Winter 12-12-2015

The Innovative Capabilities Of Digital Payment Platforms: A Comparative Study Of Apple Pay & Google Wallet

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THE INNOVATIVE CAPABILITIES OF DIGITAL PAYMENT PLATFORMS: A COMPARATIVE STUDY OF APPLE PAY & GOOGLE WALLET

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Abstract

This study presents a model for studying the innovative capabilities of digital payment platforms in regards to open innovation integration and commercialization. We perceive digital platforms as layered modular IT artifacts, where platform governance and the configuration of platform layers impact the support for open innovation. The proposed model has been employed in a comparative case study between two digital payment platforms: Apple Pay and Google Wallet. The findings suggest that digital payment platforms make use of boundary resources to be highly integrative or integratable, which supports the intended conjoint commercialization efforts. Furthermore, the architectural design of digital platforms impacts the access to commercialization, resulting to an exclusion or inclusion strategy in accessing value opportunities. Our findings contribute to the open innovation and digital platform literature, by providing a deeper understanding how these digital platforms can be designed and configured to support open innovation.

Keywords: Digital Platforms, Open Innovation, Payment, Apple Pay, Google Wallet

1 Introduction

Digital payment platforms are multi-sided and layered modular artifacts (Rochet et al. 2003; Yoo et al. 2010) that primarily mediate payment transactions between payers and payees. Due to recent technological advancements in payments, new interconnected digital payment platforms (e.g., Apple Pay, Google Wallet) are equipped with application programming interfaces (APIs), and software development kits (SDKs), which have the goal to foster platform generativity, and simultaneously enforce platform control on third parties (Ghazawneh et al. 2013).

As such, new digital payment platforms create the foundation for *(coupled) open innovation*, and *open business models* (Gassmann et al. 2004), which is basically conjoint development and commercialization of innovative platform derivatives (e.g., apps) between platform owners and third parties. The growing prevalence of these novel payment IT artifacts, which are embedded within innovation ecosystems (Adner et al. 2010; Iansiti et al. 2004; Nambisan et al. 2011), makes it for researchers, as well as for practitioners imperative, to understand how digital payment platforms can make use of external innovations from an *integration* and *commercial* point of view. As payment incumbents and start-ups utilize digital platforms to achieve their information systems (IS) and business strategies (Bharadwaj et al. 2013; Chen et al. 2010), there is notable paucity in the literature regarding how organizations *integrate* and *commercialize* external innovation.

Consistent with West et al. (2014), they conclude in their comprehensive literature review on open innovation studies that *sourcing* open innovation has received abundant attention among researchers. Even so, there are knowledge gaps in how firms *integrate* and *commercialize* open innovation. Following the call by West et al. (2014) for more research in this area, the aim of this paper is to study how digital payment platforms create conditions for (1) *integrating* open innovation, and (2) how is open innovation *commercialized* that reflect reciprocal business interests. Thus, our research question is: *How do digital payment platforms integrate and commercialize open innovation?*

To answer our research question, we expand on the work of Yoo et al. (2010) by delineating digital payment platforms into five layers: (1) device; (2) operating system; (3) network; (4) service; and lastly, (5) content. Secondly, we adapt the API management framework by Iyer et al. (2010) illustrating how payment providers develop their digital platforms and how platform derivatives (e.g., apps) are distributed. We argue that platform layer configurations have an impact on the *integration* of open innovation, by being either *integrative* or *integratable* towards third parties. Secondly, the findings suggest that the chosen *integration* type defines the attributes of *commercializing* open innovation. In this case, platforms follow either a *selective* or *indiscriminant* commercialization strategy with third parties.

This research aims to have several contributions. First, our study complements the extant literature on digital platforms (Baldwin et al. 2000; Gawer et al. 2002; Ghazawneh et al. 2013; Iyer et al. 2010; Thomas et al. 2014; Wareham et al. 2014; Yoo et al. 2010). By providing conceptual clarity, this paper would lead to more concise digital platform studies. Secondly, by following the call by West et al. (2014), this study contributes to the open innovation literature (Chesbrough 2003) by delineating coupled open innovation. Lastly, this study follows the call by Bharadwaj et al. (2013) to unravel complex digital platforms and their business strategies. This paper provides insights into how digital payment platforms exercise *open business models* in the payment context.

2 Theoretical Underpinnings

In this section, we provide the theoretical background in understanding the logic of digital platforms, and how these layered modular IT artifacts support open innovation in regards to *integration* and *commercialization*. To derive our theoretical model, we draw on key concepts in the open innovation and digital platforms literature, which are serving us as theoretical lenses to study the innovative capabilities of digital platforms. Figure 1 illustrates our proposed unified theoretical model of digital platform innovation based on related literature. We argue that the design and configuration of digital platform layers have an impact in supporting open innovation, from an integration and commercialization point of view. The linkages between these platform elements illustrate correlations, and do not imply causality.

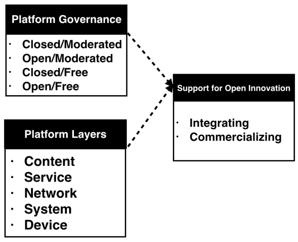

Figure 1. Digital Platform Innovation Model.

Support for Open Innovation

Open innovation is the use and leverage of external and internal ideas to create new products and services (Chesbrough 2003), whereas the open business model is the commercialization of co-created ideas (Chesbrough et al. 2006). Studies on open innovation have identified three distinct modes in which firms practice open innovation within and across their organizational boundaries (Gassmann et al. 2004; West et al. 2014): (1) outside-in, (2) inside-out, and (3) coupled innovation. ***Outside-in open innovation*** is the integration of external resources (e.g., knowledge) into organizations to enhance the value propositions of their products ands services, whereas ***inside-out open innovation*** is the reversed approach of externalizing internally developed resources (e.g., patents) to the market, which may translate to adoption and profitability.

Lastly, ***coupled open innovation*** has a dual approach, as it represents a combination of the aforementioned open innovation concepts, where value is co-created in a reciprocal, cooperative, and complementary manner (Gassmann et al. 2004). Taking digital platforms as an illustrative example, digital platforms support the notion of coupled open innovation, as digital platforms and third-party developers complement and integrate their corresponding services with each other. This builds the architectural foundation for future innovative platform derivatives in an iterative manner. As such, this kind of open innovation illustrates interfirm modularity (Staudenmayer, Tripsas, & Tucci, 2005), where organizations with external ones conjointly create and capture value.

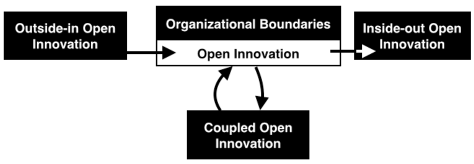

Figure 2. Three Types of Open Innovation.

The open innovation literature has received substantial attention among scholars in their bid to explain the logic behind open innovation. However, by distilling a comprehensive literature review of 291 open innovation publications, West et al. (2014) conclude that research on integration and commercialization of open innovation are notably rare: *"This review has shown an extensive body of research on the front end of the process of externally sourcing innovation, but leaves major gaps on how such innovation is integrated and ultimately commercialized."*

As digital platforms practice coupled open innovation, proprietary (e.g., iOS), and open digital platforms (e.g., Android) have evidently different platform governance mechanisms (cf. Ghazawneh et al. 2013), and organizational capabilities (cf. Iyer et al. 2010) in how innovations (e.g., apps) by third parties are *integrated* and distributed to create and capture value. It can be argued that the integration and commercialization of open innovation is to a large extend determined by the architectural structure of digital platforms, and how these structures (e.g., platform layers) are designed and configured. In the next section, we provide a working definition of digital platforms, which are layered modular architectures.

Digital Platforms: Layered Modular Artifacts

Digital platforms are layered modular architectures (Yoo et al. 2010), which have the capabilities to create rapid positive network effects (Eisenmann et al. 2006; Katz et al. 1985). We adopt the digital platform definition by Kazan et al. (2014), who state that a *"digital platform [is] a proprietary or open modular layered technological architecture that supports efficient development of innovative derivatives, which are embedded in a business or social context"*. Consistent with Yoo et al. (2010), this working definition is a suitable theoretical lens, as it describes the innovative capabilities of digital platforms due to their modularity. As these layered IT artifacts integrate and release controlled, or permissionless, innovative platforms derivatives (e.g., mobile apps) on different layers, digital platforms have the capabilities to support coupled open innovation.

Digital Platform Layers: Five Different Layers

Previous studies have laid the theoretical foundation to understand what digital platforms are, which are layered modular architectures (Baldwin et al. 2000; Baldwin et al. 2008; Yoo et al. 2010), how IT capabilities present the genesis of (digital) platforms (Hanseth et al. 2010), and how digital platform owners govern their systems, while balancing the act between control and generativity (Ghazawneh et al. 2013; Iyer et al. 2010). As such, earlier studies had a more generic view on digital platforms, where the unit of analysis was merely the service layer (cf. Yoo et al. 2010). Therefore, studies showed little attention to discussion of the different and interlinked platform layers, which have significant impact on platform configurations, and business models. Based on our working definition, we perceive digital platforms not as monolithic IT artifacts, but rather as five distinct platform layers (Kazan et al. 2014; Yoo et al. 2010). In doing so, the conceptual granularity allows us to analyze digital platforms in a more precise manner. We exemplify the five platform layers on the basis of Apple's mobile payment service Apple Pay.

The ***device layer*** constitutes a physical, programmable IT artifact through which stores process and execute digital encoded data and instructions. Apple's iPhone and smartwatch embody these traits by being physical IT artifacts that store and run the Apple Pay software (integrated in passbook app), and initiate NFC (Near-Field-Communication) payments. The (operating) ***system layer*** represents a logical software system that executes and controls software, as well as physical IT artifacts. Apple's mobile payment solution Apple Pay requires iOS and Watch OS as operating systems, to control the payment app (software), NFC chips and its secure element (physical). The ***network layer*** is the communication channel to transport data among different nodes. Apple's mobile payment service relies on mobile and payment networks (e.g., Visa, AT&T) to process and settle payments (Kokkola 2010). The ***service layer*** constitutes software applications for storing, generating and distributing own, or third-party data. Apple Pay represents a payment service that mediates payment transactions, and addition, it offers APIs toward third parties to integrate Apple Pay into their apps (Apple 2014c). Lastly, the ***content layer*** is the representation of digital data based on audio, video, text and images. Apple Pay generates payment data, e.g., purchase amount, merchant, time and/or location (Apple 2014b). As digital platforms consist of five different layers, each layer has the capability to support open innovations (e.g., third-party devices). As digital platforms exercise different control mechanisms on different platform layers, this has an impact how supportive digital platforms are towards open innovation.

Digital Platform Governance

To align IS and business strategies of digital platform owners (Bharadwaj et al. 2013; Chen et al. 2010; Henderson et al. 1993), digital platforms make use of boundary resources (e.g., APIs, SDKs) (Ghazawneh et al. 2013) to enforce their preferred platform governance scheme. To achieve this, a digital platform and each of its layers are accordingly designed and managed in regards to (1) platform development (self or co-development), and (third-party) service distribution (open or moderated). Therefore, the design and rules for platform development and service distribution (platform derivatives) vary among digital platforms, since organizational capabilities, IS and business strategies differ.

To illustrate different *platform governance* options, we adapted the API management framework by Iyer et al. (2010), which is a suitable theoretical concept to explain the logic of different types of platform governance design options, in regards to platform development in an exclusive or inclusive manner, and the degree of control in how platform derivatives are distributed (cf. Kazan et al. 2013).

Platform Development. We define platform development as the ability of and degree to which third parties co-develop and maintain a digital platform. Platform owners, which follow the *closed* notion, develop and set the rules on their own (e.g., the amount and the rules for APIs access), thereby excluding third parties. To illustrate *closed platform development*, Barclays' mobile payment service Pingit shares these traits, as it is a proprietary and self-developed mobile payment platform. On the contrary, *open platform development* is the involvement of third parties, enabling third-party platform co-development. For instance, the payment startup Stripe is active on GitHub.com, an online forum and repository service for code sharing. By having an online presence on this service, Stripe (platform owner) and its third-party developers are co-developing the platform in a moderated process.

Platform Derivative Distribution. We define platform derivative distribution as the ability and degree of freedom for third parties in distributing their platform derivatives. Digital platforms also differentiate in how platform derivatives are distributed. The *moderated* approach allows the platform owner to control and channel the distribution of platform derivatives. As an example, PayPal requests prior approval from third parties to use its payment APIs, to exclude e.g., undesirable merchants. The *free* approach allows third parties to distribute their services without prior approval by the platform owner. Coinkite, a Canadian Bitcoin merchant service, illustrates the free approach by offering open bitcoin APIs to third parties without interfering what service they offer. Based on the above-mentioned concepts, we can derive four different and generic platform governance design options: (1) closed and moderated; (2) closed and free; (3) open and moderated; and lastly, (4) open and free.

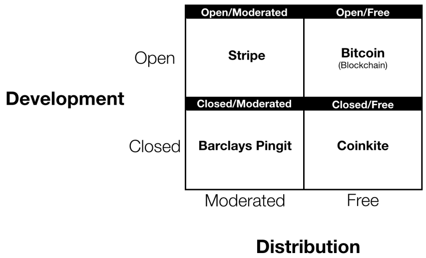

Figure 3. Digital Platform Governance.

3 Research Method

The empirical basis for this research is a comparative and interpretive case study to examine how different digital platform design and configurations are impacting the support for open innovation (Walsham 1995; Yin 2009). As such, our study approach has an explorative trait through synthesizing and combining key platform concepts into one unified theoretical model (Figure 1). Based on two cases (Apple Pay and Google Wallet), the proposed model (*Digital Platform Innovation*) is guiding us in identifying similarities and variations between these two cases. We consider the case study approach to be a suitable method of inquiry, as it can answer "*how*" and "*why*" questions within a contemporary, broad and complex setting (Dubé et al. 2003; Yin 2009). In this study, the complexity is reasoned as digital platforms constitute digital ecodynamics (El Sawy et al. 2010), which are embedded in innovation ecosystems (Adner et al. 2010; Iansiti et al. 2004). In doing so, digital platforms have to cope with *internal* complexities (i.e., internal IS business strategy alignment), as well as *external* ones, as digital platforms act as bridging technologies between internal and external systems. Therefore, a case study approach is deemed to be appropriate for grasping complex platform configurations, innovation and business structures.

Research Context and Case Selection

To study the innovative capabilities of digital platforms, we chose digital payment platforms as our context and unit of analysis. Digital payment platforms are particularly suitable to explore digital platform innovation, as the payment landscape is in the midst of industry transformation. New and innovative digital payment platforms enter the payment market (e.g., Apple Pay, Stripe), where established financial institutions are confronted with challenging market dynamics. More importantly, the application of accessible and affordable technologies is leading to disintegrations of once-profitable business models (Jacobides 2005).

We chose two prominent digital payment platforms, which have the capabilities and resources (technical and financial) to introduce a new and dominant design (Suárez et al. 1995) in regards to mobile payment: Apple and Google. Both technology firms are known for being cross-boundary disrupters (Burgelman et al. 2007), as they have the power to upset market equilibrium in rapid fashion (Downes et al. 2013). Furthermore, Apple and Google have different approaches in regards to platform control. Google is known for supporting openness (e.g., Android), whereas Apple is recognized for its walled garden approach (e.g., iOS) (cf. Eaton et al. 2015). Conceivably, these two different platform firms may have different approaches in regards to open innovation, which might provide additional insights from an integration and commercialization point of view. It should be emphasized that these two cases are illustrative examples, to demonstrate the applicability of the proposed digital platform innovation model.

Data Collection

The empirical basis for this study is based on two sources: one semi-structured interview (primary) and online data (secondary). We collected publicly available data from different online sources (blog entries, news articles, official documents by Apple and Google). To assist with our data collection efforts, we made use of the technology blog aggregator Techmeme.com. Blog aggregators have the advantage of serving as a filter, as they tend to highlight influential articles (Davidson et al. 2009; Eaton et al. 2015). In the case of Apple, the search was conducted using the keyword "Apple Pay" by limiting the time period from the 9th of September, 2014 (Apple Pay announcement), till 15th of November, 2014. Our search inquiry on Techmeme.com resulted into 68 hits. In the case of Google, the same method was applied by using the keyword "Google Wallet" between the time period 25th of May, 2011 (Google Wallet announcement), and 15th of November, 2014. Our search inquiry resulted into 119 hits. In addition to Techmeme.com, we crosschecked official documents by Apple and Google (i.e., FAQ lists on product and developer website and guidelines), if the online data was not sufficient enough.

To support the data collection process, online data was imported into Nvivo 10, a qualitative analysis software program that allows a structured way to collect and categorize data. Data collection based on online sources has the advantage of being current, accessible and more importantly, verifiable through replicative studies. To complement the Google Wallet online data set, the case was triangulated with a semi–structured interview. We conducted an in-depth and face-to-face semi-structured interview (October 2014) with a mid-level manager from the Google Wallet unit. The interviewee was significantly involved in Google's mobile wallet rollout (US and Europe) between 2011 and mid-2014. The interview lasted 42 minutes and was recorded and fully transcribed. The interview questions were derived from the proposed digital platform innovation model. Apple was not interviewed, as they are known for being secretive and inaccessible. Nevertheless, the secondary data sources of Apple are rich and triangulated to provide sufficient data points to conduct a comparative analysis (cf. Eaton et al. 2015). Our interview strategy was to understand events and decisions on (1) how and why Google Wallet was designed and governed from an architectural point of view (e.g., platform layers and platform integration). The second goal was to gain insights into (2) the business strategy and its corresponding business model, and lastly, (3) whether or not open innovation was supported and commercialized. Semi-structured interviews have the advantage of allowing the interviewer to capture additional insights (e.g., publicly inaccessible data) that can enrich the model further.

Data Sources	Description
Interviews	One interview with a former Google Wallet manager. Interview duration: 42 minutes, recorded and transcribed.
Press releases	Apple Pay (7), Google Wallet (38) based on official Google Blog and Google Commerce
Product Website	*Apple Pay:* https://www.apple.com/iphone-6/apple-pay/, *Google Wallet*: https://www.google.com/wallet/

Support Page	Apple Pay FAQ Consumer: http://support.apple.com/en-us/HT201469 Google Wallet FAQ for consumer: http://www.google.com/wallet/faq.html Google Wallet FAQ for business: http://www.google.com/wallet/business/faq.html
Developer Page	Apple Pay: https://developer.apple.com/apple-pay/ Google Wallet: https://developers.google.com/wallet/
Online articles (Techmeme.com)	Apple Pay (68) and Google Wallet (119), (9to5Mac, ArsTechnica, Bank Innovation, Bloomberg, Engadget, MacRumors, New York Times, PandoDaily, Re/code, TechCrunch, TheVerge, Wall Street Journal)

Table 1. Data Sources.

Data Analysis

After a careful review, relevant online data was selected and coded. The selection criteria were based on containing and supporting coding categories of the proposed digital platform innovation model (e.g., platform layers, support for open innovation). For analyzing the data, directed content analysis was applied (Hsieh et al. 2005; Potter et al. 1999). The coding categories were derived from the digital platform innovation model, serving as a theoretical guide during the analysis process. Directed content analysis is a suitable approach when prior or existing research about a phenomenon is incomplete or requires further explanation, helping to support or extend key concepts and theories. As such, the aim of this research was to study the integration and commercialization of coupled open innovation within digital platforms.

4 Two Digital Payment Platforms: Apple Pay & Google Wallet

Apple Pay

In September 2014, Apple announced its much-anticipated mobile payment service called Apple Pay. Apple Pay makes use of interoperable Near-Field-Communication (NFC), which allows iPhone 6 (iOS) and Apple Watch (Watch OS) users to perform both biometric (fingerprint and pulse) and contactless payments within mobile apps and at brick-and-mortar stores. Accordingly, merchants within physical stores are required to have complementary NFC payment terminals to accept Apple Pay. To mediate these payment transactions, Apple has partnered with credit card networks (MasterCard, Visa, AmEx) and with multiple banks, which ultimately process and settle payments between cardholders and merchants. In this context, Apple Pay serves merely as a proxy and mediator between cardholders' (card issuer) and merchants' (acquirer) bank accounts, thereby supporting and enforcing the existing roles and business models of financial firms in the current payment ecosystem. At its initial rollout, Apple preserved the exclusive right to have access to the NFC chip with its secure element; the latter stores sensitive payment details, i.e., payment tokens (controlled by credit card networks) and cryptogram (controlled by banks).

To enhance its payment service further, Apple offers Apple Pay APIs free of charge to third-party developers, which allows them to offer Apple Pay functionalities within their own mobile applications, after they have passed the review process. For developers who don't have their own payment processor, Apple collaborates with several online payment solution providers (e.g., Stripe, Braintree). These payment processors offer third-party developers an uncomplicated integration process, in accepting biometric-based Apple Pay payments. At the end, these processors charge regular payment fees. Apple Pay has the technical capabilities to generate highly contextual and valuable payment data, though Apple has not the ambition to utilize it. Rather, Apple supports current business practices, where financial partners continue in capturing valuable payment data. For security reasons and service improvements, Apple Pay collects only the location of the device, and date/time. The business model of Apple Pay has a two-track approach: the usage of Apple Pay is free of charge for end-users and third-party developers (subsidy side). There is no change for merchants in accepting Apple Pay, as they still continue to pay the regular fees to their payment processors. Moreover, Apple charges the banks (money side) with the help of credit card networks, which hand over 0.15% (credit card fees) of the transaction amount to Apple.

Google Wallet

In May 2011, Google announced its mobile payment service Google Wallet, an initiative to extend its advertising business to the offline world. At launch, Google teamed up with the handset vendor Samsung, which provided the first Android mobile phone (Nexus S) that was compatible with Google

Wallet, allowing users to perform contactless payments. The phone contained the NFC chip, and the secure element, which stored a virtual credit/prepaid card by MasterCard (payment network) and Citi bank (card issuer). First Data (acquirer), which had the role of a Trusted Service Manager (TSM), was responsible to manage remotely the secure element. Google Wallet was a novel payment instrument; however, it faced considerable challenges during its rollout. Besides slow adoption on the user side and merchant side, large mobile network operators (T-Mobile, AT&T, Verizon) had no interest in supporting Android smartphones, which had a built-in secure element. Rather, they preferred to have the secure element in their controlled SIM cards. Secondly, as these mobile operators were also working on their own mobile payment solution (Softcard), they had little incentive to support a rival solution on their mobile networks. Absent from this joint venture, Sprint was the only US mobile operator willing to collaborate with Google.

To overcome these challenges, Google released a new version of its mobile OS Android (KitKat), which allows storage of the secure element in the cloud (Host-Card-Emulation). With a cloud-based approach, Google Wallet is compatible with practically any NFC Android device, without requiring approval by handset vendors and mobile network operators. Moreover, this solution is also applicable by any other NFC service provider without Google's approval. To extend its user base beyond Android devices, Google made its mobile payment service also available to iOS users (P2P payments only). Over time, Google was also successful in teaming up with the remaining payment networks Visa, AmEx and Discover, as Google Wallet agreed to support their existing fee-based business models. The value proposition toward merchants to accept Google Wallet is that it is tightly integrated with Google's location-aware promotion offers (e.g., loyalty and offers). Besides regular payment fees to payment processors, merchants can use Google Wallet and its promotion functionalities on different third-party online channels free of charge, after passing a review process. Google, however, charges merchants fees as soon as online properties by Google are used (e.g., AdWords).

To build a community around its payment service, Google Wallet offers APIs, allowing third parties to ingrate payment functionalities/promotions into their own Android/iOS apps and mobile and desktop websites, free of charge. However, Google differs from Apple, in that it doesn't provide a list of recommended payment processors, leaving third-party developers unsupported to a certain degree. Google Wallet collects payment data much like Apple Pay, such as merchant, payment amount, date and time, method of payment and location. As such, the business model for Google Wallet is primarily designed to extend Google's online advertising business.

5 Analysis

Platform Layers and Governance

Device Layer. Apple issues proprietary device layers (i.e., iPhone, Apple Watch) with built-in NFC chips and secure elements. In doing so, Apple preserves the exclusive right to produce, modify and configure any hardware components. On the contrary, the Google Wallet service relies on open device layers (Android handsets), which are manufactured and provided by third parties. To illustrate the open device layer strategy of Google Wallet, the Google manager states: *"We want [service] ubiquity […] we need a partnership with an OEM (original equipment manufacturer) right now."* Furthermore, he states: *"Let's find a way to [remove] the OEM from needing to be part of the process. So let's release host card emulation, [where] no hardware is needed, […] if a phone has NFC […and] it's running Android, it's done".* Implications: We therefore propose that the Apple Pay device layer is ***closed*** (i.e., proprietary), whereas the Google Wallet device layer is ***open*** and ***free*** in supporting third parties to manufacture and distribute Android devices.

System Layer. To be functional, Apple Pay requires iOS and Watch OS, which are proprietary system layers by Apple. Conversely, Google Wallet operates on Android, which is open source (i.e., Android Open Source Project), representing an open system layer. Overall, the closed system layers of Apple Pay are tightly integrated with closed Apple device layers, offering better configurations options in regards to technology and user experience. On the other hand, Google Wallet's system layer is open, and can be integrated within various open Android devices in an agnostic manner. By keeping the device and system layers open to external stakeholders, Google Wallet creates the conditions for service ubiquity on many Android devices. Implications: We therefore propose that the Apple Pay system layer (e.g., iOS) is ***closed*** (i.e., proprietary), whereas the Google Wallet system layer (i.e., Android) is ***open*** and ***free*** to create and distribute custom operating systems for various Android devices.

Network Layer. Apple Pay and Google Wallet have cooperative arrangements with payment networks and with banks, which have granted access to their financial networks to processes and settle Apple Pay and Google Wallet transactions. In addition, both services rely on mobile network operators to send payment transactions. Implications: We therefore propose that the network layer of Apple Pay and Google Wallet are ***closed,*** (controlled by financial institutions and telecom operators), and ***free***, as these networks distribute payment services without major interferences.

Service Layer. Apple Pay offers third-party developers SDKs and APIs to integrate the Apple Pay functionality (biometric only) into their own and approved mobile application, which are distributed through Apple's App Store at the end. Likewise, Google Wallet offers SDKs and APIs to approved third-party developers. As the Google manager states: "*They're public APIs; there are terms and conditions that are associated with them [...] it's kind of like a click and accept agreement type."* However, Google Wallet exceeds Apple Pay by being highly integratable into various external channels, such as email, mobile and desktop webpages. Implications: We therefore propose that the service layer of Apple Pay is ***closed*** (i.e., proprietary) and ***moderated***, as Apple controls third-party app distributions through its App Store. In contrast, the service layer of Google Wallet is ***closed*** (i.e., proprietary), but ***free,*** as it allows third parties to distribute the Google Wallet service on various channels without major interventions.

Content Layer. For Apple Pay, the payment data is opaque, since Apple does not collect the data. Rather, it supports existing business practice and data sovereignty by allowing credit card firms and banks to have exclusive data collection rights. According to Eddy Cue, Apple's Senior Vice President of Internet Software and Services: *"Apple doesn't collect your purchase history, so we don't know what you bought, where you bought it or how much you paid for it,"* [stating that] *"the transaction is between you, the merchant and your bank."* (Apple 2014a) Google Wallet collects payment data cooperatively with credit card firms, and banks data in the form of location, merchant name, amount, date/time and method of payment. The Google manager states: *"The data that Google Wallet was receiving was the same data that MasterCard and Visa were receiving [...].* Furthermore, the manager emphasizes *"What really matters is not basket-level data but item-level data [...]."* As such, Google has rather a long-term view in commercializing payment data. Implications: We therefore propose that the content layers of Apple Pay and Goggle Wallet are ***closed*** (i.e., proprietary), as payment data is not accessible by third parties (e.g., developers), except it is shared with its core business partners (i.e., banks and credit card firms).

Platform Layers	Apple Pay	Google Wallet	Platform Governance
Content	Apple Pay does not collect payment data. Credit card firms & banks have data sovereignty over payment data.	Google Wallet collects payment data cooperatively with its business partners.	***Closed:*** both payment platforms have *closed content layers.*
Service	Apple Pay offers SDKs and APIs to app developers & payment processors (e.g., Stripe), enabling them to integrate Apple Pay into their iOS-based services.	Google Wallet offers SDKs and APIs to third-party developers, to integrate payment & promotion into their email, mobile apps and web services.	***Apple Pay: Closed & Moderated*** Apple controls the service layer, and moderates the distribution of third-party services. ***Google Wallet: Closed & Free*** Google controls the service layer, but does not moderate the distribution of services.
Network	Apple collaborates with three credit card firms (MasterCard, Visa, AmEx) and with the consent of multiple banks to process and settle biometric and contactless mobile payments.	Google partnered with two credit card firms (MasterCard, Discover) & with one bank to store & process any payment card without prior approval of the card issuer.	***Closed & Free*** Both payment platforms rely on closed and externally owned networks layers, though the service distribution occurs without major interferences.
System	Apple Pay uses proprietary mobile operating systems (iOS/Watch) to be operational.	Google Wallet requires Android (KitKat or higher), which is an open source mobile operating system (i.e., Android Open Source Project).	***Apple Pay: Closed*** Apple controls the system layer ***Google Wallet: Open & Free*** Google does not control the system layer or its distribution.

Device	Apple Pay functions on proprietary mobile devices, which are controlled by Apple.	Google Wallet functions with any NFC Android phone produced by third-party handset vendors.	***Apple Pay: Closed*** Apple controls the device layer. ***Google Wallet: Open & Free*** Google does not control the system layer or its distribution.

Table 2. Comparative Platform Analysis.

6 Discussion and Conclusion

The aim of this study is to advance the digital platform and open innovation literature that sheds light on how digital platforms are designed and configured to utilize open innovation. Following the call by (West et al. 2014) for more studies on how organizations *integrate* and *commercialize* open innovation, this paper investigates how digital payment platforms perform third-party integration and commercialization.

Open Innovation Integration

Both digital payment services make use of boundary resources (SDKs and APIs) on the service layer to ensure integration conditions for open innovation (Ghazawneh et al. 2013), though both digital payment platforms differ as to how integration is accomplished. Apple Pay has an integrative approach to open innovation, as third parties are compelled to integrate their services into Apple's platform (i.e., outside-in). For instance, developers of iOS applications with built-in Apple Pay are required to submit their applications to Apple to pass the review process, which are afterwards exclusively distributed through Apple's App Store. Accordingly, the findings suggest that **Apple's** capability to enforce an **integrative** approach to open innovation can be argued, as Apple's platform layers are tightly integrated with each other, achieved by designing, configuring and offering primarily closed and moderated platform layers. As such, Apple performs coupled open innovation by offering a coupled modular platform architecture, which requires from third parties to follow Apple's integration rules in order to have the opportunity to capture value. Google's payment solution has a reverse approach in regards to integration. ***Google Wallet*** is designed to be highly ***integratable*** into various external services and systems (i.e., inside-out) in providing the conditions for co-creating value. Taking the service layer and the device layer as an example, third parties are free in their choice as to how Google Wallet is integrated into *external* systems (service layer). Furthermore, Google does not dictate which NFC Android handset is used (i.e., device layer) to perform contactless payments, as independent third-party handset vendors manufacture and control these Android devices. Based on these results, Google's capability to practice an *integratable* approach to open innovation can be argued as Google Wallet's platform layers are loosely coupled, which is achieved by designing, configuring, and offering primarily open and free platform layers. As such, Google achieves coupled open innovation through its *decoupled modular architecture*, allowing third parties the flexibility in integrating Google Wallet, in order to have the opportunity to capture value.

Open Innovation Commercialization

Based on the above-mentioned observations, Apple Pay has a selective commercialization strategy by controlling access to value. Apple takes the freedom to decide with whom it does business by leveraging boundary resources (i.e., SDKs and APIs) and its coupled modular architecture against external stakeholders, thereby granting qualified access to value capture opportunities. As an example, Apple denied Adobe access to Apple's service layer (i.e., Safari browser) in integrating its graphic standard "Flash" due to performance issues (cf. Eaton et al. 2015). In doing so, Apple ensures monopolistic power on its platform layers. We therefore propose that ***Apple*** performs with its integrative approach to open innovation an ***exclusion commercialization strategy*** to value access. Contrasting Google's payment service, ***Google Wallet*** has an ***indiscriminate commercialization strategy*** by opening access to value. To achieve service ubiquity, Google leverages boundary resources (i.e., SDKs and APIs), and its *decoupled modular architecture* to be highly integratable into external stakeholder systems, thereby providing *ubiquitous access* to value capture opportunities. For instance, in introducing a cloud-based NFC payment solution (i.e., host card emulation), Google relinquished control of the device layer, a domain previously controlled by handset vendors and telecom operators. In doing so, Google ensures service ubiquity, which is driven by third parties on the device and system layer. We therefore propose that Google performs with its *integratable approach* to open innovation an *inclusion strategy to value access.*

Apple Pay	Google Wallet
Integrative Open Innovation:	***Integratable Open Innovation:***
Apple Pay makes use of SDKs and APIs to be highly integrative into Apple's platform (i.e., device and service layer).	Google Wallet makes used of SDKs and APIs to be highly integratable into various external third-party systems
Selective Commercialization:	***Indiscriminate Commercialization:***
Apple Pay performs with its *integrative approach* on open innovation an exclusion strategy to access value.	Google performs with its integratable approach on open innovation an inclusion strategy to access value.

Table 3. Support for Open Innovation.

Theoretical & Practical Implications

This study contributes to the platform (Gawer et al. 2002; Ghazawneh et al. 2013; Iyer et al. 2010; Thomas et al. 2014; Yoo et al. 2010) and open innovation literature (Chesbrough 2003; West et al. 2014) by bridging knowledge gaps in how digital (payment) platforms integrate and commercialize open innovation. The findings suggest that the studied digital platforms utilize two different modes of open innovation integration (i.e., being integrative and integratable). Ultimately, these two types of integrations have an impact on how access to commercialization is granted, resulting in either an exclusion or inclusion strategy in accessing value opportunities. From the practitioner's point of view, we provide decision support by increasing the awareness of different digital platform configuration options they have to provide and access platform value. This paper is constrained in its generalizability, as it used only two cases. Relevant avenues for future research are available in terms of configuration of digital (payment) platforms. In this study we have illustrated that different platform layer configurations (decoupled and coupled modular architecture) are leading to the same service offering. The question arises whether different platform design configurations with the same outcome are equally successful.

7 References

Adner, R., and Kapoor, R. 2010. "Value creation in innovation ecosystems: How the structure of technological interdependence affects firm performance in new technology generations," *Strategic management journal* (31:3), pp 306-333.

Apple 2014a. "Apple Announces Apple Pay," CUPERTINO.

Apple 2014b. "Apple Pay security and privacy overview."

Apple 2014c. "Getting Started with Apple Pay."

Baldwin, C. Y., and Clark, K. B. 2000. *Design rules: The power of modularity*, (MIT press.

Baldwin, C. Y., and Woodard, C. J. 2008. "The architecture of platforms: A unified view," *Harvard Business School Finance Working Paper*:09-034).

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., and Venkatraman, N. 2013. "Digital business strategy: toward a next generation of insights," *MIS Quarterly* (37:2), pp 471-482.

Burgelman, R. A., and Grove, A. S. 2007. "Cross-boundary disruptors: powerful interindustry entrepreneurial change agents," *Strategic Entrepreneurship Journal* (1:3-4), pp 315-327.

Chen, D. Q., Mocker, M., Preston, D. S., and Teubner, A. 2010. "Information systems strategy: reconceptualization, measurement, and implications," *MIS quarterly* (34:2), pp 233-259.

Chesbrough, H. 2003. *Open innovation: The new imperative for creating and profiting from technology*, (Harvard Business Press.

Chesbrough, H., Vanhaverbeke, W., and West, J. 2006. *Open innovation: Researching a new paradigm*, (Oxford university press.

Davidson, E., and Vaast, E. 2009. "Tech talk: An investigation of blogging in technology innovation discourse," *Professional Communication, IEEE Transactions on* (52:1), pp 40-60.

Downes, L., and Nunes, P. F. 2013."Big-Bang Disruption," *Harvard Business Review* (91:3),pp 44-56.

Dubé, L., and Paré, G. 2003. "Rigor in information systems positivist case research: current practices, trends, and recommendations," *Mis Quarterly*), pp 597-636.

Eaton, B., Elaluf-Calderwood, S., Sørensen, C., and Yoo, Y. 2015. "Distributed Tuning of Boundary Resources: The Case of Apple's iOS Service System," *MIS Quarterly* (39:1), pp 217-243.

Eisenmann, T., Parker, G., and Van Alstyne, M. 2006. "Strategies For Two- Sided Markets," *Harvard Business Review* (84:10), pp 92-101.

El Sawy, O. A., Malhotra, A., Park, Y., and Pavlou, P. A. 2010. "Research Commentary-Seeking the Configurations of Digital Ecodynamics: It Takes Three to Tango," *Information Systems Research* (21:4), pp 835-848.

Gassmann, O., and Enkel, E. Year. "Towards a theory of open innovation: three core process archetypes," R&D management conference2004.

Gawer, A., and Cusumano, M. A. 2002. *Platform leadership*, (Harvard Business School Press Boston.

Ghazawneh, A., and Henfridsson, O. 2013. "Balancing platform control and external contribution in third-party development: the boundary resources model," *Information Systems Journal* (23:2), pp 173-192.

Hanseth, O., and Lyytinen, K. 2010."Design theory for dynamic complexity in information infrastructures: the case of building internet,"*Journal of Information Technology* (25:1),pp 1-19.

Henderson, J. C., and Venkatraman, N. 1993. "Strategic alignment: Leveraging information technology for transforming organizations," *IBM systems journal* (32:1), pp 4-16.

Hsieh, H.-F., and Shannon, S. E. 2005. "Three approaches to qualitative content analysis," *Qualitative health research* (15:9), pp 1277-1288.

Iansiti, M., and Levien, R. 2004. "The keystone advantage," *Harvard Business School Press, Boston*).

Iyer, B., and Henderson, J. C. 2010. "Preparing For The Future: Understanding The Seven Capabilities Cloud Computing," *Mis Quarterly Executive* (9:2), Pp 117-131.

Jacobides, M. G. 2005. "Industry change through vertical disintegration: How and why markets emerged in mortgage banking," *Academy of Management Journal* (48:3), pp 465-498.

Katz, M. L., and Shapiro, C. 1985. "Network Externalities, Competition, and Compatibility," *American Economic Review* (75:3), p 424.

Kazan, E., and Damsgaard, J. 2013. "A Framework For Analyzing Digital Payment As A Multi-Sided Platform: A Study Of Three European NFC Solutions," in *ECIS 2013*: Utrecht.

Kazan, E., Tan, C.-W., and Lim, E. T. K. 2014. "Towards a Framework of Digital Platform Disruption: A Comparative Study of Centralized & Decentralized Digital Payment Providers," in *Proceedings of the Australiasian Conference on Information Systems ACIS 2014*: Auckland New Zealand.

Kokkola, T. 2010. "The payment system," *Payments, Securities and Derivatives, and the role of the eurosystem. Frankfurt am Main: ecB*).

Nambisan, S., and Sawhney, M. 2011. "Orchestration Processes in Network-Centric Innovation: Evidence From the Field," *Academy of Management Perspectives* (25:3), pp 40-57.

Potter, W. J., and Levine-Donnerstein, D. 1999. "Rethinking validity and reliability in content analysis," *Journal of Applied Communication Research*).

Rochet, J. C., and Tirole, J. 2003. "Platform competition in two-sided markets," *Journal of the European Economic Association* (1:4), pp 990-1029.

Suárez, F. F., and Utterback, J. M. 1995. "Dominant designs and the survival of firms," *Strategic Management Journal* (16:6), pp 415-430.

Thomas, L., Autio, E., and Gann, D. 2014. "Architectural leverage: Putting platforms in context," *The Academy of Management Perspectives*), p amp. 2011.0105.

Walsham, G. 1995. "Interpretive case studies in IS research: nature and method," *European Journal of information systems* (4:2), pp 74-81.

Wareham, J., Fox, P. B., and Giner, J. L. C. 2014. "Technology Ecosystem Governance," *Organization Science* (25:4), pp 1195-1215.

West, J., and Bogers, M. 2014. "Leveraging External Sources of Innovation: A Review of Research on Open Innovation," *Journal of Product Innovation Management* (31:4), pp 814-831.

Yin, R. K. 2009. *Case study research: Design and methods*, (Sage).

Yoo, Y., Henfridsson, O., and Lyytinen, K. 2010. "Research commentary-The new organizing logic of digital innovation: An agenda for information systems research," *Information Systems Research* (21:4), pp 724-735.