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選擇產品自有品牌/OEM 商業模式之動態

Dynamics of Choosing Brand and/or OEM Product Business Models

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摘要

我們探索供應商在全球供應鏈的演變中，如何選擇產品的自有品牌商業模式、代工業務(OEM) 商業模式、或品牌和 OEM 的雙元商業模式 。我們長期研究一個電子供應商個案對不同產品的模式選擇，這些選擇定義了供應商與品牌通路商和 OEM 買主的活動疆界。我們根據組織疆界的能耐及權力要素，決定一個模式選擇的觀念性框架。這個框架運用代表供應商產品專屬資源的技術暨行銷能力，以及代表市場環境變化的產品生命週期。建議的商業模式種類有：以強烈行銷活動來控制市場的主導性品牌模式、以適當活動以增強產品能耐的實驗性品牌模式、專案技術服務的 OEM 模式、以及為擴張市場範疇的不同種類的雙元模式。對於每種模式也考慮供應商為了增加產品的效率或適應性，會對品牌通路商及 OEM 買主，實施不同強度市場活動的跨公司行銷能力，並進而影響通路商及 OEM 買主有效服務客戶，以極大化產品利潤。本論文的主要貢獻於有關於供應商如何能有效選擇品牌和 OEM 的商業模式文獻。

關鍵詞：商業模式、OEM、雙元商業模式、組織疆界

Abstract

We explore how product suppliers effectively choose brand, original equipment manufacturing (OEM), or brand-and-OEM dual business models (BMs) for products in evolving global supply chains. We conduct a longitudinal case study examining an electronics supplier’s BM choices for various products. These choices define suppliers’ activity boundaries with brand channel resellers and OEM buyers. We determine a conceptual framework of BM choice based on competence and power factors indicated in the organizational boundaries and theories. This framework encompasses focal products’ technological and marketing capabilities, representing suppliers’ product-specific resources; and products’ position in the product life cycle, representing markets’ environmental dynamism. Proposed BM types are: dominant brand BMs with significant marketing activities aimed at controlling markets, experimental brand BMs with modest marketing activities aimed at competence enhancement, subcontracted

OEM BMs for project-based technological services, and different types of dual BM for expanding market coverage. Each BM also takes into account suppliers' interfirm marketing power over channel resellers and OEM buyers by defining varying amounts of marketing activities for enhancing product efficiency and adaptability. These activities influence resellers and buyers, who then efficiently serve users and therefore maximize product profit. We add insight to the BM literature on how suppliers effectively choose brand and OEM BMs.

Keywords: Business Model, OEM, Dual Business Model, Organizational Boundaries

1. Introduction

With the rise of global brand competition and offshore outsourcing, understanding the role and capabilities of product suppliers in the global supply chain has been elevated from an operational concern into a strategic issue (Alcacer & Oxley, 2014). To manage these changes product suppliers must choose from several types of product business model (BM): brand, OEM, or brand-and-OEM dual. All three BM types let suppliers utilize complementary business partners to provide products and services. Brand BMs use channel resellers to reach addressable markets, OEM BMs use OEM buyers to reach un-addressable markets (Kang et al., 2009), and dual BMs use both. Choosing the right BM allows suppliers to quickly access markets, maximize profits, and reap other benefits by utilizing partners' capabilities through the "learning by supplying" process (e.g., Lee & Chen, 2000; Alcacer & Oxley, 2014; Kuo & Lee, 2016). Choosing the wrong BM leads to wasted marketing activities, delayed market access, and other undesirable effects (Zott et al., 2011; Markides & Sosa, 2013). Thus, in this new environment, understanding the evolution of product suppliers' BM choices is a pressing strategic issue.

Although BM choice is important, it remains understudied. Some scholars have described brand BM choice, including one-brand BMs (e.g., Shafer et al., 2005) such as Apple's, two-brand BMs (e.g., Markides & Charitou, 2004) such as

Toyota and Lexus's, or evolutionary changes from OEM to own-brand BM (Alcacer & Oxley, 2014) such as with HTC, which did OEM for T-Mobile in the cell phone industry but shifted to a brand BM. These studies make limited effort to investigate OEM BM choice, such as that of Quanta, the world's largest laptop OEM supplier, and brand-and-OEM dual BMs, as in the case of famous bicycle supplier Giant (Kuo & Lee, 2016). Moreover, most research focuses on start-ups and neglects the issues faced by established suppliers (Demil et al., 2015), such as how evolving technological and marketing capabilities lead to dynamic choices between different BMs. In addition, Kalinowski & Vives (2013) contributed to BM choice literature by using a contingency approach to describe the relationship between suppliers' strategic choices and the environment. Some scholars consider environmental contexts such as "change" without offering a clear construct for shifting BM choice over time (Casadesus-Masanell & Ricart, 2010; Demil & Lecocq, 2010). Further, most BM choice studies focus only on efficiency (e.g., Morris et al., 2005), competences and resources (e.g., Demil & Lecocq, 2010), or both (DaSilva & Trkman, 2014). The organizational boundary factor of power, an "institution that facilitates coordination to reduce dependence" (Santos & Eisenhardt, 2005), has been overlooked despite its importance in inter-firm relationships and therefore BM implementation (Demil et al., 2015). Since few studies directly address the choice process, decision makers cannot systematically make choices over time. Thus, more exploration of brand and OEM BM choice is needed.

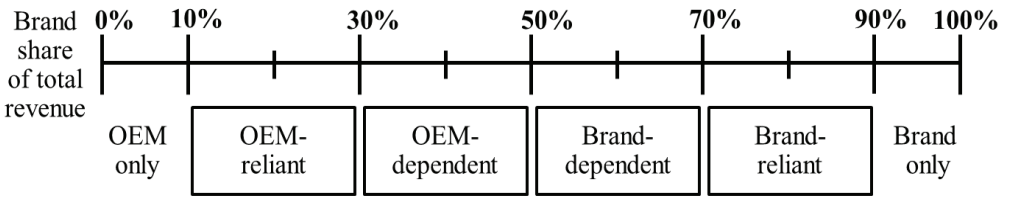
Since the current literature lacks an in-depth account of how suppliers choose the right BM, we ask, How do established suppliers choose a brand, OEM, or brand-and-OEM BMs for each product? We aim to provide a theoretical view of BM choice for strategic decisions made over time (Zott et al., 2011), and explain how decision makers systematically choose the right BM without relying on intuition. Due to the limited theory and evidence available, our inductive research design was a single-case study with embedded multiple product lines (Yin, 2009). Focusing on a single case let us capture the richness of activity boundaries for each BM type, giving insight into a new theory (Dyer & Wilkins, 1991). Multiple lines provided a comparative logic of replication and extension (Eisenhardt, 1991). We tracked decision makers' thoughts and offer a framework for interpreting choices.

We contribute to BM literature by proposing a framework for choosing brand, OEM or dual BMs based on organizational boundary factors. We find that when choosing product BMs decision makers consider two primary factors. First is competence, derived from resource-based theory (Penrose, 1959), and involving three key constructs: technological capabilities, marketing capabilities (Song et al., 2007), and product life cycle (PLC). The first two are inside-out views representing suppliers' product-specific resources; the third is an outside-in view representing the working environment of market dynamism covering ambiguous and structured conditions (Kotler et al., 2006; Santos & Eisenhardt, 2009). These constructs cover the main concerns of competence in organizational boundary (Santos & Eisenhardt, 2005) and BM literature (Demil & Lecocq, 2010). BMs and activity boundaries are chosen by matching capabilities with PLCs to maximize the value of suppliers' capabilities.

The second factor decision makers must consider is inter-firm marketing power. This concept borrows from resource dependence theory (Pfeffer & Salancik, 1978), and is represented by the amount of suppliers' marketing activities associated with each BM. Modest activities influence channel resellers and OEM buyers to enhance product adaptability, while significant activities enhance product efficiency (Porter, 1980; McGrath & MacMillan, 1995; McGrath, 2001). Thus, correct BM choice based on competence and marketing power allows suppliers to efficiently approach users directly and indirectly.

Possible BMs include: dominant brand BMs with significant marketing activities for controlling markets and becoming a market leader (Porter, 1980); experimental brand BMs with modest marketing activities for competence enhancement and limiting immature product risk (McGrath, 2010); subcontracted OEM BMs for project-based technological services; and dual BMs for maximizing market share and profit. Possible dual BM types are: brand-reliant, brand-dependent, OEM-dependent, or OEM-reliant (Kuo & Lee, 2016). Each type represents a different combination of brand and OEM revenue (see Figure 1) and amount of marketing activities implemented towards channel resellers and/or OEM buyers.

As construct status changes over time choices are dynamic for each product. Thus, using our framework, decision makers can quickly reach consensus and choose the best BM.



Brand only: over 90% of total revenue from brand, less than 10% from OEM.
Brand-reliant: 70 to 90% from brand, the rest from OEM.
Brand-dependent: 50 to 70% from brand, the rest from OEM.
OEM-dependent: 30 to 50% from brand, the rest from OEM.
OEM-reliant: 10 to 30% from brand, the rest from OEM.
OEM only: less than 10% from brand, over 90% from OEM.

Figure 1. The percentages of brand and OEM revenue for each type of business model

Data resource: Kuo & Lee, 2016

2. Theoretical Background

Our research question aims to determine how established suppliers effectively choose brand, OEM or dual BMs for products. Here we review the extant research on 1) effective BM choice, 2) brand, OEM and dual BMs, 3) BM choice literature, environmental constructs and PLC stage, and 4) the relationship between organizational boundary factors and BMs.

For BM choice to be effective, channel resellers and OEM buyers must have marketing attributes in the supply chain that complement suppliers and satisfy user demands (Priem et al., 2013). Suppliers also must implement suitable marketing power to influence resellers and buyers. This creates beneficial relationships where channel resellers promote suppliers' brand names and OEM buyers promote their own. Regardless of whom users buy from, they can enjoy brand owners' products and services. However, suppliers have little or no positive effect on outcomes if they make an ineffective choice that leads them to work with less-desirable partners, regardless of time and effort spent. In short, effective choices let suppliers increase market coverage and maximize profit (Kuo & Lee, 2016).

Previous studies often assumed suppliers adopt one-brand (Shafer et al., 2005) or two-brand BMs (Markides & Charitou, 2004; Casadesus-Masanell & Tarzijan, 2012). Only a few discuss OEM or dual BMs (Lee & Chen, 2000; Kuo & Lee, 2016). For example, Porter (1996) discussed two-brand BMs: "Companies seeking growth through broadening within their industry can best contain the risks to strategy by creating stand-alone units, each with its own *brand name* and tailored activities." In a paper on managing two BMs, Markides (2013) discussed brand naming: "Should the separate unit adopt a name similar to the parent name, or should its name be totally different?" This assumes suppliers have the resources to promote multiple brand names to different target segments, even though only a few well-endowed suppliers actually can. Less well-endowed suppliers need to leverage the *marketing capabilities* of world-famous OEM buyers to reach un-addressable markets (Kuo & Lee, 2016). These suppliers also need OEM buyers' strong *product validation capabilities* to improve immature product technology. OEM buyers benefit as well, as suppliers' technology can help them adapt to fast-changing markets and increase competitive advantage. These factors have increased OEM and dual BMs' popularity (Alcacer & Oxley, 2014).

Most studies do not consider the relationship between environmental constructs and BM choice. The representative definition of BM choice is that BMs represent a firm's strategic choice and underlying logic for appropriating and distributing value within the value network (Shafer et al., 2005). Casadesus-Masanell & Ricart (2010) stated that a BM comprises a set of choices that generate a set of consequences. Smith et al. (2010) proposed that BMs are the design firms use to convert a set of strategic choices into value, and organize a particular architecture to capture this value. Sabatier et al. (2010) stated that a BM is at the intersection of competence and consumer needs, and a firm's BM portfolio has many ways to deliver value to customers. Kuo & Lee (2016) proposed a dual BM choice framework based on capabilities-based constructs: segment-making capabilities and product/service innovation potential. These studies emphasized the environmental contingency under which organizations match their internal resources with the environment's demands (Siggelkow, 2001). However, they do not provide a clear construct for further research on product BM activity boundaries.

A construct indicating the working environment at the product level is important because it can account for market dynamism when a product's BM is chosen.

PLC stages relate to products' regional situation, rather than the overall market, and help decision makers interpret products' market dynamism (Kotler et al., 2006). The stages are introduction, growth, and maturity, and they occur in high velocity, moderate, and less dynamic working environments, respectively (Santos & Eisenhardt, 2005). This means they can objectively represent the construct of products' external demand environment. We ignore the decline stage because this is when suppliers focus on exit strategy (Grant, 2008).

Organizational boundary factors aid understanding of BM choice. A BM can be defined as "a system of interdependent activities that transcends the focal firm and spans its boundaries" (Zott & Amit, 2010). Decision makers should consider all factors described, including identity, power, and competence as well as efficiency, for effective BM choice. Each factor relates to a fundamental aspect of firms: cost (efficiency), coherence (identity), autonomy (power), and growth (competence) (Santos & Eisenhardt, 2005). Among these four factors, identity is the most important, and efficiency the least.

BM choice focuses on *competence* as the central factor in business growth. A product BM can be described by three elements: "its resources and competences, its organizational structure, and its proposition for value delivery" (Demil & Lecocq, 2010). In search of dynamic consistency, when product resources and competences vary within the evolution of their own competitive landscape, suppliers' organizational structure and value propositions vary as well. In brand BMs suppliers have large marketing and sales organizations to promote superior product value to numerous channel resellers and users. In OEM BMs suppliers utilize limited sales organization to provide products with superior cost-performance ratios to a few OEM buyers (Kuo & Lee, 2016). Thus, accurate judgment of competence and, hence, choosing the right BM, is key for products' success. In contrast, misjudgment leads to choosing unsuitable BMs and implementing inappropriate organizational structures and value propositions, resulting in wasted time and effort due to ineffective cooperation with suboptimal partners.

Effective BM choice also allows partners with good inter-firm *marketing*

power relationships with suppliers to *efficiently* market products to a broad user base with minimal time and effort. Marketing power is a boundary decision determined by activity domains, which suppliers use to increase or decrease influence on channel resellers and OEM buyers (Santos & Eisenhardt, 2005) for BM implementation. Previous research focused on competence and efficiency, but paid less attention to inter-firm marketing power factor.

Overall, the extant literature suggests that when suppliers make products BM choices they: (1) are more likely to choose brand BMs without considering OEM or dual BMs, (2) pay little attention to environmental constructs, and (3) focus on efficiency and competence more than power boundaries. Despite its importance, BM choice has not yet been properly addressed in BM literature. Thus, a granular account of how suppliers choose product BMs is needed.

3. Methods and Data

3.1. Case Selection

Because evidence and theory regarding our research question of “how?” was limited, we conducted a study of a single case with embedded multiple product lines (Yin, 2009). This type of study can accurately tell good stories with theoretical import (Dyer & Wilkins, 1991). Also, multiple product lines provide a comparative logic of replication for developing theoretical insight (Eisenhardt, 1991). Each line has its own BM, allowing confirmation and disconfirmation inferences to be drawn from other lines. BMs are emerging as a new unit of analysis with wider scope than firms, since they can represent different firms’ capabilities in multiple industries (Amit & Zott, 2001; Zott et al., 2011). Thus, we focused on the exploration of each product’s BM choice, associated competitive environment conditions (Demil et al., 2015), and technology/marketing competence compared to competitors over time. Capabilities and environment are at the core of boundaries of competence, representing products’ specific resources and market dynamism (Santos & Eisenhardt, 2005).

Purposive sampling was used in the selection of a single-case firm. AV-Firm

(disguised name), headquartered in Taiwan, was chosen for the following reasons: First, Taiwan is a global hub for computer and communication products. Many firms developed using brand and OEM BMs and benefited from inter-firm learning such as personnel exchanges. Within this context, AV-Firm is a *typical* Taiwanese computer peripheral designer and manufacturer that developed with brand and OEM BMs. It is the largest and most representative Taiwanese company in the field of video applications. Second, AV-Firm is a *revelatory* case, as its senior executives sought to establish a theoretical approach for choosing BMs. It launches 5 to 10 new products annually, so researchers could easily access internal managerial data. Third, AV-Firm was established in 1990, allowing for a *longitudinal* study. It was listed on the Taiwan stock market in 1997, demonstrating successful business development. It is a mid-sized high-tech company with peak revenue of $200M USD in 2011, and it owns over 500 patents filed in Taiwan. AV-firm is familiar with worldwide OEM accounts such as HP, Dell, Sony and Acer. It sells brand products in over 70 countries and has 10 international sales offices. Because it is an established firm that has successfully marketed multiple product lines via brand and OEM BMs, we can make inductive analyses with rich contextual information. In sum, AV-Firm is appropriate because it is a *typical, revelatory, and longitudinal* case (Yin, 2009).

Table 1 describes the background for four product lines for the education, PC, telecommunications, and security markets. They were the primary sources of revenue and profit streams (Amit & Zott, 2001) for AV-Firm, confirming that they utilized the right BMs. They also reveal industry confluence where numerous global brand and OEM business collaborations emerged. In addition, the education and PC lines were first-mover products in their market segments, while the telecommunications and security products were later-movers. The first-mover products were launched in the introduction stage of the PLC; the later-mover products in the growth and maturity stages. The product lines have been marketed for 17, 22, 5, and 8 years, respectively, so accurate and detailed data were available for our longitudinal study. Hence, we could determine the influence of different industries and competitive environments on BM choice, enhancing our study's generalizability and providing a firmer foundation for theory-building (Hallen & Eisenhardt, 2012).

Table 1. Description of Sample Data for Four Product Lines

Product Name	Document Camera (DC)	PC-TV Tuner (Tuner) [a]	Video Conferencing Device (VC)	Network Video Recorder
Product Function	Captures objects, displays live image on LCD projector or TV.	A PC add-on card, or external device that lets PC function as a smart TV.	Camera and microphone for talking with far site VC devices.	Captures images from IP cameras and stores them for security processing.
Target Customer and Application	Helps teachers improve interactive communication with students.	Consumers in retail markets and PC makers in pre-installed market. Can watch TV on PCs.	Inexpensive room-based devices for small and medium business (SMB) market.	Acts as a system component for resellers or system integrators for small- and medium-sized projects.
Year of Product Launched	1998	1993	2010	2007
First or Late Mover	First mover	First mover	Late mover	Late mover
Years of Dual Business Model	2012-Present	2010-Present	2014-Present	2010-Present
Brand vs. OEM Revenue & Type of Dual Business Model	83:17 Brand-reliant	22:78 OEM-reliant	62:38 Brand-dependent	42:58 OEM-dependent
Competitive landscape (2010-2015)	More than 5 worldwide brands compete for platform-type document camera market in university auditoriums. Only 3 to 4 less famous brands compete for portable-type market in K-12 classrooms. AV-Firm is the biggest player in portable-type market with 40% market share in North American market.	More than 10 brands compete for retail markets. Only three compete for preinstalled market. AV-Firm is ranked as #1 in preinstalled market and #2 in retail market, with 35% market share worldwide.	More than 5 big players compete for large company market. 2 major players have 80% VC market share but only 4% of meeting rooms have VC installed. AV-Firm focuses on SMB market which cannot afford higher price and is ignored by major players.	More than 10 big players compete in the market for solution-based system products. More than 20 compete in the low-cost NVR market. AV-Firm focuses on special customization to meet system integrators' project needs.
Industry	Education	PCs	Tele-communications	Security
Number of interviews	5	8	5	4

[a] Please see Table 3 for different types of dual business model for PC-TV tuner.

Data resource: Kuo & Lee, 2016

3.2. Data Collection

We used two data sources: archives and interviews. This triangulation increases confidence in the precision of the emergent theory. We started collecting archival data internally from the finance and manufacturing departments. Internal sources also included sales revenue records covering brand and OEM since each product's release, and production yield rates, particularly before and after OEM business began delivering. Finally, we developed a chronological list using tables and graphs containing key metrics such as revenue, market share, profitability, and yield rate.

We continued collecting data using semi-structured interviews with internal informants. We also drew on observations one of the researchers made of AV-Firm's development since 2000, enabling us to make a longitudinal study. Several decision makers were identified during the initial phase, including the CEO, the presidents of headquarters and branches, heads of product business units (BUs), and sales and R&D executives. These informants were decision makers in BM choices, and were located in Taiwan, Japan, and the US. We identified at least 3 managers per product line in the interviews, accumulating 25 interviews from mid-2013 to the beginning of 2015. Each interview lasted 50 to 90 minutes and was recorded and transcribed.

We first interviewed AV-Firm's CEO and asked him to explain the firm's brand and OEM BM policy. He explained it in terms of *identity*: "We adopt multiple BMs to maximize each product's outcome and overall firm performance. Hence, our BM choice must be flexible and adaptable for different competitive landscapes, as each product's relative competences for the market are totally different. We are a firm running brand, OEM, and dual BMs."

For each product, we began with an overview interview with the product BU head, identified as the most relevant executive in the *pilot interview*. To probe at suitable junctures interviews were based on topic guides, and conceptually lay language was added to further elucidate the meaning of possible constructs. Appendix A lists sample interview questions

focusing on products' capabilities and environmental conditions. Technology and marketing capabilities lie at the heart of the BM as the main source of the competence and resources which form firms' competitive advantages (Morris et al., 2005). Product BU heads are key decision makers in product BM choice and therefore assisted with *construct validation* (Yin, 2009). They reconfirmed the development of products' technological and marketing capabilities and competitive landscapes in market dynamics, which are their main concerns. Technological capabilities concern manufacturing processes, production facilities, new product development, and forecasting technological changes. Marketing capabilities include skills in segmenting and targeting markets as well as knowledge of competition and customers, in pricing and advertising, and in integrating marketing activities (Song et al., 2007). The strength or weakness of product capabilities are judged in comparison to main competitors, as perceived by users. We also identified each product's competitive environment construct through conditions such as the intensity of price competition, the level of industrial concentration, and so forth (Santos & Eisenhardt, 2005).

Meanwhile, we checked the implementation of each BM, in particular the amount of marketing activities between suppliers and partners. We then conducted *related interviews* for each BM with engaged executives. We asked open-ended questions and encouraged informants to speak freely about their participation in BM choices and interaction with partners. To increase *reliability* (Yin, 2009), we formed a database containing texts and documents which became the main corpus for data analysis.

We mitigated potential bias in several ways. First, we triangulated data on each product's BM choice and execution using multiple sources and key informants, comparing data from interviews with archival material. Second, because most executives made BM choices during our study, we blended real-time and retrospective accounts. Our proposed framework has already been utilized as a standard process for choosing product BMs. Third, we focused on facts, accounts of what each informant did or observed others doing, in order to avoid speculation or inaccurate data. Finally, most

executives were highly interested in the theoretical basis of BM choice and hoped to have a systematic framework they could apply, and were therefore inclined to be truthful. Executives remained available for contact via email and phone calls to clarify discrepancies.

For the purpose of this study, BM type is defined by the ratio of brand revenue to total revenue (see Figure 1). Consistent with prior studies on making or buying component volume from upstream suppliers (Parmigiani & Mitchell, 2009), we used a 10% revenue cutoff for pure brand or OEM BM for downstream buyers. We further define OEM-reliant dual BMs as receiving 10 to 30% of revenue from brand business and the rest from OEM; OEM-dependent BMs as receiving 30 to 50% from brand business; brand-dependent as receiving 50 to 70%; and brand-reliant as receiving 70 to 90%. The percentages shown in Tables are averages of several years within the same percentage range. Each product has its competence portfolio and market dynamism in the competitive landscape; hence the chosen BM indicates a good fit that maximizes suppliers' interests (Siggelkow, 2001).

Four separate types of dual BM were necessary for this study instead of just brand-oriented and OEM-oriented dual BMs because each type represents a unique strategy. Brand-reliant is closer to a pure brand BM than brand-dependent. This implies that suppliers have well-developed technology and marketing capabilities to verify product maturity and fully promote branded products to reachable markets, so OEM business is not their main certain. In contrast, when suppliers choose brand-dependent BMs they have certain marketing capabilities but still need OEM buyers' help to verify product maturity and develop widely unreachable markets.

Suppliers that choose OEM-reliant BMs can support all their OEM buyers through non-replaceable technologies, but still want opportunities to access markets by gaining user feedback. In other words, brand business is not their main concern. In contrast, OEM-dependent BMs are chosen when suppliers cannot get enough OEM buyer support based on their existing not-strong-enough technologies. They still need brand business to learn technologies and build marketing capabilities.

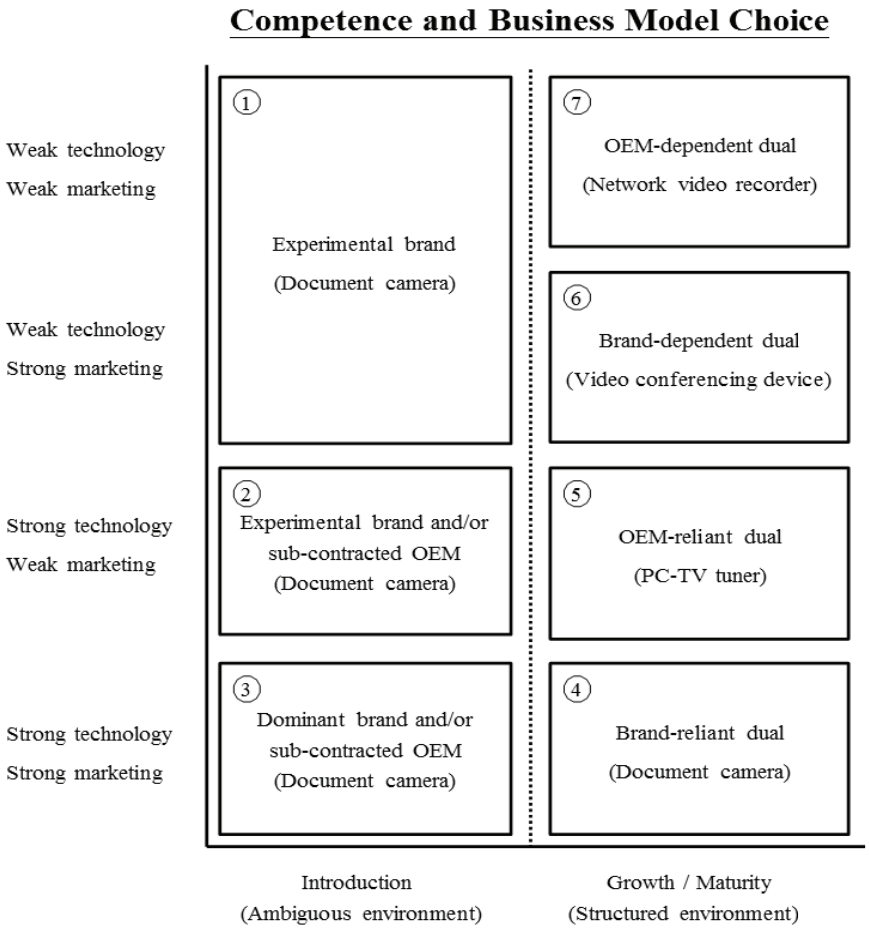
3.3. Data Analysis

For *internal validation* we next analyzed each product's BM choice through the lens of our research question (Eisenhardt, 1989; Yin, 2009). Under the assumption of no priori hypotheses, we read each case independently in order to form our own views and develop an understanding of each product's major technological and marketing capabilities and environmental condition decision constructs, which we reconciled by returning to informants and the data. We also identified the dynamic statuses of strong or weak capabilities and the competitive landscape for each product and their interactions and connections with revenue, which revealed the type of BM that was chosen. This revealed specific patterns of BM choice for each case, indicating that single products could have several BMs, each serving as a unit of analysis. Finally, we also identified the reasons for each choice.

For *external validation* we turned to cross-product analysis, in which all products' insights were repeatedly compared to identify patterns (Yin, 2009). For example, the PC-TV tuner described in Tables 1 and 3 was launched in 1993 and utilized all the dual BMs in our framework at different times. We compared each product's pattern with the patterns of other products. The constructs were grouped randomly and according to variables of potential interest to aid comparison and develop theories. Agreements and discrepancies were noted and investigated further by revisiting data. We cyclically followed an iterative process to refine our findings until a saturation point was reached—that is, data and theory closely matched (Eisenhardt, 1989). It took another five months for researchers to analyze data for the emergent framework and its applicability to new products with informants.

4. Results and Propositions

We find that decision makers enact choices imperatively using a framework (see Figure 2) in order to maximize profit by enlarging sales coverage in addressable and/or un-addressable markets, while also improving their technological and marketing capabilities. This *competence-based* framework is based on three product-level elements: PLC stage, technological capabilities and marketing capabilities. We focus on technological capabilities, including product development and information technologies, and marketing capabilities, including market development and market linking. Each sub-construct has its own testing variables (Song et al., 2007). Strong or weak capabilities in comparison to main competitors (see Table 2) serve as shift factors. When product features or services meet users' requirements better than competitors, capabilities are strong; otherwise, they are weak. Consequently, linking these capabilities with PLC stages is the basis of BM choice. Once a BM is chosen, suppliers also need to establish optimal inter-firm *marketing power* relationships with channel resellers and OEM buyers, so partners can meet user demands *efficiently*. Due to space limitations we only include the framework's final version, shown in Figure 2.



Marketing Power and Business Models

Business Model	Marketing Activities to Channel Reseller	Marketing Activities to OEM Buyer
① Experimental brand	Modest.	No action
② Experimental brand and/or sub-contracted OEM	Modest	Significant
③ Dominant brand and/or sub-contracted OEM	Significant	Significant
④ Brand-reliant dual	Significant	Significant
⑤ OEM-reliant dual	Modest	Significant
⑥ Brand-dependent dual	Moderate	Modest
⑦ OEM-dependent dual	Modest	Modest

Figure 2. A conceptual framework of business model choice

Data resource: this research

Table 2. Technological and marketing readiness, product life cycle, and the chosen business model for each product

Case No.	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7
Product	Document camera (DC)	Document camera (DC)	Document camera (DC)	Document camera (DC)	PC-TV tuner (Tuner)	Video conferencing (VC) device	Network video recorder (NVR)
Years	1998–2001	2002–2003	2004–2005	2006–2012–present	2010–present	2014–present	2010–present
PLC	Introduction: First to launch portable-type for K-12 market. Lacked product definition.	Introduction: Product features gradually defined by AV-Firm. Tried different sales channels.	Introduction: 3 major vendors competed by creating promising features. Formed an industry.	Growth/maturity: Price competition. Became standard tool for teachers. 3 vendors have most market share.	Maturity: Well-diffused technical know-how. PC preinstalled OEM market replaces brand retail market.	Growth/maturity: Flat business growth for room-based VC. 2 firms had 80% of large company market share, no firms targeted small and medium businesses (SMB).	Growth/Maturity: Continuously increasing market demand due to unstable social and political environment. Emergence of dominant design.
Technological readiness	Weak: Designed camera module and lighting system with new technology.	Strong: Users started accepting 3rd generation product's display quality, brightness, and zoom features of character font.	Strong: Added advanced features to meet teachers' special needs and differentiate from traditional PC USB camera.	Strong: Applied 61 patents to protect second-to-none features. Only firm to develop teaching software to enhance features.	Strong: Served PC-makers' special requests for product design, production, and order fulfillment.	Weak: Provided basic features to work with AV-Firm's and other vendors' VC devices. Cannot provide more than 10 user sites or complicated solution such as telepresence.	Weak: Needed to test all different IP cameras from different vendors without unified standard protocols. No comprehensive way to test a non-stop system with hard disk.
Marketing readiness	Weak: Audio-visual resellers didn't want to sell this new product and few K-12 teachers were aware of it. Provided hot swap for deficient goods.	Weak: Invited resellers to join several school road shows to educate teachers about applications. Special OEM project for Echo for camera module.	Strong: Joined many road shows and dealt with school districts' technical directors. Special OEM project for projector manufacturer, Delta, for bundle sales.	Strong: 150 road shows annually to signal leadership to K-12 markets and channel reseller. After 2012, OEM for white board manufacturer, Alpha, which provided DC as option in its total solution.	Weak: Adopted minimal effort for promoting to users whose PCs don't have a tuner. OEM for many famous PC makers.	Strong: Targeted SMB, not big companies, by providing affordable price and best service for any small projects. Served as an OEM supplier for data communication vendor, Beta, to target big company market and verify VC features.	Weak: Provided tailored service to system integrators, cannot provide total solution to distribution resellers. Serve as an OEM supplier for security solution firm, Gamma, which provided complete solutions to channels.
BM choice	Experimental brand	Experimental brand and OEM	Dominant brand and OEM	Brand-reliant	OEM-reliant	Brand-dependent	OEM-dependent

Data resource: this research

In the following sections we review the data showing how decision makers choose BMs and associated levels of marketing activities at various PLC stages, and why each choice was made. Figures 1 & 2 summarize each choice.

4.1. Introduction Stage of the Product Life Cycle

During products' introduction stage the objective of marketing is to create product awareness and conduct trials while sales volume is low (Kotler et al., 2006). Observation of environmental conditions focuses on the pace of technological change and the level of ambiguity, as there is a lack of structure and no clear cause-effect relationship. At this stage industry structure is undefined or fleeting; product definition is unclear or missing; and there is a lack of dominant logic to guide actions (Grant, 2008; Santos & Eisenhardt, 2005; 2009). Established OEM buyers wait to see how the product develops, with no intention of engaging in a regular distribution-based OEM business with suppliers. The marketing director of AV-Firm described their experience: "When we approach OEM buyers to promote new products, they are open to discussions during the growth/maturity stages but have no interest in the introduction stage, because market demand is unclear." This shows that AV-Firm could only choose brand BMs at this stage, regardless of the readiness of its internal capabilities, apart from *special* project-based OEM business. Normally, this OEM business provides technological services or modules for a short period such as one year. After that, OEM buyers need to further integrate them into their existing system to create their own special applications. Thus, during the introduction stage, suppliers can only choose brand BM possibly combined with a project-based OEM BM, different from the brand-and-OEM dual BM described in the following subsection on the growth and maturity stages of PLC.

4.1.1. Weak technology and weak marketing; weak technology and strong marketing.

Our data suggest that in this case suppliers choose experimental brand BMs. These can be implemented using modest marketing activities with channel resellers to enhance product adaptability (Santos & Eisenhardt, 2005), while also selling through selected stores to learn from users and markets (Chatterji & Fabrizio, 2014)

(see Table 2, Case 1).

We can now consider AV-Firm's product: document cameras, a device that displays live video of objects on a large screen. In 1998, AV-Firm designed the first portable document camera, targeted at kindergarten to high school (K-12) teachers, for use as a teaching aid in interactive presentations. The price was under $500, much lower than the existing platform type used in universities, which cost from $3,000 to $30,000 (see Table 1). This product was in the introduction stage of its PLC as technologies transformed and the market lacked large demand and institutional patterns. Hence, AV-Firm adopted an experimental brand BM.

AV-Firm made this choice for two main reasons. First, the portable document cameras' technology was still immature, so product features may not have yet fully met users' stated and unstated needs and would have been difficult to sell well regardless of AV-Firm's marketing capabilities (Kotler et al., 2006). This can be seen from the president of the US office's recollection: "In the beginning, we were unsure what to call the document camera. We got the name from teachers. Furthermore, our product quality and features were poor. However, our price was much lower than the platform type's. A few teachers used it as a trial product, because there was no alternative. At the same time, we continued to improve product quality and features to better meet teachers' requirements."

The second reason is to minimize negative user perception, reduce exposure, and avoid recalls for defective products. This was achieved through modest activities with channel resellers, similar to those observed by McGrath (2010). AV-Firm's ex-president, the key decision maker then, explained: "To control risks and maintain good customer service, we limited marketing activities to several regions and provided a hot-swap service for faulty goods to regain the trust of early adopters." From the above discussion of the BM's choice and implementation, we propose:

Proposition 1a: *When a product is in the introduction stage of its product life cycle and its technological readiness is weak, regardless of whether marketing is strong or weak, a supplier is more likely to choose an experimental brand business model.*

4.1.2. Strong technology and weak marketing.

Our data suggest that in this case suppliers choose experimental brand BMs and sub-contracted project-based OEM BMs. These can be implemented with modest activities with channel resellers to enhance product adaptability and significant activities with OEM buyers to enhance efficiency (Santos & Eisenhardt, 2005) (see Table 2, Case 2).

Suppliers choose experimental brand BMs primarily because their marketing readiness is not strong enough to meet users' channel service requirements and other needs, even if their technology is strong. This can be seen from AV-Firm's ex-president's experience: "We continuously received market feedback about our document camera which allowed us to improve features and design a professional exterior for the third generation. At that time, our product technology was strong. However, marketing activities remained modest." The Japanese office president also described this type of situation: "Most vendors in developing countries don't know how to provide good service to users. They only know how to design products. Hence, we must be conservative and learn how to satisfy users' demands." Thus, AV-Firm adopted an experimental brand BM, while improving marketing capabilities and securing its status as a cognitive referent in a distinct market (Santos & Eisenhardt, 2009).

At the same time, suppliers can also choose an OEM BM for subcontracting projects with world-class OEM buyers by aggressively providing strong technological services that use similar technologies. The VP of R&D explained: "After the success of the third generation product, a big Japanese firm, Echo, approached us for a camera module project. It taught us relevant technological know-how. Although sales volume wasn't big, it allowed us to improve our technology to a professional level with Japanese optical quality." Thus, we propose:

Proposition 1b: *When a product is in the introduction stage of its product life cycle and its technological readiness is strong but marketing is weak, a supplier is more likely to choose an experimental brand business model and a subcontracted project-based OEM business model for technological services.*

4.1.3. Strong technology and strong marketing.

Our data suggest that in this case suppliers choose dominant brand BMs and sub-contracted project-based OEM BMs. These can be implemented using significant marketing activities with channel resellers and projects with OEM buyers to enhance product efficiency (Santos & Eisenhardt, 2005) (see Table 2, Case 3).

The US branch's president described AV-Firm's implementation of a dominant brand BM as its document cameras entered this stage, by accelerating marketing activities: "Gradually, our technology and marketing strengthened. We began to heavily promote our products at roadshows, becoming the largest player. We offered higher incentives than competitors to channel resellers, such as a $100 spiff per unit for promoting our products." AV-Firm's stronger product features and services met user requirements, so AV-Firm moved to tip the emergent market in its favor by signaling leadership and disseminating stories. This allowed AV-Firm to defend its boundaries through its dominant brand and protect new markets from competition. AV-Firm controlled markets for channel resellers by acquiring vital resources to cover market space, eliminating or delaying rivalry (Santos & Eisenhardt, 2009).

AV-Firm also cooperated at this stage with OEM buyers through technological projects which helped them determine the market perimeter in the industry structure (Santos & Eisenhardt, 2009). The ex-president gave an example: "One of our OEM clients for document cameras was Delta, a big player in the LCD projector market. Delta bundled its projectors and our special-made cameras for all markets." Delta was attracted to AV-Firm's strong technology, which it integrated into its existing products to enhance their features and portfolio. We therefore state:

Proposition 1c: *When a product is in the introduction stage of its product life cycle and both its technological readiness and marketing are strong, a supplier is more likely to choose a dominant brand business model and a subcontracted project-based OEM business model for technological services.*

4.2. Growth and maturity stages of product life cycle

Demand during these two stages is higher than in the introduction stage, so suppliers seek to launch new products. For the purpose of modelling we grouped these stages into one. During the growth (maturity) stage, the objective of marketing is to maximize market share (profit) while sales volume rapidly rises (reaches a sales peak) (Kotler et al., 2006). Significant environmental conditions include the intensity of price competition, the level of industrial concentration, the strength of institutional forces, and the level of uncertainty about future states. In this type of market industry structure is defined, product definition is clear, and there is a dominant logic to guide actions (Santos & Eisenhardt, 2005; 2009). Market demand increases in the growth stage and repeat buying occurs in the maturity stage, and total market size is large (Grant, 2008).

These conditions create many brand and OEM opportunities. OEM buyers face intense price competition, uncertain new technologies, and strong institutional pressure to outsource (Alcacer & Oxley, 2014). In contrast, suppliers face marketing uncertainty and an unfavorable level of industrial concentration (Santos & Eisenhardt, 2005). As a result, many OEM opportunities occur. Suppliers can choose a dual BM to address reachable markets through brand and unreachable markets through OEM, thereby maximizing market share and profit. Table 3 describes the situation of OEM buyers covered in this research. In the following discussion, we ignore single BMs, because they are in a transient state during dual BM development. For example, Table 1 shows that all products first adopted a brand BM, and later adopted a brand-reliant or other dual BM. Finally, the OEM BM products discussed here work as subsystems or system products and can be distributed alone, unlike purely project-based technological services or modules described in the introduction stage section above.

Table 3. OEM buyer's background and OEM product status

Case No.	Case 8	Case 9	Case 10	Case 11	Case 12	Case 13	Case 14
Product	**PC-TV Tuner (Tuner)**	**PC-TV Tuner (Tuner)**	**PC-TV Tuner (Tuner)**	**PC-TV Tuner (Tuner)**	**Document Camera (DC)**	**Video Conferencing Device (VC)**	**Network Video Recorder (NVR)**
Years of Dual BM	1999-2000	2001-2008	2009	2010- Present	2012-Present	2014- Present	2010- Present
OEM Buyer Background	Some Japanese local brand distributors had 10 times more revenue than AV-Firm.	Most Japan-based and a few US-based PC makers. Fortune 500 companies.	PC makers: Most world-famous PC makers. Fortune 500 companies.	PC makers: Most world-famous PC makers. Fortune 500 companies.	Alpha: Largest interactive white board provider with 10 times more revenue than AV-Firm.	Beta: Large, but not major, communication tool provider. Fortune 500 company.	Gamma: Large video security provider. Fortune 500 company.
OEM Product Changes	Altered company logo to reflect OEM buyer and added specified features.	Altered company logo to reflect OEM buyer and added specified features.	Altered company logo to reflect OEM buyer and added specified features.	Altered company logo to reflect OEM buyers and added specified features.	Added new proprietary software feature and changed appearance.	Changed user interface and enhanced compatibility with standard protocols.	Changed user interface and used AV-Firm's existing case with Gamma logo.
OEM Buyers' Product Positions	Local distributor focused on Japanese retail market.	PC maker focused on Japanese retail market; sells own PCs with preinstalled PC-TV module.	PC maker focused on European retail market through own PCs with preinstalled PC-TV module.	PC maker focused on worldwide retail market through their own PCs with preinstalled PC-TV module.	Focused on interactive white board systems for K-12 market; treats OEM camera as an accessory.	Focused on complicated solutions for non-SMB markets; treats OEM device as VC system end point.	Gamma focuses on security system total solutions for reseller distribution; treats OEM products as system parts.
Brand versus OEM Revenue	80:20 brand-reliant	62:38 brand-dependent	42:58 OEM-dependent	22:78 OEM-reliant	83:17 brand-reliant	62:38 brand-dependent	42:58 OEM-dependent
Conflict Status: Complementarity or Substitution	Complementarity: No conflict though they target retail market. AV-Firm did not address Japanese retail market.	Complementarity: No conflict though they targeted retail market. AV-Firm did not address Japanese retail market.	Substitution: Conflict as users bought fewer tuner modules and more laptops from same retail market.	Substitution: Conflict as users bought fewer tuner modules and more laptops from same retail market.	Complementarity: Almost no conflict even though Alpha targets the same K-12 market.	Complementarity: Almost no conflict as Beta targets big companies while AV-Firm targets SMBs.	Complementarity: Almost no conflict as Gamma targets reseller and AV-Firm targets system integrators.

Data resource: Kuo & Lee, 2016

4.2.1. Strong technology and strong marketing

Our data suggest that suppliers choose brand-reliant dual BMs in this situation, including significant marketing activities with channel resellers for reaching addressable markets and with OEM buyers for reaching un-addressable markets (see Table 2, Case 4). Although marketing activities with both resellers and OEM buyers are also significant in dominant brand BMs, because of higher demand for the product at this stage of PLC, so the absolute amount of marketing activities is also higher in brand-reliant dual BMs (see Figure 2).

AV-Firm's president explained how AV-Firm's document cameras benefited from a brand-reliant dual BM: "As interactive teaching became popular our sales accelerated. We used a flexible pricing strategy and bonding service capability for users and channels and attended around 150 roadshows annually, becoming the biggest player in the US with more than 40% market share." AV-Firm captured higher value and profit with this BM due to its technological and marketing premium in markets. As tipping points occurred, AV-Firm moved aggressively to control existing and new markets ahead of competitors (Ozcan & Eisenhardt, 2005), thereby sustaining monopolies in constructed markets.

This choice also benefited AV-Firm's OEM business. The US branch's president said: "The largest interactive white board solution provider, Alpha (see Table 3, Case 12), tried to cooperate with us on an OEM project with a different approach. This OEM buyer treated document cameras as a subsystem of its own solution. This project occupied around 20% of total revenue in AV-Firm and scaled up the quantity and quality of our products as well." The CFO added, "The total factory overhead costs with and without Alpha OEM document camera were: $4.43 and $6.1 million for 2012, $3.3 and $6.6 million for 2013, and $4.3 and $7.84 million for 2014. This improved 42% overhead costs with an $8.51 million reduction."

Because market demand was large, AV-firms' brand signaled OEM opportunities to Alpha. In some cases OEM buyers may request a different design to avoid direct competition from similar products in the same market. This shows that suppliers can also engage in OEM business, thereby strengthening alliances with resource-rich OEM buyers. This can be explained thusly: A firm, with limited

global resources, may not fully take advantage of a situation when it controls a critical asset relating to the survival of others (Hillman et al., 2009). Thus, we propose:

Proposition 2a: *When a product is in the growth/maturity stages of its product life cycle and its technological readiness and marketing are both strong, a supplier is more likely to choose a brand-reliant dual business model.*

4.2.2. Strong technology and weak marketing.

Our data suggest that suppliers choose OEM-reliant dual BMs in this case. These can be implemented with significant marketing activities with OEM buyers, taking advantage of buyers' superb marketing capabilities (Parmigiani & Mitchell, 2009), and modest activities with channel resellers for receiving market feedback and signalling more OEM opportunities to other potential OEM buyers (Spence, 1973) (see Table 2, Case 5). Although marketing activities with OEM buyers are also more significant than with channel resellers in experimental brand BMs, because demand for the product is higher at this PLC stage so the absolute amount of marketing activities is also higher in OEM-reliant dual BMs (see Figure 2).

We now consider another AV-Firm product: PC-TV tuners. These are peripheral devices that add intelligent TV functionality to PCs. AV-Firm was the first to design PC-TV tuners in 1993. Since then, it has continuously enhanced features and successfully sold them in the retail brand market (see Table 1). Around 2005, Microsoft promoted its PC-TV entertainment software to consumers. This application induced PC makers such as HP, Sony, and Acer to conduct OEM business with AV-Firm by selling pre-installed tuners in the retail market. Inside AV-Firm, substitution between brand and OEM business occurred (see Table 3, Case 11). After 2010, AV-Firm received almost 78% of its revenue from OEM and 22% from brand.

One reason suppliers choose OEM-reliant dual BMs is inferior channel capabilities compared to dominant OEM buyers. OEM buyers are usually resource-rich in established markets and can employ hard-power tactics, such as making large-scale, deep-pocket investments that create barriers to entry (Porter, 1980). Suppliers therefore need to spend more up front on marketing to compete for

limited opportunities in existing distribution channels, which promote few product lines during these PLC stages (Kotler et al., 2006). Thus, because developing brand business is time-consuming, suppliers with weak marketing should increase dependence on OEM buyers in order to gain benefits as OEM buyers' technological partners (Santos & Eisenhardt, 2005).

AV-Firm's marketing director explained: "To develop its PC-TV application, Microsoft gave PC makers marketing funds for promotion in the home entertainment market. Tuners became very popular among PC makers. Our years of retailing experience provided us with mature technology for meeting their specific demands. However, our retail market revenue began to fall. We gradually redirected our engineers and marketing to support PC makers and gained 90% market share." In addition, the factory VP noted: "Our production technology is strong. Our tuners had a 99.60% first pass yield rate with a standard error of 0.0012."

However, in this situation suppliers can still benefit from brand business with modest marketing activities by developing markets OEM buyers may be reluctant to engage in (Alcacer & Oxley, 2014), thereby signaling OEM opportunities to other OEM buyers. Modest brand business also provides market feedback so suppliers can avoid information asymmetry with OEM buyers, and diversify business risks from pure OEM. The sales VP of AV-Firm observed: "For the PC-TV tuner product, our sense of bonding with customers was maintained in the branded channel, but marketing promotion became weaker as its main function was to look for new OEM opportunities." Hence, we propose:

Proposition 2b: *When a product is in the growth/maturity stages of its product life cycle and its technological readiness is strong but marketing is weak, a supplier is more likely to choose an OEM-reliant dual business model*.

4.2.3. Weak technology and strong marketing.

Our data suggest that suppliers choose brand-dependent dual BMs in this case. These are implemented through moderate marketing activities with channel resellers to develop products' market position and receive feedback, and modest activities with OEM buyers for technology verification and validation and co-developing different markets (see Table 2, Case 6).

Now we consider another product—AV-Firm's video conferencing systems (see Table 1). The market for large customers is dominated by Cisco and Polycom, with a price range from $6,000 to $10,000 per end point. Around 2006 AV-Firm started designing and promoting its own end point for small and medium businesses (SMBs), a previously unexplored market, with a price range from $1,000 to $1,500. This proved successful, but AV-Firm's technology was still not as strong as Cisco's and Polycom's, and it remained unable to handle larger projects with complicated requirements.

Suppliers may choose brand-dependent dual BMs to better understand markets and cognitive referents through moderately promotion of branded products in selected markets. Suppliers often need to spend far more money on marketing than engineering. For example, in 2013, Apple invested 2.5 times more on marketing. However, this can damage suppliers' image when products are immature (McGrath, 2010). Moderate promotion in selected markets mitigates risk while allowing suppliers to gain technological and marketing knowledge.

AV-Firm's PM for video conferencing explained how this strategy suited AV-Firm: "We don't have any business opportunities with Fortune 500 firms. Our features cannot meet their demands, as they need complicated solutions and don't care about price. We instead support SMBs and local governments, which need acceptable quality at an affordable price. We provide excellent service for customers regardless of how small their projects are. Polycom cannot."

Another reason suppliers choose this BM type is to gain assistance from OEM buyers for satisfying the large market demand that occurs at this PLC stage, despite products' immature technology. Suppliers can also harness OEM buyers' validation capabilities to rapidly move technology to maturity. This allows suppliers to maintain good relationships with key buyers in major markets and parry potential competition (Santos & Eisenhardt, 2009).

We can see this in the example given by AV-Firm's R&D director. "Our Japanese OEM buyer, Beta (see Table 3, Case 13), reviewed our product quality and found several crucial technical points had been ignored, such as the handling of communication protocols. We applied their recommendations to our brand products as well." The president added: "For big projects in traditional channels, resellers

need a few months to close transactions. They promote products repeatedly to arouse interest, demo and install them, and train users. With our low margins we cannot afford for our channel resellers to do this, but our OEM buyers can. Our business is around 60% from brand and 40% from OEM." The president of the Japanese office said, "After we supplied the OEM buyer, our quality matured and SMB business improved, with even some large firms showing interest." Based on these observations, we propose:

Proposition 2c: *When a product is in the growth/maturity stages of its product life cycle and its technological readiness is weak but marketing is strong, a supplier is more likely to choose a brand-dependent dual business model*.

4.2.4. Weak technology and weak marketing.

Our data suggest that suppliers choose OEM-dependent dual BMs in this case. These involve modest marketing activities with OEM buyers for collecting feedback on product technology and co-developing markets, and modest activities with channel resellers to receive market feedback in order to enhance both capabilities (see Table 2, Case 7).

Suppliers choose OEM-dependent dual BMs because they need OEM buyers' assistance to meet rapidly increasing market demand while their products' technology is still immature and marketing is weak. AV-Firm's VP of R&D said, "We cannot tell where the devil is by ourselves. We focus on product design rather than on validation as our knowledge of users' demands is relatively weak. OEM buyers have strong validation capabilities for maintaining brand value." Suppliers also need modest OEM business to avoid unexpected problems because OEM buyers demand punishing contract terms if products fail to meet requirements. For example, the President of AV-Firm explained, "When one component is sold to OEM buyers, once the failure rate in the market passes a threshold, we must send technical staff to user sites around the world to replace them at the our own cost."

AV-Firm's network video recorders (NVRs), which capture and process images from IP cameras, is an example of this BM choice. AV-Firm began developing NVRs in 2000. This market is large and supplied by well-known branded firms such as Bosch and GE (see Table 1).

AV-Firm's R&D VP said, "Security systems are very complicated and must work non-stop, including IP cameras, NVRs, central management system software, and so on. We couldn't solve all the issues with our NVRs in house. Before actively promoting a branded product we needed an OEM buyer's help to verify product specifications, validate features, and avoid compatibility issues. The buyer, Gamma (see Table 3, Case 14), sold our NVRs within its solution through its distribution channels.

By choosing this BM suppliers can still use their own brand to market vertical applications through selected channel resellers, as we can see from AV-Firm's NVR BU head's example: "We have weak marketing in regular distribution channels but we serve system integrators well by providing tailor-made products for each project. The ratio of brand to OEM business is around 40:60." Thus, we propose:

Proposition 2d: *When a product is in the growth/maturity stages of its product life cycle and its technological readiness and marketing are weak, a supplier is more likely to choose an OEM-dependent dual business model.*

5. Discussion and Implications

We employ organizational boundary factors to enrich BM choice literature. Our core contribution is a framework which decision makers can use to effectively choose suitable BMs and shape products' activity boundaries (see Figure 2). Collectively, this choice relies on the strength or weakness of a product's *technological and marketing* capabilities and its *PLC* stage. Both technological and marketing capabilities lie at the heart of BMs as the source of *competence*, focusing on how decision makers gather, exploit, and renew products' specific resource advantages for business growth (Penrose, 1959). PLC plays a critical role in the conception of *competence*, representing the market dynamism of products in the competitive landscape which indicates the status of competitors and customers. Hence, multiple BMs may be needed to meet consumer preferences, as both internal and external situations change. This means suppliers must anticipate changes in user preferences by dynamically choosing different product BMs

(Demil & Lecocq, 2010; DaSilva & Trkman, 2014). This can be seen in Tables 2, from case 1 to 4, and Table 3, from case 8 to 11, where we can find AV-Firm adopted different BMs for its document camera and PC-TV tuner products.

In addition, suppliers need to consider the appropriate inter-firm *marketing power* for influencing channel resellers and OEM buyers. *Marketing power* is implemented using varying amounts of marketing activities, from significant to modest. Significant activities promote suppliers' technological and marketing benefits to partners with the goal of maximizing sales and increasing efficiency (Porter, 1980). Modest activities allow suppliers to experiment with partners to better shape business opportunities (Hallen & Eisenhardt, 2012) and gradually improve product adaptability and weak capabilities (Santos & Eisenhardt, 2005) while limiting risks. In sum, by putting customers at the center of their considerations (Demil et al., 2015), suppliers can choose the right BM for maximizing products' profit based on products' *competence* at selecting partners, and implement suitable *marketing power* for maintaining good inter-firm relationships so partners can *efficiently* serve users. Under a clear *identity* that guides multiple types of BM choice, decision makers objectively choose the right BM without relying solely on intuition.

These findings not only clarify how suppliers can choose the right brand, OEM, or dual BM but also enrich and complement the arguments in Kuo and Lee (2016). Kuo and Lee firstly highlighted how suppliers can choose four types of dual BM based on capabilities-based constructs. Our framework is anchored in organizational boundaries factors, focusing on marketing power and competence, which are comprehensive considerations in BM choice.

When discussing competence, we consider not only technological and marketing capabilities but also market dynamism represented by PLC, which Kuo and Lee did not clearly mention. In the introduction stage of PLC, suppliers in ambiguous environments must choose brand-only BMs with optional OEM technological modules. In growth/maturity stages, suppliers in structured environments can choose one of the dual BM types we describe.

We also address suppliers' exertion of *marketing power* over channel resellers and/or OEM buyers by implementing different amounts of marketing activities.

The amount of marketing activities is related to the performance of dual BM choices, also not mentioned by Kuo and Lee. For example, brand-reliant and OEM-reliant BMs have significant activities which indicate that they perform better than brand-dependent and OEM-dependent BMs, because the latter two require improvements to products' technology, marketing, or both.

The framework of BM choice in the field of strategy has significant implications for academic researchers and practitioners. For researchers, choosing business partners—channel resellers or OEM buyers—determines stakeholder activities, one of the antecedents of BM design (Zott et al., 2011; Amit & Zott, 2015). The other three antecedents needed to craft business architecture are goals for creating and capturing value, templates of incumbents, and environmental constraints. Each antecedent may increase and promote one or two design themes, which are the value sources of activity systems. The themes are novelty, efficiency, lock-in, and complementarities (Zott & Amit, 2010). We are mainly concerned with stakeholder activities, especially the level of marketing activities. The result of focusing on the antecedent of stakeholder activities is promoting complementarities-centered BM design for new products. This requires cooperation and coordination with channel resellers and OEM buyers, aligning interests among them in order to lay the basis for realizing complementarities. Moreover, if suppliers work with highly reputable OEM buyers, a critical legitimacy threshold may be reached beyond which working with other channel resellers and OEM buyers will be easier. This involves stakeholders' activities antecedent and promotes a lock-in-centered BM design for new products, which motivates less-committed stakeholders to participate in the BM (Amit & Zott, 2015). Overall, through the value themes of complementarities or lock-in, suppliers can sell more products through their chosen BMs.

We also investigate how suppliers do business at the system level (Zott et al., 2011) by observing decision makers' choices through the central role of customers in our framework, and by emphasizing the role of implementation to complement the traditional focus on planning (Demil et al., 2015). Proper BM choices explain why firms perform differently for each product. Through chosen BMs, decision makers describe the logic of the firm and how they seek to generate product

revenue and profit streams (Demil et al., 2015). Customers represent the demand side of needs which must be explicitly taken into account for BM definition (Morris et al., 2005; Priem et al., 2013). We show how suppliers can serve customers through their own brand BM development and/or through OEM buyers' sales channels, thus further demonstrating how BMs reflect realized strategy and connecting them with implementation. During implementation, suppliers keep suitable marketing power relationships with channel resellers and OEM buyers to bring a product/service to market and serve customers (Demil et al., 2015).

For practitioners, the pragmatic framework generated by this study provides useful insights into how to quickly choose BMs for each product. This choice depends on suppliers' capabilities relative to competitors in the constantly evolving target market. Thus, practitioners need to be aware of the permanent disequilibrium of BM choice at all times (Demil & Lecocq, 2010). AV-Firm has already applied the proposed framework during its product development process to quickly confirm if an adopted BM is right or wrong. Further, the amount of marketing activities during the introduction stage and growth/maturity stages is different.

This framework can be further hypothesis-tested in order to generalize it to other cases of BM choice, as there have not yet been many quantitative studies in this field (Markides, 2013). There are three potential directions for further research: 1) considering external competition between a supplier's and OEM buyer's brand in the same market from the point of view of coopetition, 2) studying how to implement ambidextrous organizations internally for dual BMs, which involve paradoxical internal operations (Markides, 2013), and 3) exploring the impact constructs of organizational boundary factors such as identity and efficiency in additional to competence and power (Santos & Eisenhardt, 2005) to comprehensively interpret BM choice activity systems. The conception of identity asks who the organization is from different stakeholders' point of view. Efficiency focuses on minimizing governance costs by asking whether products should be governed by brand BM and/or OEM BMs in order to maximize profits.

6. Conclusion

Our aim was to gain a holistic understanding of business model choice for each product. This choice decides whether channel resellers, OEM buyers or both will be the preferred complementary business partners for addressing reachable and unreachable markets. We thus studied a single firm with embedded multiple product lines that was longer-lived and more successful than many ventures. Our study proposes a framework grounded by organizational boundary factors. With technological and marketing capabilities representing suppliers' product-specific resources and PLC indicating the market's environmental dynamism, suppliers' decision makers can systematically choose the right business model. Possible business models include brand, OEM, or dual business models. Proper implementation requires a good inter-firm marketing power relationship between suppliers and business partners to efficiently approach end users. We hope to have laid the foundations for fruitful future research and empirical testing on the choice of business model.

Appendix A: Excerpts of interview topic guide
1) What were AV-Firm's product applications and background information? Who were the target customers? What were the competitive landscape and working environment? What business model was chosen?
2) What was the OEM buyers' background for each product? Why did these buyers choose AV-Firm? What were brand and OEM revenues? Were the attributes of the dual business model complementary?
3) For each product, what were its special marketing capabilities, such as knowledge of competitors and customers, effective advertising and pricing programs, integrating marketing activities, skill of segment and target markets, etc.?
4) For each product, what were its special technological capabilities, such as new product development, production process and manufacturing facilities, technology development, ability to predict technological changes, etc.?
5) For each product, what were its working environmental conditions, such as intensity of price competition, level of industry concentration, strength of institutional forces, pace of change, and level of uncertainty and ambiguity?

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