Dependency Challenges, Response Strategies, and Complementor Maturity: Joining a Multi-Sided Platform Ecosystem

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ABSTRACT

Complementors gain market opportunities by joining ecosystems; they also face challenges from relationships with multi-sided platform ecosystems. Prior research provides insights on emergence, growth, and competition between platforms and ecosystems. This research focuses on managerial challenges and strategic and organizational responses of complementors joining ecosystems. Asymmetries lead to dependencies, which I categorize into three types: 1) technological, 2) information, and 3) values-based. Based on a three and a half year qualitative inductive field-based study, this research finds the organization responds with combinations of three strategies: *compliance*, *influence*, and *innovation*. Over time, the organization passes through three phases of complementor maturity changing the relative emphasis on each strategy. This paper contributes to platform, ecosystem, and organizational theory research by: 1) exploring relationships between complementors and dependencies, 2) articulating complementor response strategies, and 3) introducing phases of complementor maturity and outlining how, when, and why an organization moves through these phases.

Keywords: *Managing Innovation, Multi-Sided Platform, Ecosystem, Dependence, Complementors, Asymmetric Inter-organizational Relationships, Complementor Maturity*

"You know how in America we never dip our flag to anybody? At the Olympic Games, you know... We never dip our flag, period. Well, I feel like we kind of dipped our flag."

- Zuni manager, 2-8-12

"So, dipping our flag? I'll dip…I'll dip… because I know that I'm still in the end delivering a better experience than anybody else can."

- The same Zuni manager, 8-26-14

INTRODUCTION

Some products work better when they are combined with others; a baseball glove is not useful unless one also has a baseball. A computer, smartphone or tablet becomes more valuable when a user downloads and uses software applications (also known as "apps") or adds accessories. With the growing prevalence of products that include open interfaces, products are becoming increasingly more interdependent such that users purchase accessory products, or complements, which they use to realize the full potential of their purchases (Brandenburger & Nalebuff, 1996; Adner & Kapoor, 2010). Accessories exist in the form of software apps and as hardware products such as cases, keyboards, headphones, speakers, memory sticks, trackballs, etc. To access large markets, organizations that create these complementary products join ecosystems and become dependent upon other firms to provide interface specifications, guidelines, requirements, technological components, and so on. In many cases, firms that produce products that benefit from accessories operate multi-sided platform (MSP) businesses that facilitate interactions between buyers of their core products (e.g., smartphones) and producers of complementary products (e.g., smartphone accessories). As an increasing percentage of the world's most valuable and influential firms operate platform-based business models (Gawer & Cusumano, 2002; Regalado, 2014; The Economist, 2014), there is growing interest in the effects of these businesses on the complementors dependent upon them.

Examples of multi-sided platform-based businesses include: Google Play (formerly Android Market), which enables developers to sell apps to Android phone consumers; Amazon Marketplace, which facilitates third party vendors to sell used and new goods to consumers; and Internet dating sites, which allow individuals to interact with others looking for relationships. Research on platform-based businesses continues to increase with recent articles organizing platform literature and providing definitions and typologies (e.g., Baldwin & Woodard, 2009; Gawer, 2014; Thomas, Autio, & Gann, 2014). Much of the research in this area focuses on the emergence of platforms and competition between them finding that network effects generally play a role in their success (Rochet & Tirole, 2003; Eisenmann, Parker, & Van Alstyne, 2006; Zhu & Iansiti, 2012). A burgeoning area of research emphasizes strategic decision-making related to platform governance and differentiation and its impact on competition outcomes finding there are trade-offs to governance structures, including a platform's hierarchy (Bresnahan & Greenstein, 2014). Throughout this work, platform-based businesses are the focal unit of analysis and implications for complementors remain either secondary or left un-addressed.

Ecosystem research has focused on challenges and opportunities of ecosystem creation (Moore, 1993, 1996), competition (Iyer, Lee, Venkatraman, 2006; Adner, Oxley, & Silverman, 2013), and technology emergence and substitution (Christensen & Rosenbloom, 1995; Adner & Kapoor, 2015).[1] Ecosystem-focused scholars commonly find that creating and successfully managing a strong ecosystem of complementors is beneficial to a focal firm (Adner, 2012; Iansiti & Levien, 2004), though governance of these ecosystems may also create tensions through the emergence of contradictory logics and paradoxical tensions (Wareham, Fox, & Giner, 2014).

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[1] Research relevant to the study of ecosystems also sometimes refers to systems of producers and markets as value networks such as in Christensen & Rosenbloom (1995). The definition of a value network, however, does not imply the existence of complementors; though, the study of these inter-related interdependent systems are valuable to understanding the broader phenomena of ecosystems that include complementors.

Further, in the emerging management-centered ecosystem literature, researchers have been studying trade-offs associated with ecosystem management decisions such as opening participation to all actors versus limiting involvement via compliance criteria finding that the number of participants on a platform is linked to innovation and investment (Boudreau, 2012). Scholars are also applying the complementary asset framework (Teece, 1986) in the context of entrants into new industries exploring how complementarities and competition affect strategies of these new entrants (Kapoor & Furr, 2014). Still, with few exceptions, this work mostly centers on platform owners and managers and stops short of extending findings to managerial implications for complementor organizations. These under-studied firms constitute a multi-billion dollar worldwide industry and increasingly face challenges associated with interfacing with large powerful platform managers (such as Apple, Samsung, and Facebook).[2]

To study challenges and response strategies of complementors operating in multi-sided platform-based ecosystems, I explored the research question: What are the strategic and organizational issues associated with mature, independent organizations joining established ecosystems? In particular, what challenges does an organization face as it enters into asymmetric relationships, and how does the organization respond to these challenges? Are these challenges and responses different in the context of MSP-based businesses and their complementors, or are they similar to those present in other asymmetric interfirm relationships (e.g., buyer-supplier, alliances, etc.). Because of the limited existing research related to this topic, I utilized an inductive theory-building approach with a longitudinal single case study design that spanned three and a half years and included semi-structured interviews, observation, and archival research. I studied this question from the perspective of an incumbent organization joining

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[2] For example, Strategy Analytics, a reputable industry analyst firm, recently forecast global total apps revenues of $33.7B (MacQueen, 2014).

ecosystems as a complementor and investigated challenges experienced by a division of an accessory provider as it strived to balance maintaining its own independence and growth aspirations with an emerging need to operate as a member of ecosystems managed by large and powerful central firms.[3]

My analysis shows we can use theories related to dependency, power, influence, and organizational identity to better understand challenges complementor organizations face as they join ecosystems, particularly when these organizations are mature incumbents entering asymmetric relationships. I have identified three types of dependencies prevalent in such situations: 1) *technological*, 2) *information*, and 3) *values-based*. Analyzing data from this study, I am able to identify three response strategies the organization invoked to manage these dependencies: 1) *compliance*, 2) *influence*, and 3) *innovation*. Further, I propose that over time the complementor organization followed multi-pronged strategies that employed a combination of these responses, and the composition of these strategies shifted as the complementor gained experience operating in the ecosystem. The research findings suggest that as the complementor became more mature in its approach to participating in ecosystems, it changed the relative emphasis it placed on each of the response strategies. I outline three phases of complementor maturity and the variation in response strategies. The findings also suggest that the proportional emphasis the organization placed on response strategies during maturity phases may be associated with dimensions of the organization's existing and evolving identity. In support of this finding, I have induced a model illustrating the relationships between theoretical concepts identified in this study. Taken together, this analysis of response strategy and complementor

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[3] Although the focal division at Zuni was exploring options to offer complementor products in multiple ecosystems, during the time of this study, its primary focus was on providing products to work with Apple products. Thus, the vast majority of my data relates to Zuni's interactions with, and challenges related to, offering products to work with Apple products.

maturity provides a new way to understand how complementor organizations manage when they are engaged in relationships with powerful platform managers. It also adds new insights to our understanding of dependencies in interfirm relationships.

THEORETICAL BACKGROUND

Multi-sided platforms, ecosystems, and complementors

Across platform-related research, the term *platform* is used with varying definitions. Hagiu and Wright (2015a) present a definition for multi-sided platforms (MSPs) (also sometimes referred to as multi-sided markets or multi-sided networks) suggesting MSPs are organizations that enable or facilitate direct interactions between two or more groups of participants. This is the definition I adopt since my research is focused on platform-based businesses in the context of relationships with complementors, or firms that independently offer complementary products or services to mutual customers (Brandenburger & Nalebuff, 1996; Yoffie & Kwak, 2006).[4,5,6] This definition envisions MSPs as enabling a triangular set of relationships in which the MSP and complementor maintain independent relationships with a customer. This definition contrasts with a supplier-buyer-customer (or reseller) business model characterized by linear relationships in which a supplier sells to a buyer (or reseller), which sells to a customer. (See Figure 2.1 for schematic

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[4] Though firms investigated in this paper are technology-related, this research does not address computer platforms (Bresnahan & Greenstein, 1999), nor general technology platforms (Kim & Kogut, 1996; Meyer & Seliger, 1998; Economides & Katsamakas, 2006), nor specific decisions related to technology platform choices (Boudreau, 2010).

[5] MSPs at the center of systems of complementors are also sometimes referred to as "platform managers" (Eisenmann, Parker, & Van Alstyne, 2006), which is terminology I also use here. The term "platform manager" is particularly appropriate when an MSP, such as a smartphone provider, does not create its own platform technology in its entirety, but rather adopts and modifies a technology (e.g., Android software), and then manages an ecosystem associated with that MSPs version of the technology integrated with their products (e.g., smartphones).

[6] When I refer to a complementor in this paper, I mean complementors to MSP-based businesses. At the extreme, any business model that includes a complementor can be considered to be an MSP.

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diagrams contrasting linear with triangular business models.) Complementors, taken together

with the MSP they complement, are sometimes referred to as an MSP's ecosystem.[7]

Linear Business Model

Multi-Sided Platform Business Model
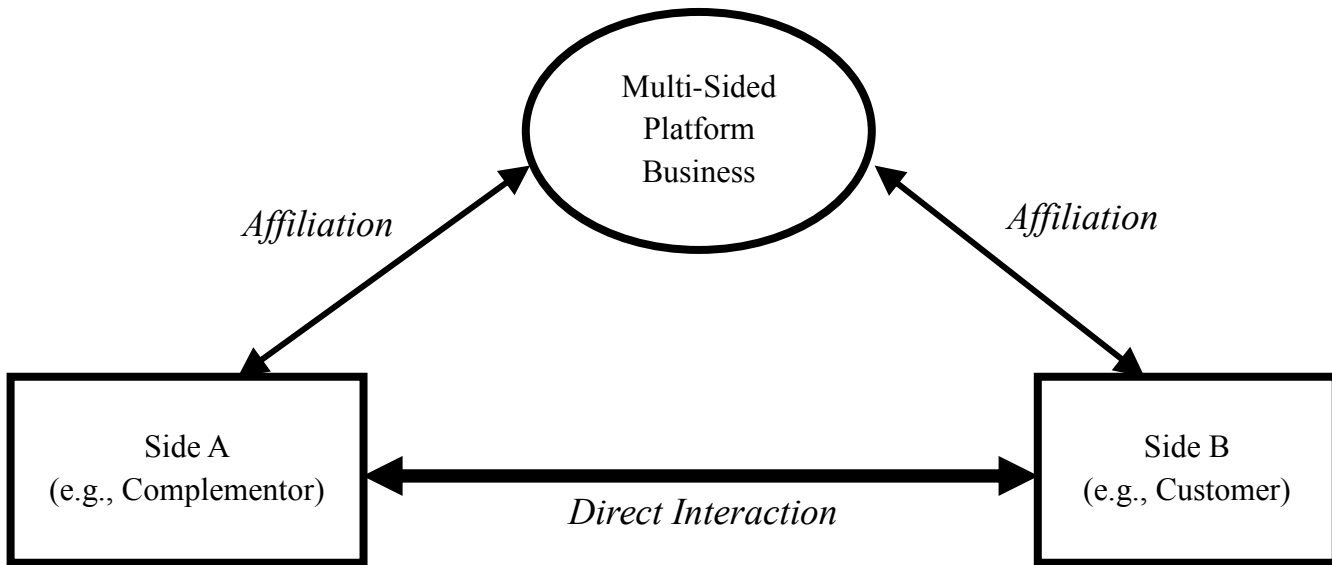
Figure 2.1 Business model schematics

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[7] While the term "business ecosystem" often also encompasses suppliers and customers of a focal firm, for this paper though suppliers and customers are not explicitly excluded from the definition, the primary emphasis is on the complementors that are part of an MSP's ecosystem. Additionally, when I refer to an ecosystem, I generally mean MSP-governed ecosystems in which an MSP is enabling interactions between complementors and customers.

Whereas not strictly true of all MSPs, for ones most relevant to this research, indirect network effects generally play a role in the success of these platforms as the increasing presence of apps or complements on one side brings value to users on the other side (Rochet & Tirole, 2003; Eisenmann, Parker, & Van Alstyne, 2006; Zhu & Iansiti, 2012). Research has shown this to have been true in the Personal Digital Assistant market in which a dearth of third party software applications negatively impacted the evolution of the hardware market (Nair, Chintagunta, & Dubé, 2004) and in the video game industry in which both pricing and game variety affected market growth (Clements & Ohashi, 2005). This is also true for ecosystems around smartphones and tablets, the setting for this study: the more third-party developed apps and accessories become available for products, the more value a user can derive from a smartphone or tablet. However, these network effects are not necessarily beneficial for any given complementor because they encourage increased market entry for competing complementors and thus enable less power versus an MSP to accrue to any individual complementor. This dynamic is one of the primary reasons why this research focuses primarily on dependencies rather than interdependencies between complementors and MSPs. As more complementors join an MSP's ecosystem, the MSP's power to dictate terms of engagement increases. Complementors remain dependent on MSPs along multiple dimensions, but MSPs become less dependent on any particular complementor (Boudreau, 2012).

Research related to complementors generally addresses strategic decisions platform firms face relative to complementors, such as first-mover advantages and standardization (Cusumano, Mylonadis, & Rosenbloom, 1992), whether or not to treat complementors as complementors or suppliers (Hagiu & Wright, 2015a and b), pricing structure decisions (Armstrong, 2006), implications of modularity on ecosystem relationships (Baldwin & Clark, 2000), strategies on

whether or not MSPs should compete against complementors (Gawer & Henderson, 2007), or more recently organizational challenges MSPs face as the locus of value creation moves to networks of complementors (Kapoor, 2013). In this research, rather than keeping MSPs as the center of inquiry, I focus on challenges faced by complementors of MSP-based organizations.

There is scant work investigating the effects of core firm behaviors on complementors (Pierce, 2009) and taking the perspective of complementors. An exception to this is Venkatraman and Lee's (2004) study of the U.S. video game sector, which provides an excellent explanation of the important role of complementors as it examines video game console manufacturers and their complementors (game developers) and relationships between complementors. This research utilized network theory to analyze game developers' choices regarding platform linkages. They found that game developers' choices are affected by macro network characteristics (e.g., density) as well as platform attributes (e.g., newness) and that a combination of these characteristics must be considered for each case. Whereas these researchers consider dependencies arising in complementor networks, they do not delve into types of dependencies nor address response strategies to them as the research in this paper does.

Another exception is emerging work related to mobile applications. Researchers have found that the great volume of app entry creates difficulties related to marketing and commercialization, specifically matching products and consumers and particularly causing challenges for entrepreneurs (Bresnahan, Davis, & Yin, 2014). Though this work is one of the few studies specifically exploring challenges from the perspective of complementors, in this case app suppliers, it still focuses on market-related challenges of product competition. This paper complements that work by centering on management challenges associated with these organizations becoming complementors.

Within related research streams there is also growing interest in the role of complementors. For example, within engineering management literature, Kude, Dibbern, and Heinzl (2012) study the enterprise software industry and explore complementor firm's motivation to partner with large platforms or what they refer to has "hubs." They find that the reputation of the hub and its ability to provide integrated systems play a role in complementor motivation, and more importantly that the level of product complementarity with the hub explains variation in how much a hub's innovativeness drives participation. Although this study is one of the few to explore complementor motivations, it doesn't consider the nature of the dependencies between the complementors and hubs and how this drives responses. Additionally, marketing scholars are recognizing the importance of MSPs, especially as they relate to sales of software and hardware. Binken & Stremersch (2009) study the effect of superstar software games in the video game console industry finding that the introduction of a superstar game (e.g., Super Mario 64) has a sizable effect on hardware console sales. This research brings a marketing perspective to the study of MSPs and ecosystems, and emphasizes the role of complementors, but again does not focus on organization-level challenges and responses of these complementors.

Information science and software engineering scholars are starting to address challenges of building and governing platform-based businesses and software ecosystems (Costa, Silva, Santos, Werner, & Oliveira, 2013). Jansen, Finkelstein, Brinkkemper (2009: 187) defined software ecosystems as: "a set of businesses functioning as a unit and interacting with a shared market for software and services, together with the relationships among them." They present a research agenda encompassing technical and business elements and highlighting a range of challenges including establishing ecosystem relationships, managing release timing and quality, portfolio and product planning, and knowledge management.

Open innovation, or the movement towards firms soliciting innovative contributions from external parties, is being recognized by information science and management scholars as being related to MSPs and their ecosystems with research addressing ecosystem management and governance. Among others, some research questions address levels of openness versus proprietary approaches (Selander, Henfridsson, & Svahn, 2010; West, 2003). Additionally, since organizations in MSP-governed ecosystems create value through networks of co-specialized firms, this work is also related to burgeoning work on market and industry architecture (Jacobides, Knudsen, & Augier, 2006; Ferraro & Gurses, 2009; Ozcan & Santos, 2014). Still, in general this research remains focused on ecosystem conveners and managers rather than on participants or complementors and the challenges associated with dependencies they face.

Dependency

Within organizational research, scholars have long noted that organizational structure and associated relationships often echo relationships between technological products and/or services (Barley, 1986; Tushman & Anderson, 1986). In the context of interfirm relationships, we see a similar pattern with MSP businesses and their ecosystems of complementors. Complementor products enhance MSP products and have connections to them (in some cases physically through hardware and software interfaces; in others only virtually). This is true also of complementor organizations that develop and maintain affiliations with one or more MSP-based organizations.

Dependency between organizations has been the subject of much research related to interfirm relationships and resulting strategic and managerial challenges (Pfeffer & Salancik, 1978). Dependence (and specifically resource dependence), interdependency, and relationships associated with these concepts have been studied by scholars in a range of fields including

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sociology (Emerson, 1962; Blau, 1964/1986), organizational theory (Pfeffer & Salancik, 1978), strategy (Zaheer & Venkatraman, 1995; Holm, Eriksson, & Johanson, 1999; Kim, Hoskisson, & Wan, 2004), and management (Bode, Wagner, Petersen, & Ellram, 2011; Buchanan, 1992).

Scholars have used resource dependence theory to consider organizations as entities that rely on an exchange of resources with external organizations such as suppliers, competitors, regulators, and so on (Pfeffer & Salancik, 1978; Katila, Rosenberger, & Eisenhardt, 2008; Ozcan & Santos, 2014). These external entities are similar in some respects to complementors in that they impact the performance of the focal entity. More specifically, products and services offered by complementors to customers of MSPs (e.g., accessories) depend on products and technologies of MSPs to function appropriately. Thus, it is useful to consider organization-level dependencies between MSPs and their complementors. Put another way, referring back to the triangle diagram in Figure 2.1, not only do complementors have an affiliation with an MSP, but they also experience dependencies from the MSP since they rely on the MSP for certain critical resources. In the literature on dependency, power imbalance, and interfirm relationships, there is minimal research on effective strategies for organizations that are in the less powerful position such as is the case with complementors joining ecosystems of MSPs more powerful than they are.

When an incumbent organization joins an ecosystem managed by a larger platform manager, an asymmetric relationship (Casciaro & Piskorski, 2005; Gulati & Sytch, 2007; Katila, Rosenberger, & Eisenhardt, 2008) is created between the two. Scholars have studied asymmetric inter-organizational relationships and found they exhibit dependencies (Uzzi, 1997; Doz, 1988; Staudenmayer, Tripsas, & Tucci, 2005). The platform manager may exert power (Pfeffer & Salancik, 1978; Nye, 2011) over the ecosystem joiner in the form of imposing constraints, such as technological specifications and branding guidelines. Gulati & Sytch (2007) studied

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procurement relationships and found that joint dependence improved the performance of such relationships, yet this effect was partially mediated by factors such as joint activities and the quality of communication between partners. With complementors, there also can be joint dependence, particularly early in an MSP's development when MSPs need complementors to gain traction, and there may be shared activities (e.g., marketing) and communication between entities. Accordingly, these theories are pertinent to complementor relationships, and this paper extends the existing work by distinguishing more finely the types of dependencies evident between complementors and MSPs and complementor response strategies to address them.

Customer and supplier relationships have been the subject of considerable research exploring the influence of dependencies on inter-organizational learning, value creation, and performance (Helper, MacDuffie, & Sabel, 2000; Gulati & Sytch; 2007). Alliance researchers have noted that risks and dependencies may be accompanied by behavior monitoring that may generate tension between firms (Das & Teng, 2001). This is similar to that seen with complementors such as with auditing requirements and compliance testing. However, the existing research does not articulate the nature and type of these tensions, nor responses to them. Further, it does not articulate how dependencies and responses in the contexts of MSPs are similar in some respects, but quite distinct in others, due to the nature of MSP-based relationships particularly vis a vis customer interactions.

Beyond alliances and supplier relationships, Casciaro and Piskorski (2005) considered resource dependence in the context of mergers and acquisitions in which power imbalance and mutual dependence affected organizations in opposing ways, reducing dependency. These dependencies may be related to those seen in complementor relationships because they include power imbalance and mutual dependence, but the context of acquisitions is quite different than

complementors in that the outcome is the dissolution of the original studied organization. Though dependencies may be similar as the M&A process begins, as relationships mature, those in an M&A environment eventually resolve through the creation of a singular entity. Those in complementor relationships, in contrast, evolve with organizations working to maintain independence. Additionally, even within the M&A context, the evolution over time of organizational responses to dependencies seems yet to have been fully addressed.

Since the data in this study spans a multi-year time period, I am able to examine how power imbalances and dependencies in MSP complementor ecosystems affect an organization as it becomes a more sophisticated complementor and how this variation affects its responses to dependencies. My research suggests that in relationships between complementors and MSPs, dependencies emerge and therefore theories that consider dependencies between organizations are a useful lens through which to further explore these relationships. For this study, I adopt a broad definition of dependency as situations in which an organization relies upon or needs important or critical resources from another organization and for which there are limited or no alternatives (Emerson, 1962; Pfeffer & Salancik, 1978; Buchanan, 1992).

METHODOLOGY

Research design and setting

This paper is based on a qualitative inductive field-based research study spanning three and a half years starting in the fall of 2011 and continuing through the spring of 2015 with Zuni (a disguised name), a large well-established global technology-based accessory provider. Zuni participates as a complementor to multi-sided platform businesses. Other consumer electronics firms, both large and small, from Japan, Korea, China, Europe, and the US participate in these

markets as well. For the MSP-based markets in which Zuni competes, one side of the MSP market is accessory providers like Zuni and the other is users of smartphones, tablets, etc. The MSP is a firm like Apple or Samsung, which by selling smartphones that are customizable from both hardware and software perspectives enables interactions between accessory providers and end users. It is important to note that Zuni retains its relationships with its customers, selling accessories directly and through retailers.[8]

The selection of this setting was appropriate for this research inquiry because during the time of this fieldwork the business was in the process of joining powerful ecosystems in which the division needed to abide by policies determined and enforced by firms that had more market influence than it did. It was actively starting to provide products compatible with one large platform manager's products (Apple's). It was also considering joining other ecosystems during the course of the study (initially for Microsoft, Blackberry, and various providers of Android products, and later in the study specifically for Samsung as it emerged as a market leader). Whereas the dynamics of MSP businesses and their related ecosystems are characterized by interdependencies (Thompson, 1967) between entities, this paper focuses on dependencies and less on interdependencies because there is large asymmetry between Zuni and the platform managers running the ecosystems in which Zuni operated as a complementor. Consequently, the relationship was dominated by dependencies more than by interdependencies.

Competitors to Zuni were starting to provide products for these ecosystems, so Zuni recognized the opportunity and need to do so. Environmental factors forced the division to make strategic decisions that it might not have otherwise chosen to pursue. This is important because

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[8] Though Zuni also supplies accessories directly to Apple as a small part of its business, the supply relationship with Zuni is not the focus of this inquiry. This is reasonable from a research design standpoint because the vast majority of Zuni's products that work with Apple products are not sold through Apple, but rather through other retailers such as Best Buy or wholesale clubs in the United States.

in much of the platform and ecosystem literature there are implicit assumptions that firms join platform-based ecosystems due to growth aspirations. Whereas there were clearly economic motivations in this case, there was also a sense of unwillingness and inevitability. If it had been possible for this division to maintain its growth trajectory without having to become compliant with a powerful ecosystem manager's constraints, it probably would have done so. Hence, this site provides an interesting window into a very successful incumbent organization facing a new competitive reality in which growth is via joining an ecosystem, even if reluctantly.

The field study site is the headquarters for a division that designs and sells products that work with other electronics devices. Zuni has a long history as an independent company with a strong brand name. It had to modify its competitive strategy (Barney, 1986) and operations in a few divisions because technology evolved such that to develop and sell new innovative products it needed to establish relationships with firms providing products with which its products worked. The focal division at Zuni became very successful during this study, and that success in large measure resulted from devices that worked with (and connected to) Apple products. Sales and profit numbers for this division are unpublished, so cannot be included here. However, based on confidential interview data there is evidence they have grown steadily from an economic standpoint, and also in organizational size and market influence. Revenue and profitability have increased substantially. The number of people in the division has grown dramatically. Internally, managers of this division have taken leadership roles for initiatives that span the parent corporation. And, although this study includes primarily Zuni's activities related to the Apple ecosystem, by the end of the study they were actively starting to participate in other similar ecosystems such as Microsoft's, Samsung's, and others.

The qualitative case study research approach is an empirical inquiry applicable when investigating phenomena within a real-life context, and contributes to appropriate methodological fit when the phenomena lends itself to nascent theory building (Eisenhardt, 1989; Edmondson & McManus, 2007; Yin, 2009). This research employs a single holistic case study design in which the unit of analysis is a product division (Ragin & Becker, 1992). The division is a reasonable unit of analysis rather than the entire firm because the division is a self-contained business unit undergoing a specific business transition (see Galunic & Eisenhardt, 1996 for a thorough review of division-centric research). The relationship the division has with the platform manager is managed primarily at the division level. The division is a fast growing part of the business that contributes a significant share of profits to the parent firm. The study is a revelatory case (Yin, 2009) since researchers have not had prior access to this type of field site over a prolonged period of time to observe and analyze the phenomenon of a complementor's evolving relationship with a more powerful platform manager.

Finally, this study is an extreme case where the phenomena can be very clearly seen. This is true because both the primary platform manager (Apple) and the complementor (Zuni) have characteristics that are extreme compared to peer organizations. Apple is known to be exceptionally strict and challenging in its relationships with complementors, thus providing a case of a highly demanding platform manager. Further, this division of Zuni is a very well-known, highly respected, technology-driven, profitable organization. During this study, Zuni became highly dependent upon Apple for continued commercial success and growth.

Data collection

This study follows rigorous qualitative field-based research methods. The data include 60 longitudinal cross-functional and cross-level semi-structured field interviews and archival

research. I conducted 56 semi-structured field interviews with all members of the senior

management team of the division in the fall and spring of 2011-2012, in the spring of 2013, in

the spring and summer of 2014, and a few confirmatory interviews in the winter and spring of

2015 providing a rich set of longitudinal data. (See Table 1 for interview details).

Table 2.1 Data Collection: Interview Timing and Distribution

Interview Block	Start Date	End Date	Approximate Timespan	Interview Numbers
First Interview Block	September 2011	March 2012	7 months	# 1 - #16
Second Interview Block	March 2013	June 2013	4 months	#17 - #32
Third Interview Block	March 2014	August 2014	6 months	#33 - #54
Confirmatory Interviews	February 2015	March 2015	1 month	#55 - #56
Expert Additions	January 2012	March 2015	4 years	#57 - #60

Interviews of the management team included the division general manager, direct reports,

and those who do not have direct reporting responsibility but served on the senior leadership

team, for example human resources and finance leaders. An interesting feature of this data set is

that the focal division experienced essentially no turnover at the management level during the

time of this study. Thus, I was able to conduct repeat interviews with individual members of the

management team over consecutive years. The data also include a sample of non-senior

leadership team members ranging from product managers to analysts. During interviews, once

respondents became comfortable with the interview format, they were willing to tell stories and

explain situations that did not always cast the division in a positive light, and which were very

useful during data analysis. This was particularly true in later interview rounds, by which time

respondents had known me for a few years and had developed a trust and understanding that seemed to lead to disclosure of candid observations and organizational insights.

I also conducted formal interviews with industry experts familiar with MSPs and ecosystem-based businesses to test concepts and support development of interview questions. A formal interview with a former Zuni employee provided cultural and identity related insights. More informal conversations with other members of this and related industries informed the research questions as well. The average interview lasted approximately 60 minutes, and length ranged from approximately 30 to 90 minutes. Interviews involved cross-functional staff members, including employees from marketing, research, product development, etc. This eliminated bias that might result from interviewing only employees from specific functional organizations. Informants had a range of tenures in the organization, though most had been there a relatively long time, which is typical of the management team. The interviews spanned organizational levels from the general manager of the division to a business analyst. This ensured impressions related to organizational change were held across levels of management. By spanning functions and organizational levels, this study includes a rich set of data that captures observations from a multitude of perspectives.

A sister division within Zuni had also joined the Apple ecosystem. This division developed different products but sold them through similar channels to similar customers. Particularly during the earlier part of the study, the sister division had an independent relationship with Apple. As time progressed, the two divisions became more coordinated in their communications with Apple. Still, they maintained separate liaisons and had separate processes to manage compliance requirements for their respective products. Interviews were conducted with members of this sister division in each round of interviews (starting in early 2012 through

2014). These employees had been actively involved with the relationship between Zuni and

Apple representing their division, and were very aware of the relationship between Apple and the

focal division. Thus, they were able to provide observations from outside the focal division that

were extremely useful for triangulating data and corroborating stories from members of the focal

division. Table 2.2 includes a list of formal interview participants and dates of interviews.

Table 2.2 Data collection: Semi-structured interview list

No.	Title/Role	Date
1	Marketing, Prod. Management, Sales	9-15-11
2	Marketing, Prod. Management, Sales	10-7-11
3	Product Development Engr.	10-25-11
4	Business Operations, Strategy	10-25-11
5	Marketing, Prod. Management, Sales	10-28-11
6	General Manager	10-28-11
7	Controller, Finance	11-8-11
8	Engineering	11-8-11
9	Human Resources	11-8-11
10	Business Analyst	11-15-11
11	Market Research	11-15-11
12	General Manager	2-8-12
13	Marketing, Prod. Management, Sales	2-15-12
14	Strategy	2-28-12
15	Product Manager	3-15-12
16	New Product Planning	3-29-12
17	Marketing, Prod. Mgmt., Sales	3-21-13
18	General Manager	4-11-13
19	Marketing, Prod. Management, Sales	4-15-13
20	Product Development Engr.	4-22-13
21	Controller, Finance	4-24-13
22	Business Operations, Strategy	4-24-13
23	Human Resources	4-24-13
24	Strategy	4-29-13
25	Engineering	5-1-13
26	Product Manager	5-21-13
27	Market Research	5-21-13
28	New Product Planning	5-22-13
29	Business Analyst	5-22-13
30	Marketing, Prod. Mgmt., Sales	5-22-13
31	Category Business Manager	6-14-13
32	Category Business Manager	6-10-13
33	Marketing, Prod. Management, Sales	3-10-14

34	Marketing, Prod. Management, Sales	3-11-14
35	Marketing, Prod. Management, Sales	4-22-14
36	Controller, Finance	4-22-14

Table 2.2 (Continued) Data collection: Semi-structured interview list

37	Product Development Engr.	4-25-14
38	Engineering	4-25-14
39	Human Resources	4-29-14
40	Business Operations, Strategy	4-29-14
41	Strategy	4-30-14
42	Marketing	5-9-14
43	Product Manager	5-9-14
44	Product Manager	5-9-14
45	New Product Management	5-9-14
46	Engineering	5-12-14
47	Strategy	6-2-14
48	New Product Management	6-3-14
49	Market Research	6-24-14
50	Marketing	6-27-14
51	Business Analyst (Strategy) & Sales	6-27-14
52	Category Business Manager	7-1-14
53	Category Business Manager	7-1-14
54	General Manager	8-26-14
55	Marketing	2-13-15
56	General Manager	3-24-15
57	Non-Zuni: Trademark Attorney	1-13-12
58	Non-Zuni: Accessory Business Manager	1-13-12
59	Non-Zuni: Former BD Director	3-16-12
60	Non-Zuni: Former Zuni Employee	3-21-15

The interviews were generally conducted in employee's offices, though some were in the company cafeteria when employees did not have closed door offices or preferred to meet in the cafeteria. The interview protocol included an introductory explanation of the nature and purpose of the study, a reminder that data were covered under a confidentiality agreement and that the company would be disguised, and a request for permission to audio record the interview.

Semi-structured interviews were based on an interview guide that included questions related to a number of topic areas (see Appendix for an example interview guide). The first topic

area included questions about products that might work with other firms' products. This led quickly to discussions of relationships with other firms and interdependencies and dependencies, including benefits and challenges of these relationships, changes to relationships, and speculation regarding future potential changes to relationships. The second set of questions pertained to organizational considerations such as whether the division had to change business processes as a result of working more closely with other firms and how these changes might have been perceived. The next questions were more open-ended and asked about greatest challenges in the organization. In the final interview phase, I asked (relative to their work) what kept informants up at night, which frequently led to enlightening discussions about organizational happenings.

Interviewing multiple employees across the organization allowed confirmation of the data from several sources and eliminated potential biases of individual sources (Golden, 1992; Miller, Cardinal, and Glick, 1997). In many instances, organization members provided confirming commentary validating a position previously relayed by another respondent. I used initial interviews to validate preliminary assumptions and then adapted the interview protocol for later interview rounds. For example, dependency challenges were not originally a central component of this research, but as fieldwork progressed and I analyzed data, they emerged inductively as an important theme. Additionally, themes related to organizational identity also started to emerge as salient. Accordingly, the interview guide evolved to include questions more specifically aimed at understanding dependencies and identity-related challenges. Similarly, themes of compliance, innovation, and influence emerged during early and middle round interviews, so later interviews included more questions related to these and other topics associated with asymmetries, dependence, response strategies, and complementor maturity.

In later interviews, as research questions became clearer and theoretical framings developed, the final sections included more questions related to Zuni's relationships with platform managers and particularly with Apple. A section was added related to organizational identity encompassing inquiries such as: "What are you most proud of related to Zuni?", "What are you most frustrated by at Zuni?", and "What do you think Zuni stands for?" These were followed by questions asking if these items had changed, and if so, how might they have done so.

In addition to collecting interview data, over the course of the study I gathered significant archival data related to Zuni. These data included press releases, advertisements, website clippings, media articles, product packaging samples, and retail display photographs from locations around the world. These data were instrumental in triangulating findings across sources and over time and contributed to ongoing revisions of the interview protocols as iteration continued between data collection, data analysis, and theoretical development.

DATA ANALYSIS

Interviews were audio recorded with hand-written notes keyed to the audio via a LiveScribe pen. Interviews were transcribed resulting in over 1,000 pages of text. I coded the interviews with Atlas.ti qualitative data analysis software. Coding and theory development progressed iteratively throughout data collection to inform data gathering. As themes emerged and data analysis progressed, all interview transcripts were included in the analysis software enabling searches for key coding terms. This enabled comparison of interviews across respondents over time to capture variability of perspectives by individual as well as variability across individuals.

Iterative code development

Code development followed a three-stage process of qualitative analysis: 1) data reduction (organizing, coding, and summarizing data), 2) data display (creating tables, network views, and diagrams to view data from various perspectives), and 3) conclusion drawing/verification (Miles and Huberman, 1994). This process was iterative requiring frequent re-examination of the original transcript data while cycling between developing displays, generating initial conclusions, continued coding and re-coding, conceptual development and thematic identification (Gioia, Corley, & Hamilton, 2013). To avoid confirmation bias, data that both confirmed and contradicted findings were included in the coding process.
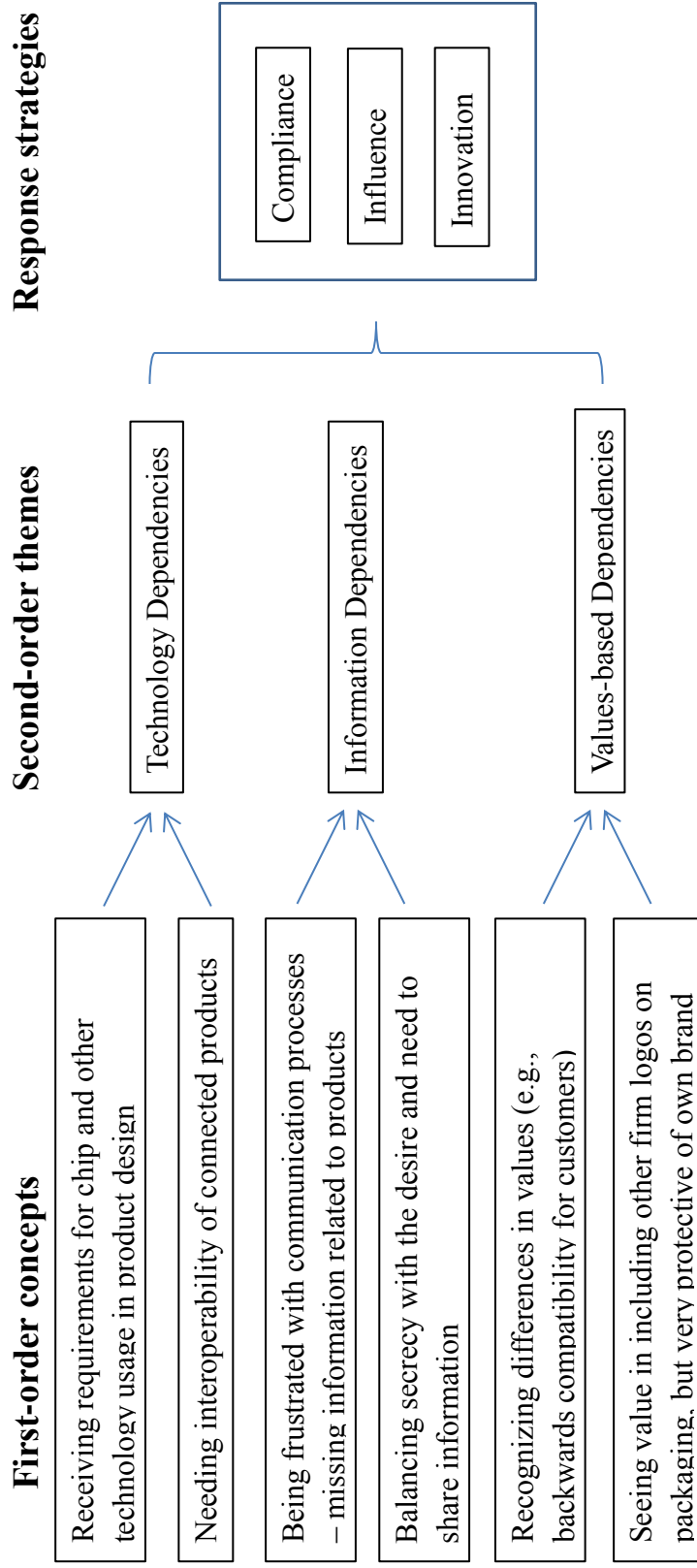
The transcript data were coded by "deriving and developing relevant concepts from the data" (Corbin & Strauss, 2008: 65). The first coding round stayed close to the respondents' words and meanings, sometimes employing in-vivo coding (Corbin & Strauss, 2008), and developing first-order codes and concepts (Gioia, Corley, & Hamilton, 2013). Through use of Atlas.ti software to manage the significant amount of data, these codes were grouped into code families. Comparative analysis (Corbin & Strauss, 2008) was useful to compare incidents across interviews and timeframes. For example, multiple respondents used the same examples of Apple interactions to illustrate points; these were all coded together. Similarly, because the data are longitudinal, perceptions of concepts across time could be captured via coding. An example is the two quotes that open this paper from the same person separated by two and a half years.

Code relationships

Network views were developed as part of the second stage analysis. For code families that emerged as most important, these network views enabled visualization of relationships between

codes and assisted in later abstraction to higher level categories, concepts, and themes. In the

tradition of grounded theory research and building on more modern qualitative inductive

research techniques (Glaser & Strauss, 1999; Corbin & Strauss, 2008; Gioia, Corley, &

Hamilton, 2013), from first-order code families, concepts emerged and then second-order themes

were induced. These then mapped to three aggregate strategies Zuni used to address

dependencies. See Figure 2.2 for a diagram showing this data structure and the relationships

between elements (Gioia, Price, Hamilton, & Thomas, 2010; Gioia, Corley, & Hamilton, 2013).

The process of building network views, and iterating between data coding, concept development,

and thematic analysis led to insights related to asymmetries, power relationships, dependencies,

response strategies, and complementor maturity that developed as Zuni joined MSP ecosystems.

First-order concepts

Second-order themes

Response strategies

- Receiving requirements for chip and other technology usage in product design
- Needing interoperability of connected products

→ Technology Dependencies

- Being frustrated with communication processes – missing information related to products
- Balancing secrecy with the desire and need to share information

→ Information Dependencies

- Recognizing differences in values (e.g., backwards compatibility for customers)
- Seeing value in including other firm logos on packaging, but very protective of own brand

→ Values-based Dependencies

- Compliance
- Influence
- Innovation

Figure 2.2 Data structure
(Figure adapted from Gioia, Corley, & Hamilton, 2013)

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A MODEL OF COMPLEMENTOR MATURITY

As a result of the data analysis, I have developed a grounded theory model identifying

relationships between ecosystem joining, ecosystem-related dependencies, and complementor

maturity response strategies. Figure 2.3 provides a diagram of this model. The following sections

explain the elements of the model and the relationships between them.
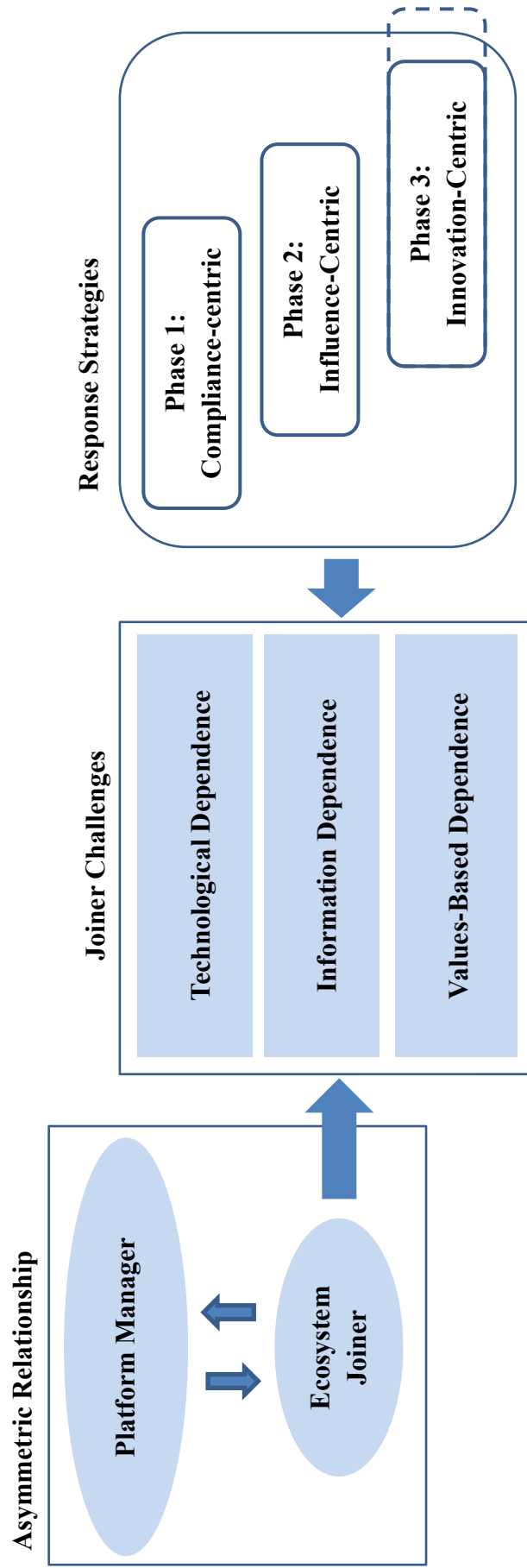
Figure 2.3 Grounded theoretical model of challenges, response strategies, and phases of complementor maturity associated with joining an MSP-governed ecosystem

Asymmetric Relationship

Platform Manager

Ecosystem Joiner

Joiner Challenges

Technological Dependence

Information Dependence

Values-Based Dependence

Response Strategies

Phase 1: Compliance-centric

Phase 2: Influence-Centric

Phase 3: Innovation-Centric

With powerful platform providers such as Apple, Microsoft, Samsung and others developing huge markets for smartphones, tablets, and other mobile devices, in 2011 a large market had been developed for accessory products. Zuni recognized the market opportunity to design products that were optimized to work with particular MSPs' products, and in particular to enter Apple's ecosystem by developing products that would be approved by Apple and marketed with Apple's "Made for iPhone" or "Made for iPad" certification logos. These decisions to create products that required Apple certification, and to move the product portfolio mix substantially in the direction of creating complementor products for powerful MSPs, led to Zuni entering into an asymmetric relationship with Apple as a developer of complementary products.

DEPENDENCIES OF ECOSYSTEM JOINING

As Zuni joined ecosystems of powerful platform-based businesses Zuni experienced three types of dependencies: 1) technological, 2) information, and 3) values-based[9]. I define and outline each category below with evidence of dependencies associated with each.

Technological Dependency

When Zuni started making products to interoperate with Apple products, it experienced technological dependency. Consistent with the definition adopted above of dependency as encompassing the need for important or critical resources, I define technological dependency to capture situations in which Zuni needed resources and requirements from an MSP to create and deliver products and services as part of that MSP's ecosystem (i.e., complementary products). Frequently, and most obviously, these resources and requirements were technology related,

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[9] A fourth type of dependency could also be articulated as economic dependency. However, through the data analysis, it became clear that this dependency was really a product of the other dependencies. Thus, I have not called out economic dependency as a separate type, but it is essentially captured as a result of the other three types.

however, this dependency encompasses all situations in which an MSP prescribed a particular way to do something, or a performance level that needed to be achieved. Thus, also included under the umbrella of technological dependency are all occasions in which an MSP provided packaging or business process requirements as well. Essentially, whenever Zuni was being told what to do or how to do it, I consider it a technological dependency.

The data analysis showed that the concept of technological dependency also included sub-types of dependencies. These sub-types can be envisioned along a spectrum varying by level of resources need by Zuni. An alternate way to conceptualize the spectrum is by considering variation in restrictiveness imposed on Zuni by an MSP. For example, the extreme (worst case) was when specific technologies and their implementations were prescribed by an MSP (e.g., when Apple required accessory providers to use a specific component chip only available from one vendor). A less restrictive example was when an MSP provided technological requirements or standards that a complementor must achieve. These situations imposed different dependencies on Zuni, yet both related to decision-making and resource needs so are captured in the notion of technological dependency.

As it experienced the first type of technological dependency, Zuni had to choose whether to use the required technology. For example, Zuni had to choose whether to incorporate the chip into its design and buy it from the specified vendor. Once Zuni agreed, there was little latitude in how it implemented the requirement to use this technology. Additionally, there were intellectual property (IP) considerations because Zuni was forced to use (license via the chip fee) another firm's IP. This felt to Zuni like a very strong and restrictive requirement. An engineering manager explained,

"So, we had to license a chip. We had to actually utilize the [component from the supplier] that they recommended... And, we had to use their specifications for reference designs in order for it to work with all the varied devices: iPod Nano, iPod Touch, iPhone, iPad. It was a little awkward and what's really interesting is we had trouble making them work."(10-25-11)

In addition to feeling like this was a strong requirement, Zuni perceived that Apple included

technologies that did not add value to the accessory product, but added value only for the MSP.

For example, one was a technology that enabled Apple to maintain proprietary limitations across

the ecosystem. A product manager explained,

"They then put these certain requirements and one of them is this [component] that is just super expensive and, from our perspective, adds no value." (5-9-14)

Not only did Apple dictate technologies Zuni needed to use, but some of those technologies

required Zuni to make performance trade-offs because it believed its own internal designs would

result in better products. An informant outlined the problem:

"I think one of the key things about the Apple problem is… Apple really did want to influence the design of the product. So, if you remember back, we were of the opinion at the time that our designs for the [product attributes] were better than what Apple was forcing us to use. That, I think, was at the heart of one of my problems here." (2-8-12)

For decades, Zuni had been developing products to industry standards, but those

standards were relatively straightforward technologically and provided Zuni with significant

flexibility in how to implement them. When Zuni decided to create products to interface with

Apple products that would need to be approved by Apple, Zuni had to adhere to stringent and

constraining requirements. In instances when a chip was not specified but Zuni was required to

meet requirements, Zuni had flexibility in how to achieve required performance levels, so this

dependency was weaker and allowed more flexibility. Still, because required performance

dimensions were prescribed, the organization's decision-making capabilities were affected as it

had to design products in certain ways (potentially contrary to how the organization would have

preferred to design them), and therefore a technological dependency existed. One manager noted:

"...this whole design is because of them. We used to have it [this way], but when you [interfaced it with] an iPhone or whatever, [there would be a problem] ... So, we had to completely change the design... But at the end of the day, it was all driven by them, by their products, and how people use their products." (10-25-11)

In 2014, even as Zuni had matured as a complementor and accepted the need for compliancy, it was still dealing with significant technological dependency broadly defined to encompass various specification types as Apple continued to impose requirements. An informant explained,

"So, there's a lot of things that are value added, but all this other junk comes along and now...it came up again a couple of weeks ago ...they're specifying more and more of the implementation details of our product and I'm not very happy about it. ...because it's starting to constrain us and second guess us more and more and more. I understand their intent. Their intent is they want this ... so that it works properly. ...but as it's maturing they're getting into their partner's shorts more and more." (4-25-14)

Table 2.3 provides additional quotes illustrating technological dependency.

Information Dependency

Another form of dependency Zuni faced was information dependency. I define information dependency to characterize situations when Zuni needed information from a platform manager to deliver product or services. To compare this with technological dependency, when Zuni was required to meet standards, the need to comply with those standards generated a technological dependency. In contrast, needing to *communicate* about standards, obtain information about them, learn about them, and so on, generated information dependency. Information dependency was characterized by difficulties related to communication between Zuni and an MSP and challenges obtaining information that generated uncertainty related to product design.

As with technological dependency, the data analysis showed sub-types of information dependency. Two types included: 1) *availability* or *completeness* of information, and 2) *timing* obtaining information. In some circumstances the challenge of the dependency was to get information that was not being released. In other situations, the difficulty was trying to obtain information faster than it was being offered. Related to the former, one manager said:

"It is a little bit hard to get answers from them. They have a lot of people, and then they have this certification, 'Made for iPod, iPad' certification that can be a little bit of a pain too, and they have a whole suite of tests but they'll never tell you which ones they'll run..."(10-25-11)

Because of lack of information availability, Zuni spent more time and resources than would have been necessary if it had obtained better information. As a member explained,

"So, you spend a lot of that time because they are so secretive and don't tell anybody anything… spending a lot of your time sort of speculating, 'if this, then we'll do that,' and having contingency plans." (2-28-12)

Members not only recognized this information dependency, but also the potential impact on their business and the advantages of trying to respond to the dependency. An informant explained,

"We're always trying to extract from them, 'Okay, what are you guys going to do next?' They don't tell us, but sometimes they'll give us a wink, wink, nod, nod. Or, we'll say, 'Hey, we are going to be doing this.' And they'll say, 'I'm not sure I'd do it like that, I think I'd do it like this.' And when you don't have that relationship, it's like a tsunami. You get wiped out." (2-28-12)

Apple provided Zuni with various forms of requirements (technological, packaging, financial, etc.) and controlled information flow. There were many times Zuni wanted more information about topics like compliance testing and product design. One manager noted:

"You know they're very closed about what they do technically…very closed. So, it's really difficult to figure out what their product roadmap is." (4-24-13)

Even once the relationship between Zuni and Apple was well established and Zuni was more sophisticated in its interactions with Apple, Zuni faced information dependencies significantly impacting product development. A manager explained the difficulty,

"Another thing that was a real pain in the neck, even though we're a great partner and they want to work with us, just like everybody, nobody got to know what the size of the iPhone 5 was going to be. We guessed." (8-26-14)

Table 2.3 provides additional quotes illustrating information dependency.

Values-Based Dependency

A third dependency Zuni experienced was values-based. I define values-based dependency as situations in which Zuni's core values were challenged or threatened as a result of Zuni's attempts to participate in an MSP-governed ecosystem. Examples of this type of dependency were challenges to how Zuni treated customers or managed interfirm relationships. For instance, Zuni had a different view of customer relationships than did platform managers. As Zuni became a member of MSP-governed ecosystems, those MSPs began to shape boundaries that governed Zuni's customer relationships and Zuni began to lose control of the boundaries. Values-based dependencies can also be broken into sub-types including: 1) *values threats*, and 2) *values clashes*.

Zuni prided itself on customer service and ensuring products lasted a very long time. Zuni informants often mentioned the need to assure products continued to work with older (and newer) generations of products (a.k.a., backwards (and forwards) compatibility). Zuni noted a mismatch with MSPs on expectations of appropriate product lifecycles, which threatened Zuni's values. A member explained,

"…it was just these very small mechanical changes that they require that make things incompatible with previous versions and then make it hard for people to use them with other products … and so their whole philosophy of not worrying as much about backwards compatibility as we do, is a disconnect sometimes." (11-8-11)

Another informant also noted the difference in perspectives:

"It was very important to us, but it takes a lot of bandwidth to do this to make sure that it worked with all the devices that they make as they change. Because they don't have a lot of backwards compatibility drive. As a matter of fact, they have said to us, 'You guys are nuts. It's not compatible anymore. Tell them to buy a new one.'" (10-25-11)

In 2014, over three years after Zuni had started actively participating in Apple's ecosystem, Zuni managers across functional areas still noted that problems remained related to

disconnects in customer service. Zuni's values were not aligned with Apple's, yet Zuni was

dependent upon Apple and thus affected by Apple's values.

"It's a challenge because…and this is the thing where I can't understand how they continue to grow. They have no concern about their customers …they'll introduce a new product, they will have new technology and new functionality and new everything, and they completely ignore their previous customer and the product that they had." (4-29-14)

The values-based dependency went beyond product compatibility to encompass an overall

approach to product development. In 2012, a manager summed up the tension and how that

derived from the values of the organization.

"I have to admit that ... I still don't want to be a part of these ecosystems. That's still where I am. I recognize the need and I recognize how I can be successful, but I would still rather not be a part of it. That's where I stand... It's just not the way we were raised here. We're not supposed to do that. It's just not right. Our products are our products. They speak for themselves."(2-8-12)

Another values-related dependency Zuni experienced was related to interfirm

relationships and expectations. This dependency created clashes with Zuni's values. Before

joining Apple's ecosystem, Zuni managers noted Zuni had not placed high value on working

with other firms. One manager noted:

"There's a saying around Zuni, which is quote-unquote, 'We dip our flag to no one.'"(10-7-11)

Zuni didn't acknowledge a need to work with other organizations, particularly in relationships in

which another party had more power and could dictate activities. As Zuni started to realize the

importance of a relationship with Apple, and the importance of having Zuni products work well

with Apple (and other MSPs') products, this began to change. As another member noted:

"…the reason why we are willing to do that now is because of a change in corporate philosophy right now. Apple created such an environment that we finally had to swallow our pride and say, 'If we don't do things contrary to the way that our philosophies tell us to do things, we will not be compatible.' (10-28-11)

There was also growing recognition of the asymmetry of the relationship between Zuni and

Apple and the dependency that created. As the same manager continued,

"So, that was a philosophical change. 'Okay, they win. They win. We used to be bigger, they were smaller. Now they're a heck of a lot bigger, and we're a heck of a lot smaller than they are, and they win. We dip our flag and we've got to learn to work with them.'" (10-28-11)

Table 2.3 provides additional quotes illustrating values-based dependency.

Table 2.3 Dependency data examples

Dependencies	Data example
Technological	"Apple is the only one who we customize our products to work with their products." (10-25-11)
	"So, when we actually came back and said, 'Okay, these are the demands of Apple. They are incompatible with our technology strategy and, frankly, we don't agree with them. We don't think this is the right customer experience.' We said, 'No, thank you.' We walked away from tens and tens of millions of dollars of business." (10-28-11)
	"Once the needle is in the arm and you're used to that drug, and you've got a big business… the company can't afford for it to go away overnight. I'm responsible for making sure that it doesn't go away, and that Apple doesn't take a hard right turn and we keep going this way." (2-8-12)
	"One thing I worry about is that as the ecosystem matures the base functionality expectation keeps rising, and so the amount of money and engineering effort we have to put into stuff that is checkbox…which, if just doing checkbox we're going to execute on it extremely well, so we still want to do the job, but I'm really uneasy about the portion of our time focus, BOM costs on the stuff that is not making us stand out from others is becoming too high..." (5-1-13)
	"So, I think in the Apple context they have the ability to leverage the technologies that they believe are the most important, and [technology X] has no value to us but it has real value to them." (5-9-14)

Table 2.3 (Continued) Dependency data examples

Information	"Now, the scary part about that is they continue to change their products and the iPhone 4S is out… And they don't tell us. There's no communication to us ..." (10-25-11)
	"That's well beyond the bandwidth they have to deal with us. They've got their teams. They're designing their stuff, then there's the engineer that works with the alliances or the ecosystem that says, 'Okay, can I answer your questions for you?' There's not the path to bring it back in, at least we haven't found that path, yet." (10-25-11)
	"What my hope is that we can just still be communicative. I wish they would be a little bit clearer on some of their expectations. I wish that they would be clearer on what's coming next, but I can't really begrudge them that. I mean, I wouldn't tell anybody what's coming up, so why would they tell anybody what's coming up?" (2-8-12)
	"Yeah, I would love it if these people could figure out, what's an Android standard? What's a Windows standard? What's a RIM standard? Oh, my god. It's not out there. There's just no standard and it looks like…oh, god, it looks like there may…what is it? HTC, I think it's HTC, might even be trying to create their own Android standard." (2-8-12)
	"One form of communication with Apple is called their MFi portal...Apple limits the number of people that have access because there is company confidential information...Our solution was to create this group of people so even though there might be another product that wants to get certified, that program product manager would come to me and say, 'I need to do x, y and z,' and I would help them get that done.." (5-21-13)
	"They keep enabling more functionality. So, with more functionality just comes more complexity which is more testing, but actually where I think the problem is coming into play more is as their ecosystem grows and more players want to be a part of it, it's harder to get Apple's attention to get approval. Sometimes you need the approval, sometimes you can self-approve. It's a little confusing..." (8-26-14)

Table 2.3   (Continued) Dependency data examples

Values-based	"One of our challenges with [Apple] is we are very customer focused and if [a customer] bought our product, we want that product to be able to work with other products. Apple doesn't care. They don't worry about last year's version… Well, if that phone changes and you bought [X] two years ago and they are on iPhone 6 or 7, they don't care about you… And that is different for Zuni. We struggle a lot with that... So they do create more turmoil for us, if you will, in how they operate." (10-25-11)
	"Yeah, this is only hearsay, but … 'Apple, wait a minute. Do you realize that you've gone to a nonstandard [interface] and that nothing is compatible?' And the answer back was, 'Those are the old customers. We care about the new customers. You guys spend too much time worrying about customers who have already given you money. Worry about the ones who haven't given you money yet.' That is hard for us…that's hard for me to fathom. I don't get it." (10-28-11)
	"I think..., philosophically, they don't really worry about backward compatibility. Buy a new one, right? Get the next one. Get the latest. They don't feel an obligation for… that's not as high a priority for them as it is for us... They've got a business model and a set of user expectations that say, 'Yeah, just throw it away. Get the next one. Get the next one.' People expect our products to last for shockingly long amounts of time and they get really, really mad at us when they wear out." (11-8-11)
	"By the way, the whole relationship with Apple is quite new… We developed products on our own terms. Now, we have this external force that is coming and giving us nudges to what is right and wrong. Where, as an organization, for the last 30 years, we decided what was right and wrong." (3-15-12)
	"Our general strategy is one of differentiation in the marketplace. The challenge with having a differentiation strategy when you are working within an ecosystem, or with a partner, is that we, almost by default, don't necessarily want to do things exactly the way they were put in the specification, or they ask us to. So, figuring out how to balance our needs against their needs, and find the middle ground to say, 'Here is what we will do, here is what we will be able to do, and here is what we would like to do. We understand this is where you are, what can you live with to let us do the things we need to do in our products?' And, sometimes that works really well; sometimes it doesn't go our way." (3-29-12)
	"…here we're doing all this quote, unquote, work, with these…the team, and yet we're not…clearly, we're not being treated as enough of a partner that they would even share that seemingly basic information on the dimensions of the product." (4-24-13)
	"We had everything lined up, ready to go, because we have [a product] that's designed to work with an iPhone and it says right on the box, "Compatible with iPhone." ... There's one human being on the face of the earth who has to approve those accessories. It took that one individual on the face of the earth six months to approve it." (8-26-14)

RESPONSE STRATEGIES TO DEPENDENCIES

Zuni experienced technological, information, and values-based dependencies associated with

joining ecosystems managed by powerful MSPs. Over time, as Zuni learned to manage its

relationships with platform managers and became more experienced at being a complementor in

each ecosystem, Zuni developed a variety of response strategies to cope with these dependencies.

The data show evidence of three types of response strategy: 1) compliance, 2) influence, and 3)

innovation. In different phases of maturity becoming a complementor in an ecosystem, Zuni used

combinations of these strategies, with varying emphasis on each, to address dependencies. In the

following sections, I provide evidence of each of these response strategies.

Compliance

There were times when Zuni adopted a compliance strategy as it chose to live with challenges

associated with ecosystem-related dependencies and comply with rules and mandates imposed

upon it. Accordingly, I have labeled the first response strategy *compliance*. For example, when

Zuni decided to increase the number of products optimized to interoperate with MSP products

the general manager, senior leadership staff, and product managers decided to comply with

specifications, guidelines, requests, and so on even though doing so required trade-offs related to

performance and other dimensions (e.g., added costs). In these instances, Zuni did not attempt to

resolve tensions associated with becoming technologically, information, and values-based

dependent, but rather learned to work within constraints associated with them. This strategy is

characterized by Zuni learning about the new constraints imposed upon it (e.g., technological

requirements, branding guidelines, etc.) and deciding how to cope with these new constraints

(e.g., to what extent does it want to be compliant and in what ways). Compliance spanned not

only technological requirements, but also marketing (e.g., compliance logo guidelines, packaging requirements), financial (e.g., royalty audit clauses), and so on.

Some cases of compliance addressed the heart of the organization, its product design decision-making associated with product performance. Early in Zuni's path towards becoming a mature complementor, Zuni recognized that standards Apple required it to meet were not only dictating product design decisions, but also leading to designs that diminished performance below what Zuni could otherwise accomplish operating independently. Still, after weighing trade-offs, Zuni chose to comply, as one manager explained,

"We had a lot of conversations about whether or not the performance they were dictating was up to the standards of being a Zuni product. We had a lot of conversation about that. Finally, in the end we agreed that it was acceptable, but it was certainly not preferred." (10-28-11)

Although Zuni initially resisted complying with specifications imposed by other firms, it began to acknowledge the need to do so to ensure interoperability and gain access to larger markets. Recognizing the value Apple was creating throughout the ecosystem, even though it was demanding compliance, a manager explained,

"Apple is the only one right now who has really effectively created a well…I say this in air quotes, 'well-understood ecosystem where you know what you have to do to be able to play.' And once you've done that and you've got your certificate, then you can put this icon on your product and everybody knows."(2-8-12)

Still, challenges remained even as Zuni became a much more mature complementor and accepted its need to comply with requirements. An informant acknowledged Zuni's need to comply and relayed the ongoing frustration,

"*[Apple is] continuously increasing the requirements document around compatibility with their Made for iPhone program, and so the list of things we must comply with... they're ever increasingly specifying what must be done to the point where I'm starting to get really unhappy and uncomfortable." (4-25-14)*

Apple maintained significant influence on Zuni product design choices that required compliance and cross-organizational interfirm processes. A manager who played a leadership role in this process explained the certification process,

"...we communicate with Apple through this web interface. We tell Apple what products we're about to develop and they either accept that idea or reject it, and if they accept the idea, then we can start buying certain components... we develop prototypes... we send them to Apple and they certify they operate appropriately ,...we also submit our packaging...." (5-9-14)

Influence

Compliance is associated with acceptance. Influence, in contrast, is based on the notion of not accepting circumstances, but rather aiming to change them. The data analysis shows that as an element of Zuni's multi-pronged strategy to address ecosystem-related dependencies, it employed an *influence* response strategy to try to improve circumstances in which it operated and to test the boundaries of the constraints under which it was operating. Whereas the compliance strategy was most directly aligned with responding to technological dependencies, the influence strategy applied across all three dependencies: responding to technological by trying to alter requirements, information by trying to influence to gain better and more timely information, and values-based by trying to change values-challenging situations. Although compliance and innovation responses encompassed Zuni activities within boundaries of its own organization, the influence response addressed interfirm relationship challenges and crossed boundaries. It centered on interactions outside organizational boundaries, and captured instances in which Zuni attempted to influence sensemaking (Weick, 1995) and activities of another party.

Early in the study when Zuni was newly operating as a complementor, the data suggest that influencing was not a notable part of Zuni's overall approach. Zuni did not yet believe it had the ability to influence. A working level manager explained,

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"... basically, we take what we're given, interpret it to the best of our abilities, go through, basically, normal and routine channels of question asking, but that's really all it is. It's a specification with question asking and clarification without any ability to impact those specifications or change them ...." (10-28-11)

Even at that time early in its path to becoming an established complementor, a more senior Zuni manager held the optimistic expectation that if they worked hard to build a relationship with Apple the relationship would grow and be mutually beneficial. Zuni placed a high value on relationships and building trust over time, and presumed other companies did as well. Thus, this manager believed that by executing a compliance strategy, or playing by the rules, Zuni would be able to influence the relationship. He explained,

"I think part of our philosophy is also that, over time, if we can respond appropriately and behave appropriately, then that kind of behavior, hopefully, will drive products that will be very successful at Apple. And the good company they are, they'll recognize, 'Whoa, there's an opportunity for a lot more success working with this company than others. Alright, let's make this relationship stronger.' So, I think that our unwritten hope is that by following the rules, doing what we're supposed to do, that will be the entry into a bigger relationship." (10-28-11)

As Zuni became more mature as a complementor, it developed established processes for working with Apple, and slowly started to push back on certain requirements to address dependencies it encountered. Though Zuni could have pushed for changes for the entire ecosystem, Zuni's main motivation was to gain freedom of action for its own products so, at least initially, Zuni was content (and potentially preferred) to gain exceptions to existing requirements, or waivers, rather than requirement changes. Referring to how Zuni used influence to address a technological dependency, a product planner explained,

"...[Apple] puts together guidelines for certain technologies and says, 'You should do this big list of things' And, for one of our products...we wanted to treat it like a different set of requirements... so, I brought pictures and I pitched it to them... We actually got through that... we got an exception." (3-29-12)

There were also occasions in which requirements caused problems and Zuni attempted to influence Apple to change these requirements. Apple started to recognize the value Zuni brought technically and began to more readily accept Zuni's technical inputs. A Zuni manager explained,

"Well, Apple, in their last upgrade, they somehow [caused a problem with the product interface] ...we pointed it out to them. [Apple said,] 'Ahh, yeah, we'll have to fix that.' So...they appreciate ...what we bring to the party from a technology point of view..." (4-24-13)

Relevant to both technological and information dependencies, a manager explained how the relationship between engineering teams had evolved,

"...the engineering relationship is actually at this point quite deep and you know the thing we talked about where we feel like we can give them information to make it work better? I mean we've been having actually that kind of relationship with their engineers where we found some bugs that they didn't know ... and you know they revised it..." (3-14-14)

When I asked if this type of relationship had existed from the beginning, the manager replied,

"Not at all. No, not at all. I mean first of all, Apple is not open to that mostly but, second, we just haven't been positioned but we sort of said to ourselves a few years ago we need to get in deeper. We're so dependent on them. We need to try to get in deeper, and the only way to get in deeper is to offer them value... To help them establish the standard for something new."(3-14-14)

Zuni's aspiration was to be a preferred partner of Apple's in their complementor role. They hoped Apple would come to them first to discuss product ideas and provide early information regarding upcoming technology changes. Put another way, as Zuni managers referred to it, they were trying to avoid being one upgrade cycle behind, which happened when they did not get advance product information (and therefore had to wait until a product was launched to get full information about it). To that end, as Zuni became more adept in its role as a complementor there were times when Apple asked Zuni for input, so Zuni was able to exert influence. An informant explained,

"So, we have zero visibility because we're not a customer, we're not a supplier, we're a user of their technology and they look to Zuni for helpful input because they trust us." (4-25-14)

Though engineering interactions grew stronger, as the relationship matured, the management team began to perceive the relationship in a less positive manner. Apple had always competed to some extent with Zuni products by offering their own versions, but as the market grew they began to more aggressively do so and started to compete more directly with Zuni. As this occurred, it became clear that Zuni would not be a preferred partner and Zuni managers recognized that though they had some success influencing Apple's technical decisions, they had not built the relationship for which they had originally hoped. They realized that their product offerings would always be slightly behind those offered directly by Apple because of the imbalance in information.

In August 2014, a key manager reflected,

"I think the relationship we established was only on the surface. It never went deep."(8-26-14)

This comment, and others like it, contrasts with previous quotes explaining the improved depth of the relationship and may have been affected both by Apple's more aggressive moves into Zuni's markets and also Zuni's evolving maturity as a complementor. It illustrates that there were different opinions within the organization about the level of influence Zuni had with Apple, and these opinions seemed to depend on whether one was discussing technical bug fixes and such, or more strategic technology and product planning. The strategy of influencing was quite successful relative to tactical problems with technical specifications, fixing bugs, clarifying confusion, and so on, but was much less effective relative to generating substantive product changes that benefitted Zuni (and in keeping Apple out of direct competition with Zuni).

As Zuni management recognized that the level of influence they were able to have was limited, and that the relationship they were building was not as mutually beneficial and trusting

as they had originally hoped, Zuni became more sophisticated with its communication

approaches and its influencing attempts. Continuing the previous discussion about having a

surface-level relationship, the manager explained further how he only wanted to influence in

ways beneficial to Zuni,

"...every meeting I had with [our liaisons] where we would talk about this I reminded [them] every chance I got, 'Don't...go too far with this. Please don't teach. Please don't share. Please answer questions in a way that still lets us keep our competitive advantage but...enables us to impact *some of the decisions they might be doing so our stuff can work better.'" (8-26-14)*

Zuni was attempting to influence, but to do so to improve its own ability to innovate. Still,

outcomes were not always as expected or desired. This was particularly true for outcomes that

were less tactical and more strategic in nature. Lamenting the difficulties with the relationship,

the same manager further explained,

"If I can interpret some conversations I had from the engineers after their meetings I actually think we helped... I think we helped the Apple engineers think through, architect, and craft some of the [interfaces]...There's no question in my mind we helped. But there's also no question in my mind we reaped absolutely no benefit from that. None, none whatsoever."(8-26-14)

Innovation

Beyond compliance and influence, the data show Zuni invoked a third response strategy, which I

have labeled *innovation*. Zuni chose to make changes to its offerings, and organizational

processes, to resolve challenges associated with dependencies of being a complementor. These

changes can be grouped into two types, 1) those aimed at making Zuni a better complementor

within the constraints of an MSP's ecosystem (e.g., developing innovative approaches (possibly

technologies) that enable it to comply better with requirements), and 2) those aimed at Zuni

avoiding dependencies by creating products that do not require compliance even though they still

may work with an MSP's products (e.g., by using a standard industry interface, or developing products to work with competitive products).

In the first type of innovation within the constraints of an ecosystem, innovations sometimes were product-design-specific (e.g., modifying a product design to be less dependent upon Apple technology) and other times affected marketing and other functional areas (e.g., changing a product's color or advertising). Though Zuni accepted it often needed to be compliant with MSPs' requirements, and realized it had some ability to influence, it also recognized that even with an ecosystem, compliance did not limit flexibility along *all* dimensions. Zuni retained the ability (and necessity) to innovate to differentiate, and understood that although it could become compliant along some product dimensions, it could still innovate along other dimensions that might lead to higher differentiation.

Pursuing the second type of innovation, Zuni also began to innovate with other technologies that had much less or potentially no dependency on ecosystem requirements. These initiatives were aimed at Zuni being able to offer products that would work with an MSP's products, and thus Zuni would still be a complementor, but might not require Apple compliance. A non-Zuni example of this would be if an accessory maker produced a case for an Apple product, but didn't run it through any Apple testing. It would not be able to display the "Made for iPhone" logo, but it also would not be faced with Apple dependencies. Zuni pursued innovation projects that might enable it to also offer products that would work with Apple products, but not have as much (if any) significant dependencies. Additionally, as Zuni became more mature in its relationships with MSPs, and particularly with Apple, it began to more actively join other ecosystems (e.g., Samsung's) and to innovate in how it operated in new ecosystems to attempt to reduce risks associated with dependencies.

Zuni had always been a technology-centric innovation-focused organization, which was clear from the earliest interviews. At that time, the innovation focus was almost entirely on technological innovation, and not innovating around Apple requirements. A manager explained,

"Our goal is not to become the largest market share or the highest sales dollars. It's around technology innovation, because our philosophy is always that if you can drive that, then the level of profits and margins all come after." (10-28-11)

Thus, Zuni's inclination was to think in terms of technological innovation. As it focused more on products to work with Apple products, Zuni needed to think more holistically about its products. Joining an ecosystem began to affect how Zuni was innovating from a product perspective. Another informant explained,

"... the whole relationship with Apple is quite new... We developed products on our own terms. Now, we have this external force that is coming and giving us nudges to what is right and wrong. As an organization, for the last 30 years, we decided what was right and wrong."(3-15-12)

Zuni started to consider how to balance its need for compliance with its desire for differentiation. An organization member relayed the difficulty,

"As a company, our general strategy is one of differentiation in the marketplace. The challenge with having a differentiation strategy when you are working within an ecosystem, or with a partner, is that we, almost by default, don't necessarily want to do things exactly the way they were put in the specification, or they ask us to." (3-29-12)

As Zuni's role as complementor continued to evolve and it became more sophisticated in its thinking about how to remain competitive and address the dependencies it faced, it realized that although historically it looked to measures of technological performance, it needed to re-frame its conceptions of performance and focus on other dimensions beyond technology. Zuni innovated by redefining what it considered its primary means to differentiate. A manager said,

"The heart of the product has to be technology. The reason for the product to exist and the reason for it to be in the Zuni portfolio is because it's delivering performance…in the past that

was what we focused on and that's what we marketed. What we are understanding now... is that we have to expand our definition of the word 'performance.'" (4-11-13)

Zuni eventually also recognized that becoming part of an ecosystem, and the dependencies associated with that, affected multiple parts of the organization so responses needed to permeate the organization, including affecting product innovation processes. The same manager explained,

"...when we define our product concept up front we have to take into account relationships now. We have to take into account which products are these going to be used with and which parts of the ecosystem do we have to have alignment with?...it's got to be much more tied together?"(4-11-13)

Since Zuni employed a multi-pronged response strategy, the innovation strategy was deployed in conjunction with compliance and influence strategies. For example, as Zuni was becoming an active complementor to other MSP businesses such as Samsung, Zuni recognized it could use its ability to innovate to be more successful at influencing. Although Zuni didn't like being burdened by technical requirements, it came to recognize the value of requirements for increasing interoperability and reducing risk. A manager speculated about what actions Zuni might take to innovate and create its own standards and then influence an MSP to use them,

"They have no ecosystem so we're going to have to probably build an ecosystem for them. We'll probably have to point out to them that there is nothing to develop to, that they don't actually have standards, and so we're going to have to make decisions like: Are we going to make standards and give them to Samsung? ..." (5-9-14)

Table 2.4 provides additional examples of response strategies from the data.

Table 2.4 Response strategy data examples

Response strategy	Data example
Compliance	"...we needed to recognize the value of Apple products to our customers. Like I said, when 80 percent of them are using Apple products, if we wanted to continue to grow sales, we needed to make that realization..." (10-25-11)
	"It creates a service issue for us, so we need to come up with a minor tweak to our engineering to work with their systems, if you will." (10-25-11)
	"...in the past we were more than willing to walk away from business. It's not quite the same anymore. We needed this business; otherwise, all of our great technologies were not going to end up being used anyway. … I can honestly say I would not be sitting here in this role and this division would not be doing what it's doing if [Apple] hadn't done what they did." (10-28-11)
	"…we're going to be massively influenced now by the biggest players in this ecosystem. If (platform managers like) Samsung are all of a sudden going to dump $2 billion dollars in marketing around their new device, and guess what, we don't work with it…(sigh)…bad news." (4-11-13)
	"The thing that's happened recently, and we're still ... trying to get our head around this, is that Samsung is emerging as a pretty substantial competitor to Apple in the smartphone space where it seems like they're starting to become the one that's going to bubble up above all the others. That's interesting because now… there's maybe a smaller subset of things that if we could make sure we're compatible with those, then life is good, right?" (5-1-13)
	"So, it's a love/hate relationship with them, you know? Their sales have allowed us to grow ourselves, but they don't make it easy." (4-29-14)
	"... we still make our products [perform] right, but we are either adding in cost or complexity. There are new failure modes that could happen. So, from not necessarily customer-facing but internally we're like, 'We could have made this better. There are more elegant designs'…but we had to do it this way." (5-9-14)
	"... everything that we did was sort of justified in the market context. Like, 'If we don't do this with Apple, we will lose the majority of our business.'" (5-9-14)
	"The only thing special we're doing is we are incorporating the design that they require. So, to use their [technology] there's a certain [technological] approach. There are specifications that have to be in the product to do that. ... So, we do something specific so that it can [work with] an Apple device and we put the little Apple thing on the packaging based on their specifications, but that's it. There's nothing else that we're doing…" (8-26-14)

Table 2.4 (Continued) Response strategy data examples

Influence	"I think our hope someday is to have our engineers speaking with their engineers to generate solutions. And, also, our marketers [to be] speaking with their marketers, although I think that is more pie in the sky… We're not going to really work with them in that sense, but I mean that would be nice if we could mutually solve those types of problems as well." (3-15-12)
	"I mean so once the spec is a spec…I mean so what I will say I've observed is they do actually listen to us and we have some relatively special access to be able to talk to people who will listen and are close enough to decision making, but they occasionally…you know months later they'll come back and say, "Hey, this changed." It's like, 'Oh, okay.' We never know if that's under discussion or it's a closed convers…we don't know what is actually being taken and run with versus just dismissed." (4-25-14)
	"As a company we've made a conscious decision that we're not going to have…not anybody can just reach out to Apple with questions or concerns. They all get funneled through [name]. I'll craft an e-mail that goes to [name] and I'm like, '[Name], this is why we did it,' and he and I will banter back and forth whether or not I was right or wrong because…it's possible that I'm wrong. ...And then we craft that reply together..." (5-9-14)
	"What else has to change is that you need somebody that can go out and interface with them and understand, okay, make the proper impedance match so there's just relationship management and then there's some technical management that has to happen. …the person that's going to take advantage of the ecosystem, in this case Zuni, that has to understand the licensing deal and it has to be maybe a combination of a legal person and/or a licensing specialist and then finance has to be involved because they have to be paid royalties, so we have to figure out how am I going to do this?" (6-2-14)
	"... outside of the just general transactional side I think there's a little bit of bilateral influence going on. We certainly advocated for certain things and even gotten them. They've advocated for certain things and gotten them from us... I mean in the scheme of things they probably…well, they certainly have more power in the relationship but the nature of influence has been reasonably well balanced ... They're incented to build an ecosystem and work with partners so they want to do well." (6-3-14)

Table 2.4 (Continued) Response strategy data examples

Innovation	"...the reason the products are changing is because the applications that they're attached to are changing." (11-8-11)
	"We don't necessarily want to be expert in xyz. And then we had to decide, was that important enough to us? It is. Can't find it. Develop it. And we have the research backing in [parent] where we've got material science groups, we got pure researchers.'" (10-25-11)
	"Honestly, I've worked for three other companies. I've never seen people as passionate about the company, the brand, the products as I have [here]. It's really... it's a beautiful thing. It really is. We encourage innovation in all aspects of our work, not just engineering, but everywhere and, together, we create value for our customers." (11-8-11)
	"We've gone both ways. We've changed products when we've needed to meet their spec, and we've excluded their technology." (3-29-12)
	"... finding the right balance of, you got to do those things to stay in the game, at least some of them, but if you do them all you've got nothing left for the stuff that is why you're better and different than everyone else. And so, that balance worries me." (5-1-13)
	"I don't think the performance part is ever going to go away. I don't think engineering ..., I don't think that will ever go away. I mean that's really, really, really at the heart. The difference is that it's not only that. There are other pieces that are part of it..." (3-14-14)
	"I don't think anything has changed as far as values go. That is actually pretty strong. It can be a hindrance to progress because [values are] used as a crutch. Because people sort of use [values] as an excuse, so people are like, 'Oh, we haven't done it that way in the past because we never do this, this or this.' And it's like, 'Alright, so I just have to frame the problem differently so that it does fall within our values.'" (5-9-14)

Table 2.5 provides examples of how Zuni applied the three response strategies to each of the ecosystem dependencies. The responses along the upper left to lower right diagonal (i.e., complying to cope with technological dependence, influencing to resolve information dependence, and innovating to address values-based dependencies) are the most obvious and ones that potentially might have been expected. The off-axis responses provide some more surprising and interesting findings and examples. For instance, Zuni's struggles related to compliance in the context of threats to their core values, and Zuni's efforts to innovate to reduce information dependency, show the broader scope and applicability of the framework and highlight how it can be used to uncover more subtle challenges and responses of MSP-complementor relationships, particularly in the presence of power asymmetries.

Table 2.5 Example response strategies mapped to dependencies of ecosystem joining

Response Strategy	Technological dependence	Information dependence	Values-based dependence
Comply	• Comply with specifications (e.g., technical, packaging, business processes)	• Proceed with info received and don't share to influence	• Comply with logo guidelines and work to understand intention of MSP as comply; Focus on interpretation and customer implications
Influence	• Provide feedback to fix and improve specs	• Create liaison process and appoint contact people to negotiate	• Suggest standards and logo compliance guidelines; aim to change intentions and customer experience
Innovate	• Design products that take into account platform requirements and re-define how to differentiate	• Design products less dependent on platform info	• Offer products less sensitive to backwards and forwards compatibility to reduce customer concerns

COMPLEMENTOR MATURITY

Zuni matured as a complementor as it improved its ability to respond to the dependencies associated with joining an ecosystem, adopted new behaviors, and shifted attitudes toward being a complementor. Zuni combined three response strategies (compliance, influence, and innovation) into strategies addressing ecosystem dependency challenges. The relative mix of

response strategies Zuni used varied as Zuni became more mature in an ecosystem relationship. Since the data in this study encompass primarily Zuni's relationship with Apple, I use the evolution of Zuni's maturity as a complementor to Apple to distinguish three phases (or stages) of complementor maturity. Leveraging the temporal element of this data, enables me to take a process perspective and identity an arc of stages through which Zuni passes as it becomes more mature as a complementor to Apple. It is also clear in the data that Zuni began to move through similar stages as it joined other ecosystems. In subsequent ecosystem joining, such as with Samsung, Zuni started to move quickly through the phases, but still started at the first phase (rather than starting at a later phase). Using this data set and related analysis, I can identify a strategic process Zuni followed as it aimed to increase its performance through its role as a complementor to Apple.

The data collection for this study took place in three main blocks of time separated by approximately one year each (see Table 2.1 for dates). The identified phases closely align to these time periods since they match well with Zuni's evolution as a complementor. During the first interview block, the focal division had recently started offering products optimized for Apple's ecosystem. Thus, data in this block matches well with Phase 1 since Zuni was very compliance-centric. During the second interview block, the division's product portfolio had become almost entirely designed to work with Apple products. This corresponds well with Phase 2 since Zuni was working to influence Apple and align products with Apple product launches. However, to more closely match with the data, the second phase spans two interview blocks and crosses from the second to the third interview block. In the early portion of the third block of interviews, the division was still heavily focused on attempting to influence Zuni and build a stronger relationship. During the later time of the third block of interviews, Apple began to more

aggressively compete with Zuni by entering its markets. Thus, the third phase starts during the middle of the third interview block when Zuni started more vigorously pursuing an innovation-centric strategy. By the end of this block, with Zuni firmly in Phase 3 of complementor maturity, the data show Zuni more actively focusing on products for other ecosystems and becoming less dependent on technologies, information, and aligning values with Apple.

Various indicators provided evidence as to when Zuni moved through different stages of complementor maturity. For example, during later interviews, informants mentioned organizational structures, liaison processes, and standard operating procedures that had been established to address compliance considerations. Similarly, informants explained routines related to meetings with Apple and the outcomes of these meetings, which provided data associated with Zuni's influencing strategies and accompanying activities. They provided indications of the difficulties associated with working with Apple, gathering information from them, and attempting to modify the constraints under which Zuni was operating.

Phase 1 – Compliance-centric

In the first phase, which I refer to as *compliance-centric*, Zuni expended a great deal of effort reacting to the new requirements imposed on it as it became a more active ecosystem participant. During this phase, not only was Zuni figuring out how to become compliant, but it was also wrestling with decisions about to what extent it was comfortable with following requirements. Though the phase is called compliance-centric to represent the amount of attention being paid to the notion of compliance, it is important to recognize that some of this effort was, in essence, being directed at figuring out ways not to be compliant. Still, the data shows a good deal of effort

being placed focusing resources and attention on how to become compliant. An informant

explained the difficulties of compliance:

"...engineering never goes like it's supposed to. Simply being handed a card or handed a spec or handed a requirement... it's not rocket science, but I think it's more work than a lot of people would guess... you can make A work and you can make B work, but when you plug A and B together, you always get unexpected interactions, period."(11-8-11)

A great deal of managerial focus was spent on challenges and tensions related to compliance

with various informants mentioning meetings and discussions struggling with performance trade-

offs and debates about new design influences and Zuni's willingness to comply with new

requirements. Although Zuni was highly focused on technological prowess and product design,

during this phase it was grappling with a growing recognition of the need to compromise to

participate as a complementor in an MSP ecosystem.

An example of this compliance-centric thinking that moved beyond product design to

branding and packaging revolved around ecosystem compliance logos. Zuni strongly resisted

adding any other firm's brand to its packaging and struggled with the idea of having to comply

with branding requirements. It eventually chose to allow the logos, but this was a highly

emotional decision for many of the managers. An informant explained,

"And then the fact that you have to put Apple mandated stuff on your packaging - that made it tougher. One of the things I'm realizing now, it's actually beneficial to be able to do that... So, if I can finally accept the fact that our product is an accessory and not a product, which...don't tell anybody in the company I admitted that. Then, it behooves the customer at the point of sale to be able to know: 'Can I use this accessory with the thing that I want to use it with?'" (2-8-12)

Zuni became accustomed to including others' brands on its packaging. Contrary to Zuni's initial

resistance to logo inclusion, Zuni became so comfortable with this complementor compliance

mentality that managers became frustrated when MSPs would not provide logos and guidelines:

"I mean...we're trying to figure out, what is Windows' compatibility? Windows doesn't even know and they won't let us use their icons. So, how can you tell a customer, 'I'm compatible with

a Windows phone,' when Windows' licensing team won't even let you use the Windows name or icon on your product?" (2-8-12)

During this phase, Zuni did not emphasize influencing Apple but rather recognized it did not have a relationship with Apple in which it could provide input. An informant explained,

"They're not asking us, 'So, what are you trying to do? What experience are you trying to create?' There's none of that."(10-25-11)

Still, supporting the notion that Zuni was following a multi-pronged strategy, a senior manager noted that Zuni needed to start thinking along the lines of an influence strategy:

"We'll learn from our relationships with Apple to make sure we do things better in the future, but I think at this point everything is moving so fast, we've got to ramp up our ability to contribute to this ecosystem, as well."(2-8-12)

Though Zuni was not significantly innovating against dependencies in this phase, Zuni was starting to develop an innovation response. Zuni senior managers were beginning to think about innovation to address the dependencies. A manager explained,

"It's time for us to start to think about, how can we create a new category? We need to be looking at technology that is not just going to be subservient to them. How can we create an experience that is independent of this ecosystem? Ideally, it would be one that doesn't even need this ecosystem. So, that is actually where I'm putting my creative juices emphasis..." (2-8-12)

Phase 2 – Influence-centric

In the second phase, which I refer to as *influence-centric*, the angst associated with being newly saddled with compliance requirements seemed to abate somewhat. Zuni accepted the need for compliance and started to learn to work within Apple's processes. One of the key managers explained how they coped with testing requirements,

"...as Apple evolves their products there's increasing amounts of interoperability testing we need to do, but they do a very good job of supporting their devices in a way that maybe there's some slight variation, but largely we do things according to their rules and it works." (5-1-13)

Zuni developed a liaison process with regular meetings, documentation, etc., which enabled less

significant senior management involvement in the process. A participant explained,

"So, we have a standing meeting that we call the MFi meeting…some of us were chosen to make sure we fully understand how to introduce a new product for Apple. We sit down and we discuss all the issues that we're having with Apple. We then document all those issues and give them to one of two people." (5-21-13)

In a similar example, the organization accepted the need to include compliance logos on its

products, and implemented a process for complying with these requirements (but emotional

tension around it remained):

"With Apple it was sort of a…we had to work with them to get permission and to get the logo, pay the royalty; we held our nose and we did all that stuff." (6-14-13)

Compliance continued as an essential response strategy to cope with dependencies, but on a

relative basis, management effort towards it was reduced.

With regular compliance-related interactions somewhat under control, and thus increased

bandwidth available for other types of response strategies, Zuni continued to mature as a

complementor and shifted its attention towards relationship building and influencing

circumstances. Zuni was able to place more emphasis on instances in which dependencies caused

problems and needed to be substantially addressed. Explaining a Zuni response to a situation that

included a technological dependency and a performance trade-off, an informant explained:

"...sometimes it's like, 'Well, that's not what we were going to do and really that's not the best way to do it,' and so we'll argue with [Apple] sometimes, but I gather that we're actually one of the few people that argue with them about that sort of stuff." (5-1-13)

Similarly, a manager explained another interaction in response to a technology dependency in

which Zuni influenced the situation:

"So, we went back to them and we said, 'We are not implementing [that technology],' and their reaction was typical which is, 'Why not? We told you to.' And then, we provided data that said it

degrades the experience - we cannot do it. They reacted well to that and had us provide data with our measurement techniques... they really appreciated the thoroughness...” (5-21-13)

Another manager emphasized the extent to which Zuni was learning how to submit feedback, work within Apple's systems, and move beyond a simple compliance mentality. He explained,

"...right now we're trying to be more proactive, so not only would we submit a bug report but then we're beginning to improve our network where whoever submitted the bug report will e-mail [a Zuni liaison] and say, 'You ought to bring this up [to Apple] and tell them to reach out to me with a more detailed explanation with data.'” (5-21-13)

While operating in this phase, Zuni also began to more steadily incorporate an innovation response as it started to more specifically recognize how dependencies were causing inefficiencies in Zuni products. While explaining another very specific example of a technological dependency, the same manager explained,

"So now I'm always thinking of ways around that because that annoys me. It just makes the [part of the Zuni product] expensive and it's not value added to the customers... It doesn't degrade the experience but it's not adding value to the customer, so it bothers me that I pay for it when I could use that money elsewhere to enhance the experience.” (5-21-13)

Phase 3 – Innovation-centric

Though in Phase 2 the data show examples of Zuni beginning to innovate to avoid dependencies, it is in Phase 3 when Zuni continues its evolution as a complementor and more substantially starts to use innovation as a relatively significant response strategy. In this phase, Zuni places relatively more management emphasis on innovation than compliance or influencing. Consistent with these behaviors, I refer to this third phase as *innovation-centric*.

In this phase, Zuni seemed to spend less management attention on compliance details because, though the organization still exhibited many compliance behaviors, these behaviors (or routines) had become part of a normal operating mode. As a manager explained,

"We've gotten a lot more mature… There's a lot more organizational ownership of working to their specs. I've set up a whole cross-functional team and they're mostly running on their own. We've got much more internal buy-in that this is what we're doing…we all grump about it sometimes but people understand why we're doing it and we do it …it's just part of our standard work." (4-25-14)

Similarly, yet somewhat counter-intuitively, in this phase Zuni also started to reduce its emphasis

on influencing as a response strategy; during Phase 2, Zuni's management emphasis on

influencing seemed to have peaked. By Phase 3, senior managers recognized Zuni was not going

to be successful in building the type of relationship with Apple to which it had initially aspired.

A managed commented:

"So, I think the lesson that we've sort of learned here is…there really isn't a two-way ecosystem. There really isn't something where two companies who are competing in a marketplace really…really want to work together for mutual benefit because one is always bigger than the other." (8-26-14)

Apple had started to aggressively enter Zuni's markets and compete head-to-head with Zuni

products. Zuni's influencing efforts reverted to focusing primarily on tactical changes to

technical specifications and bug fixes.

Zuni's primary emphasis in this most mature of the three phases was on innovation and

determining how to continue to offer differentiated competitive products while living with the

dependencies imposed by operating within a large ecosystem controlled by a more powerful

organization. A manager explained,

"If I don't pursue these other side opportunities I think the way that Apple has evolved is going to prevent me from getting the growth I need. That's why I need to do it."(8-26-14)

As part of these efforts, Zuni not only focused on innovation within its own boundaries, but also

on actively engaging with other ecosystems run by large MSPs (e.g., Samsung, which by this

time had emerged as another powerful market leader). Referring to working both with Apple and

Samsung, yet also highlighting the need for an innovation strategy, one informant noted,

"I still have to work with Apple. I mean, my god, I still have to make things that work with the Galaxy device. I realize that. But I've got to do more." (8-26-14)

To summarize, Zuni progressed through three phases of complementor maturity. In each phase, Zuni deployed three response strategies (compliance, influence, and innovation) to varying degrees to counteract the effects of dependencies they experienced as they joined an MSP ecosystem. Figure 2.4 summarizes shifts in management attention through the phases.

	Phase 1: Compliance-centric	Phase 2: Influence-centric	Phase 3: Innovation-centric
Compliance	●	◐	◐
Influence	◌	●	◐
Innovation	◌	◐	●

Key: ● = substantial management attention

◐ = medium management attention

◌ = less management attention

Figure 2.4 Management attention variation by complementor maturity phase

Reading across the columns provides an overview of the relative emphasis on strategies in each phase. In the first phase, Zuni focused primarily on compliance with much less attention placed on influence and innovation. In the second phase, Zuni placed a great deal of emphasis on influencing, and still worked considerably on managing compliance while also starting to

increase attention on innovating to respond to dependencies. This phase was the peak time for

Zuni's efforts related to influencing. In the third phase, Zuni had shifted its attention to a great

extent towards innovating while still placing some emphasis on influencing (mostly around

tactical topics like software bugs). In this third phase, Zuni had already established new norms

and operating procedures to address compliance, so exerted less management effort on

compliance.

Reading across the rows provides a view of how each response strategy shifted through

the phases. The compliance strategy started high and steadily decreased in management

attention. The influence strategy started low, then increased in the middle, then decreased once

Zuni recognized the relationship was not progressing to address strategic initiatives. Finally, the

innovation strategy started low when Zuni was heavily focused on compliance, and then steadily

increased as Zuni matured as a complementor.

DISCUSSION

In this paper I explore how mature incumbent firms that join MSP-governed ecosystems as

complementors cope with dependency challenges. I highlight three response strategies that

employed in combination comprise multi-pronged strategies complementors execute as they pass

through three phases of complementor maturity. My theoretical framework illustrates how a less

powerful firm joining an established ecosystem experiences dependencies and then addresses

these challenges over time by modifying a hybrid set of response strategies.

A complementor perspective - The vast majority of current literature related to MSP-

based businesses and ecosystems focuses primarily on platform managers governing these

systems and the various barriers to growing and competing in ecosystems such as the "chicken

and egg problem" (Caillaud & Jullien, 2003) and winner-take-all concerns (Cennamo & Santalo, 2013). Scholars have proposed solutions to address these problems that include types of pricing strategies (Hagiu, 2009), governance mechanisms (Boudreau, 2010), and multiple approaches to building and growing ecosystems (Eisenmann, Parker, & Van Alstyne, 2011). By looking at platforms and ecosystems from the perspective of an accessory provider joining ecosystems as a complementor, and focusing on an organizational perspective, I am able to contribute new insights to our understanding of these systems including those related to dependencies, response strategies, and phases of complementor maturity.

Complementor maturity - Recent literature on ecosystem governance has studied technology ecosystems at different stages of maturity considering how ecosystem evolution may affect generativity and innovation of entering complementors particularly in the face of contradictory logics and paradoxical tensions (Boudreau, 2012; Wareham, Fox, Cano Giner, 2014). Wareham, et al. (2014) note that from a population perspective complementor maturity is relevant and they call for further exploration of generativity as ecosystems evolve, but this work does not explore strategic and organizational changes undertaken by complementors as they mature in their ecosystem participation.

MSP-complementor relationships are different from other types of interfirm relationships - Whereas supply chain and alliance researchers study interfirm relationships similar to complementor relationships that also exhibit joint dependencies with shared risks and outcomes (Gulati & Gargiulo, 1999; Helper, MacDuffie, & Sabel, 2000) and potential asymmetric power dynamics, the MSP complementor relationships studied here have characteristics that distinguish them from these other forms of interfirm relationships. As illustrated in Figure 2.1, MSP relationships exist in a triangular form in which both the MSP and

the complementor establish relationships with end customers. In contrast, in supplier

relationships and alliances, the focal organization operates in a linear fashion with its suppliers

and/or partners whereby one entity (usually the buyer or larger alliance partner) owns the

customer relationship and ultimately provides the added value (Brandenburger & Stuart, 1996).

In contrast, in complementor relationships, the MSP offers a product or service and the

complementor offers a distinctly different product or service (e.g., an accessory product) that

builds upon the initial offering to add increased value (Brandenburger & Nalebuff, 1996; Yoffie

& Kwak, 2006). The primary difference between linear and triangular form relationships is that

in the triangular (MSP) form, the complementor maintains a direct channel to the end customer.

Thus MSPs have some similar characteristics to other forms of interfirm relationships, but are

distinctly different (see Hagiu & Wright, 2015b for a more extensive comparison of the MSP

business form with other business models). It follows also then that dependencies associated with

MSP-complementor relationships might be different than those exhibited in other types of

interfirm relationships.

   Dependencies and responses are different in MSP-complementor relationships -

Management scholars have explored responses organizations use to control dependencies in

interfirm relationships (Green & Welsh, 1988; Provan & Skinner, 1989; Xia, 2011). Since MSP

relationships share attributes with traditional interfirm relationships, it is worth considering

whether dependencies and responses in complementor relationships are different than those in

other forms of interfirm relationships. Technological dependencies are evident in linear

buyer/supplier relationships in which a buyer can dictate specifications and requirements to a

supplier. However, the risks associated with this dependency are different than in an MSP

complementor case because contractual guarantees exist between buyers and suppliers, and roles

of the two are very clear. Hence, there is less risk that the supplier ends up with unsalable product. In the MSP case operating as a triangle with multiple customer relationships, there is considerable technological dependency and risk because the MSP can unilaterally change specifications. This is principally true when the MSP controls a sizable share of a market. Because both the MSP and complementor have relationships with customers, when the MSP changes technologies, the complementor may be negatively affected as it still needs to manage its relationships with its customers. The complementor's product offerings may potentially become non-interoperable with the MSP's offerings.

As in MSP-complementor relationships, information dependency also exists in buyer-supplier relationships in which suppliers desire more and quicker information from buyers. However, in MSP-complementor relationships, an MSP might have a strategic incentive to withhold information because it is managing across multiple complementors and may be attempting to maintain a "level playing field" across the ecosystem. The MSP might also withhold information when it is competing, or planning to compete, against its own complementors (Gawer & Henderson, 2007). There might be some of this behavior evident in the case of buyer-supplier relationships, in which a buyer might be maintaining multiple sources of a component or item, or might be planning to vertically integrate (Hagiu, 2015a and b). Still, information dependency is likely to be much more pervasive in the MSP context because MSPs maintain a separate and distinct relationship with customers. They aim to maintain these relationships and need to be sure they do not get commoditized. One of the ways for an MSP to retain power in an ecosystem is by carefully managing information flow and creating information dependencies for complementors, making information dependencies more severe in MSP-complementor relationships.

The same types of dynamics hold true relative to values-based dependencies: they exist in other forms of interfirm relationships, but are different in an MSP context. In buyer-supplier relationships there might be values mismatches between actors, but once the supplier chooses to engage in a relationship with a buyer, these become minimized. In this linear relationship, the buyer will own the relationship with the customer, so the buyer's values related to customer relationships will dominate. In complementor relationships, because the complementor also maintains customer relationships, it is more likely there will be core values divergence and therefore values-based dependencies as evidenced in the Zuni case. Thus, across all three types of dependencies, we see they exist in other forms of interfirm relationships, but they are likely to be more prevalent, and more impactful, in the MSP-context.

The same analysis is relevant for response strategies comparing how we would expect them to manifest in more traditional linear forms of interfirm relationships versus in MSP-complementor relationships. Asymmetries in power affect relationships between firms and their responses to challenges (Dahl, 1957; Emerson, 1962; Nye, 2011). With respect to compliance, a less powerful and more dependent entity must comply with requirements of a more powerful entity. This dynamic is likely to be similar across forms of interfirm relationships in which there is an asymmetric power relationship, including with MSPs. However, again as illustrated by the triangular business model schematic (Figure 2.1) complementors create and maintain relationships with their own customers, so they retain flexibility in determining to what extent they will comply with MSP-requirements. Still though, the MSP can use mechanisms such as compliance logo branding programs (e.g., Apple's MFi program) to encourage and enforce compliance behavior by complementors. Thus, whereas at first analysis it may seem like compliance is a less relevant strategy with MSPs versus other interfirm relationship forms, the

data in this research shows compliance is a dominant strategy early in a complementor's maturity and stays relevant as long as the complementor remains in the ecosystem.

The influence response strategy appears to be quite different in the MSP case versus a linear business model. In most buyer-supplier relationships, a supplier has minimal leeway to influence the requirements of a buyer, though there are some strategic relationships in which a supplier may work directly with a buyer to influence requirements. Still, in the MSP case, the complementor can use its relationships with customers (all of whom by construction are also customers of the MSP) to influence the MSP. Additionally, if the complementor has its own high level of technological (or other functional domain) expertise, as was the case with Zuni, the complementor may be able to use this knowledge to influence an MSP. Further, a high risk of vertical integration by a platform into a complementor's market space affects opportunities for complementors (Gawer & Henderson, 2007; Hagiu & Wright, 2015a and b). An influence strategy might enable a complementor to get an early inclination that an MSP might be considering vertical integration into its market. Thus, an influence strategy is likely to be more prevalent in MSP-complementor relationships versus other interfirm relationships.

Finally, the innovation strategy also appears to be different in MSP-complementor relationships versus traditional linear buyer-supplier or alliance business models. In a buyer-supplier relationship the contractual obligations provide significant restrictions. In an MSP-governed ecosystem, the complementor can decide along which dimensions it desires to comply and on which it wants to innovate. This can be as simple as choosing to change product colors or marketing strategies, or as technologically complex as switching to adopt an industry standard versus an MSP-proprietary one (e.g., switching to an industry-wide wireless interface standards such as Bluetooth).

In addition to articulating types of dependencies and response strategies in MSP-complementor relationships, this study recognized three phase of complementor maturity. Since these phases incorporate how a complementor employs responses, and these strategies can be different in MSP-complementor relationships versus other interfirm relationships, these maturity phases are also likely to be different in MSP relationships. In sum, the findings show that dependencies, responses, and maturity phases are related to those evident in linear interfirm relationships, but distinctly different. This is primarily due to the triangular nature of complementor-MSP-customer relationships in which both the MSP and customer maintain customer relationships.

Why do complementors choose specific combinations of responses as they mature? - In this study, why Zuni chose the response strategies it did during each phase, and why it moved from one phase to another might be attributed to a number of factors. One plausible set of explanations relates to Zuni's strong and long established organizational identity (Albert & Whetten, 1985). Joining an ecosystem governed by a much more powerful player may have challenged Zuni's identity (Dutton & Dukerich, 1991; Elsbach & Kramer, 1996). Zuni considered itself to be a fiercely independent technology-centric product organization. It also believed strongly in "doing the right thing" and behaving with the utmost integrity. Thus, it is not surprising that as Zuni started to participate in an ecosystem, its first concerns would be those related to technological performance and complying with the imposed requirements. Additionally, Zuni struggled with the notion of being a complementor and becoming significantly dependent upon other organizations. Early in the study, Zuni's behaviors were consistent with a very independent organization trying to comply, but on its own terms.

As the organization gained experience in the ecosystem, it started to recognize how dependent it had become on another organization and began to more actively test boundaries, resist rules, and work to change them; it moved into the influence-centric second phase. Over time, as the results of the influencing were not progressing to the organization's liking, and the organization became more accustomed to its role in the ecosystem and its ability to be successful as a member, it fell back on its strong heritage and organizational identity characteristics as an innovator. In the later phase, the organization showed signs of having modified some of its identity dimensions. It underwent an attitudinal shift by accepting that it was an accessory provider and dependent upon another organization, but it also adopted behaviors completely consistent with its dominant identity characteristics of being an innovator. Rather than exhibiting a substantial organizational identity shift, Zuni showed organizational identity resilience as its fundamental identity remained.

Reacting to technology-driven change as a complementor - Scholars have long known that organizations find it difficult to adapt to technology-related change (Tushman & Anderson, 1986, Henderson & Clark, 1990; Christensen, 1997) and that managerial cognition plays a role in this inertia (Tripsas & Gavetti, 2000). This study builds on this tradition by empirically exploring over a multi-year period the challenges a complementor organization faced as it joined a technologically driven ecosystem and how the routines, behaviors, and capabilities of the organization evolved. The organization gained experience as a complementor as it became successful offering products in the ecosystem. It began to accept its role and also learned how to adjust to perform even more effectively within it developing new heuristics and capabilities.

This is particularly noteworthy because accepted wisdom is that significant discontinuous organization change is usually accompanied by executive team change (Tushman & Rosenkopf,

1996). Throughout the duration of this study, the management team of the division did not change; this organization exhibits very little management turnover. It is true and noteworthy that the president of the parent organization had changed soon before this study began and it is likely that executive shift affected the approach of this division. Still, over a multi-year period it was very clear the management team associated with the studied division altered its mental models related to its participation in MSP-governed ecosystems.

Complementor maturity as an ecosystem-specific construct - During the duration of this research, Zuni was joining and participating in multiple ecosystems. However, because of the market dynamics in the smartphone and tablet markets, it made most sense for Zuni to focus its efforts on creating products that worked well with Apple products. Somewhat unfortunately for Zuni, but fortunately for this research, joining Apple's ecosystem imposed more requirements (and thus dependencies) on Zuni than those of Android, Microsoft, or other device makers. The question arises: Were the phases of complementor maturity here relationship-specific or were they applicable to the Zuni such that when it later joined another ecosystem it would already be more mature?

The data indicates that these phases are relationship-specific. The idiosyncratic nature of relationships between complementors, in this case Zuni, and platform managers seems to affect how a complementor moves through phases of maturity. As each relationship is different, it follows that there might be variation in how a complementor manages its relationships with platform managers. This is particularly interesting in situations, which are becoming increasingly common, where complementors simultaneously compete in a variety of MSP-based ecosystems.

Towards the end of this study, Zuni began to more actively create products to work with Samsung devices as Samsung was emerging as an Android smartphone market leader. When

presented with the phases of complementor maturity framework in March 2015, Zuni's general manager agreed that they were in essence operating in Phase 1- Compliance-centric as they navigated their relationship with Samsung. He noted that they would probably move through the phases more quickly than they had with Apple as they joined this second large ecosystem, but confirmed that they were not starting with an innovation-centric mindset. First, they needed to focus on how they were going to address compliance questions, including the possibility of helping Samsung develop standards. Again, Zuni was pursuing a multi-pronged strategy with variable relative emphasis on responses.

Since each MSP is unique and creates its own governance regime, it is reasonable to expect that the phases of complementor maturity would to some extent reset as a complementor joined a new ecosystem. However, it also seems that Zuni underwent attitudinal and behavioral shifts, and gained competencies, as it became a more mature complementor such that it would go through subsequent sets of phases more quickly and more skillfully. The research suggests that these findings are generalizable beyond the joining of Apple's ecosystem and should hold relative to other ecosystems as well. Additionally, though this study included extensive data from one complementor, confirmatory interviews with other industry participants also suggests that the findings should hold for other complementors as well.

FUTURE RESEARCH

A construct not thoroughly covered in this research, yet commonly associated with ecosystem development is that of co-opetition in which an organization joining an ecosystem is both cooperating with, but also competing against, the platform manager (Brandenburger & Nalebuff,

1996; Afuah, 2000). The notion of organizations both competing and cooperating is not a new one (Deutsch, 1968), and organizations operating within MSP ecosystems are often confronted with the dynamic since platform managers have been known to compete with the complementors they enable (Gawer & Henderson, 2007). Because the empirical data in this study provided insights into new frameworks of dependencies, responses, and complementor maturity associated with joining MSP-governed ecosystems, I chose to focus this paper on internal challenges and responses rather than on competitive dynamics. However, there is great potential to continue this research considering co-opetition dynamics and tying more tightly to existing and emerging research on co-opetition.

Though we can use organizational identity theory to consider when and why an organization might invoke response strategies, this study focused almost entirely on organizational identity in terms of insiders' views of their own organization. An extension might be to include how insiders account for how others perceive them (particularly because there was significant branding work underway during this study) and also how others perceive the organization. Also, since identity theory spans both micro (individual) level and macro (organizational) levels, future research could tie this work more closely to micro identity themes. It could also complement emerging work on ambivalence in organizations (Pradies & Pratt, 2010; Ashforth, Rogers, Pratt, & Pradies, 2014) since that research shares considerations with identity research and also spans micro and macro levels.

Agency and leadership are two topics that also were not addressed in this paper, but are relevant and would add further insight into how an organization copes with challenges studied here. The general manager played a significant leadership role throughout the time of this study as did one of the senior managers on the team. Yet, organization members had significant

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autonomy in how they interacted with MSP representatives and interpreted platform requirements. Studying the interplay between leadership directions and de facto strategy development (Burgelman, 1994) in this context would be very interesting.

Though this single case study is appropriate for this topic, this empirical work might also benefit from additional cases. During the course of this research, Zuni was entering multiple ecosystems in addition to its efforts related to Apple. The findings indicate that Zuni was starting to move through similar phases with Samsung and others, thus one option for continued research would be to conduct more extensive fieldwork in the same division as it more aggressively joins additional ecosystems. Another option would be to study another division of the same firm, and yet another option might be to expand the study to other firms in the same ecosystem. A further expansion might be to include accessory or complementary provider firms in additional industries. Finally, although qualitative methods are appropriate to address the research questions here since they are nascent and the theoretical contribution is a suggestive model (Edmondson & McManus, 2007), as the research questions become more well defined, quantitative survey and other methods might provide further insight.

This paper addresses challenges and responses as organizations join ecosystems. Consistent with the focal case study, it addresses mature incumbent organizations joining ecosystems. Another related research area could investigate challenges faced by organizations that become complementors, but which are not already well established, such as entrepreneurial ventures. Based on the findings in this paper, it is reasonable to expect that dependencies encountered by entrepreneurial ventures might be similar, particularly related to technology and information, though possibly less so related to values. The complementor firm might have had less time to establish processes strongly aligned with existing values. Similarly, it is reasonable

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to expect that response strategies might incorporate compliance, influence, and innovation, but potentially to different extents. Thus, the nature and timing of the phases of complementor maturity might differ.

Additionally, whereas this paper focused entirely on organizations joining ecosystems, as information constraints continue to decrease and platform-based businesses become increasingly more prevalent (Altman, Nagle, & Tushman, 2015), firms are transitioning from product to platform-based business models and undergoing changes in institutional logics (Gawer & Philips, 2013). Though this is a different transition than ecosystem joining, organizations adopting MSP-based business models are essentially on the other side of the dynamics explored in this paper as they are imposing dependencies and encouraging response strategies from their complementors. It would be interesting to study organizational changes associated with product-to-platform transitions exploring dependencies, responses, phases of maturity, and organizational identity considerations (see Altman & Tripsas, 2015 for an introduction to this topic).

CONCLUSION

This paper contributes to the burgeoning research on multi-sided platforms (e.g., Hagiu & Wright, 2015a; Gawer & Phillips, 2013) and that related to business ecosystems (e.g., Iansiti & Levien, 2004; Adner & Kapoor, 2010, 2015; Kapoor & Adner, 2012; Kapoor & Lee, 2013; Wareham, Fox, & Cano Giner, 2014) by taking an organizational theory approach and elucidating challenges, response strategies, and phases of complementor maturity as organizations join complementor ecosystems. This research extends existing research on complementors (e.g., Cusumano, Myloanadis, & Rosenbloom, 1992; Gawer & Henderson, 2007)

in that this is one of the first empirical studies to take the perspective of a complementor entering and participating in these networks to understand the challenges it encounters and its responses. Although most of the platform and ecosystem literature is economics-based and focused on pricing, competition, and governance, this work considers organizational and managerial challenges and identifies three types of dependencies (technical, information, and values-based) confronted by organizations joining ecosystems, three response strategies (compliance, influence, and innovation), and three phases of complementor maturity characterized by the use of these strategies to varying degrees. This is also the first time that dependency, power, influence, and organizational identity theories have been brought to bear to help us understand phenomena associated with platforms and ecosystems.

The dependencies and response strategies articulated in this research are characteristic of MSP-based ecosystem and complementor relationships, and the managerial implications of this work are numerous. The frameworks presented here can be adapted such that managers of complementors starting to join an ecosystem can consider the types of dependencies they might face and how they might respond to them. Technological dependencies map to concerns related to product and service development and delivery. Information dependencies encompass communication-related challenges. Values-based dependencies are related to considerations of identity and culture that are of great concern to organizational leaders. Managers could use these frameworks to develop their own responses taking into account those presented here. In addition, managers of MSPs can consider these dependencies and responses as they create ecosystems and better understand how their complementors may be affected by their actions and policies.

Complementor firms play a large role in the arena of multi-sided platforms and ecosystems, yet their challenges have been substantially under-explored and researchers rarely

focus on the interactions between complementors and platforms. As tablets, smartphones and other devices that rely on complementor products to deliver full functionality continue to grow in popularity worldwide, and firms continue to recognize value in joining ecosystems in which they can offer complementary products, there will be increasing interest in challenges organizations face as they join ecosystems governed by powerful platform managers.

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