Evaluating Platform Business Models in the Telecommunications Industry via Framework-based Case Studies of Cloud and Smart Home Service Platforms

Completed Research Paper

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Abstract

The rise of digital platforms is changing organizations, markets and the logic of innovation in the digital economy. In particular, telecommunication companies re-structure their business models to gain control of innovative services and digital platforms. In this light, we aim to advance research on digital platform business models conducting a framework-based case study analysis of telecommunication operators' platforms for enterprise cloud and smart home services. Besides the contribution of an analysis framework, our work provides insights on platform business models and strategies. In particular strong similarity between platforms for enterprise cloud services is confirmed, while a dominant design of smart home platforms has not yet emerged. Further, the analysis reveals that the telecommunication companies intend to foster platform adoption through different strategies regarding customer ownership and degrees of freedom for complementary participation. Finally, we find that complementary innovation is challenged by costly quality assurance measures imposed by the telecommunication companies.

Keywords: Digital platforms, business models, smart home, cloud computing, case study research

Introduction and approach

Digital technologies organized as platforms are transforming organizations and markets in the digital economy (Yoo et al. 2010) and the way business is done in the ICT industry (Ballon and Van Heesvelde 2011). In particular, telecommunication companies have faced significant shifts in revenues and need to align their business models to gain control over innovative services and digital platforms (Ballon 2009; Liebenau 2012). From a research perspective, much work has been done on the multi-sidedness of platforms regarding price regulation as a means to stimulate adoption and minimize negative network effects (Boudreau and Hagiu 2009). However, effective platform strategies go beyond efficient revenue distribution and require a comprehensive understanding of platform business models (Boudreau and Hagiu 2009; Cusumano 2010). In this sense, we follow the call of Yoo et al. (2010) and aim to enhance knowledge on platform business models in the light of digital innovation. Specifically, we ask what is a generic and comprehensive framework for analyzing business models of digital service platforms? Further, we investigate how platform business models of telecommunication operators are designed in the fields of enterprise cloud applications and smart home services?

In order to answer these questions we take a two-step research approach: first, we derive a framework to analyze platform business models consolidating insights from related literature on economics, strategy and innovation management; second, we strike a multiple case study approach based on within-case and cross-case analyses in the spirit of Yin (1981). That is, we review available primary and secondary documentations of service platforms from publicly available sources including operator websites, press articles, presentation documents, product specifications and service terms and conditions. The analyzed cases include the platforms of leading telecommunication operators players that have a world-wide presence and a strong commitment to digital innovation: these are the cloud service platforms of Deutsche Telekom and Telefónica, i.e., the TelekomCloud Business Marketplace and Aplicateca respectively, as well as the smart home platforms of Deutsche Telekom and AT&T, i.e., QIVICON and Digital Life.

Theoretical background and framework

A business model describes "the content, structure, and governance of transactions" between the focal firm and external parties (Amit and Zott, 2001). Consolidating a broad range of renowned business model concepts, Al-Debei and Avison (2010) identify the value proposition, architecture, network and finance as the "main elements to be examined when designing, analyzing, and evaluating business models". Thus, we implement and describe these dimensions in the following referring to literature on platform theory in the digital economy. Figure 1 illustrates the analysis framework derived in this process.
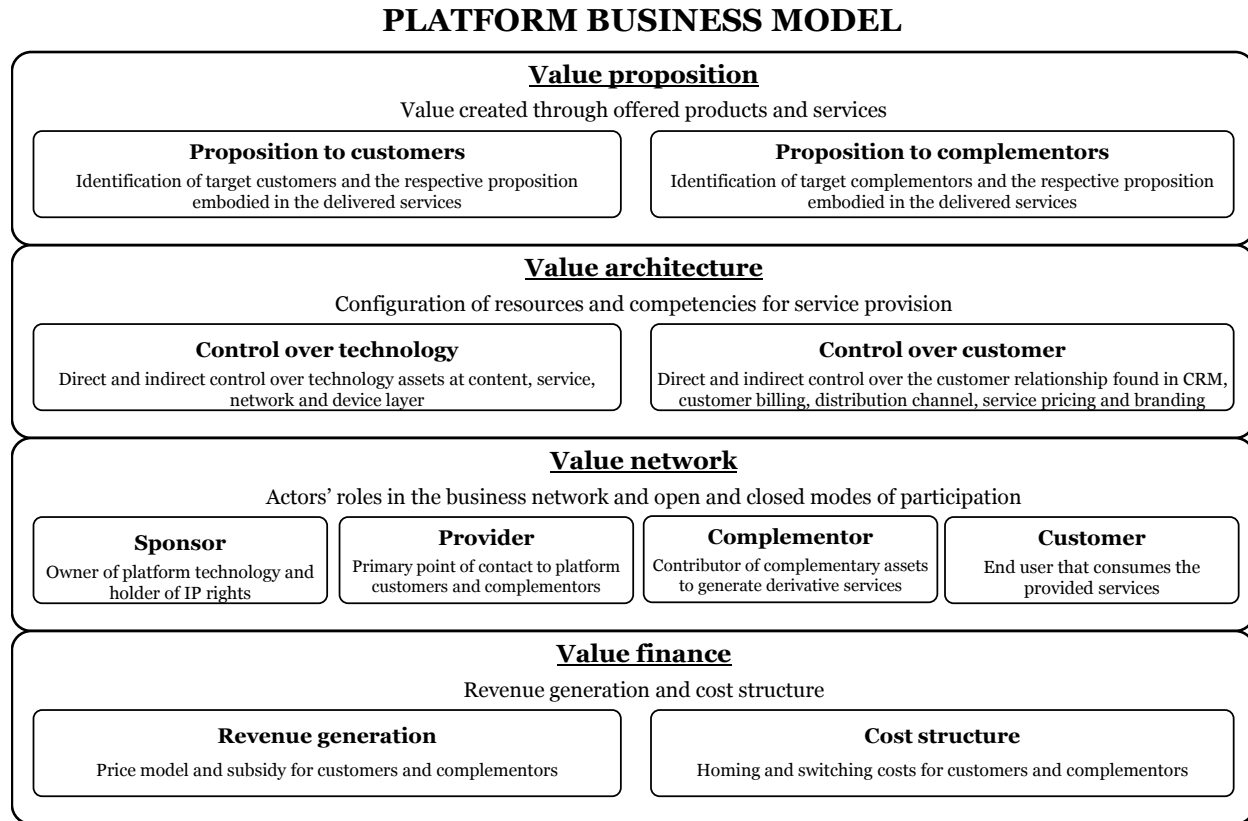
PLATFORM BUSINESS MODEL

Figure 1. Derived analysis framework for platform business models

The value proposition refers to the way in which organizations create value both for their customers and for each party engaged in service provision (Al-Debei and Avison 2010). In this sense, the value proposition is embodied in the products and services offered by an organization. Economic literature commonly regards platforms as two- or multi-sided markets – compare (Eisenmann et al. 2006; Evans 2003; Hagiu and Wright 2011) – understanding a platform as "an organization that creates value

primarily by enabling direct interactions between two (or more) distinct types of affiliated customers" (Hagiu and Wright 2011). Cusumano and Gawer (2002) adopt this two-sided view to the field of innovation management understanding that a platform creates value by providing assets upon which complementors generate products and services for customers that consume those.

The value architecture represents how an organization's resources and core competencies are configured in order to create and provide value to customers (Al-Debei and Avison 2010). As such, it describes the way organizations integrate organizational and technological assets for efficient and effective service provision. According to (Yoo et al. 2010), the provision of a digital service can be described by an architecture comprising four layers: the content, service, network and device layer. Further, Schlagwein et al. (2010) and Hilkert et al. (2011) point to the technical platform and the platform's marketplace or distribution channel as the two basic distinctive assets of platforms. Similarly, Ballon (2009) distinguishes platforms in the mobile industry according to their control over technology assets that ensure the value proposition and over the customer relationship. In both cases, the platform owner either controls these assets directly or is reliant on the assets of other actors. In this spirit, we demarcate direct and indirect control over technology assets at the above layers from control over the customer embodied in the distribution of services, the customer relationship management and support, customer billing and payment as well as branding and pricing of services.

The value network describes inter-organizational relationships within a business model. In this sense, it focuses on the roles of different actors and their way of collaboration in the business network (Al-Debei and Avison 2010). In platform literature this perspective is embodied in the concept of platform openness understood as the extend to which platform-mediated networks allow for participation in different roles (Eisenmann et al. 2009). Platform openness is crucial as it trades off platform adoption and appropriability (West 2003). In this regard, Figure 2 provides a consolidated understanding of roles in platform value networks as proposed by different scholars of strategy and technology management as well as business ecosystem research. Generally, third-party involvement in these roles is either open, i.e., participation is unrestricted or restrictions are reasonable and non-discriminatory, or elsewise closed (Eisenmann et al. 2009; Hilkert et al. 2011; Iyer and Henderson 2010). As a consequence, a platform's value network comprehends the roles of the platform sponsor, provider, complementor and customer each allowing for participation in either open or closed mode.
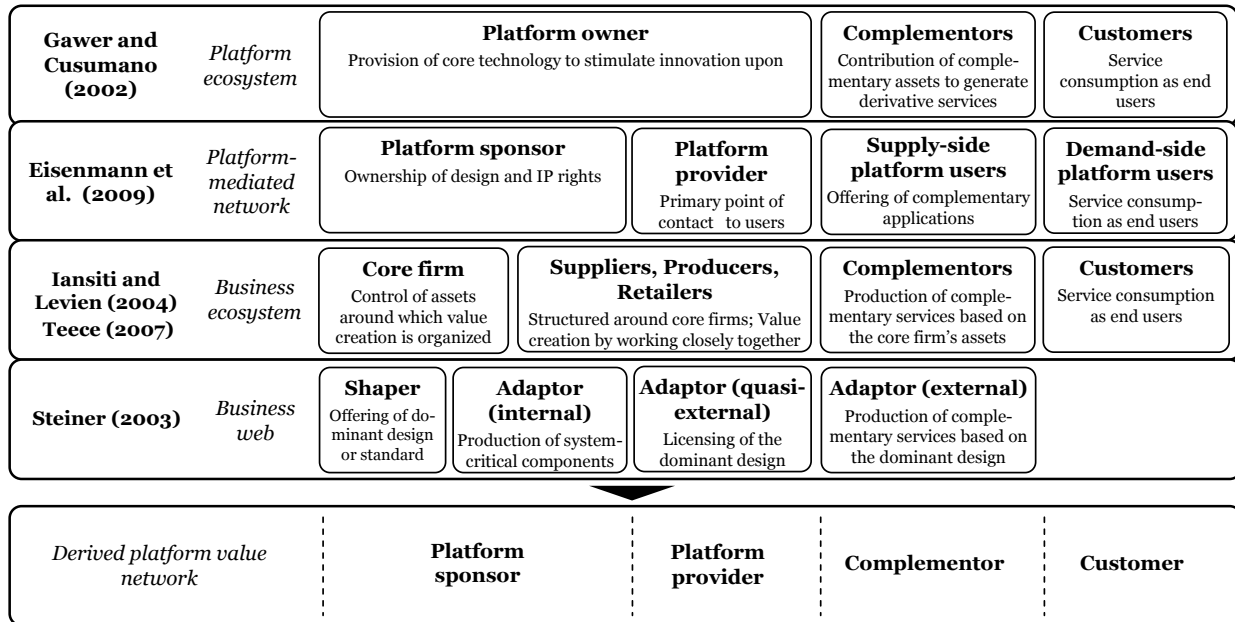
Gawer and Cusumano (2002)	*Platform ecosystem*	**Platform owner** Provision of core technology to stimulate innovation upon		**Complementors** Contribution of complementary assets to generate derivative services	**Customers** Service consumption as end users
Eisenmann et al. (2009)	*Platform-mediated network*	**Platform sponsor** Ownership of design and IP rights	**Platform provider** Primary point of contact to users	**Supply-side platform users** Offering of complementary applications	**Demand-side platform users** Service consumption as end users
Iansiti and Levien (2004) Teece (2007)	*Business ecosystem*	**Core firm** Control of assets around which value creation is organized	**Suppliers, Producers, Retailers** Structured around core firms; Value creation by working closely together	**Complementors** Production of complementary services based on the core firm's assets	**Customers** Service consumption as end users
Steiner (2003)	*Business web*	**Shaper** Offering of dominant design or standard	**Adaptor (internal)** Production of system-critical components	**Adaptor (quasi-external)** Licensing of the dominant design	**Adaptor (external)** Production of complementary services based on the dominant design
Derived platform value network		**Platform sponsor**	**Platform provider**	**Complementor**	**Customer**

Figure 2. Consolidation of different research perspectives on the platform value network

The value finance dimension relates to the way revenues are generated and costs are structured in the business model (Al-Debei and Avison 2010). As network effects play an important role in platform strategies, a platform's value to any given user is determined to a large extend by the number of users on the other side of the platform (Eisenmann et al. 2006). Thus, profits depend strongly on the revenue decomposition between the two sides and the question which side should be subsidized (Eisenmann et al. 2006; Evans 2003). As a consequence, a platform's revenue model is described by the revenues generated both from customers and complementors. From an economic point of view, the most relevant costs associated with platform affiliation are homing and switching costs (Kazan et al. 2013). Homing costs include opportunity costs and expenses for adoption and operation of a platform and its complements. Switching costs are given in cases of lock-ins, i.e., homing costs are preemptively high to switch to an alternative platform. As homing costs and lock-ins can arise both for customers and complementors, a major challenge for platform business models is to get both sides on board (Ballon 2009). Consequently, drivers of homing and switching costs both for customers and complementors characterize the cost structure of a platform business model.

Case analysis

In this chapter, we conduct the within-case analysis that aims at documenting the key characteristics of a particular case and we carry out the cross-case analysis to highlight major similarities and differences between cases. Table 1 provides an overview of the key characteristics identified in each case.

Within-case analysis

Cloud service platforms

In September, 2009, Telefónica launched Telefónica Aplicateca, an online platform for the provision and management of business applications and services facilitated through cloud computing to small- and medium-sized companies (SME) in Spain. Since then, Aplicateca has enjoyed rapid growth in users and constantly expanded its cloud service portfolio, currently offering over 55 applications from multiple service vendors in a wide range of areas, including, e.g., e-commerce, marketing, CRM, accounting, office administration or communications and collaboration. Similarly, in July, 2012, Deutsche Telekom put into service its platform for cloud service applications, the TelkomCloud Business Marketplace, in Germany. Currently, the TelekomCloud Business Marketplace's portfolio includes over 45 applications from more than 20 different service vendors growing in number. The value propositions to customers come as reliable, scalable and convenient access to and management of latest business applications enabling commercial deployment and saving time-to-market. Additionally, IT cost savings can be realized, e.g. for search, acquisition and licensing, installation and management of software as well as for investments in IT infrastructure, hardware integration, maintenance and usage. Cloud software vendors find value in convenient content and service management, may benefit from marketing synergies and from economies of scale through usage of a common cloud infrastructure respectively.

The telecommunication companies own the content and service management platforms that implement the features and interfaces required to aggregate and manage multiple different applications including single-sign-on funcationality as well as deploy them on a global scale. While third-party vendors design and develop the marketplaces' cloud applications, the operators exert strong influence on these competencies: i.e., complementors' business models are aligned in a formalized on-boarding process, including feasibility study, platform integration, contract negotiation and testing. At the network layer, both platforms are fully integrated in the operators' back-end systems for a seamless experience and efficient operation. Server-side hosting of applications is provided on servers in Spain and Germany respectively, complying with the companies' standardized technical security and data privacy concept. However, complementors may opt for third-party hosting. In this case, the operators enforce security and privacy levels of applications through audits and penetration tests. Further, both marketplaces directly control the day-to-day customer and first level support relationship, customer billing and charging as well as the promotion and distribution of applications through their online portals, product catalogues and member distribution lists. Service branding and pricing is owned by the application developers, however, tightly controlled through the above on-boarding process.

With respect to the value network, sponsorship of the platform design and intellectual property (IP) rights is exclusive to the telecommunication operators respectively. In order to drive international expansion, Telefónica licenses the platform exclusively to its national affiliates outside of the Spanish home market, such as Argentina, Brazil and Colombia. Further, both marketplaces stem on a growing and varied network of independent service vendors. Both operators allow for competing applications on their platforms, however, suitability of vendors' business models is validated during the on-boarding processes. Finally, service provision is independent from existing broadband access or other services offerd by the operators and thus, open to customer outside the operators' customer base.

The end users constitute the revenue side in the marketplaces' business models. Generally, pricing is based on monthly service fees available at monthly contractual commitments, while service revenues are shared between the platforms and developers at terms that elude from public information. Homing costs for customers come as service configuration and data migration costs, while services are interoperable with desktop and mobile devices, IT and operating systems commonly used in SMEs. Compared to customers, cloud service vendors face relatively high homing and switching costs manifested in the on-boarding processes that can take up to eight weeks and most likely requiring long-term service comittments.

Smart home service platforms

AT&T Digital Life is a wireless home management platform for home security and automation services, including video monitoring and locking systems, launched in April 2013 in 15 cities in the US and by now, expanded to 58 cities. QIVICON – Deutsche Telekom's platform for smart home services launched in October, 2013 – offers services for home automation, like smoke detection and automated light or heater control. Both platforms target mass-market consumers that value service reliability and security as well as convenient, remote control of various compatible smart home services through one central user interface. In contrast to Deutsche Telekom, AT&T puts strong emphasis on end-to-end service delivery and support. With respect to complementors, the smart home platforms engage with component manufacturers, application developers that aim to benefit from access to a new and growing market, marketing synergies, cost-efficient service development as well as compatibility across different device and application domains.

In terms of technology control, both operators provide the service gateway installed in customers' homes and manage the backend network infrastructure. In order to deliver its proposition to 24/7 professional home monitoring, AT&T runs two monitoring centers certified by the insurance industry that reach out to and inform customers immediately in case of alerts and irregularities. While AT&T has developed integrated service packages, Deutsche Telekom allows third-party development through selected and certified partners. Similarly, both operators keep in check devices compatible to their platforms: while the QIVICON platform ensures device compatibility by independent certification bodies, including the Association for Electrical, Electronic and Information Technologies e.V., one of Europe's largest technical-scientific associations, AT&T takes over device integration itself. Regarding customer ownership, AT&T controls all customer-related assets, while QIVICON leaves the customer relationship management, service distribution, pricing and branding to complementors – only customer billing and payment is optionally taken over by Deutsche Telekom.

While both operators exclusively control the development of the home service gateways, they have struck opposite approaches with respect to complementary contributions. AT&T integrates hardware and software of a limited set of component manufacturers and application developers and acts as the only service provider to end customers. However, plans have been announced to licence its platform technology on a wholesale basis to operators abroad. Contrarily, Deutsche Telekom has assembled a growing alliance of leading players in the German smart home market, including energy providers, domestic appliance manufacturers, electronic device manufacturer and providers of home automation solutions. Each of these companies may serve as a sole contact point for end customers that use QIVICON services. Additionally, Deutsche Telekom maintains a network of software development and consulting partners to provide assistance to complementors. Both platforms are open from an end user perspective, as service provision is access-network agnostic and interoperable with commonly used operating systems for wireless access devices.

			Telefónica Aplicateca	TelekomCloud Business Marketplace	ATT Digital Life	QIVICON
			Marketplace for cloud business applications		Smart home service platform	
			Launch September, 2009, in Spain	Launch July, 2012, in Germany	Launch April, 2013, in 15 major US cities	Launch October, 2013, in Germany
V. proposition		Customer...	*SMEs*		*Residential mass-market*	
		... proposition	Reliability; security; variety; convenience			
			Scalability; IT cost savings; reduced ttm		Compatibility; central UI; remote access	
			End-to-end support			
		Complementor...	*Application developers*			
					Component manufacturers	
		...proposition	Marketing synergies			
			Econ. of scale; scalability; convenient service mgmt.		New market opportunity; cost-effective development; compatibility	
V. architecture	**Technology control**	Content & Service	Direct (Content & service mgmt platform)		Direct (Home service gateway)	
			Indirect (On-boarding)		Direct (Integration)	Indirect (Certification)
		Network	Direct (Backend infrastructure)[1]			
		Device	Indirect (Standardization)		Direct (Integration)	Indirect (Certification)
	Customer control	CRM	Direct			Indirect[2]
		Billing				
		Distribution				
		Price/Brand	Indirect			
V. network		Sponsor	Closed[3]			
		Provider				
		Complementor				
		Customer	Open			
V. finance	**Rev.**	Customer	Subscription-based			One-time charges
		Compl.	Revenue-sharing		n/a	
	Costs	Customer	Configuration; data migration		Gateway; components; installation; starter bundles	
			Short-term contracts[4]		Long-term contracts[4]	No commitment[4]
		Compl.	On-boarding; auditing		Integration	Certification
			Long-term commitment			

1 Cloud service platforms: regular testing and auditing for applications hosted on third-party infrastructure
2 Billing and distribution through an online portal are offered as an option
3 AT&T Digital Life announced plans to licence platform to other telcos and launch a software development kit
4 Minimum contract length: 1 month (cloud service platforms), 2 years (AT&T Digital Life), none within first 2 years (QIVICON)

Table 1. Overview on characteristics of platform business models as identified in case analysis

AT&T's financing model puts the customer on the revenue side offering services at two-year contracts on monthly recurring rates plus one-time charges for equipment and installation. In contrast to this, the QIVICON platform does not hold a direct commercial customer relationship and generates revenues from complementors whose current pricing does not include recurring service charges within the first two years

of service. In both cases, no specific information on pricing and contract terms with complementors are publically available. Homing costs for customers come as investments in the service gateways, hardware components and installations fees. As for AT&T's Digital Life, customers' switching costs stem from monthly service charges and early termination fees if contracts are cancelled before maturity, while currently complementary services of the QIVICON platform are priced at no charges within the first two years of service. Complementors are required to invest in hardware and software certification and integration. While in both cases details on partners' service commitments are not publically available, requirements for long-term service commitments seem likely.

Cross-case analysis

Within the same service type, i.e. cloud computing or smart home, the value propositions are very similar targeting the same types of customers and complementors with comparable service claims respectively. Propositions that are common across both service types are given as service reliability, security, variety and convenience on the customer side and marketing synergies on the complementor side. However, one central difference between the smart home platforms is remarkable: while AT&T is committed to end-to-end service delivery, Deutsche Telekom leaves customer support to complementors.

With respect to value architecture, all telcos put strong emphasis on controlling the underlying technology. On the one hand, technology assets that provide the core functions of service delivery, i.e., the technical platforms and the back-end networks, are owned by the telecommunication operators. On the other hand, the operators enforce compatibility, reliability and security of third-party assets through on-boarding, certification and integration of services and devices. Regarding control of the customer relationship, the architectures of the cloud service platforms are identical: i.e., positioned as marketplaces, both operators act as the primary point of contact for sales, billing and support leaving only pricing and branding of services to complementors. Contrarily, the smart home platforms diverge fundamentally with respect to control over customers: while Deutsche Telekom's smart home platform leaves the customer relationship fully to complementors, AT&T assumes all degrees of freedom in this regard under its own brand.

Generally, the design and IP rights of the platform technology is exclusively owned by the operators. Differences exist in the platforms' openness towards participation of third-party platform providers and complementors. While the cloud marketplaces are provided exclusively under the telcos' brands, they are open to the distribution of third-party applications. In contrast, AT&T's home security platform is closed for third-party applications, while QIVICON is designed for provider variety both regarding the platform itself as well as compatible applications and hardware components. Finally, the platforms are open towards end customers as they are not exclusive to specific customer bases, access devices, IT systems or networks.

In terms of value finance, the cloud marketplaces and AT&T Digital Life generate revenue from the customer, while current pricing of QIVICON's smart home services subsidizes the end user. Homing costs for all platforms are driven mainly by one-time investments for initial acquisition and set-up of hardware and software. In the case of the smart home platforms, additional homing costs are manifested in the starter packages that bundle multiple services and hardware components for first-time customers. While both cloud marketplaces allow for monthly subscriptions, the smart home platforms approach contract flexibility: AT&T requires customers to commit to 2 year service terms, while customers of the QIVICON platform do not incur early termination fees within the first 2 years of service. Homing costs for complementors stem from on-boarding and auditing in the case of cloud service platforms as well as certification and integration for smart home platforms, while long-term lock-ins presumably apply in all cases.

Discussion

We find that the business models of the cloud service platforms show many similarities. Combing the technological platforms with app stores for enterprise application software the telecommunication operators opted for a marketplace model in place by several non-telecommunication companies, compare (Wenzel et al. 2012). Considering the increasing number of available applications in these stores as well as Telefónica's successful internationalization, the app store concept seems to be a viable model for

telecommunication operators to provide B2B cloud applications. Regarding the smart home platforms, however, the analysis reveals fundamental differences in terms of value architecture, network and finance. In alignment with the typologies proposed by Ballon (2009) and Eisenmann et al. (2009), we demarcate the closed system integrator model from the open enabler model: while AT&T restricts participation in the value network and directly controls key technology assets as well as the customer relationship, Deutsche Telekom leaves the customer relationship to complementary service providers and incentivizes partipation in different network roles. In this sense, the variety of smart home platforms found for cases outside the telecommunication industry (Nikayin and de Reuver 2012), is confirmed for telco-owned platforms in this field.

Service reliability, security, variety and convenience are identified as common value propositions across all service and customer types. Propositions exclusive to the cloud service platforms such as service scalability, reduced costs for IT resources and faster deployment times stem from the specific capabilities of cloud computing technology (Iyer and Henderson 2010). Whereas ensuring software and hardware compatibility and the increased usability through a central user interface and remote control are promises that seem particularly valuable in the smart home market (Papadopoulos et al. 2009). Interestingly, all operators announce marketing synergies to complementary application and hardware component providers, though, three different approaches are struck to bring about such synergies: first, in an integrated approach AT&T markets white-label contributions of third-parties under the AT&T brand and its own channels; second, in the cases of the cloud service platforms synergies stem from cross-marketing of multiple brands through a centralized operator-branded distribution channel; third, complementors to the QIVICON platform benefit from multiple established sales channels of the allianced partner brands. In this sense, platform adoption may be driven by different strategies regarding the control over the brand and the distribution channel.

Further, we find diverging choices on customer ownership and the platforms' openness towards third-party providers. In three out of four cases the operators directly control core customer-related assets regarded as critical for the successful provision of enterprise cloud services and smart home services, like trusted provider brands, established customer contacts, sales and support channels (Levy et al. 2012; Prodan and Nascu 2013; Wenzel et al. 2013). Owning these assets and only licencing their platform for internationalization, the operators close the platform from further providers. This allows to subsidze growth on the end-user side avoiding the risk of free-riding competitors, which seems especially beneficial in novel markets and for market leaders (Eisenmann et al. 2009). Contrarily, Deutsche Telekom opted to devolve control over the customer relationship to motivate resourceful third-parties to adopt its platform. Considering the importance of inter-organizational cooperation for growth in the smart home market (Nikayin and de Reuver 2012), we find that such control strategy should be considered as a lever for platform leadership. This is as QIVICON's concession of control towards third-party providers may spur the creation of innovative and differentiated services that otherwise would not have been achieved – compare cases studied by (Eisenmann et al. 2009).

In terms of openness towards complementors, only AT&T's home security platform is closed, while the other platforms are open to complementary contributions without enforcing platform exclusivity. Considering that integrated designs may yield quality advantages (Eisenmann et al. 2009), AT&T's choice may be driven by the high quality expectations of security service customers that are willing to pay a corresponding premium. Generally, all platforms tend to prioritize complementors' quality over quantity, represented in quality control mechanisms like application certification, on-boarding and auditing. Such mechanisms, result in relatively high homing and switching costs for complementors and thus, intend to make low-quality contributions economically unviable (Hagiu 2009). To compensate complementors customers are placed on the revenue side. QIVICON represents an exeption as it subsidizes the end user through the absence of contractual commitments and recurring service charges. With such strategy, i.e., charging no membership fees and providing high membership benefits, the "chicken & egg" problem may be avoided (Kouris et al. 2012). Similarly, the cloud service platforms aim to avoid customer lock-ins through short-term contracts, free-of-charge trials and transparent price models, which has proven beneficial in this service field (Wenzel et al. 2013).

Conclusion

In this paper we assessed four platform business models in the telecommunications industry through a in-depth case study research approach. The contribution of our work is manifested in the derived analysis framework and insights on platform business models and strategies. In particular we identify service-specificity as a determinant of platform design and find strong similarity between the platforms for enterprise cloud services, while a dominant design of smart home platforms has not yet emerged. Further, our analysis affirms the strategic importance of customer ownership and reveals the telecommunication operators' diverging strategies in this regard. Finally, we find that platform complementors may face inhibitively high costs due to the telecommunication operators' strong devotion to service reliability and security.

The generalizability of our findings is limited by the fact that they are based on a case study research approach that assesses publically available information on four service platforms of telecommunication companies. Thus, generalizability could be increased by incorporating a higher number of cases and extending the nature of assessed information, e.g., through expert interviews.

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