created for all value cocreators when new value cocreators with distinct yet complementary resources and needs are added into the configuration and the overall complementarity of the resource configuration is enhanced.

We suggest that there are two processes that are critical in bridging needs and resources in a digital age. The first is the process of grafting. It is a process in which a focal firm experiments with new combinations of heretofore unconnected (or less connected) resources and needs. For instance, Square has been experimenting with connecting its retail store clients with many other value cocreators that have not had effective connections with retail stores. Such value cocreators include, but are not limited to, financial service providers (e.g., credit report services), business service providers (e.g., tax service), and logistics service providers (e.g., on-demand delivery service). The objective of the grafting is to identify unique complementarity between resources and needs and enhance the value creation of the resource configuration.

Distinct from a typical problem-solving process, the grafting process often starts with resources at hand and searches for needs of new value cocreators that enable firms to leverage the resources to create more value (Hitt et al., 2011). The process involves a lot of creativity and serendipity, and it is particularly important when firms have the capabilities to access resources at a faster pace and at a larger scale. The digitization empowers firms with that capability through allowing firms to reach resource controllers (e.g., customers) at an unprecedented pace and to experiment with new combinations of resources and needs with minimum costs (Ries, 2011). The unique complementarity a focal firm identifies and realizes leads to value creation for all value cocreators. Hence, we propose:

Proposition 3a: Grafting enables the creation of the unique complementarity among the value cocreators that the focal firm bridges and enhances the value creation of a focal firm's resource configuration in a digitally enabled world.

The second process that enables a firm to bridge needs and resources is streamlining. It is the process in which the focal firm provides or connects additional resources to enable or enrich the unique and novel complementarity they create through bridging needs and resources. For instance, Pinterest identifies the unique complementarity between its fashion-chasing users and the fashion brands, who commit substantial resources to attract and engage with such prospective customers. While the fashion brands might have the resources (e.g., image of their fashion goods) that Pinterest's fashion-chasing users need, their current marketing channels (e.g., exclusive shops) do not allow them to reach these customers effectively. Pinterest enriches the marketing of fashion brands through collecting trending and customer preference information, which enables more targeted and effective image-based marketing. Moreover, Pinterest connects image data analytics and data solution companies to facilitate customers' purchase of fashion brands through images. The streamlining process reduces the incompatibilities and uncertainties as a result of the unique and novel complementarity the bridging process creates. The mitigation of the uncertainties and incompatibility is critical in

realizing the full value-creation potential of the firm's resource configuration. The digitization has largely enabled the streamlining process by increasing the variety of digitally enabled resources (e.g., data in multiple digital formats), which could be utilized to complement existing resources and address the incompatibility issue. These digitally enabled resources indeed enable the creation or enrichment of the unique complementarity between resource bundles and unmet needs that a firm bridges. Hence, we propose:

Proposition 3b: Streamlining enables the unique and novel complementarity among the value cocreators that the focal firm bridges and enhances the value creation of a focal firm's resource configuration in a digitally enabled world.

Conclusion

The digitization of businesses allows entrepreneurs and managers alike to reimagine the boundary of their resource configurations and, thereby, enhance the value-creation potential of resources. Figure 3 summarizes our framework on resource configuration in a digitally enabled world. The framework we propose highlights the importance of adopting a system-based and value-creation-centric perspective that considers the needs and resources of all value cocreators when conceiving of resource configuration. The resource-configuration prototypes illustrate distinct means of value creation, which are enabled by the digitization of businesses. Building on these prototypes as well as on the received literatures on resource orchestration (Sirmon et al., 2011) and business-model design (Zott & Amit, 2015), we discuss distinct sources of value creation (e.g., discovering new needs and resources, matching needs with resources, bridging needs and resources) in the digital era as well as the processes that enable the value creation, which we hope will inspire new value-creation strategies by both scholars and practitioners.

Our framework intends to provide the foundation for conceiving of and designing novel ways to link heterogeneous resources with heterogeneous needs in a digitally enabled world. In line with the business

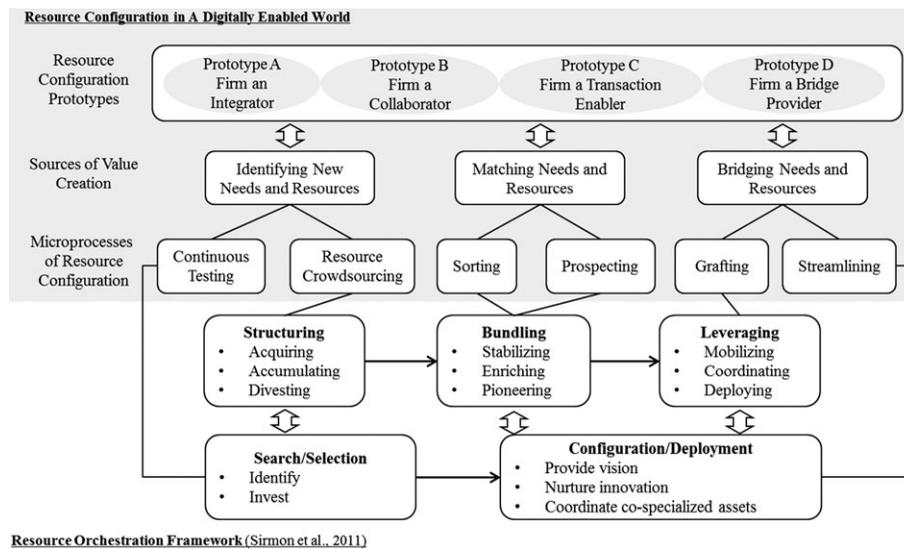


Figure 3. Framework of resource configuration in a digitally enabled world.

model innovation literature (Amit & Zott, 2001, 2012), we suggest that the novelty of a digitally powered resource configuration may come from: (a) the newness of the needs to be met and/or the newness of resources to be more effectively utilized, (b) the innovative ways through which the matching of resources and needs are enabled and more efficiently and effectively managed, and (c) the uniqueness of the complementarity among all value cocreators that the focal firm bridges and involves in the value-creation process. We note that the specific resource configuration prototypes we use illustrate sources of value creation. They are templates (Amit & Zott, 2015) that could be modified, combined, integrated, or even disrupted so that novel resource configuration could arise through “the gales of creative destruction” (Schumpeter, 1934).

We also intend to advance the strategic entrepreneurship literature through introducing digitization as an important contextual element for firms when conceiving of and designing their resource configurations. In particular, building on the extant framework of how strategic entrepreneurship could be achieved through resource orchestration (Hitt et al., 2011), we propose specific microresource configuration processes, which largely have been enabled (e.g., crowdsourcing) or enhanced (e.g., continuous testing) by digitization. In Figure 3, we illustrate how our resource configuration processes link to the processes in the resource orchestration framework. As Figure 3 depicts, we

anchor our process model on the resource orchestration framework (Sirmon et al., 2011) and further crystalize the underlying microprocesses that have been significantly empowered by digitization. In particular, we illustrate how these microprocesses are, on the one hand, rooted in the existing resource orchestration framework, and, on the other hand, linked with distinct digitally enabled ways to create value through resource configuration. We thereby enrich the strategic entrepreneurship literature by highlighting the processes through which existing resources could be exploited to explore new opportunities in the digital age. In addition, our framework also builds linkages among resource configuration prototypes, their sources of value creation, and the underlying resource orchestration processes in the digital age. By incorporating the ramifications of digitization into the existing resource orchestration framework, we extend the framework to a digitally enabled world.

Future studies may advance our conceptualization in several ways. First, while acknowledging the fact that the needs and resources in our framework are representations of a vector of needs and resources, we have not explicitly addressed the heterogeneity of resources and needs that are associated with each value cocreator. In particular, each value cocreator (e.g., a customer) often has multiple needs (e.g., quality, ease of use) and controls multiple types of resources (e.g., money, data, and knowledge). Factoring such heterogeneity into the

conceptualization would make it more complex yet theoretically more interesting and practical. Second, our conceptual framework assumes that there are identifiable needs of value cocreators. In future work, one may consider extending the framework to allow for the creation of new entrepreneurial opportunities. Third, the prototypes we develop are meant to be illustrative rather than exhaustive. Moreover, in practice we often observe variations or combinations of these prototypes. For instance, Pinterest (our example for Prototype D) later brought in another group of value cocreators, which are data analytics companies, to provide their complementary resources (e.g., image recognition and analytics technologies) to help brands better collect customer data and convert picture viewers into buyers. The data analytics companies are collaborators of Pinterest, which transforms its resource configuration to become a combination of Prototypes B and D. Future studies could draw on our prototypes to examine the variations in resource configuration prototypes enabled by digitization and to further understand their implications on value creation. Finally, while we have suggested sources of value creation by distinct, digitally enabled resource configuration prototypes, we have not addressed explicitly the capabilities and processes the focal firm needs in order to exploit these sources of value creation. These and related questions may be addressed in future studies.

Acknowledgements

Both authors contributed equally to this manuscript. The authors gratefully acknowledge the very helpful comments and suggestions of the senior editor and of two anonymous reviewers.

References

- Adner, R. (2006). Match your innovation strategy to your innovation ecosystem. *Harvard Business Review*, 84(4), 98–107.
- Adner, R., & Kapoor, R. (2010). Value creation in innovation ecosystems: How the structure of technological interdependence affects firm performance in new technology generations. *Strategic Management Journal*, 31(3), 306–333.
- Adner, R., & Kapoor, R. (2016). Innovation ecosystems and the pace of substitution: Re-examining technology S-curves. *Strategic Management Journal*, 37(4), 625–648.
- Afuah, A. (2000). How much do your co-opetitors' capabilities matter in the face of technological change? *Strategic Management Journal*, 21(3), 387–404.
- Afuah, A., & Tucci, C. L. (2000). *Internet business models and strategies: Text and cases*. New York, NY: McGraw-Hill Higher Education.
- Afuah, A., & Tucci, C. L. (2012). Crowdsourcing as a solution to distance search. *Academy of Management Review*, 37(3), 355–375.
- Amit, R., & Schoemaker, P. (1993). Strategic assets and organizational rent. *Strategic Management Journal*, 14(1), 33–46.
- Amit, R., & Zott, C. (2001). Value creation in E-business. *Strategic Management Journal*, 22(6-7), 493–520.
- Amit, R., & Zott, C. (2012). Creating value through business model innovation. *MIT Sloan Management Review*, 53(3), 41–49.
- Amit, R., & Zott, C. (2015). Crafting business architecture: The antecedents of business model design. *Strategic Entrepreneurship Journal*, 9(4), 331–350.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17, 99–120.
- Barua, A., Konana, P., Whinston, A., & Yin, F. (2004). An empirical investigation of net-enabled business value. *MIS Quarterly*, 28(4), 585–620.
- Beckman, S. L. S., & Barry, M. (2007). Innovation as a learning process: Embedding design thinking. *California Management Review*, 50(1), 25–56.
- Boland, J. R., & Collopy, F. (2004). *Managing as designing* (). Stanford, CA: Stanford University Press.
- Brandenburger, A. M., & Stuart, H. (1996). Value-based business strategy. *Journal of Economics & Management Strategy*, 5(1), 5–24.
- Brown, T. (2008). Design thinking. *Harvard Business Review*, 86(6), 84–92.
- Brown, T. (2009). *Change by designing: How design thinking transforms organizations and inspires innovation*. New York, NY: Harper Collins.
- Ceccagnoli, M., Forman, C., Huang, P., & DJ, W. (2012). Cocreation of value in a platform ecosystem: The case of Enterprise software. *MIS Quarterly*, 36(1), 263–290.
- Chadwick, C., Super, J. F., & Kwon, K. (2015). Resource orchestration in practice: CEO emphasis on SHRM, commitment-based HR systems, and firm performance. *Strategic Management Journal*, 36(3), 360–376.
- Chatain, O. (2011). Value creation, competition, and performance in buyer-supplier relationships. *Strategic Management Journal*, 32(1), 76–102.
- Chirico, F., Sirmon, D. G., Sciascia, S., & Mazzola, P. (2011). Resource orchestration in family firms: Investigating how entrepreneurial orientation, generational involvement, and participative strategy affect performance. *Strategic Entrepreneurship Journal*, 5(4), 307–326.

- Christensen, C. M., & Bower, J. L. (1995). Customer power, strategic investment, and the failure of leading firms. *Strategic Management Journal*, 17(8), 197–121.
- Eisenmann, T., Parker, G., & Van Alstyne, M. W. (2006). Strategies for two-sided markets. *Harvard Business Review*, 84(10), 92–101.
- Gruber, M., Heinemann, F., Brettel, M., & Hungeling, S. (2010). Configurations of resources and capabilities and their performance implications: An exploratory study on technology ventures. *Strategic Management Journal*, 31(12), 1337–1356.
- Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H., Teece, D., & Winter, S. G. (2007). *Dynamic capabilities: Understanding strategic change in organizations*. Malden, MA: Blackwell.
- Helfat, C. E., & Peteraf, M. A. (2003). The dynamic resource-based view: Capability lifecycles. *Strategic Management Journal*, 24(10), 997–1010.
- Hitt, M. A., Ireland, R. D., Camp, S. M., & Sexton, D. L. (2001). Guest editors' introduction to the special issue strategic entrepreneurship: Entrepreneurial strategies for wealth creation. *Strategic Management Journal*, 22(6–7), 479–491.
- Hitt, M. A., Ireland, R. D., Sirmon, D. G., & Trahms, C. A. (2011). Strategic entrepreneurship: Creating value for individuals, organizations, and society. *Academy of Management Perspectives*, 25(2), 57–76.
- von Hippel, E. (1976). The dominant role of users in the scientific instrument innovation process. *Research Policy*, 5(3), 212–239.
- Iansiti, M., & Levien, R. (2004). Strategy as ecology. *Harvard Business Review*, 82(3), 68–78.
- Johnson, M., Christensen, C., & Kagermann, H. (2008). Reinventing your business model. *Harvard Business Review*, 86, 50–59.
- Lavie, D. (2007). Alliance portfolios and firm performance: A study of value creation and appropriation in the U.S. software industry. *Strategic Management Journal*, 28(12), 1187–1212.
- Lengnick-Hall, C. A. (1996). Customer contributions to quality: A different view of the customer-oriented firm. *Academy of Management Review*, 21(3), 791–824.
- Lohr, S. (2016). Stepping up security for an “Internet-of-Things” world. *The New York Times*, pp. B3.
- Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, 21(1), 135–172.
- Lusch, R. F., Sagarin, R., & Tang, Z. (2016). Commentary—Lessons from nature: Enhancing the adaptable potential of service ecosystems. *Service Science*, 8(1), 85–96.
- Makadok, R. (2003). Doing the right thing and knowing the right thing to do: Why the whole is greater than the sum of the parts. *Strategic Management Journal*, 24(10), 1043–1055.
- McGrath, R., & MacMillan, I. (1995). Discovery driven planning. *Harvard Business Review*, 73(4), 44–54.
- Ndofor, H. A., Sirmon, D. G., & He, X. (2015). Utilizing the firm's resources: How TMT heterogeneity and resulting faultlines affect TMT tasks. *Strategic Management Journal*, 36(11), 1656–1674.
- Peteraf, M. A. (1993). The cornerstones of competitive advantage: A resource-based view. *Strategic Management Journal*, 14(3), 179–191.
- Prahalad, C. K., & Ramaswamy, V. (2004). Co-creating unique value with customers. *Strategy and Leadership*, 32(3), 4–9.
- Priem, R. L. (2007). A consumer perspective on value creation. *Academy of Management Review*, 32(1), 219–235.
- Priem, R. L., Butler, J. E., & Li, S. (2013). Toward reimagining strategy research: Retrospection and prospecting on the 2011 AMR decade award article. *Academy of Management Review*, 38(4), 471–489.
- Ries, E. (2011). *The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses*. New York, NY: Crown Business.
- Rysman, M. (2009). The economics of two-sided markets. *Journal of Economic Perspectives*, 23(3), 125–143.
- Schumpeter, J. A. (1934). *The theory of economic development*. Cambridge, MA: Harvard University Press.
- Shah, S. K., & Tripsas, M. (2007). The accidental entrepreneur: The emergent and collective process of user entrepreneurship. *Strategic Entrepreneurship Journal*, 1(1–2), 123–140.
- Sirmon, D. G., & Hitt, M. A. (2009). Contingencies within dynamic managerial capabilities: Interdependent effects of resource investment and deployment on firm performance. *Strategic Management Journal*, 30(13), 1375–1394.
- Sirmon, D. G., Hitt, M. A., & Ireland, R. D. (2007). Managing firm resources in dynamic environments to create value: Looking inside the black box. *Academy of Management Review*, 32(1), 273–292.
- Sirmon, D. G., Hitt, M. A., Ireland, R. D., & Gilbert, B. A. (2011). Resource orchestration to create competitive advantage: Breadth, depth, and life cycle effects. *Journal of Management*, 37(5), 1390–1412.
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533.
- Vargo, S. L., & Lusch, R. F. (2004). Evolving to a new dominant logic for marketing. *Journal of Marketing*, 68(1), 1–17.
- Wassmer, U., & Dussauge, P. (2011). Network resource stocks and flows: How do alliance portfolios affect the value of new alliance formations? *Strategic Management Journal*, 33(7), 871–883.

- Weill, P., & Woerner, S. L. (2013). Optimizing your digital business model. *MIT Sloan Management Review*, 54(3), 71–78.
- Ye, G., Priem, R. L., & Alshwer, A. A. (2012). Achieving demand-side synergy from strategic diversification: How combining mundane assets can leverage consumer utilities. *Organization Science*, 23(1), 207–224.
- Zott, C., & Amit, R. (2007). Business model design and the performance of entrepreneurial firms. *Organization Science*, 18, 181–199.
- Zott, C., & Amit, R. (2010). Business model design: An activity system perspective. *Long Range Planning*, 43, 216–226.
- Zott, C., & Amit, R. (2015). Business model innovation: Toward a process perspective. In C. E. Shalley, M. A. Hitt, & J. Zhou (Eds.), *The Oxford handbook of creativity, innovation, and entrepreneurship* (pp. 1–14). New York, NY: Oxford University Press.
- Zott, C., Amit, R., & Massa, L. (2011). The business model: Recent developments and future research. *Journal of Management*, 37(4), 1019–1042.