COPENHAGEN BUSINESS SCHOOL
HANDELSHØJSKOLEN

Towards a Disruptive Digital Platform Model

Kazan, Erol

Document Version
Final published version

Publication date:
2018

License
CC BY-NC-ND

Citation for published version (APA):
Kazan, E. (2018). *Towards a Disruptive Digital Platform Model*. Copenhagen Business School [Phd]. PhD series No. 25.2018

Link to publication in CBS Research Portal

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy
If you believe that this document breaches copyright please contact us (research.lib@cbs.dk) providing details, and we will remove access to the work immediately and investigate your claim.

Download date: 04. Jul. 2025

COPENHAGEN BUSINESS SCHOOL
SOLBJERG PLADS 3
DK-2000 FREDERIKSBERG
DANMARK

WWW.CBS.DK

ISSN 0906-6934

Print ISBN: 978-87-93579-96-5
Online ISBN: 978-87-93579-97-2

TOWARDS A DISRUPTIVE DIGITAL PLATFORM MODEL

PhD Series 25-2018

Erol Kazan

TOWARDS A DISRUPTIVE DIGITAL PLATFORM MODEL

Doctoral School of Business and Management

PhD Series 25.2018

CBS COPENHAGEN BUSINESS SCHOOL
HANDELSHØJSKOLEN

Towards a Disruptive Digital Platform Model

Erol Kazan

Primary Supervisor: Professor Jan Damsgaard

Secondary Supervisor: Professor Chee-Wee Tan

BM PhD School

Department of Digitalization

Copenhagen Business School

Erol Kazan
Towards a Disruptive Digital Platform Model

1st edition 2018
PhD Series 25.2018

© Erol Kazan

ISSN 0906-6934

Print ISBN: 978-87-93579-96-5
Online ISBN: 978-87-93579-97-2

The Doctoral School of Business and Management is an active national and international research environment at CBS for research degree students who deal with economics and management at business, industry and country level in a theoretical and empirical manner.

All rights reserved.
No parts of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage or retrieval system, without permission in writing from the publisher.

Foreword

I want to express my gratitude to the many people who assisted me during my doctoral program. First of all, I am thankful to my two supervisors Jan Damsgaard and Chee-Wee Tan, who joined me on my Ph.D. journey and guided me in many scientific and personal matters. It is also important to acknowledge my colleagues and fellow doctoral students at the Department of Digitalization (CBS). They were both incredibly helpful and supplied an abundance of fun along the way. Bodil and Jeanette helped me in many administrative matters and a big thank you to Niels Bjørn-Andersen and Helle Zinner Henriksen as well for sharing their experiences as researchers and as friends. Thank you to my fellow co-authors Eric Lim (UNSW) and Carsten Sørensen (LSE) for supporting my research and stay in the UK. Lastly, I deeply appreciate my parents and family for their support throughout this Ph.D. study.

Abstract

Digital platforms are layered modular information technology architectures that support disruption. Digital platforms are particularly disruptive, as they facilitate the quick release of digital innovations that may replace established innovations. Yet, despite their support for disruption, we have not fully understood how such digital platforms can be strategically designed and configured to facilitate disruption. To that end, this thesis endeavors to unravel disruptive digital platforms from the supply perspective that are grounded on strategic digital platform design elements. I suggest that digital platforms leverage on three strategic design elements (i.e., business, architecture, and technology design) to create supportive conditions for facilitating disruption. To shed light on disruptive digital platforms, I opted for payment platforms as my empirical context and unit of analysis. Through primary and secondary data sources, findings suggest that digital platforms with an Analyzer and Prospector strategy profile have favorable conditions to facilitate disruption. It is envisioned that insights gleaned from multiple cases will contribute towards bridging existing knowledge gaps in strategic management, digital platforms, and open innovation literature.

Dansk Resume

Digitale platforme er modulære, lagdelte informationsteknologiske arkitekturer, der understøtter disruption. Digitale platforme er særligt disruptive, da de faciliterer hurtig udgivelse af innovationer, som kan erstatte etablerede innovationer. På trods af deres støtte til disruption, har vi dog ikke forstået, hvordan sådanne digitale platforme kan strategisk designes og konfigureres, så at de faciliterer disruption. Til dette formål bestræber man sig på at optrævle disruptive digitale platforme ud fra udbudsperspektivet, der er baseret på strategiske digitale platformsdesignelementer. Jeg påstår, at de digitale platforme udnytter tre strategiske designelementer (dvs. business, arkitektur og teknologidesign), der skaber understøttende betingelser for at facilitere disruption. For at belyse disruptive digitale platforme, valgte jeg betalingsplatforme som min empiriske kontekst og analyseenhed. Resultaterne fra primære og sekundære datakilder peger på, at digitale platforme med en Analyzer og Prospector-strategiprofil har gunstige betingelser for at facilitere disruption. Det er hensigten, at indsigter fra flere cases vil bidrage til at bygge bro mellem eksisterende vidensforskelle i strategisk ledelse, digitale platforme og åben innovationslitteratur.

Table of Contents

Introduction

Digital platforms are layered modular information technology (IT) architectures (Baldwin et al. 2000; Yoo et al. 2010) that have the potential to disrupt established innovations such as existing products and services and their corresponding value configurations. Digital platforms are particularly predestined to generate disruptive innovations due to their practice of digital modularity. Digital modularity is the decomposition of digital products or services into their basic components, which in turn can be combined, extended, or configured in new ways, towards a desired outcome (e.g., simpler in their composition), while maintaining or even extending their attributes (El Sawy et al. 2010; Schilling 2000; Staudenmayer et al. 2005). In the same vein, the act of new combinations or configurations towards a desired outcome is considered to be a basic form of innovation (Schumpeter 1934, p. 66). New combinations or configurations are particularly applicable for digital innovations, since the cost of creating or accessing digital components is negligible—in most cases, free (e.g., open-source software libraries), scalable, and globally accessible. Accordingly, it suggests that difficult-to-replicate modularity innovations can be construed as a competitive advantage among digital platforms.

As modularity allows standardized and fast component combinations with the help of boundary resources (e.g., APIs) (Ghazawneh et al. 2013), digital platforms usually team up with third parties (e.g., developers) to make use of external components to co-create modularized products or services. Researchers term this type of collaboration “interfirm modularity,” or, in innovation terminology, “coupled open innovation” (Chesbrough 2003; Gassmann et al. 2004; Staudenmayer et al. 2005). In this line, digital platforms can be perceived as incubators and catalysts for modularized innovations. As digital platforms foster new and rapid cycles of innovation, they arguably have the ability to introduce disruptive innovations as well. I argue that innovations introduced by digital platforms have the ability to support disruption by imitating or exceeding the value proposition of established innovations. Disruptive digital platform innovations are niche to begin with, but they inherently have the supportive conditions for becoming disruptive at day one and fulfill their actual disruption in the event of their becoming a new standard or dominant design (Suárez et al. 1995; Rogers 2003; Wang 2010).

Take the music sales industry as an example. The established value configuration (i.e., established innovation) in traditional music sales markets stems from the sale of music files (e.g., Apple iTunes). Conversely, Spotify challenges the aforementioned value configuration. Spotify’s value configuration is based on streaming music instead of offering downloads. In this way, Spotify attempts to transform established music value configurations from music ownership to music as a service. From a business model perspective, both music value configurations compete for the same consumers who demand music consumption. Spotify, though, diverges in how it sells and delivers its service, which is in and of itself a new form of innovation in the music sales industry. Considering this innovation from a disruptive innovation theoretical lens, Spotify’s music value configuration could set the foundation for a new standard in the music sales market. To put it differently, Spotify music streaming service (i.e., its technology architecture for on-demand music) has supportive conditions for disruption by proposing a new logic for music consumption. As a matter of fact, streaming as a new form of music value configuration is increasingly gaining a foothold in the music industry (e.g., Apple Music), exhibiting its potential towards becoming truly disruptive.

Similarly, the idea of new value configurations or new technology architectures is in alignment with architectural innovation theory (Henderson et al. 1990). Architectural innovation theorizes that products consist of (1) components and (2) architectures, where the latter structures the aforementioned components to a systematic whole stipulated by the product inventor. In this context, innovations in architecture usually maintain the overall value proposition of a product (e. g., music consumption). Innovations in architecture (e.g., Spotify's cloud computing servers) change the underlying composition of established product components in new ways, which may support efficiency gains or new avenues for new value-added features (e.g., on-demand music service). If successful, new innovations in architecture have consequences for incumbent organizations, as these innovations challenge the existing (product) architecture and knowledge, which may result in product obsolescence—in other words, disruption through modularity innovation.

As we have a good understanding about traditional modularized products when facing disruptive innovations (Henderson et al. 1990), we have not fully understood how modern digital platforms introduce disruptive innovations (Burgelman et al. 2007; Eisenmann et al. 2011). First, compared to traditional firms that operate in value chain economies (i.e., firms transforming inputs into valued outputs in a sequential manner) (Porter 1985), digital platforms operate in so-called network economies (Stabell et al. 1998), where value is primarily created through efficient connections among a large number of network participants (Eisenmann et al. 2006; Rochet et al. 2003). In these network economies, digital platforms play an important role, as they are considered to be enablers of these efficient connections. In this regard, it suggests that innovations in modularity (e.g., new architectures or components) are vital for digital platforms to achieve competiveness (de Reuver et al. 2017; Yoo et al. 2010). Secondly, since information systems literature suggests that business and IT strategies have symbiotic relationships (Chen et al. 2010; Sabherwal et al. 2001), and innovations are arguably in some ways shaped by these two strategy elements, we have ambiguity as to how digital platforms leverage on these two strategic elements (henceforth labeled "design elements") to create supportive conditions for disruption.

This thesis suggests that disruptive innovation introduced by digital platforms are in some ways supported or driven by business- and IT-related design elements, where innovations either sustain or replace established innovations (e.g., from MP3 files to streaming music). To identify supportive conditions for disruptive innovations, this thesis aims to identify business and IT strategy design elements that are pertinent for digital platforms. Secondly, this thesis aims to derive improved prescriptive knowledge by deriving design principles (cf. Hevner et al. 2004) for digital platforms that exhibit supportive conditions for disruption. Accordingly, I endeavor to unravel disruptive digital platforms by providing an answer to the following research question (RQ):

How to design and configure digital platforms that facilitate disruption?

Generally speaking, as soon as digital platforms introduce innovations that partially or fully replicate the attributes of established innovations, digital platforms obtain supportive conditions for disruption; they become truly disruptive in the event of broader adoption towards a new standard. To explore this phenomenon, I adopt the supply perspective of an organization as my unit of analysis and draw on layered modular architecture (Yoo et al. 2010) and configuration theories (El Sawy et al. 2010) to derive digital platform design principles. I segment the main RQ into the following three sub-research questions (SRQs):

- SRQ1: *What are the design elements of digital platforms?* SRQ1 aims to identify generic strategic design elements that are pertinent for digital platforms. I suggest that digital platforms are driven by three interrelated design elements: *business*, *architecture,* and *technology design*.
- SRQ2: *How are design elements configured to create conditions for open innovation?* SRQ2 aims to explore how the aforementioned three design elements foster open innovation. Open innovation is explored as most modern digital platforms practice this type of innovation to co-create modularized innovations that either maintain or change established innovations.
- SRQ3: *Which design element configurations are supportive for disruption?* SRQ3 aims to derive a typology of configurations of design elements that create supportive conditions for disruption.

To answer the preceding RQ, I advance a research model that decomposes digital platforms into three interrelated design elements: (1) *business design* (i.e., strategic orientation of digital platforms) (Chen et al. 2010; Miles et al. 1978); (2) *architecture design* (i.e., architectural setup, composition, and governance of digital platforms) (Henderson et al. 1990; Iyer et al. 2010; Yoo et al. 2010); and (3) *technology design* (i.e., the means to support modularized open innovation) (Besen et al. 1994; Ghazawneh et al. 2013; Katz et al. 1986; Saloner 1990; Sanchez et al. 1996; West 2003).

Theoretical Background

Introduction to Disruptive Innovation Theory

Disruptive innovation theory (Christensen et al. 1996), which has its roots in creative destruction theory (Schumpeter 1934), explains why incumbent organizations with successful products and dominant market shares are challenged and replaced by simpler technologies in the long run. Schumpeter’s (1934) seminal work on organizational innovation and competition suggests that innovation by entrepreneurs has the ability to disturb economic equilibria of existing systems such as transforming an entire industry towards a technology standard. In his studies, Schumpeter categorizes industries as either Mark I (unstable and dynamic) (Schumpeter 1934) or Mark II (stable) (Schumpeter 1962).

Mark I industries are characterized by *creative destruction,* where organizations such as market entrants with innovative solutions shape the competitive landscape, as industry boundaries are not fixed. Mark II industries, on the other hand, are characterized by *creative accumulation*, where industry boundaries and market positions are stable, allowing incumbent organizations to refine their existing or established innovations towards economy of scale and scope benefits. In his studies, Schumpeter asserts that innovation is largely a phenomenon that emerges within organizational boundaries, a notion clearly contrary to the open innovation literature, which propagates the idea that innovation can and should be co-created with external stakeholders (e.g., customers) (Chesbrough 2003).

As Schumpeter's works provide rather abstract explanations about the symbiotic relationship between innovation and competition with disruptive consequences for established organizations and their innovations (i.e., Mark I industries, creative destruction), the work of Christensen et al. (1996) is more specific in its unit of analysis. Having the disk drive industry as their empirical context (i.e., market perspective), Christensen et al. (1996) endeavored to explore how simple and inferior (technology) innovations surprisingly outperform established innovations by incumbent organizations in the long run.

Generally speaking, *disruptive innovations* can be understood as innovations that leverage on alternative resources, components, methods, capabilities, or new combinations of existing sources to produce products/services that are atypical to the dominant or sustaining innovations (henceforth referred to as "established innovations") (Christensen et al. 1996). In this context, incumbent organizations and their related stakeholders (e.g., industry consultants) initially underappreciate disruptive innovations as they are perceived to be inferior (e.g., low performance) or incompatible or simply have conflicts with existing business models and revenue-generating customers. Another reason for being reluctant to unfamiliar innovations is that incumbent organizations usually prefer to exploit their established innovations, as these are proven to reliably generate revenues that sustain existing competitiveness and organization. This arguably reduces the incentives to adopt new, alien innovations. As incumbents improve and refine their established innovations in an incremental fashion (e.g., a product becomes faster), disruptive innovation theory defines these type of innovations as *sustaining innovations*, which sustain the current existing competitive advantage (Christensen et al. 1996).

This notion suggests that innovation and competition have a symbiotic relationship with each other, with self-reinforcing effects that again are arguably influenced by strategic elements (e.g., business strategy), as organizations decide about (de)investments into new or established innovations to achieve or maintain competitiveness. As organizations continuously nurture their existing sources, paradoxically, the overemphasis on established or sustaining innovations is considered to be the root causes for incumbent organizations' vulnerability to disruptive innovations (Christensen et al. 1996; Hill et al. 2003).

To begin with, disruptive innovations find their application in underdeveloped market segments of an industry, as these inferior innovations are considered to be affordable, simple, and good enough to get specific jobs done (Christensen et al. 2007). Though, with the lack of technical debt and accelerated adoption and improvements in their features, these initial inferior innovations move from niche into the territory of mainstream markets. As soon as the improvements are close to matching the value proposition of established innovations, prior inferior innovations have under these circumstances obtained supportive conditions for disruption, which may introduce a new dominant design or standard within a certain business environment (e.g., from music files to streaming music) (Christensen et al. 1996).

Overview of Disruptive Innovation Studies

A substantial body of innovation and management literature has studied the organizational implications of disruptive innovations (Ansari et al. 2015; Assink 2006; Christensen et al. 1996; Crossan et al. 2010; Damanpour et al. 2006; Danneels 2004; Dougherty et al. 1996; Govindarajan et al. 2006; Sandström et al. 2009).

The study by Ansari et al. (2015) sheds light on how new market entrants (e.g., TiVo TV box) with disruptive innovations strategically navigate and balance coopetitive tensions with their incumbent counterparts while dealing with legacy systems in the U.S. television industry. Their findings suggest that market entrants may consider a dynamic and evolutionary approach with incumbents by continuously adjusting their business strategies to promote symbiotic relationships while teaming up with other established stakeholders (e.g., content providers/distributors, manufacturers, ratings firms, viewers, regulators, and industry associations) to increase leverage and create conditions for success. In the information system (IS) literature, disruptive innovation has been extensively studied as well. The study by Krotov et al. (2008) on radio-frequency identification (RFID) technology suggests that innovations have dualistic attributes; they are either sustaining, which preserves existing competences of an incumbent organization (e.g., retailer), or they are disruptive, which undermines existing competences (e.g., marketers). In this line, disruptiveness is determined by industry context. The study by Lucas et al. (2009) explores the rise and fall of Kodak. Their findings suggest that disruptive technologies like digital photography were clashing with the existing culture at Kodak, where organizational inertia was one of the root causes of Kodak's failure, creating hurdles to transforming its revenue-generating product line from physical (chemical photography) to digital.

To provide a more holistic view on disruptive innovation studies, Hill et al. (2003) synthesized innovation studies originating from various research streams (e.g., strategic management, organization and economics) to derive generic factors that are typically causing challenges for incumbent organizations facing disruptive innovations. In general, disruptive innovations challenge incumbent organizations in the following three areas: (1) *economic*, (2) *organizational*, and (3) *strategic*.

From an economic viewpoint, which relates to market dominance, market control, and the creation of market entry barriers, Hill et al. (2003) suggest that incumbent organizations prefer to exploit their current investments in established innovations to sustain existing competitive advantages and protect market shares. By tacitly enforcing a specific mode of competition or dominant design, which usually exhibit the attributes of established innovations (i.e., the use of standardized but costly technology), incumbent organizations enact economic barriers against market entrants and increase competitive pressure on them. One way to build market barriers is to influence legal frameworks (e.g., financial industry) to deter market entrants, as they would have to incur large sunk costs (e.g., costly certified IT systems); this reduces a potential competitor's motivation to enter markets in the first place.

Incumbents consider disruptive innovations damaging to their prior investments in established innovations meant to protect existing markets. On the other hand, disruptive innovations are welcomed by market entrants, who see them as a way into prior closed markets. By leveraging on nascent technologies (e.g., blockchain) that emulate established innovations (e.g., legacy payment systems), market entrants avoid the resources (i.e., established innovations) that give incumbent organizations a competitive edge. In so doing, market entrants created conditions to compete more independently while using different means, such as innovations, with disruptive attributes.

From an organizational viewpoint, which relates to organizational inertia, incumbent organizations have underdeveloped absorptive capacities (Cohen et al. 1990) towards new innovations that do not originate from their organizational boundaries. Similar to the notion of "not invented here," organizations prefer predictability, reliability, and control, which are usually manifested through institutionalized routines. These routines in turn create inflexibilities towards unknown innovations, as routines dictate to prioritization of existing knowledge to ensure efficient resource exploitations. Take biotechnology firms as an example. Compared to their pharmaceutical counterparts, which utilize chemistry to create their products, biotechnology firms leverage on molecular biology to offer competitive products with a similar value proposition (i.e., medical treatment of patients). However, the knowledge and skills for biotechnology products are different compared to pharmaceutical ones, exhibiting in these scenarios the attributes of competence-destroying innovations (Tushman et al. 1986), as they get the same job done.

Lastly, the strategic viewpoint presents the third challenging factor for incumbent organizations in adopting new innovations. Incumbent organizations are embedded in business networks (Iansiti et al. 2004). Through these networks—a collection of various interdepended stakeholders such as suppliers, distributors, and customers— organizations are in some ways peer-pressured into reinforcing a current dominant business logic, because the current logic is the source of their current revenue streams and competitive advantages. In these scenarios, vested business interests create collective switching costs, obstructing network participants from adopting new innovations—especially innovations that undermine their competitive advantage (David 1985; Shapiro et al. 1999).

As the abovementioned sections convey rather a generic description of disruptive innovation theory, Christensen (2013) defines disruptive innovations as: "[…] straightforward [technologies], [that] consist[s] of off-the-shelf components put together in a product architecture that was often simpler than prior approaches. They offered less of what customers in established markets wanted and so could rarely be initially employed there. They offered a different package of attributes valued only in emerging markets remote from, and unimportant to, the mainstream."

The definition suggests that disruption innovation theory can be understood from two different units of analysis: (1) *market perspective* (i.e., innovation that relates to the external business environment; e.g., consumer view) and (2) *supply perspective* (i.e., innovations that occur within organizational boundaries; e.g., simpler product architecture).

The next section presents key literature on disruptive innovations, which can be understood from the market and supply perspective.

Understanding Disruptive Innovation from the Supply and Market Perspective

Disruptive innovation studies with a *market perspective* as their unit of analysis have the external business environment as their research foci, attempting to uncover the innovation dynamics among market participants (e.g., product performance, price from a user, or competitor viewpoint). Accordingly, these types of studies explore market segments of an industry (e.g., niche versus mainstream). Disruptive innovation studies that have the *supply perspective* as their unit of analysis, on the other hand, have the goal of uncovering the composition and inner workings of innovations (e.g., sophisticated and simpler product architectures). Table 1 illustrates key disruptive innovation studies with two different theoretical perspectives.

Table 1. Disruptive Innovation Literature: Two Theoretical Perspectives		
Unit of Analysis	**Theories/Categories**	**Defining Attributes**
Market Perspective **Key Reference:** Christensen et al. (1996)	***New Market Generation***	An innovation that creates new consumer demand and a market that has not existed before.
	Low-End Market Disruption	Inferior innovations located in niche markets that match and exceed established innovation in mainstream markets (e.g., performance, price) over time.
Supply Perspective **Key References:** Abernathy et al. (1985) Tushman et al. (1986) Henderson et al. (1990)	***Competence-Enhancing & Destroying Innovations***	*Competence-enhancing innovations* solidify the knowledge, methods, and asset base of organizations for creating established products. *Competence-destroying innovations* abolish them through new knowledge, methods, and asset base.
	Architectural Innovation *(Modularity perspective of competence enhancing & destroying innovations)*	Product has new architecture compared to established ones while maintaining its components.

Disruptive Innovation from the Market Perspective

From a market perspective, innovations generate two types of market instances: (1) innovations that create new markets and satisfy new consumer needs, and (2) low-end market innovations, which are inferior innovations to begin with, but through continuous improvements moving into mainstream markets, they increasingly satisfy the needs of consumers in mainstream markets (Christensen et al. 2013). From a competition viewpoint, low-end market innovations are usually identifiable and often ignored by incumbent organizations, as they operate within existing industry boundaries. New market innovations, on the other hand, are particular in that they are opaque and initially unnoticed because their market or industry affiliation has not been established. Therefore, they are not on the competition radar of market incumbents. Nevertheless, new market innovations still cause disruptions in unaffiliated markets/industries as they get the same or similar job done.

New Market Generation

New market generation is manifested in innovations (e.g., products, services, or business models) that create a new market space that has not existed before. But the new markets may unexpectedly challenge existing mainstream markets because they get the same job done (Kim et al. 2004; Markides 2006; Schumpeter 1962). Being first movers, these types of innovations usually create monopolistic power over supply and price as they face no competition. But this advantage is usually short-lived. New profitable markets attract competitors in the form of second or late movers (Shamsie et al. 2004), who usually challenge new market monopolists in a rapid fashion as they adapt new market innovations at a faster pace by simply observing and avoiding the same trial and errors of the new market creators. Take the iPhone as an example. Launched in 2007, it could be considered as a sustaining or established innovation for doing phone calls. But at the same, looking at its mobile computing and Internet connectivity, the iPhone created an entirely new market for consumers in how the mobile Internet is consumed—the latter arguably a terrain defined and dominated by laptop manufacturers.

From an intra-organizational perspective, new market creators face considerable challenges as well. Demand for new market innovations are difficult to predict as organizations have no track record or experiences to derive informed managerial decisions to mitigate uncertainty and risk for unproven innovations. Secondly, new market innovations may substantially contribute to the sunk cost structure of an organization as new market innovations tend to differ from existing production sources or knowledge bases (e.g., Apple's first mobile phone), which are usually optimized to cater to established innovations in existing markets (e.g., Mac computers). In this scenario, management is required to undertake additional capital investments or decide on de-investments in other business units, which may cause organizational challenges like inertia (Hill et al. 2003).

Low-End Market Disruption

Low-end market innovations are innovations that are initially located in existing, niche, and unprofitable markets of an industry because they do not match the needs of users in mainstream markets (e.g., performance). The work of Christensen et al. (1996) on the disk drive industry suggests that incumbent organizations are usually reluctant to adopt inferior innovations like smaller disk drives as they do not match the needs of revenue-generating customers, who demanded larger and faster disk drives. Accordingly, they create arguably little incentive for market incumbents to invest scarce resources into new businesses endeavors, where market demand is opaque or negatively perceived. This phenomenon is particularly observable among publicly traded incumbent organizations as management compensations are profit orientated, pressuring organizations to exploit and sustain their existing revenue-generating products, which usually takes the shape of sustaining or established innovations.

Over time, however, these underappreciated low-end market innovations improve in their features, having the potential to move up into mainstream markets and hence into the territory of incumbent organizations. Lacking technical debt and being simpler to manufacture compared to sustaining or established innovations, disruptive innovations improve in their performances at an accelerated pace and steeper trajectory. In so doing, prior inferior innovations may achieve a level of being good enough to match or exceed the value proposition of established innovations—thus having disruptive properties.

In this context, disruptive innovation competes on the basis of several value proposition attributes, such as performance, reliability, availability, easy of use, aesthetic appearance, and cost or brand reputation (Abernathy et al. 1985). As soon these value proposition attributes are about to reach or intersect with the needs of mainstream consumers, disruptive innovations may disintermediate consumer relationships with sustaining innovations (Christensen et al. 1996; Schumpeter 1962). To keep disruptive innovations at a distance, though, incumbent organizations respond by expanding their investments into current established innovations in the hope of widening the value proposition gap between established and disruptive innovations. However, this may result in over-engineered established innovation. Over-engineered innovations exceed the demand of existing consumers in mainstream markets, who are incapable of absorbing the additional performance increases, whereas disruptive innovations are economically and performance-wise good enough to satisfy their needs (Christensen et al. 1996). Hence, over-engineered innovations can be considered an additional contributing factor that causes the demise of established innovations.

Disruptive Innovation: The Supply Perspective

Disruptive innovation literature with a supply perspective as the unit of analysis (i.e., organizational perspective) attempts to explain disruptive innovations broadly through the lens of *competence-enhancing* or *competence-destroying innovations* (Abernathy et al. 1985; Tushman et al. 1986).

Competence-Enhancing or Destroying Innovations

Competence-enhancing innovations are improvements that solidify existing knowledge or asset of organizations in how products/services are created and/or delivered. In digital economies (e.g., digital media industry), the efficient delivery of standardized digital goods (e.g., music streaming) is a highly sought competence. Since competence-enhancing innovations maintain and enhance established innovations, competence-enhancing innovations are theoretically aligned with sustaining innovations (Christensen et al. 1996), which propagate the idea that incumbents prefer to invest and optimize existing means for creating their current profit-generating (established) innovations. This type of organizational behavior is consistent with resource dependence theory (Pfeffer et al. 2003), which suggests that organizations rely on their accumulated resources and skill sets to ensure their own organizational survival. On the negative side, though, resource dependence reduces the incentives and motivation to allocate additional capital for new competence-enhancing innovations (e.g., investing in streaming expertise), where the commercial outlook is considered to be opaque.

To the contrary, *competence-destroying innovations* undermine the expertise of established innovations. To begin with, competence-destroying innovations are subject to a period of instability and fermentation until a dominant design (i.e., standard) prevails (Suárez et al. 1995). But as soon as competence-destroying innovations gain increased adoption and approach accepted common practice, they cause severe ramifications for incumbent organizations, eroding existing resources and skills in the creation and delivery of established innovations. To put it differently, the way incumbents have created their established innovations may become outdated. Organizations with little or no technical debt (e.g., market entrants) that have successfully integrated competence-destroying innovations have created supportive conditions to grow at a faster rate in both creation and delivery compared to established ones. In these kinds of situations, incumbents are pressured to consider whether or not to abandon old competences and adopt new ones to ensure organizational sustainability. This is particularly challenging for large incumbent organizations with research and development (R&D) units as they usually identify early competence-destroying innovations but struggle to react adequately (e.g., Kodak) (Lucas et al. 2009).

Take Blockbuster and Netflix as an example. Founded in 1985, Blockbuster was the dominant player in the U.S. video rental market. With its recognizable brand and large network of physical stores that were conveniently located for walk-in customers, Blockbuster was the uncontested market leader. Blockbuster was considerably successful with its multi-billion-dollar business, but it had to file for bankruptcy in the year 2010. On the other hand, Netflix, founded in 1999, was a small market actor that focused initially on a niche market by renting out movies by mail. Over time, though, Netflix managed to reengineer its organization by transforming its business from movie mail delivery to a movie streaming service. This was an extraordinary organizational transformation, and the adoption of new competences transitioned Netflix from a physical-orientated business (e.g., mail delivery) to a digital one (e.g., online servers), which required new skill sets to deliver movies in a different way. In this specific context, Netflix out-innovated Blockbuster through process innovation (Schumpeter 1934, p. 66).

Architectural Innovations

In the same theoretical vein of competence-destroying innovations, the work of Henderson et al. (1990) on *architectural innovation* provides insights as to why incumbent organizations and their corresponding products, in the form of modularized systems, are vulnerable to innovations in new product architectures. Architectural innovation destroys the competences (i.e., architecture knowledge or blue sprint) of incumbent organizations in how products are manufactured and assembled. In this context, architectural innovation by a competitor is an attempt to challenge and replace incumbents' architecture knowledge, which may reduce demand and use and result in product obsolescence. The work of Henderson et al. (1990) in the semiconductor industry explores and studies the composition and structure of modularized products in terms of their (1) architecture and (2) components, where architecture serves as a blueprint that dictates how the aforementioned components are structured to a logical whole. Generally speaking, modularity describes systems in regards to their components' (1) compositions, (2) recombination possibilities, and (3) how tight the aforementioned components relate to each other (e.g., being loosely or tightly coupled) while adhering the rules of architecture (Orton et al. 1990; Schilling 2000). Considering architecture and components as two dimensions (see Figure 1), Henderson et al. (1990) propose four types of modularity innovations that either refine (i.e., competence-enhancing innovations) or overturn (i.e., competence-destroying innovations) the logic of existing products.

1. ***Incremental Innovations*** refine existing components and maintain existing architectures.

2. ***Modular Innovations*** overturn existing components but maintain existing architectures.

3. ***Architectural Innovations*** refine existing components but overturn existing architectures.

4. ***Radical Innovations*** overturn existing components and architectures.

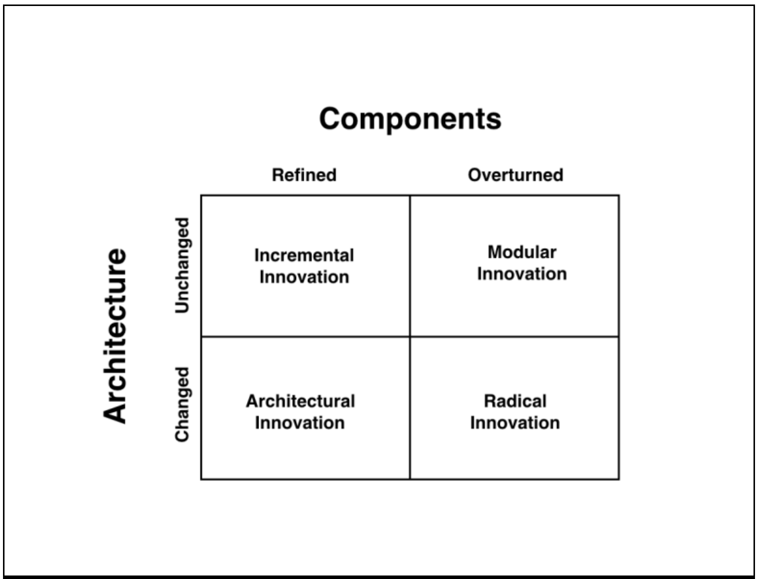


Figure 1. Architectural Innovation

Incremental & Modular Innovations. Innovations that maintain the architectures of existing products strengthen the competences of incumbents in how these modularized products are structured. In this sense, both innovation types reinforce the incumbent's architectural knowledge for certain product classes, which in turn creates favorable conditions to lead and define standards for an entire industry, which is still achievable in the event of refined or overturned components. Take Apple's iPhone as an example for modular innovation. The phone consists of hardware and software components, where third-party applications from Apple's App Store have the ability to replace or extend prior installed (digital) components while still maintaining the underlying (product) architecture of the physical phone itself.

Architectural & Radical Innovation. Innovations in architecture, however, have broader ramifications for incumbent organizations. Organizations that introduce architectural innovations implement subtle changes into existing modularity product classes while maintaining a similar value proposition (e.g., music consumption through streaming services instead of music downloads). In this context, architectural innovations appear to be harmless from a competition viewpoint, but with accelerated adoption, new architectures could replace incumbent's architecture knowledge that could impact their commercialization efforts for their existing products. If new architectures indeed promise efficiency gains (e.g., simpler and getting the same job done), they have favorable conditions to evolve to a new standard, which creates a new competitive advantage for the new architecture owner. In the innovation terminology, this is defined as disruption. Furthermore, the process towards a new architecture standard could be accelerated if new architecture unleashes untapped innovations, as it opens up new features that were not feasible before, which increase value propositions even further compared to existing ones.

To illustrate, music streaming services require arguably different competences and means compared to traditional music download services, while the components (e.g., digital music files) are largely maintained or slightly refined (e.g., better file compression techniques to achieve better Internet bandwidth use). With its new architecture (e.g., servers that support on-demand cloud computing), streaming services offer arguably a superior value proposition: instant music access and a large music library. If this type of music consumption becomes popular, unprepared incumbent organizations with no architecture knowledge in music streaming could face the risk of disruption.

Radical Innovations. Lastly, radical innovations are contenders for creating a complete new dominant design that abolishes the architecture and the components of established innovations.

Defining Supportive Conditions That Facilitate Disruption.

Based on the above-mentioned literature, this dissertation defines innovations with supportive conditions for facilitating disruption when unproven, inferior, but nascent innovations imitate or replicate value propositions of established innovations (i.e., products, services, or systems). In the modularity context, modularized systems with new architectures and/or new components that replicate the value proposition of established modularized systems can be considered as disruptive contenders as well. In the event of broader adoptions, innovations with supportive conditions for facilitating disruption can be considered potential candidates for a new dominant design or standard that replaces established innovations.

Research Gap: Digital Platform Disruption.

Considering architecture and components from an innovation and competition viewpoint, the work of Henderson et al. (1990) on architectural innovation is one of the first studies on strategic modularity that explains how organizations achieve competitive advantage or get challenged by it. That being said, the theory of architectural innovation illustrates that *competition advantage* and *innovation* relate to each other or have self-reinforcing effects (Pil et al. 2006). For instance, the degree of control exercised over components (e.g., loosely or tightly coupled components) gives indications as to what kind of innovation an organization permits to achieve or maintain its competitive advantage, which again provides cues about their strategic postures (e.g., being aggressive or conservative). To illustrate, consider Android and iOS, which are both mobile operating systems and hence digital components of Google’s and Apple’s mobile phone business units. Android is largely open-source and hence a highly malleable digital component for third parties (i.e., loosely coupled component). Apple’s iOS, on the other hand, is proprietary (i.e., tightly coupled component) and restricts any third-party modifications (i.e., innovation) to maintain control, as Apple considers iOS an innovative asset and component that gives it competitive advantage. If we consider these aforementioned illustrations, Google and Apple exhibit two different and opposing strategies (i.e., open versus closed) while promoting mobile operating systems. Accordingly, understanding *competition* and *innovation* in the realm of modularity (e.g., architectural innovation) can serve to identify strategic postures among organizations to derive strategy profiles that are pertinent for digital platforms.

Beyond doubt, the work of Henderson et al. (1990) is a key reference literature that provides the theoretical foundation to understand disruptive innovation in the modularity context. As prior research indicates a symbiotic relationship between competiveness and innovation in the modularity context (Pil et al. 2006), there is, however, a paucity of studies that explain how advanced digital platforms in value networks facilitate favorable conditions for disruption.

In the same vein of disruptive innovations and digital platforms, de Reuver et al.'s (2017) proposed research agenda on digital platforms suggests that there are few studies that explain the transformative digital platforms that shape entire industries. Specifically, de Reuver et al. (2017, p. 7 ff) state: "*The emergence of platform thinking and the resulting 'platform economy' demands research into the transformative and disruptive impact of digital platforms on organizations and their business models and the business environment as a whole […] [f]irms are not isolated anymore, and value is co-created and co-delivered by multiple contributing entities. New theories and models that capture, explain and predict the potentially disruptive nature of digital platforms are needed*."

Therefore, unpacking the supportive conditions for facilitating disruption requires an understanding of what is considered (1) innovation and (2) a competitive advantage in the digital platform context. Arguably, assets and methods for achieving innovation and competitive advantages in network economies are different compared to traditional organizations that adhere to the notion of value chain economies (Porter 1985; Stabell et al. 1998). Lastly, deciphering competitive advantage and innovation principles among digital platform organizations allows us to derive characteristic strategy postures and hence strategy profiles that are pertinent to digital platforms. The next section provides an overview of the platform literature, with an emphasis on digital platforms, which are layered modular technology architectures that promote value networks (Baldwin et al. 2000; Baldwin et al. 2008; Pil et al. 2006; Tiwana et al. 2010b; Yoo et al. 2010).

Platform Literature

Research on platforms can be categorized into four main research streams (Thomas et al. 2014): (1) organizational, (2) product family, (3) market intermediary, and, lastly, (4) platform ecosystems. Platform studies belonging to the ***organizational research stream*** try to understand how organizations create structures and building blocks (i.e., a platform) for storing and enhancing organizational resources and capabilities (e.g., dynamic capabilities). The ***product family*** research stream, on the other hand, has its roots in engineering, technology, and innovation studies. The platform (e.g., automobile) provides a stable core for a range of product families to serve different market needs. Platform studies belonging to the ***market intermediary*** research stream have an economic view on platforms, treating them as market places, market makers or multi-sided platforms that enable efficient connections among various stakeholders that wish to exchange good or services (e.g., payment services) (Eisenmann et al. 2006; Hagiu et al. 2011; Rochet et al. 2002). Lastly, the ***platform ecosystem*** stream studies the strategic use of technology platforms within value networks, which is guided by the notion of modularity, where platform owners exercise control over architecture and integrate selectively complementary assets (e.g., internal and external components) (Baldwin et al. 2000; Yoo et al. 2012). The platform ecosystem stream has its roots in strategic management (Porter 1985), technology value creation (Teece 1986), information systems competition (Shapiro et al. 1998), and technology standards (Farrell et al. 1985; Suárez et al. 1995; Utterback et al. 1993). Compared to other platform research streams, platforms in platform ecosystem studies are distinct, as they tend to share the ownership and control with external actors. Take Samsung and Google as an example. Samsung produces popular mobile devices, which in turn rely on Google's Android mobile operating system (i.e., a component) to be a complete consumer product. In a way, Samsung and Google co-own the mobile device while maintaining control about their respective hardware and software components. As this dissertation aims to understand disruptive digital platforms and consider them as layered modular architectures, this study belongs to the platform ecosystem research stream.

Digital Platform Literature

A common characteristic of digital platforms is that they provide a technology foundation for third parties (e.g., developers) to create innovative components (e.g., apps), which in turn assist digital platforms achieve their competitive advantages (Ghazawneh et al. 2015). Researchers have studied many facets of digital platforms, such as the governance and development for operating systems (Benlian et al. 2015; Eaton et al. 2015; Ghazawneh et al. 2013; Pon et al. 2014; West 2003; West et al. 2000), the classification of app store platforms (Ghazawneh et al. 2015), music distribution platforms (Burgelman et al. 2007; Tilson et al. 2013), e-commerce platforms (Tan et al. 2015), enterprise resource planning (ERP) systems (Ceccagnoli et al. 2012; Sarker et al. 2012; Wareham et al. 2014), game consoles (Cennamo et al. 2013), and mobile payment platforms (Ondrus et al. 2015).

A common theme among these studies is platform governance. Digital platforms are constantly challenged to consider the needs of existing and new stakeholders (e.g., developers) to maintain attractiveness and competiveness while preventing fragmentation that would deteriorate service performance (e.g., incompatibility) (Eisenmann et al. 2011; West 2003). As digital platforms provide tools and avenues for collaborations at the component level of products, these actions are basically invitations to create value networks based on the logic of modularity.

Digital Platforms: Layered Modular Architectures

Past studies laid the foundation for conceiving digital platforms as layered modular information technology architectures that have the logic to create value or business networks around their platform boundaries (Baldwin et al. 2000; Baldwin et al. 2008; Pil et al. 2006; Tiwana et al. 2010b; Yoo et al. 2010). Consistent with Yoo et al. (2010), digital platforms can compromise up to five distinct but interlinked layers to assemble modularized products or services (Yoo et al. 2010): (1) device, (2) system, (3) network, (4) service, and (5) content. Figure 2 illustrates the digital platform layers of Apple's payment service Apple Pay.

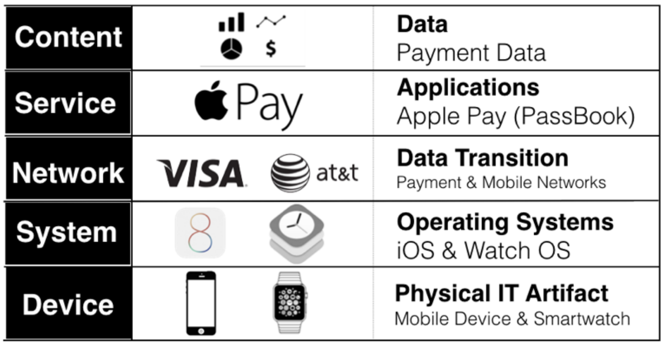


Figure 2. Digital Platform Layers & Components of Apple Pay

Device Layer: A physical, programmable IT artifact for storing and processing digitally encoded data and instructions. Apple's iPhone and smartwatch embody these traits by being a physical technology artifact that stores and runs the Apple Pay software and initiates the Near-Field-Communication (NFC) chip for conducting contactless payments.

System Layer: A logical software system for controlling and executing software and hardware components. Apple's mobile payment solution Apple Pay requires iOS and Watch OS as operating systems to regulate the payment app (software), NFC chips, and its secure element (physical).

Network Layer: Network channel for transporting data packages among different network participants. Apple's mobile payment service relies on mobile operators (e.g., AT&T) and payment networks (e.g., Visa) to process and settle payments.

Service Layer: Software applications for storing, generating, and distributing services. Apple Pay is a payment service that not only mediates commercial transactions but also offers Application Programming Interfaces (API) and Software Development Kits (SDK) to facilitate the integration of Apple Pay into third-party applications.

Content Layer: Representation of digital data in terms of audio, video, text, and images. Originating from the service layer, Apple Pay generates payment data in the form of purchase amount, merchant, time and/or location, to name a few.

Each of these five layers is basically an avenue for and invitation to third parties to contribute their own components to practice modularity to complement/enhance digital platforms in their features and overall value proposition (Schilling 2000; Staudenmayer et al. 2005). Nevertheless, access—and the quality of access to these layers—is subject to platform governance (e.g., moderated or unmoderated), which suggests the existence of commodity and value layers within digital platforms, where the latter presents control points and value capture opportunities (Kazan et al. 2014b). For instance, in the computer industry, hardware (i.e., the device layer of digital platforms) is largely considered to be a standard off-the-shelf component that shares the attributes of abundance and commodity. Data analytics (content layer of a digital platform), on the other hand, present a source for deriving business value, as data is in most cases guarded against third parties (e.g., payment data).

Considering digital platforms and third parties from an innovation viewpoint, the innovation literature considers this kind of collaboration open innovation, which is basically a conjoint innovation effort to create value (e.g., commercializable innovations) (Chesbrough 2003), or, in a broader sense, is understood as generativity (Zittrain 2006). Generativity describes unsolicited innovations by third parties, where the system owner (e.g., platform owner) has no control over the innovation process. However, as governance influences component access or contribution, and innovation indirectly, platform components at different layers are either loosely coupled, which suggests flexibility (e.g., Android is open-source on the system layer), or the platform components are tightly integrated into layers that suggest control (e.g., iOS is proprietary on the system layer).

Considering platform layers from an outsourcing viewpoint, they are similar to the notion of vertical integrations or make-or-buy decisions (Harrigan 1984). Digital platform owners have to decide which layers are to be internally developed, reflecting their need of control or having the in-house knowledge to develop themselves, and which ones are to be outsourced or shared with third parties to balance shortcomings. Arguably, the more that platform layers are controlled and tightly integrated with each other (e.g., Apple platform layers), the more favorable conditions are created to capture monopolistic value opportunities. On the contrary, if digital platforms face resource constraints (e.g., lack of component knowledge in one layer), a digital platform may have to open its layers towards third parties to offer a complete modularized product.

To illustrate, Google's initial android phone strategy was to give away the device layer to external phone vendors (e.g., Samsung, HTC, Huwai), which have the sources (e.g., production facilities) to bring affordable Android phones into the hands of consumers. Over the years, though, Google realized that a "let a thousand flowers bloom" phone strategy (Boudreau 2012) had diminishing returns on quality and user experience, endangering Android's brand perception and potentially the use of Google's services. To counteract, Google took steps to integrate more layers with each other to control user experience and value. Specifically, Google started to verticalize layers by designing, developing, and marketing its own mobile phone (e.g., Pixel), while leveraging on interchangeable hardware manufacturers (i.e., device layer). In this way, Google created a flagship phone that embodies Google's vision of mobile computing that couples layers (i.e., device, system, service, content) to increase its perceived value. An outcome of Google's layer verticalization strategy is that it set the bar for other Android phone vendors to release similar high-quality phones, which fosters Android's competitiveness.

From a strategy and competition viewpoint, layered modular architectures have the advantage, as well as the challenge, of being doubly distributed (Yoo et al. 2010). They are distributed, as they provide third parties environments to collaborate with their own components at different platform layers. But at the same time, they are digital platforms, and third parties conjointly or independently (1) control and (2) generate component knowledge in select strategic layers. Specifically, digital platform owners may face the risk of housing Trojan horses within platform boundaries. To begin with, third parties are welcomed as they contribute and build a stronghold in underappreciated commodity layers and increase their value proposition. However, hosted third parties could initiate a Trojan horse strategy within digital platforms by bundling commodity and value layers, where commodity layers function as entry points to encroach into the value layers of digital platform owners. Take Apple's iPad as an example. Amazon contributes with its Kindle eBook service to iPad's content and service layers. But concurrently, Amazon competes with Apple on the device layer with its own Kindle eBook readers and tablets (Yoo et al. 2010). In this sense, platform governance has to ensure a fine line between welcoming third parties to facilitate innovation and growth while at the same time putting measures in place to limit potential competitors.

Based on the above-mentioned observations, digital platforms function as innovation and distribution hubs, as they have the logic to enrich and orchestrate components into valued modularized products and services within value networks. In the same vein, the digital platforms that can be considered attractive and competitive offer the best conditions for practicing modularity, which offers high-value capture opportunities. As digital platforms deliver products and services within value networks, digital platforms rely on digital infrastructures. In this dissertation, digital infrastructures are considered information delivery architectures that deliver and connect digital platform stakeholders to a value network. In this sense, this dissertation posits that the majority of value creation within value networks takes place in the realm of digital platforms, and digital infrastructures' primary function is to connect and deliver value among network participants (See Figure 3).

Digital Infrastructures

Another key component for digital platforms is access to digital infrastructures (i.e., network layer) to channel platform derivatives (e.g., services) in the most efficient and economic manner (Hanseth et al. 2010; Hanseth et al. 1996; Henfridsson et al. 2013; Star et al. 1996; Tilson et al. 2010). Hanseth et al. (2010), in their study about the evolution of the Internet, define digital infrastructures "*as shared, open, heterogeneous and evolving socio-technical system of Information Technology (IT) capabilities.*" Tilson et al. (2010) define digital infrastructures "*as* basic *information technologies and organizational structures, along with the related services and facilities necessary for an enterprise or industry to function.*" Henfridsson et al.'s (2013) study about the Scandinavian airline industry describes digital infrastructures as "*the collection of technological and human components, networks, systems, and processes that contribute to the functioning of an information system.*"

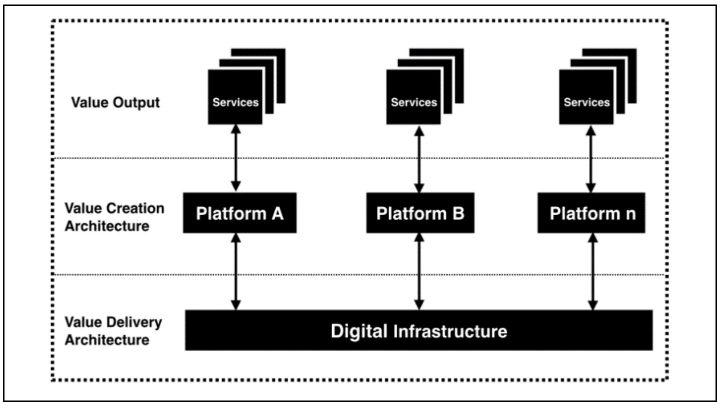


Figure 3. Value Networks

In alignment with the above-mentioned definitions, where digital infrastructures share the attributes of being basic and necessary for systems to function at the firm (e.g., digital platforms) or industry level, this dissertation defines digital infrastructures as efficient *value delivery architectures* that operate as backbones of value networks to connect and deliver value (e.g., platform services) among network participants. To illustrate, the Internet delivers digital platform services (e.g., music by Spotify) as standardized data packages to its consumer. Digital infrastructures are an important component of digital platforms (i.e., a component for the network layer [see Figure 3]); digital platforms arguably strive for unimpeded access, as digital infrastructures deliver services beyond platform boundaries in the most efficient and effective way. On the contrary, as platforms lacking access to digital infrastructures, and by that equally lacking an important component for their network layers (e.g., traditional payment infrastructures), digital platforms are compelled to forge partnerships with third parties to compensate their component shortage (e.g., banks). Alternatively, digital platforms select other access options (i.e., network layer components) that replicate digital infrastructures (e.g., blockchain systems).

The next section provides key literature and theories to contrast two different value economies: value chain and value networks. Organizations operating in value chain and value network economies have different sources and appreciations for assets, methods, and innovations that in turn provide competitive advantages. As previously illustrated, innovation and competition have symbiotic relationships (see disruptive innovation section), which either sustain established innovations (i.e., sustaining innovation) or facilitate their disruption. Thus, to understand innovation and competition principles in the digital platform context, the next section contrasts value chain and value network economies.

Competitive Advantage

In this section, I contrast how organizations in (1) value chain and (2) value network economies (Stabell et al. 1998) distinguish themselves in achieving their competitive advantages. As previously discussed (see section research gap: digital platform disruption), competitive advantage and innovation have self-reinforcing symbiotic relationships, as certain types of innovations are supportive for maintaining competitive advantages for current established innovations. Alternatively, organizations create innovations that are supportive for achieving competitive advantages by disrupting established innovations. Thus, understanding disruptive digital platforms requires understanding characteristic assets and methods that are pertinent for each value economy.

Research on firm competition has received a substantial amount of attention among scholars in their bid to explain how organizations achieve competitive advantage (Chesbrough 2003; Christensen et al. 1996; Porter 1980; Porter 1985; Schumpeter 1934; Teece et al. 1997; Wernerfelt 1984). Competitive advantage can be understood as a business condition that allows organizations to claim favorable market positions to capture business value. Having a competitive advantage is usually reflected in sustainable or superior financial performances compared to rival organizations that operate in the same business environment (Porter 1991). To achieve or revitalize competitive advantages, organizations are usually involved in continuous innovation efforts (e.g., research and development) that improve their asset base (e.g., resources, components) or methods (e.g., knowledge) to continue in creating competitive products, which allows them to charge premium prices (e.g., higher perceived quality) or produce existing products at a lower cost base (Schumpeter 1934). As organizations in value chain and value network economies have different appreciations and logics to create value (e.g., what is considered to be scarce or difficult to imitate) (Stabell et al. 1998), these characteristic value creation and innovation patterns may further assist in deriving strategy profiles that are applicable for organizations in value chain and value network economies, such as digital platforms.

Competitive Advantage in Value Chain Economies

Porter's (1985) work on value chains has evolved to a key reference in management literature. A key characteristic of organizations in value chain economies is that value is created by transforming inputs (i.e., assets and methods) into valued market outputs in a *sequential manner* (Stabell et al. 1998). Porter's (1985) value chain model embraces a company perspective that sheds light into the processes and structures of firms' understanding how resources and capabilities at different stages along the production line are leveraged to create value. Specifically, Porter (1985) delineates the value chain model into primary activities (e.g., logistic, production, marketing) and supporting activities (e.g., procurement, human resource management). The delineation has the advantage of structuring value chains in stages and costs centers. As this allows cost transparency for certain production steps, organizations can calculate a make-or-buy decision (Harrigan 1984) by comparing internal production costs with external organizations. This may result in collaboration opportunities as parts of the production line are outsourced to third parties. As more collaborations take over, organizations with prior monopolistic power over their production lines get gradually disintegrated or distributed in their value chains, thus transforming from once vertical integrated organizations to horizontal ones.

Source of Innovation: Intra-Organizational

Schumpeterian innovation theory asserts that innovation is an outcome of entrepreneurial competition that is grounded on new combinations of existing resources (Schumpeter 1934) or the leverage of ordinary capabilities (i.e., public knowledge) or dynamic capabilities (i.e., tacit knowledge) that reside in organizations to create products (Teece et al. 1997). Schumpeter's (1934, p. 66) concept of new combinations, one of the early works on firm competition and innovation, delineates innovation further into five categories: (1) a new product, (2) new method of production, (3) new market, (4) new source of supply for materials / pre-manufactured goods, and (5) the emergence of new organizations that create or abolish monopolistic market structures. The latter arguably shares the attributes of disruption.

Assets: Resource-Based View Theory

Another research stream that explains firm competition is the resource-based view (Wernerfelt 1984), which advocates a supply perspective on firm resources to explain competition-enhancing or diminishing factors. For instance, similar to the notion of market entry barriers (see page 6), Wernerfelt (1984) suggests *resource position barriers*—e.g., the privileged access to resources—which create hurdles for other firms to source the same resource under equal economic terms. Imposing strategic constraints on industry-specific key resources is a business strategy that can put rivals under economic pressure, even to the extent of endangering organizations in their existence.

Take Samsung and Apple as an example. In 2005, flash memory chips were a highly sought industry-specific key resource for electronic device manufactures. Apple secured from Samsung under favorable and exclusive terms these highly demanded flash chips for its iPod music player line. Having exclusive access to flash memory chips, Apple created bottlenecks in the flash memory market that prevented other firms from producing their devices and thus competing effectively. Moreover, smaller competitors were put out of business (Darlin 2005). Although resource access or control is an important factor for achieving competitiveness, the way resources are processed is likewise important, which can be explained through the dynamics capabilities lens.

Method: Dynamics Capabilities

Complementing the resource-based view, dynamics capabilities (1997, p. 516) is defined as "*firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. Dynamic capabilities thus reflect an organization's ability to achieve new and innovative forms of competitive advantage given path dependencies and market positions*." In this sense, dynamic capabilities can be subsumed as tacit knowledge that allows for mastery and refinement of internal resources (e.g., technology) and the streamlining of organizational and managerial processes to create valued outputs that are difficult to imitate. This in turn may translate into efficient resource exploitations to create competitive products. To illustrate dynamic capabilities, Apple has a rich set of dynamic capabilities (i.e., tacit knowledge such as process engineering) that meticulously orchestrate and combine its software and hardware units to create highly demanded products.

Business Strategies in Value Chain Economies

From a business strategy viewpoint, and similar to the theory of strategic alignment (Henderson et al. 1993), where technology assists business strategy and vice versa, the value chain model (i.e., supply perspective) connects with Porter's (1980) prior work on market or business strategies (i.e., demand perspective). If we take the *cost leadership* strategy profile (i.e., industry level) with its corresponding *focus strategy* (i.e., market segment level), the *cost leadership* strategy profile relies on efficiency to be competitive. For instance, a *cost leader* competes through standardized high-volume production methods to obtain economic scale and scope advantages. This in turn may result in cost savings along the value chain to increase profit margins while maintaining or assisting to pressure competitors by reducing the market prices. In this sense, value chains have to be designed in a way that supports the *cost leadership* strategy profile, which requires control/access to (select) resources (see resource-cased view theory) and the knowledge (see dynamics capabilities theory) to operate high-volume production lines. The remaining strategy profile *differentiation* explains organizations that compete through product differentiation or customization by serving different consumer needs that have divergent preferences compared to mainstream consumers (e.g., exclusive brand) (Porter, 1980). The value chain model has in this specific case (i.e., *differentiation strategy profile*) arguably its theoretical limitations to explain consumer preferences, as consumer preferences are driven by individualistic personal appreciations, challenging the value chain model in its explanatory power.

Competitive Advantage Value Network Economies

Value Networks

Organizations in ***value network economies*** (Stabell et al. 1998) create value primarily by establishing efficient connections and matches among their network participants (e.g., payers and payees) to mediate a network-related product or service (e.g., payment) (Eisenmann et al. 2006). The value creation activities carry the attributes of being simultaneous, parallel, dyadic, or polyadic, which are different compared to organizations operating in value chain economies that have the logic create value in a sequential manner (Stabell et al. 1998).

Within value network economies, organizations can be considered competitive when more network participants are efficiently connected with each other (Eisenmann et al. 2006; Hagiu et al. 2011). Though to establish a network in the first place, organizations leverage on network promoting technology artifacts, such as digital platforms that have the logic to orchestrate connections (Yoo et al. 2010). Accordingly, organizations that are in possession of digital platforms that generate the outmost value compared to rivals (e.g., the number and size of connections) can be deemed as having a competitive advantage (Eisenmann et al. 2006).

Source of Innovation: Open Innovation

Compared to Schumpeterian innovation, which propagates the idea that innovation emerges within organizational boundaries due to entrepreneurial activity (e.g., R&D department), open innovation theory suggests that organizations should look beyond their organizational boundaries and integrate or externalize knowledge to create competitive products and services (Chesbrough, 2003). In the digital platform context, literature describes this type of innovation practice as *coupled open innovation* (Gassmann et al. 2004). Unlike other open innovation mechanisms that are unidirectional innovation transfers—similar to the notion of value chain chains (e.g., inside-out or outside-in) (see Figure 2)—*coupled open innovation* propagates the idea that innovation activities are simultaneous and continuous, which arguably is pertinent for network-orientated organizations that create value through efficient connections (see Figure 4). In this context, organizations that provide the best tools and conditions for third parties (e.g., developers) to practice open innovation (e.g., developer tools like SDKs and APIs), as well as having a network of select innovation partners (e.g., mobile phone manufacturers), may create innovations that are perceived to be higher valued then rival ones. Conceivably, these innovations could in turn result in competitive advantages to absorb greater value.

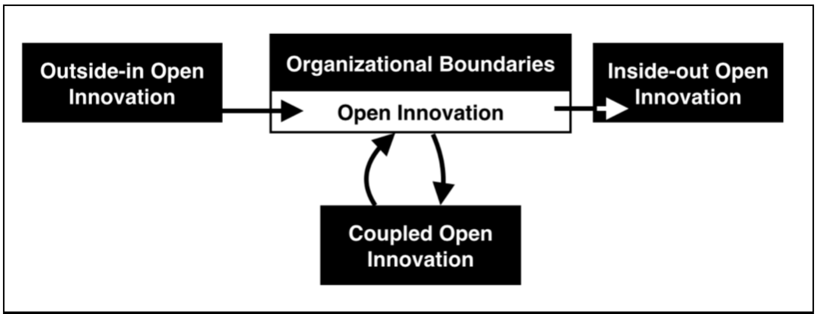


Figure 4. Open Innovation Concepts

In so doing, digital platforms typically practice open innovation through means of interfirm modularity to exchange or complement components with third parties (Staudenmayer et al. 2005; Yoo et al. 2010).

Assets: Components Access Through Interfirm Modularity

Interfirm modularity in the realm of digital platforms is defined as the development, sourcing, and distribution of components with multiple organizations to co-create a platform-related product and service (Freeman 1991; Langlois 2002; Langlois et al. 1992; Sanchez et al. 1996; Schilling 2000; Schilling et al. 2007; Staudenmayer et al. 2005; Yoo et al. 2010). Modern digital platforms achieve interfirm modularity through the means of boundary resources or interfacing technologies such as application programming interfaces (APIs) or software development kits (SDK) that have the function to provide components (e.g., libraries) to third parties to co-create modularity-based products and services (Baldwin et al. 2008; Eaton et al. 2015; Ghazawneh et al. 2013). For instance, third-party developers submit their applications to Apple's App Store, and these are basically external components that complement the iOS platform.

Compared to traditional arrangements, where partnerships for interfirm modularity are usually characterized as being idiosyncratic, difficult to establish, having high transaction costs, and relatively durable to recoup costs (e.g., automotive industry) (Gulati et al. 2000), organizations leveraging on digital platforms have the advantage of forging interorganizational relationships in a plug-and-play fashion, because (digital) components are usually highly accessible. This allows dynamic configurations by mixing and matching components from different sources and releasing them as a unified platform product or service to a value network. Take ProgrammableWeb.com as an illustrative example. ProgrammableWeb.com is a prominent API directory provider that lists various digital firms that offer industry-specific APIs (i.e., components) to third parties, ranging from ecommerce, education, health, transportation, or payment. These publicly available APIs are basically unsolicited invitations (as long as they adhere to the terms of use) to forge digital interorganizational linkages at the component level to complement digital products. This clearly differs compared to traditional interorganizational arrangements that usually exhibit high transaction costs.

Method: Modularity Configuration

As interfirm modularity provides quick access to a pool of ready-made components for value creation and innovation opportunities; the very same components, however, are also often available to rivals as well. This is especially valid for open-source components that are freely available, obstructing organizations such as digital platforms in creating strategic component constraints, which diminishes their ability to generate a competition advantage. Nevertheless, to leave competitors behind, organizations owning digital platforms may pursue a strategy of superior configurations that is less susceptible to replication (cf. Kazan et al. 2014; Pagani 2013; Woodard et al. 2013).

The notion of superior configurations is consistent with Pagani's (2013) work on the broadcasting industry. She (2013) asserts that configuration management within value networks is a valuable business capability in its own right, and Pagani (2013. p. 629) concludes: "*[as] [d]evices, software, organizational capabilities, and business processes will increasingly be restructured as […] [components] that can be quickly and seamlessly connected with other [components,] [v]alue will lie in creating [components] that can be plugged into as many different value chains as possible […] As modularization takes hold, the ability to coordinate among the [components] will become the most valuable business skill*." In this sense, mastering coordination, which is synonymous with configuration, is a powerful business capability, as it provides organizations such as digital platforms the ability to leverage on alternative means to achieve equifinal or superior products or services. In other words, strategic configuration could create superior products or replicate mainstream products (e.g., established innovation) at a lower cost structure. Clearly, this can be considered as a competitive advantage (Porter 1985), especially in value networks, where modularity is the dominant approach for interorganizational partnerships to co-create products. In this sense, digital platforms compete by designing the best platform architecture and components and release configurations that generate competitive platform derivatives (Pagani 2013; Stabell et al. 1998; Yoo et al. 2010). Considering superior configurations from the disruptive innovation theoretical angle, it shares the notion of architectural innovation (Henderson et al. 1990), where innovation in product architecture and components challenges established innovation.

Research Contribution

This dissertation theorizes that digital platforms strategically design and configure their architecture and components on different layers towards competiveness. In so doing, digital platforms likely exhibit innovation attributes that support established innovations or innovations that facilitate disruption. They have supportive conditions for facilitating disruption, as they are atypical and new compared to established innovations and become truly disruptive in the event of a new standard (the latter is not the subject of this dissertation) (Suárez et al. 1995). Considering competition and innovation conjointly, they could give insights about strategy profiles that are suitable to explaining digital platforms. As we have good understandings of how organizations in value chain economies structure their inner workings to create competitive products, and how these inner workings arguably mirror strategy profiles (e.g., value chain and cost leadership) (Porter 1980; 1895), the same concept is not fully understood for organizations in value network economies (see Table 2). As such, this dissertation presents a small but concrete step to provide a fitting response towards de Reuver et al.'s (2017) research agenda to understand disruptive digital platforms.

Table 2. Competition & Innovation Principles in Value Chain & Value Network Economies

	Value Chain Economies	Value Network Economies	Digital Platforms
Source of Innovation	**Schumpeterian Innovation** Innovation emerges within organizational boundaries.	**Open Innovation** Innovation emerges inside & outside organizational boundaries.	**Coupled Open Innovation** Innovation emerges inside & outside in a continuous & reciprocal fashion.
Assets	Resource-Based View	Strategic Linkages, Architecture & Components	Strategic Interfirm Modularity
Method	Dynamic Capabilities	Interfirm Modularity	Strategic Modularity Configurations
Business Strategy	Value Chain → Market Strategies (e.g., Cost Leadership)	Research Gap	Research Contribution

Proposing the Disruptive Digital Platform Model

Based on the notion of strategic alignment (Henderson et al. 1993) that advocates a relationship between IT systems and business strategies and vice versa, I delineate digital platform disruption as an outcome of open innovation capabilities, where the latter is grounded on (1) ***business design*** (i.e., strategic orientation of digital platforms) (Chen et al. 2010; Miles et al. 1978); (2) ***architecture design*** (i.e., architecture and component governance of digital platforms) (Henderson et al. 1990; Yoo et al. 2010); and (3) ***technology design*** (i.e., attributes of boundary resources to practice interfirm modularity) (Ghazawneh et al. 2013; Saloner 1990; West 2003). Having a strategic modularity viewpoint, this dissertation contends that the attributes of each design element and the configuration of these design elements towards open innovation allow digital platforms to acquire novel value configurations. In other words, innovations that either support established innovation or innovations that facilitate disruption (cf. Christensen et al. 1996; Kazan et al. 2013; Kazan et al. 2014a; Kazan et al. 2014b).

Accordingly, this dissertation defines ***digital platform disruption*** as *the design and configuration of digital platforms that introduce differentiating innovations into value networks, which have supportive* *conditions to facilitate disruption*. Figure 5 provides an overview of our proposed model of *digital platform disruption*.

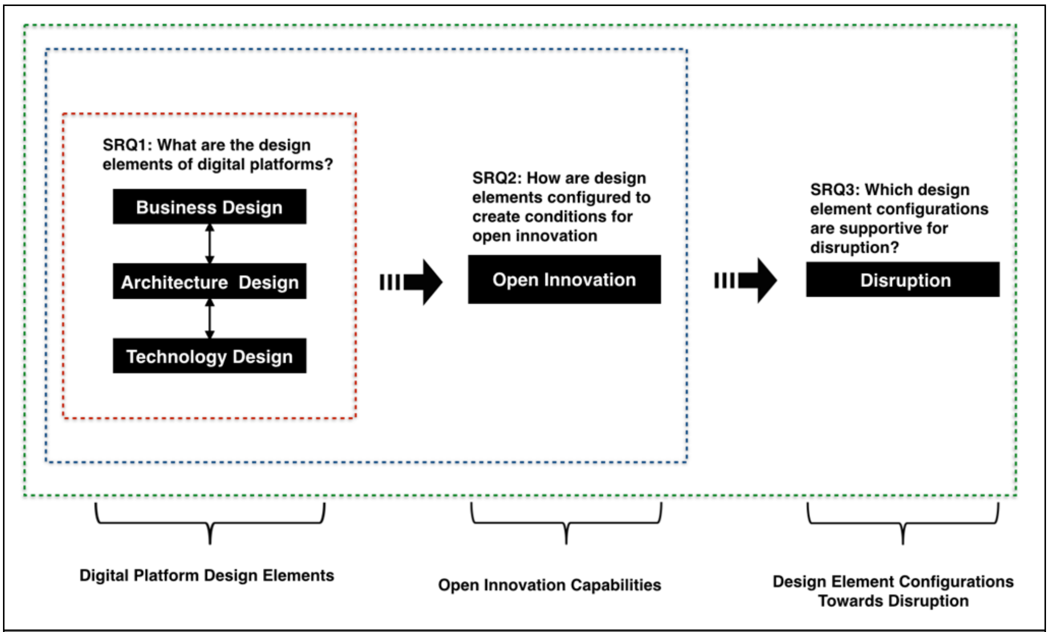


Figure 5. Digital Platform Disruption

Business Design: Strategic Orientation of Digital Platforms

Literature on business strategies suggests that organizations can be subsumed and classified into three industry-independent *strategy profiles* (Miles et al. 1978; Sabherwal et al. 2001): (1) *Defender, (2) Prospector, and (3) Analyzer.* Strategy profiles are useful theoretical lenses to classify organizations within existing business environments (e.g., competitor analysis), by categorizing characteristic attributes (e.g., competition and innovation activities) that are pertinent for certain types of strategy profiles.

The *Defender* follows an exploitative business strategy. Presenting an established organization within existing and stable business environments, the *Defender* prioritizes predictability and efficiency in its daily operations and business logic, which is usually reflected in exploiting existing technologies, assets, methods, products, and markets to optimize its cost structure in a continuous fashion. Accordingly, the *Defender* shows less flexibility regarding unproven innovations. Having its focus on exploitation, the *Defender* achieves its competiveness by creating high-quality and high-volume standard products that are targeted to serve mainstream markets. Likewise, to the *Defender*, the *Cost Leadership* profile (Porter 1980) shares similar traits, which emphasize an economy of scale and scope in its value creation logic. As its name indicates, the *Defender* presents an incumbent organization that defends the status quo by maintaining and refining existing value creation logic for an existing business environment, such as market position, and existing revenue-generating products. Considering the *Defender* through the disruptive innovation lens, it typically presents organizations that have adopted the strategy of established innovations to sustain existing products within existing mainstream markets.

The *Prospector* follows an explorative business strategy. *Prospector* organizations are usually present in the form of flexible and agile entities that seek experimentation and accept risk with new technologies or new business environments—organizations where revenue outlooks are opaque. If the *Prospector* is successful with its exploration, it grants favorable economic opportunities compared to its rivals, such as benefiting from a first mover advantage in profitable business environments, or possessing proprietary knowledge (i.e., dynamic capabilities) for innovations that promise high-growth opportunities (e.g., blockchain systems). To some extent, the *Prospector* mirrors the *Differentiator* strategy profile (Porter 1980) and seeks its advantage in serving profitable market niches with unique products (e.g., brand perception) that are higher valued by the market. As the name indicates, the *Prospector* explores new innovations that may result in new value opportunities. Thus, the *Prospector* is considered an initiator of technology and market change, if the innovations are perceived to be superior compared to established innovations (e.g., price, speed, quality). Considering the *Prospector* through the disruptive innovation lens, it typically represents organizations that follow the path of disruptive innovation, as *Prospectors* experiment and use atypical means to offer competitive products that have similar value propositions compared to established innovations.

The *Analyzer* has an ambidextrous strategy posture, which combines the best traits of the *Defender* and *Prospector* to minimize risk (i.e., *Defender*), while at the same trying to maximize new business opportunities (i.e., *Prospector)*. The *Analyzer* has the competitive advantage of having a solid foundation of core products that provide a steady and reliable revenue stream to ensure organizational survival for the long run. From this stable foundation, though, the *Analyzer* has the ability to enter carefully into new business endeavors that are alien to the *Analyzer*. As such, *Analyzers* behave like a second mover, by observing and following *Prospectors* concerning new technology adoptions or entering into new markets. In so doing, organizations with an *Analyzer* strategy profile are usually quick in catching up with *Prospectors. Analyzers* are fast second movers, because they study and avoid the initial trial costs incurred by *Prospectors*—and secondly, *Analyzers* have the advantage of having a solid economic foundation from their revenue-generating core businesses, which in turn allows them to close the gap with *Prospectors.* From a disruptive innovation theoretical perspective, the *Analyzer* is receptive towards exploration opportunities. But at the same time, the *Analyzer* does not initiate change. In this sense, the *Analyzer* is arguably a strategy profile that accelerates the adoption of disruptive innovations, but it is not the inventor of disruptive innovations.

Take Google Pay as an example. Google Pay is a highly flexible digital payment platform that empowers third parties to co-create customized payment applications. Nevertheless, Google maintains control over the Google Pay payment platform. Third-party developers who would like to integrate Google Pay into their own applications are required to register and are afterwards reviewed to see if they followed technical and legal standards, since Google has to fulfill the requirements demanded by credit card payment networks (i.e., the network layer of a digital platform), which are component providers of Google Pay's network layer, in order to have access to a global payment network. In this sense, Google Pay resembles an *Analyzer Business Design Profile* that pursues innovation by providing flexibility with third parties to increase its market reach, but at the same time it exercises control through maintaining payment network access.

From above, I infer that digital platforms similarly exhibit *strategy profiles* (Miles et al. 1978), leading to what I construe as *Business Design Profiles*. Specifically, the way digital platforms adopt or reject certain assets and methods, the way modularity is practiced between third parties (e.g., open, moderated, or proprietary), and the type of innovations permitted (i.e., established or disruptive innovation) within digital platform boundaries may assist in identifying *Business Design Profiles* that are supportive in facilitating disruption. I am not aware of past studies that specifically discuss strategic profiles for digital platforms.

Architecture Design: Modularity Governance of Digital Platforms

Research on digital platforms has studied various idiosyncrasies of proprietary or open-platform governance schemes and their outcomes, such as what kind of applications (i.e., innovations) are co-created with third parties (Boudreau 2010; Ghazawneh et al. 2013; Makadok et al. 2009; Tiwana et al. 2010a; West 2003). While these studies have indeed provided valuable theoretical contributions to the digital platform literature, most studies have adopted rather a monolithic view on digital platforms. To be specific, most digital platform studies have their unit of analysis at the service layer (e.g., how third-party applications are created and accepted) (cf. Eaton et al. 2015; Kazan et al. 2014b; Yoo et al. 2010), which arguably limits our understanding of digital platforms from a strategic modularity viewpoint. For instance, there is little discussion within the extant literature of how architecture and components (e.g., access or contribution of components to different layers) impact digital platform strategies and vice versa (i.e., *Business Design Profile*).

As previously discussed (see digital platform section), I conceive digital platforms not as monolithic IT artifacts but rather as comprising five distinct interlinked layers (see Figure 2). Depending on governance, each of these layers offers avenues for interfirm modularity or (coupled) open innovation opportunities (Kazan et al. 2014; Yoo et al. 2010). It is suggested that certain types of governance exercised on each layer (e.g., open, moderated, proprietary) shapes the overall structure of digital platforms in being either loosely (e.g., distributed) or tightly coupled across its layers (e.g., centralized) to accommodate business needs such as strategy (see Figure 6) (Ghazawneh et al. 2013; Iyer et al. 2010; Tiwana et al. 2010b).

Accordingly, on the grounds of accessibility and/or modifiability by third parties, digital platforms may exhibit different types of *Architecture Design Profiles*.

Vertically integrated platform layers indicate a *Centralized Architecture Design* profile, where a digital platform owner has basically monopolistic power over all layers and its components. In this context, it suggests that third parties are largely excluded from practicing interfirm modularity or reduced to a minimum in non-strategic areas, as digital platforms with a *Centralized Architecture Design* profile are resourceful and adequately equipped to have an isolated system. A *Hybrid Architecture Design* profile, on the other hand, suggests a digital platform, which is willing to open up certain layers towards third parties to achieve competiveness, such as addressing component shortcomings (e.g., device layer provided by Samsung in the form of a mobile phone) or having the intent to increase its overall value proposition with third parties (e.g., opening the service layer to third parties in moderated fashion). At the same time, a *Hybrid Architecture Design* profile suggests the closure of strategic relevant layers (e.g., Apple closed the systems layer for iOS systems) to ensure control and value capture points. Lastly, a *Distributed Architecture Design* profile suggests that layers are provided by various digital platform actors, where there is no clear owner in control that could exercise governance rights on other stakeholders. These types of digital platforms are arguably highly flexible, open, and free (e.g., open-source platforms like Android), where stakeholders with different component knowledge for different layers are free to join and to leave at will (see Figure 6).

As management of organizations set the direction and boundaries for governance to achieve overall long-term business goals, and thus strategies, it is contended that *Architecture Design* profiles are related to *Business Design Profiles* and vice versa. I posit that *Business Design* profiles influence *Architecture Design* profiles to fulfill a Defender's need to be exploitative with its digital platform (e.g., layers designed for efficiency), to accommodate a Prospector's need to be explorative with its digital platform (e.g., open layers designed for flexibility), and to support an Analyzer's need to be ambidextrous with its digital platform (e.g., moderated layers designed for controlled flexibility).

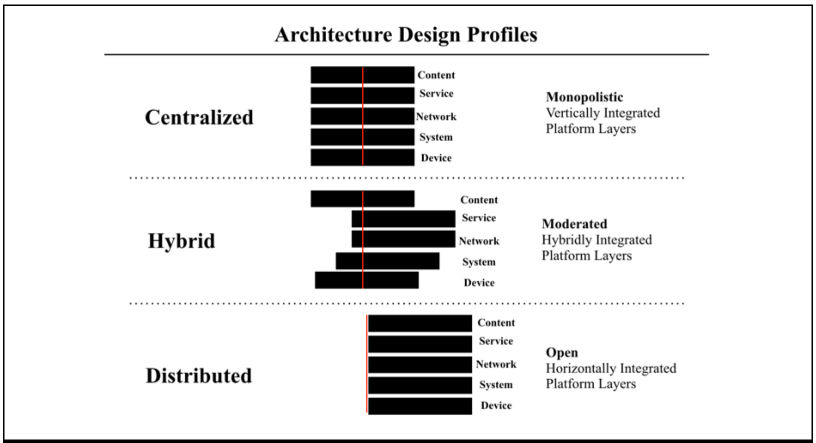


Figure 6. Architecture Design Profile

Technology Design: Strategic Boundary Resources for Interfirm Modularity

To support interfirm modularity and open innovation from a technical viewpoint, digital platforms usually provide tools to third parties in the form of boundary resources (Ghazawneh et al. 2013). Boundary resources are typically software development kits (i.e., SDKs) and application-programming interfaces (i.e., APIs), which are standardized development tools for creating or accessing components for different layers of a digital platform. Ghazawneh et al. (2013) define boundary resources as "*software tools and regulations that serve as the interface for the arm's-length relationship between the [digital] platform owner and the application developer*" (p. 175).

I argue that the attributes and features of boundary resources that enable interfirm modularity between digital platform owners and third parties (e.g., flexible, controlled, limited or the lack of it) give us insights about the degree of open innovation capabilities of digital platforms. In this sense, I posit that characteristic boundary resources (or lack thereof) result in distinct interfirm modularity profiles, which are largely (1) *Proprietary*, (2) *Compatible*, or (3) *Agnostic* in their natures—labels I use for *Technology Design* profiles.

Proprietary Technology Design

Digital platforms that do not proactively provide boundary resources are basically closed or opaque systems, excluding or not welcoming third parties to practice interfirm modularity and open innovation. The value proposition of these proprietary digital platforms rests on having the internal resources to exercise monopolistic power over their platforms, which may allow the owner to reap better profit margins by simply excluding third parties, achieving efficiency gains, or having the market power (e.g., an incumbent) to dictate a (technology) standard that fits their current business and platform logic. In other words, enforcing the status quo of their value creation. Although digital platforms with a *Proprietary Technology Design* largely exclude third parties from their systems, these types of digital platforms are still technology platforms, as they still continue to be a network promoting technology system that mediates a network-related product (e.g., payment).

Compatibility Technology Design

Digital platforms having the *Compatibility Technology Design* profile offer boundary resources to third parties that allow the practice of controlled interfirm modularity and open innovation. Boundary resources, in this context, are restricted in their functionalities, which in turn guarantees a high degree of interoperability between standardized components offered by digital platforms (i.e., internal components) and third parties (i.e., external components), while having a high degree of control over third parties. I argue that platform APIs embody compatibility attributes, as they are purposefully designed and limited to provide only specific interfirm modularity features towards third parties. In case of third party termination, a digital platform owner can simply revoke API access in the event of incompatibilities from a technical or business model viewpoint. For example, payment services (e.g., Visa, MasterCard) offer stringent payment APIs towards financial institutions, which in turn gives great control over their platforms and business models.

Agnosticism Technology Design

Digital platforms having the *Agnosticism Technology Design* profile offer boundary resources to third parties that allow the practice of *uncontrolled* interfirm modularity and open innovation (cf. Zittrain 2006). In this context, boundary resources are highly flexible and rich in their functionalities to create versatile components that cannot be anticipated by the digital platform owner. Compared to digital platforms with a *Compatibility Technology Design* profile, where components are predictable, a digital platform with an *Agnosticism Technology Design* profile suggests a higher degree of open innovation capabilities. I argue that boundary resources like SDKs adhere to the notion of agnosticism. SDKs are advanced boundary resources that consist of rich building blocks (i.e., libraries) to develop unpredictable third-party components (e.g., apps) for digital platforms (e.g., service layer). As an example, mobile operating systems (e.g., Android or iOS) offer SDKs that empower developers to develop novel components (i.e., apps), where the platform owner (i.e., Google and Apple) cannot anticipate what kind of apps are developed at the end. Accordingly, I posit that the deliberate choice of issuing of certain boundary resources may lead to distinct *Technology Design* profiles (i.e., *Proprietary*, *Compatibility & Agnosticism*).

From a design viewpoint, *Technology Design* profiles are in some ways related to *Architecture* and *Business Design Profiles* in achieving their design principles (see Table 3). For instance, to accommodate the needs of an *Analyzer Business Design* profile, which seeks flexibility and control in its business, *Analyzers* may issue similar boundary resources that support flexibility and control. In this sense, a *Compatibility Technology Design* is considered to be a suitable design element. As *Business* and *Technology Design* relate to each other, industry context shapes overall *Architecture Design* profiles (Kazan et al. 2016).

As digital platforms consist of five interlinked layers, industry context (e.g., payment industry) determines which of the five layers are considered valuable (e.g., payment data presents the content layer) and are either guarded or shared with third parties to create value. In this case, the *Analyzer Business Design* profile, may exhibit a *Hybrid Architecture Design* profile, where the most valuable layers are guarded, and other less valued layers shared with third parties co-create components (see Table 3).

Table 3. Digital platform Design Elements		
Business Design	**Architecture Design**	**Technology Design**
Defender Platform strategy profile that prefers control, exploitation, and efficiency in its operations.	**Centralized** Platform architecture profile that has monopolistic power over all layers, where third parties are largely excluded.	**Proprietary** Platforms do not proactively provide boundary resources. Thus, largely closed or opaque systems.
Prospector Platform strategy profile that accepts risk, emphasizes *exploration* and *flexibility* in its operations.	**Hybrid** Platform architecture profile that shares certain layers with third parties, while guarding the most valuable ones for control.	**Compatibility** Platforms offer boundary resources that allow controlled interfirm modularity and open innovation.
Analyzer Platform strategy profile that emphasizes control while at the same time allowing moderated flexibility in its operations.	**Distributed** Platform architecture profile that shares all layers, no clear owner that could exercise governance. Third parties are free to join & to leave at will.	**Agnosticism** Platforms offers boundary resources that allow uncontrolled interfirm modularity and open innovation.

Support for Open Innovation

Open innovation is usually achieved in three generic stages: (1) obtaining (2) integrating, and (3) exploiting external sources (West et al. 2014a; Zobel 2016). Open innovation is explored as most digital platforms practice this type of innovation with third parties to co-create modularized innovations, which either maintain or change established innovations. Accordingly, it is suggested that the proposed digital platform design elements (i.e., business, architecture, and technology), which culminate towards open innovation capabilities (see Figure 5), influence the conditions for facilitating disruption.

Obtaining

Recognition is the act of exploring, identifying, and valuing new external sources that may have positive contributions within organizational boundaries (Zobel 2016). Similar to the idea of recognition, West et al. (2014a) perceive *obtaining* external innovation through actions such as searching, sourcing, enabling, incentivizing, and contracting external sources. In the digital platform context, platform owners have the ability to source or invite external contributors (e.g., app developers) through boundary resources. A practical example for obtaining open innovation is that many large organizations like banks have recently formalized managerial processes to obtain complementary external knowledge through strategic collaborations (e.g., financial technology startups). Startups have the advantage of not being subject to organizational inertia and are thus relatively agile in adopting and executing new emerging trends in a rapid fashion (e.g., minimum viable product that satisfies the needs of early adopters). Organizational agility is highly valued by large incumbent organizations, as they are usually pressured and constrained to follow sustaining innovation paths.

Integrating

Integration is the use of tools and activities that facilitates the acceptance and implementation of external sources (e.g., components) within organizations (Zobel 2016). In the same vein of absorptive capacity, West et al. (2014a) define integration as factors that enable or hinder integrations, with the intention of amplifying existing assets or methods to create value. Though literature suggests as well that organizations with a high degree of absorptive capacity (e.g., having established research and development [R&D] departments) are also inclined to be less receptive towards external ideas, challenging the process of integration. For organizations that have not the internal resources to operate their own R&D units, substitution effects occur. In this case, studies suggest that substitution effects come to play (i.e., increased use of external sourcing) to compensate shortcomings such as having low or non-existing R&D. In the digital platform context, platforms make use of boundary resources (see technology design section) to integrate or to be integratable into external systems at the component level. In other words, the practice of modularized open innovation. To exemplify and continue with the previous example, winners of a startup competition are provided with privileged access points to their digital platforms (e.g., API access), which in turn allows a startup to offer complementary services (e.g., mobile payment) in conjunction with the platform owner (e.g., bank).

Exploitation

Exploitation is the effective utilization of assets and methods to create value. In the open innovation context, organizations exploit external sources (e.g., components) to amplify their existing strategic assets and methods (Zobel 2016). In the business model context, exploitation is referred to the commercialization of co-created value outputs. From a digital platform perspective, platform owners exploit components at different layers to complement and/or expand their platform offering, which result in value co-capture opportunities. For instance, some digital platform owners have expertise in software development (i.e., service layer in the form of apps), while lacking component knowledge in other areas such as hardware (i.e., device layer in the form of mobile phones) to offer a holistic platform-related product or service. In this line, layer or modularity complementarity offers avenues for mutual co-exploitations opportunities.

Payment Industry and Payment Platforms

Payment platforms are distinct compared to other generic digital platforms (e.g., social media platforms), since payment platforms require access to established and highly regulated national payment infrastructures (e.g., UK's Faster Payments) to transfer payments from payer to payee in a timely and secure fashion. Since access to national payment infrastructures is difficult to obtain, due to substantial technical, financial, and legal requirements, access to national payment infrastructures can be considered as a valuable asset for payment platforms, thus arguably presenting a competitive advantage. Accordingly, payment platforms are distinct compared to generic digital platforms, as the access to the Internet, which is basically an infrastructure for content delivery, is open and highly accessible, obstructing the ability to derive a competitive advantage from it.

Payment is a vital service for national economies that mediates value between payers and payees. In the last years, payment and their stakeholders are facing unprecedented changes in the form of industry transformation. Regulatory changes, new technological advancements, and the ubiquity of affordable and digital payments instruments (e.g., mobile payment) has accelerated and shaped competition in the payment industry. The main actors in this highly competitive space are payment incumbents (e.g., banks) and payment contenders (e.g., payment startups), which both aim to protect or redefine payments to their advantage. One outcome of these ongoing competitive dynamics in payment industries is that payment is increasingly transforming into a commoditized byproduct service for other lucrative financial services, which exploits payment data for other business units or lucrative products. At the center of these fierce competitions are digital payment platforms (i.e., value creation architectures). Digital payment platforms, operated by incumbents or contenders, play an important role as they serve as a mean to compete and innovate. In the same vein, promising innovations, such as the blockchain system, are an attempt to redesign the architecture and components of payment platforms, which could, if successful, disrupt the business and platform logic of incumbent ones.

For instance, new payment start-ups use blockchain systems to process and settle payments in a distributed and real-time fashion, whereas legacy payment platforms are rather centralized in their features (e.g., mainframe systems) that process and settle payments in batches, which delay settlement. The latter is particularly challenging for time-sensitive payments to secure a time-sensitive business trade or simply avoid risk such as fraud. In this context, startups with new digital payment platforms have the ability to offer a very competitive service, as they match and often exceed the value proposition offered by incumbent payment platforms. On the other hand, payment startups are challenged in growing their network on their own, as they have to rely on third parties such as payment infrastructure providers (i.e., value delivery architectures), which provide valuable access to valuable payment networks with a large user base consisting of payers and payees. As the abovementioned developments illustrate, competition in the payment industry occurs mainly in the realm of payment platforms. If we consider these platform competition dynamics from a theoretical viewpoint, competitive advantage among payment platforms is derived from superior platform design and their configurations. For this reason, platform owners strive to create unique and inimitable platform design configurals to achieve their competitiveness (Kazan et al. 2014b). Accordingly, the payment industry presents an excellent empirical context to study and uncover disruption innovation dynamics that are pertinent for digital platforms.

Research Philosophy & Research Method

Ontology

Ontology is the study of being, which investigates the nature of reality in the world we live (Crotty 1998; Guba et al. 1994). Researchers distinguish here mainly two ontological assumptions about what constitutes reality and how its existence can be studied and understood (Burrell et al. 1979; Hirschheim et al. 1989): (1) *objectivism* and (2) *subjectivism*. Objectivist researchers posit a *single reality* that consists of immutable and natural law-like mechanisms and attributes. Researchers in this worldview maintain their objective reality and reasoning by being value free in their investigations. Reality exists independently, without the involvement of the researchers (Lee et al. 2003). In this sense, researchers with an objectivistic approach have rather an observative, passive role and utilize methodological tools of enquires that do not contaminate the studied reality.

To the contrary, scholars that adhere to a subjective worldview assert that reality is subjectively, or even intersubjectively, constructed. Accordingly, different realties may co-exist while studying the same phenomenon, as researchers have their own values and interpretations of the perceived reality (Walsham 1995). Subjectivist scholars argue that the application of objectivist's methodologies to understand social realities to be inadequate. Specifically, subjectivist researchers argue that physical as well as social artifacts created by humans are fundamentally different compared to objective realities, as meaning is given through social dynamics.

Besides subjectivism, intersubjectivisim is an understanding of reality that emerges from shared experiences, where several individuals derive a common understanding in an interactive manner (Miranda et al. 2003). Intersubjective experiences can be manifested in the form of institutionalized languages, interactions, routines, norms, or methods. This creates conditions for objectifying phenomena or realities; it even originates from different subjective mindsets. As such, the collection and sharing of individual subjective worldviews creates the ground for intersubjective reality.

For instance, a business strategy is a phenomenon that resides within organizations that is shared and executed through different individuals. In this way, intersubjective realities or phenomena share the attributes of socio-instrumental and pragmatic objects (Goldkuhl 2002). Intersubjectivisim is social as it is shared among two or more individuals (e.g., entire organization) to create a common reality, and they are pragmatic objects (e.g., artifacts) as they are translated into actions. To ensure consistency in explaining realities, researchers distinguish how they derive their valid knowledge from realities, known as epistemology.

Epistemology

Epistemology concerns with the study of valid knowledge (Chua 1986; Crotty 1998; Hirschheim et al. 1989; Orlikowski et al. 1991; Walsham 1995). In this context, scholars state the question *"how we know what we know"* (Crotty 1998). As ontology deals with the observation of realities without an assessment, epistemology goes one step further by providing a *meaning* and *understanding* to the reality in the form of knowledge and especially how we obtain knowledge (Hirschheim 1985). Chua (1986) states that *"epistemological assumptions decide what is to count as acceptable truth [i.e., knowledge] by specifying the criteria and process of assessing truth claims".*

In information systems, two research philosophies for acquiring valid knowledge are largely used: positivism and interpretivism. A *positivist* researcher assumes that reality can be measured independently (i.e., objective ontology), without the influence of researchers to obtain valid knowledge. The positivist researcher uses value-free instruments to test a theory through quantifiable measures (i.e., variance theories) to increase the explanatory or predictive understanding and knowing of phenomena. While building their theories, positivist researchers formulate hypotheses or propositions that reflect the study subject, which consists of independent and depend variables and their relationships among them. Positivist researchers apply here the rule of hypothetico-deductive logic by manipulating theoretical propositions and the testability of theories. A positivist study approach has to fulfill four requirements of (1) falsifiability, (2) logical consistency, (3) relative explanatory power, and (4) survival (Lee 1991). For instance, falsifiability (dis)confirms a theory through divergent empirical contexts (e.g., offline versus online shopping), and logical consistency requires related proposition of a theory to be guided by formal logic or logically deducted from prior works. The relative explanatory power requires a theory to explain or predict the subject in a controlled setting, whereas survival aims for a theory that has attributes to survive continuous disconfirmation efforts.

On the other hand, ***interpretivism*** asserts that reality (i.e., subjective ontology) and valid knowledge are outcomes of social constructions, which include the researcher as well during the sense-making process (Orlikowski et al. 1991). Specifically, valid knowledge is generated by *"getting inside the world of those generating it, and constructing an interpretation of 'other people's constructions"* (Rosen 1991). In this regard, researchers have to immerse and contextualize themselves into their empirical environments to *understand* the (co-)created meanings. In other words, the researcher has to be knowledgeable about the language of studied individuals or organizations or understand the interpretation of the empirical data within each specific context (Orlikowski et al. 1991).

In this dissertation, I adopt the (inter)subjective and interpretive approach as I conduct primarily text interpretation based on primary and secondary data. In so doing, I apply subjective and intersubjective interpretations for deriving knowledge. Subjective interpretation is applied to derive knowledge mainly from secondary sources (e.g., payment reports), whereas intersubjective knowledge is conjointly created with my interview partners in the areas of business, strategies (i.e., business design), structure of platform architecture (i.e., architecture design), and how interfirm modularity (i.e., technology design) is practiced. For instance, during interviews I played the role of devil's advocate by putting forth an alternative interpretation about payment-related events (i.e., regulation) or features (e.g., API access rules) with my interviewee. In so doing, I and my interviewee create intersubjective meanings and interpretations for deriving knowledge.

Theoretical Building Perspective: Systems Perspective

Theory development serves as a measure of quality of any scientific work (Burton-Jones et al. 2015). Theories have the function to create logical abstractions of fuzzy phenomena, while having the attributes in providing either a description or understanding, explanation, prediction, or prescription (Gregor 2006). As researchers construct their theoretical models through inductive or deductive reasoning, theories have the following basic building blocks (Maxwell 1992): (1) concepts and (2) relationships. Maxwell (1992) states that "*any theory has two components: the concepts or categories that the theory employs, and the relationships that are thought to exist among these theoretical validity: the validity of the concepts themselves as they are applied to the phenomena, and the validity of the postulated relationships among the concepts.*"

In this regard, theories differ in how they are assembled to provide knowledge. In information systems studies, variance (quantitative studies) and process (qualitative studies) are prevalent theory-building methods (Burton-Jones et al. 2015). The properties of variance theories exhibit varying values (e.g., independent variables) to explain a research phenomenon (e.g., dependent variables) from a snapshot perspective at a given time. Changing the values of variance theories has immediate influence on the properties and relationships of the theory. To the contrary, the properties of process theories are event driven and sequentially constructed and influenced by focal actors (e.g., organizations) to achieve a specific outcome (e.g., IT adoption over time). The sequences or events have here the attributes in being probabilistic, which may generate multiple outcomes of the same phenomenon.

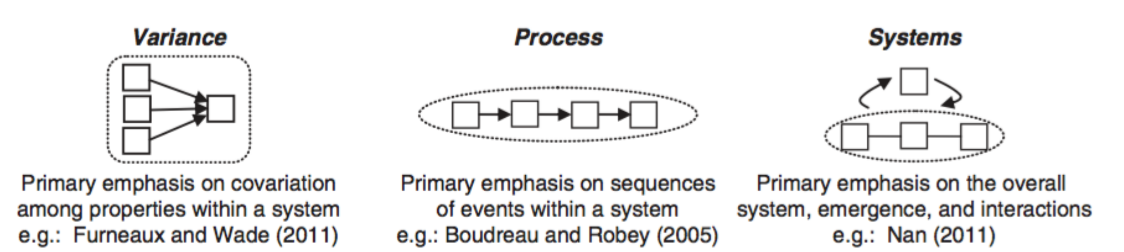


Figure 7. Variance, Process, and System Perspectives (Burton-Jones et al. 2015)

However, variance and process theories may have their limitations. For instance, configuration studies (El Sawy et al. 2010) assert a holistic view on studying systems as phenomena. Variance and process theories, though, are considered to be incomplete perspectives, as systems consist as holistic and interacting parts and not just varying values or events.

To overcome the shortcomings of variance and process theories, the *systems theory perspective* presents a third theory-building perspective (Burton-Jones et al. 2015). The system's perspective propagates the idea that certain phenomena with interconnected and recurring attributes have to be studied from holistic viewpoints and thus require their own appropriate theoretical perspective (see Figure 7). Systems theories suggest a perspective where components and relationships are emerging, interrelated, and reciprocal, which in turn results in new entities with their own properties and boundaries. In so doing, the systems perceptive exhibits a continuum from, e.g., hard, mechanistic, and closed to soft, organic, or open. This dissertation adopts the system perspective, as the proposed *Digital Platform Disruption Model* considers digital platforms as holistic, interconnected, and interactive IT artifacts. For instance, the three proposed digital platform design elements (i.e., *Business, Architecture & Technology Design*) are interrelated digital platform design elements that occur simultaneously with varying attributes (e.g., proprietary and open), which again culminates in characteristic open innovation capabilities (e.g., a continuum between high and low).

Research Method: Case Study

The method of enquiry for this dissertation is an interpretative multiple case study to uncover disruptive potential mechanisms and design elements among digital platforms (Walsham 1995; Yin 2009). In so doing, my study embraces an exploratory (Theory I) and prescriptive approach (Theory V) (Gregor 2006) by synthesizing key concepts from strategic management, digital platform, and innovation management literature to conceptualize an analytical lens for identifying (1) the constituent strategic design elements of digital platforms, and (2) configurations that create favorable conditions for open innovation capabilities. It is contended that the interplay between the three design elements and their configurations towards open innovation capabilities may create conditions for (3) facilitating disruption. If successful, it is basically a potential candidate for a new standard or dominant design.

Specifically, I argue that disruptive digital platforms are based on strategic design element configurations (i.e., *Business Design*, *Architecture Design* and *Technology Design*). The interplay among the three design elements may create new differentiating value creation logics within value networks such as in payments industries that are atypical to established innovations offered by incumbents (banks). I deem the case study approach to be a suitable method of enquiry for my dissertation as it can answer "how" and "why" questions in complex, nebulous, and contemporary research environments, where the study object cannot be manipulated in its real-word context (Dubé et al. 2003; Yin 2009). As this dissertation attempts to provide an understanding of *how* digital platform owners can design their systems towards supportive conditions that facilitate disruption (or why not), the case study approach is considered to be appropriate for untangling the intertwining relationships among the three design elements and its configurations towards open innovation capabilities. I posit that digital platforms that design towards open innovation capabilities diverge compared to traditional organizations and their established innovations, which may result in supportive conditions that facilitate disruption.

Data Collection: Semi-Structured Interviews & Secondary Resources

The empirical basis for this dissertation is two sources: primary (semi-structured interviews) and secondary data (archival records) (see Table 4). In regards to semi-structured interviews, the interview questions have been derived from my proposed digital platform disruption model to understand events and decisions on how and why digital payment platform owners design and configure platforms from a strategic, architectural, and interfacing point of view. I paid close attention to how digital platforms create and deliver their digital services through different payment infrastructures and how access to third parties is granted. Semi-structured interviews have the advantage of allowing the interviewer to capture additional insights (e.g., publicly inaccessible data) that may enrich the study further. Specifically, I was interested in gleaning insights about constituent design elements of digital platforms that create conditions for open innovation. Semi-structured interviews have been conducted largely in the Danish and British payment industry. Cross-country comparisons will allow me to derive country-specific as well as generic patterns in how digital payment platform owners design their platforms. In terms of interview partners, I first contacted knowledgeable industry experts within payment organizations, consultancies, and associations based on their job titles and job descriptions. The interviews with industry experts bring the benefit of gleaning insights about the structure of payment landscapes, and the underlying and influencing market forces, as well as identifying key actors that enable payment services in the first places (e.g., payment infrastructure providers). Subsequently, I contacted leading payment providers within Denmark and the UK. Within these organizations, I solicited interview partners (e.g., senior management) who are knowledgeable with regards to platform architecture, business partners, and strategies. Payment entrants or challengers exhibit the attributes of growth and agility while leveraging on new and affordable technologies that replicate the services of incumbent organizations. To complement my primary data collection efforts, I distilled payment reports, white papers, press releases, and archival records from industry associations (e.g., the European and UK Payments Council), payment industry online news outlets (e.g., Finextra), and news aggregators (i.e., the Paypers, Techmeme), actors, and identifying commercially active mobile payment services. Blog aggregators have the advantage of serving as a filter, as they tend to highlight influential articles (Davidson & Vaast, 2009; Eaton, Elaluf-Calderwood, Sørensen, & Yoo, 2015).

More importantly, I reconstructed national payment industries with their respective actors to understand the current state of how digital payments are mediated. The reconstruction provides me with initial insights about the logic of existing payment industries and their actors, arguably many of them currently presenting sustaining innovation efforts by current incumbent organizations. My interview strategy was to understand how digital payment platform works in practice (i.e., reconstructing narratively and visually payment transactions) and who are the external partners that are vital in providing the required resources and capabilities that ultimately enable payment services. Specially, I was interested to glean insights about how market competition takes place on the value creation and value delivery architecture. Semi-structured interviews were recorded and transcribed subsequently for coding purposes.

Table 4. Primary Data Sources

Data Points Type (In total 27)	**Description**
Industry Experts ***(In total 3)***	***United Kingdom***: • *Berenberg Bank* [Investment Bank]—VP Equity Analyst on Financial Technology (61 min), • *Consult Hyperion* [Consulting Firm]—Payment Consultant (48 min), • *IBM* [IT & Software provider]—Executive Architect for Banking Industry Innovation (72 min).
Payment Service Providers ***(In total 13)***	***United Kingdom***: • *Paym* [National Mobile Payment Service]—Head of Development (65 min), • *Barclays' Pingit* [National Mobile Payment Service]—SVP of Mobile Solutions (66 min) • *Zapp* [National Mobile Payment Service]—CEO (44 min), • *Droplet* [Mobile payment Start-Up]—CTO (68 min), • *FirstRemit* [Remittance Start-up]—CEO (113 min), • *HSBC* [British Multinational Bank]—Global Head of Digital Payments (85 min), • *Google Wallet* [Mobile Wallet Service]—Head of Payments (41 min), • *American Express* [Credit Card Firm]—Mobile Product Innovation & Strategy (113 min), • *Santander*: [Multinational Bank]—Innovation Analyst (210 min). ***Denmark***: • *AltaPay* [Payment Gateway]—CTO (80 min), • *Beeptify* [Payment Start-Up]—CFO (56 min), • *Mobile Pay* [National Mobile Payment Solution]—Head of Mobile Payment (88

	min), • *Saxo Payments* [Global Payment Provider]—CEO (74 min).
Payment Infrastructure providers ***(In total 7)***	***United Kingdom***: • *Currency Cloud* [Payment provider]—Forex Business Solutions (86 min), • *Payments Council* [Payment Industry Body]—Head of Innovation (64 min), • *Vocalink* [National Payment Infrastructure Provider]—Strategy Lead (125 min), • *WorldPay* [Merchant Acquirer]—Director Technology Innovation (45 min). ***Denmark***: • *Danish National Bank* [Central Bank]—Head of Payments (76 min), • *NETS* [National Payment Infrastructure Provider]—Head of Corporate Strategy (84 min).
Cryptocurrency Providers ***(In total 4)***	***United Kingdom***: • *CryptoPay* [Bitcoin Payment Processor]—CEO (112 min), • *CEX.io* [Bitcoin Exchange]—CEO (45 min), • *Blockchain.info* [Bitcoin Wallet & Analytics Provider]—CEO (82 min). ***Denmark***: • *Sirious Money* [Bitcoin ATM Provider]—CEO (88 min).

Data Analysis: Theoretical Thematic Analysis

Thematic analysis has been applied in this article based dissertation (Boyatzis 1998; Braun et al. 2006). Specifically, I applied theoretical thematic analysis (Braun et al. 2006). Compared to inductive thematic analysis, where the analysis process is data driven (i.e., bottom up approach), the theoretical thematic analysis process has a deductive approach (i.e., top-down approach), which is guided by concepts or theory. To begin with, the interviews of the studied case companies have been transcribed and imported to Nvivo 10, a qualitative analysis software program that allows one to collect and categorize data in a structured way. Coding categories and themes were predetermined by the proposed digital platform disruption model. In this sense, my proposed model served as a theoretical guide during the analysis process (see Table 5).

Table 5. Coding Examples from Data Analysis

	Exemplary Quote	Synthesis
Business Design	*"[...] I can't remember the number, and we have about 14 million consumers that we provide current account services and the likes to and we have an additional six million on top of that that we probably provide credit card services to. So it's a fairly significant organization here in the UK.* ***For us, innovation is a major element of our strategy."***	***Analyzer Business Design Profile:*** Platform strategy profile that emphasizes control as a market incumbent, while at the same time allowing moderated flexibility in its operations.
Architecture Design	*"So* ***the consumer side****,* ***we provide the app*** *that runs on the different* ***smartphone platforms or tablets."*** *"In terms of the support that we provide for Pingit for consumers, we're running on certainly* ***iOS, on Android, on Blackberry or—and Microsoft*** *now as well."*	***Hybrid Architecture Design Profile:*** Platform architecture profile that shares certain layers with third parties, while guarding the most valuable ones for control.

Technology Design	*[…]* ***it will be a lot of rigor around analyzing what those API's and what information they have access to*** *[…]* *[…] It has to be, of course, then commercially relevant to be disclosing any API's to that party… […]*	***Compatibility Technology Design Profile:*** Platforms offer boundary resources that allow ***controlled interfirm modularity*** and open innovation.

Findings on Strategic Digital Platform Design Elements

To date, this article-based dissertation is based on nine published papers to build the digital platform disruption model (see Figure 8).

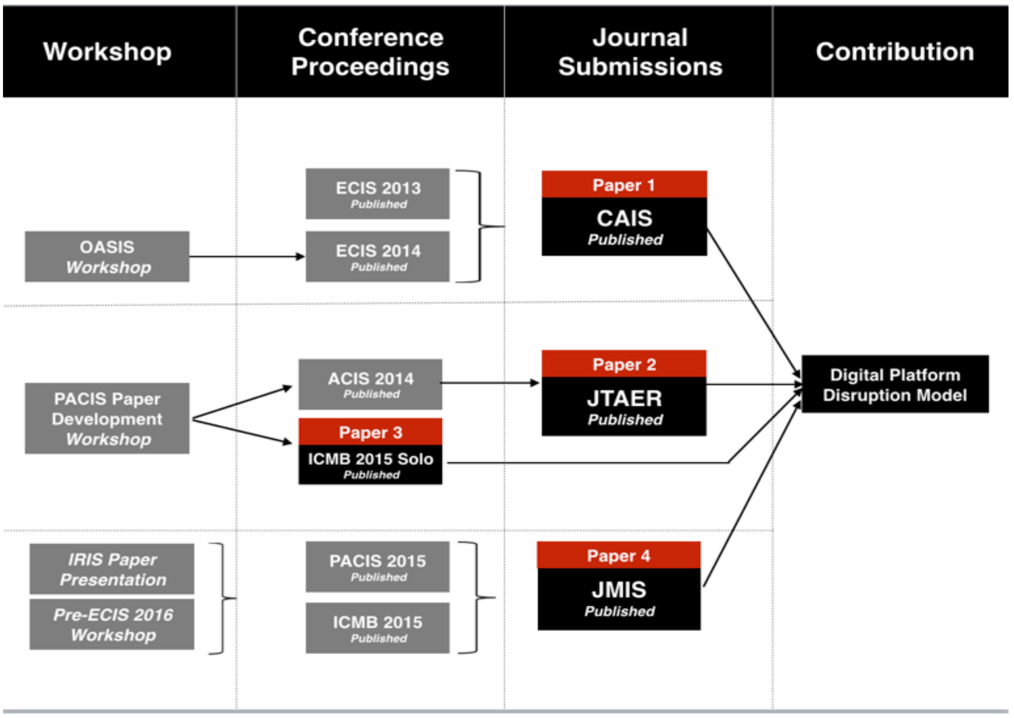


Figure 8. Publications

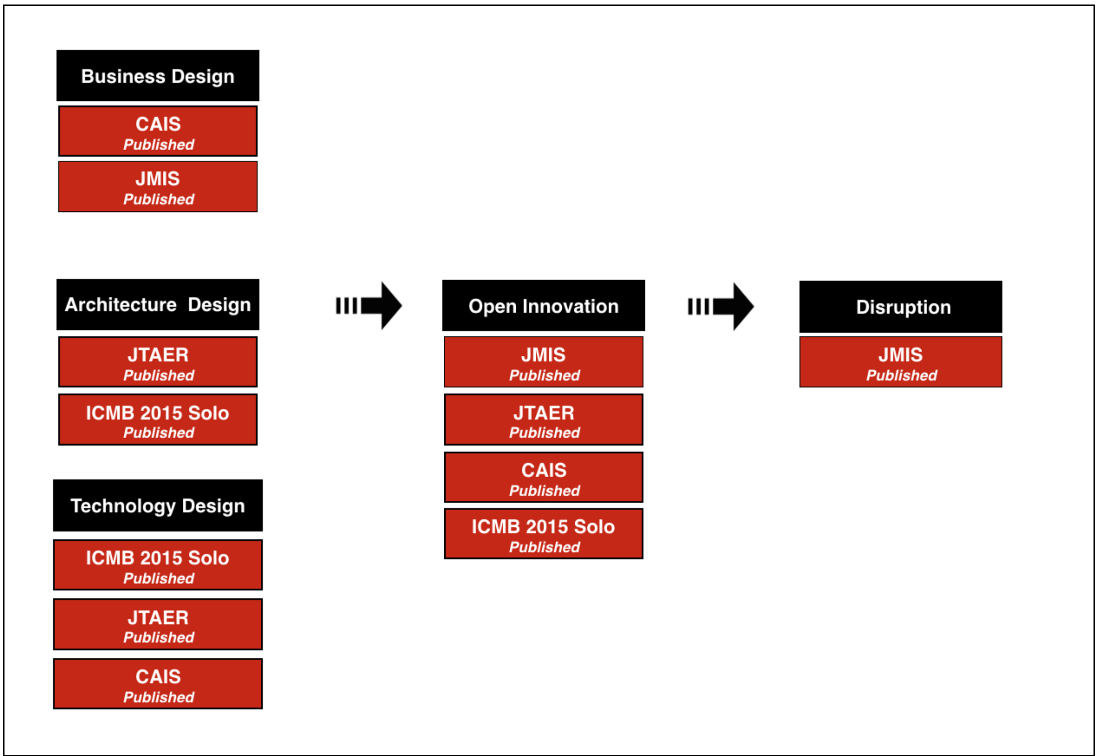


Figure 9. Publication and Model

Figure 9 illustrates the relevance of each paper for each design element. The studied digital platform cases exhibit characteristic interrelated platform design elements (1) *Business Design*, (2) *Architecture Design*, and (3) *Technology Design*. Based on observable long-term management decisions, digital platforms provide insights about their strategic postures (i.e., *Business Design*), the way platform layers are outsourced or protected (i.e., *Architecture Design*), and how interfirm modularity is established (i.e., *Technology Design*). Figure 9 illustrates my nine publications, which culminate into:

First Study: CAIS

In this study, we performed a multiple and comparative-case study among eight mobile payment platforms (i.e., banks, retailers, mobile network operators, and startups), which either protect or enter the payment market. Market entry is a strategic and costly long-term decision, reflecting management's attitude towards risk taking, where entries to platform markets are particularly challenging to enter (Eisenmann et al. 2011). Accordingly, market entry is a suitable event to analyze the strategic posture (i.e., Business Design) of digital platforms.

The findings suggest that platform owners exhibit two types of market entry modes; first, an aggressive market entry mode that attempts to challenge the existing business and technology logic in payments (e.g., mobile network operators and startups), thus presenting innovation attempts that aim to replace established innovations. Secondly, a conservative market entry that introduces gradual improvements into payments, which leverages on existing technologies in an evolutionary way (i.e., retailers), thus having the properties of causing less friction, as the switching costs are lower compared to new incompatible new payment instruments.

For instance, mobile network operators (i.e., MNO) launched proprietary mobile payment services that were advanced in their technical features (proprietary mobile phones with), which could host selective/permissioned contactless services, after third parties entered into formal contractual agreements. In this setup, MNOs did not publicly disclose access points, which suggest opaque conditions for practicing interfirm modularity with third parties. Startups, on the other hand, offered documented and moderated access points and tools towards third parties. MNOs and startups followed a risky market entry strategy into the mobile payment market, as their mobile payment instruments were largely incompatible with the existing payment card-based infrastructure (e.g., payment terminals). Moreover, it presents an effort to disintermeditate the payment instruments offered by incumbents (e.g., plastic payment card). MNOs, however, faced resistance, as most businesses were not willing to replace existing payment terminals just to offer contactless payments. Secondly, payment incumbents like banks were not keen to have a new additional intermediary between payer and payees, which would weaken payment data collection efforts and the sustainability of customer relationships. To the contrary, mobile payment solutions offered by retailers were causing less friction from a technology viewpoint, especially on the merchant side. Retailers leveraged on existing payment terminals (i.e., payee) and mobile phones (i.e., payers) for conducting payments, which were simply updated with new software to display or read barcodes. In so doing, retailers were more careful and considerate in their service roll-out. Banks, on the other hand, were favoring contactless cards that were meant to continue to sustain the existing business logic and technology standard for doing payments (e.g., plastic payment cards, ATMS).

<u>*Business Design Findings*</u>

If I synthesize the aforementioned observations from a *Business Design* viewpoint, I identify the traits of ***Defender Prospector,*** and ***Analyzer***. MNOs and startups exhibit the attributes of the ***Prospector Business Design*** profile by pursuing a risky and aggressive market entry strategy that attempted to replace the existing business and technology logic of payment incumbents. Startups and MNOs, both fairly novices in payments, accept high risk by deliberately reconfiguring predominant payment value streams to their advantage. They do this by forcefully creating new user relationships by equipping payers and payees with new payments instruments. The retailers, on the other hand, showcase the attributes of an ***Analyzer Business Design*** profile by carefully entering the payment market with fewer frictions for the existing payment infrastructure. Lastly, banks as the incumbents of payments typically portray the ***Defender Business Design*** by protecting their market against new entrants. Market protection occurred in the form of sustaining innovation (Christensen et al. 1996) by issuing payment instruments that sustains their existing payment logic. In this context, payment cards were gradually improved with contactless payment features that promise a faster checkout times.

<u>*Architecture Design Findings*</u>

From an *Architecture Design* viewpoint, mobile payment solution showcased either a ***Centralized*** or ***Hybrid Architecture Design*** profile. Looking at the bank's *Architecture Design* profile (i.e., *Defender),* all layers are proprietary, which allows the *Defender* to exercise monopolistic power over its digital platform in how payments are processed and delivered. In this sense, a *Centralized Architecture Design* profile assists the *Defender* in achieving its *Business Design* attributes (e.g., exploitation, efficiency, high volume) in doing one task very well: payments. Looking at MNOs, retailers, and startups, they exhibit a *Hybrid Architecture Design* profile. The service layers are shared by all three actors, while the device and content layers were largely proprietary. At the time of writing, the device layer among MNOs and startups was especially proprietary as they issued their own new payment instruments that offered a better proposed value proposition (e.g., mobile and contactless), whereas the retailers were more practical by using standard retail payment terminals, hence primarily controlling the service and content layers to offer their mobile payment services.

<u>*Technology Design Findings*</u>

From a *Technology Design* viewpoint, the banks (i.e., *Defender*) and MNOs (i.e., *Prospector*) present a ***Proprietary Technology Design*** profile, which treats interfirm modularity with third parties closed or opaque fashion, as they are not disclosed to the public. In this sense, increasing barriers and transaction costs for exchange components or open innovation. The retailers and startups, on the other hand, exhibit a ***Compatibility Technology Design*** profile, which invites third parties to use their service layers by offering APIs or publicly available documentation to integrate their payment services into third-party systems. As third parties access these services, they are, however, limited in their functionalities and use cases to fulfill legal and technical requirements, as the payment industry is highly regulated.

Second Study: JTAER

In the JTAER study, we contrasted two mobile payment platforms (i.e., Pingit and Paym) (see Table 6). Both platforms are market leaders in terms of brand recognition, user base, and the stakeholders behind these services. Pingit, which is operated by UK's largest bank, Barclays, is to a large degree an internally developed service (i.e., user experience and software development) to extend Barclays' portfolio and to preemptively occupy the growing mobile payment market segment to maintain and establish new user relationships. Barclays was considerably successful with Pingit's rollout, and its (bank) competitors were pressured into launching a rival solution (i.e., Paym) to avoid future relationship disintermediation. Paym is a collaborative industry solution, where multiple financial institutions and technology providers conjointly developed the service. Compared to Pingit, Paym is arguably less agile regarding strategic decisions such as innovation rollouts, as several stakeholders need to agree and to be considered with their idiosyncratic needs.

The findings indicate that Pingit achieves its competitive advantage by creating monopolistic structures in its platform architecture by developing and controlling the most important platform layers to its advantage to ensure optimal value creation opportunities (i.e., content, network layer and service layer). With its highly integrated and superior mobile payment service, which works as a standalone application, Pingit has the ability to attract and choose a network of select third parties (i.e., proprietary API access), which helps to grow Pingit further. The industry consortium solution (i.e., Paym), on the other hand, is less advanced at the time of writing. Because of being a more fragmented service (Paym is a payment feature in mobile banking apps, not a standalone application), each financial institution had its own strategy and responsibility in how Paym was offered towards end users. This ultimately undermines the ability to offer a unified mobile payment service, such as obstructing to deliver a standardized user experience or impeding to offer APIs across all financial institutions. In other words, Paym does not have its own standalone application.

Business Design Findings

If we consider both digital platforms from a *Business Design* theoretical perspective, both platforms portray an ***Analyzer Business Design*** profile. Pingit and Paym are carefully launched payment innovations (i.e., mobile payment), which complement the core businesses (i.e., banking) and products (i.e., payment in general) of their respective owners. Banks, in this context, have carefully studied the startups, as they have managed to identify and create a new sustainable market (segment) within the payment industry. Accordingly, as the *Analyzer Business Design* profile prescribed, they acted as (fast) second movers in the mobile payment market.

Architecture Design Findings

In this study, I observe ***Hybrid Architecture Design*** profiles. Both mobile payment platforms leverage on consumer devices (i.e., device and system layers) to offer their payment services, as they cannot not exercise control mobile phone vendors (e.g., Apple)—in this sense, treating the device and system layers as commodity or distribution channels to achieve ubiquity for their mobile payment services. In regards to the remaining layers (i.e., network, service, and content), both mobile payment services have indeed monopolistic power with varying degrees. For instance, the network layer is owned and shared among payment incumbents (i.e., banks), whereas the service layer is not available for third parties (i.e., Paym) or opaque (i.e., Pingit), where few selective third parties are granted with non-publically available APIs.

Technology Design Findings

Both mobile payment platforms have a ***Proprietary Technology Design*** profile. Third parties engaging in interfirm modularity is not possible, as observed with Paym, which does not offer any boundary resources (e.g., APIs) to exchange components at the service layer. Alternatively, boundary resources exist, but they are not disclosed to the public (i.e., Pingit), as access is granted through selective invitations to suitable third parties. In the latter case, it arguably reduces proactiveness among third parties, as they cannot assess the infirm modularity conditions due to intransparency.

Table 6. Comparative Cross-Platform Analysis (JTAER)

	Paym	Pingit	Competitive Principles within Layers
Content Layer *(Value Layer)*	***Protected*** Paym adopts a guarded content layer approach by preserving existing data collection rights for each financial institution within heterogeneous mobile banking applications	***Protected & Absorptive*** Pingit, like Paym, adopts a guarded content strategy that does not share the payment data of Pingit users with third parties. The Pingit app, though, is inclusive, serving non-Barclays customers as well and creating data-collection opportunities.	***Guarded vs. Infiltrative*** Both mobile payment platforms showcase protective behavior on their content layer as payment data serves as a valuable industry resource to create value. By releasing a dedicated mobile payment application, Pingit performs a Trojan horse strategy that collects customer and payment data from rival institutions.
Service Layer *(Value Layer)*	***Federated and Isolative*** Paym is a federated mobile payment platform that attempts to augment the individual resources of various financial institutions. In so doing, it preserves existing market structures and payment by being a mobile payment feature within existing mobile banking applications.	***Monopolistic and Breaching*** Like Paym, Pingit has a protective service layer approach, moderating and shielding its platform from third parties. Access is granted if these services enhance the value proposition of Pingit. Lastly, Barclays uses the Pingit app as a mean enter in to the territory of rivals to build customer relationships with non-Barclays customers.	***Orchestration vs. Germination*** Paym has on its service layer the strategy to offer a competitive industry consortium driven mobile payment application that solidifies existing market structures and data sovereignties. Barclays has the strategy nurture its own Pingit ecosystem but leverages on Pingit as a Trojan horse to challenge rivals on their content layer.
Network Layer *(Commodity Layer)*	***Inclusive*** Both mobile payment platforms have non-discriminatory access to the Faster Payment or Link payment network to clear mobile payments. Thus, not presenting a competitive advantage between these two mobile services.		***Accessibility*** Network layer for both payment services shares the traits of a commodity layer due to the inability to create access constrains.
System Layer *(Commodity Layer)*	***Availability*** Both mobile payment platforms leverage on widely available and standardized mobile operating systems. Competiveness may occur by developing the mobile payment application that makes the best use of the system resources to ensure best application experience.		***Interoperability*** System layer shares the attributes of a commodity layer, as the control and governance are not the realm of financial institutions but rather controlled by the smartphone vendor.
Device Layer *(Commodity Layer)*	***Affordability*** Both mobile payment platforms leverage on standardized smartphones in delivering their mobile payment services to end customers.		***Ubiquity*** Device layer has the attributes of a commodity layer, as the mobile phone as a new payment instrument is now owned by end user and designed by the smartphone vendor.
Competitive Principle across Platform Layers	***Value Layers: Content and Service*** Both mobile payment platforms treat the content and service layer as value layers, as they serve as industry specific resource to create and capture value.		

	Commodity Layers: Network, System and Device. Contrary to the content and service layers, the remaining layers serve merely as a means to deliver the mobile payment service to the market.

Third Study: ICMB

In this study, I compared two mobile payment services: Apple Pay and Google Wallet (now Google Pay). The paper has the research goal to contrast two different mobile payment platforms in regards to their open innovation capabilities. Specifically, the aim is to understand third-party integrations into digital platforms as well as the generic principles of how innovations (e.g. applications) are commercialized.

Apple Pay and Google Wallet are distinct mobile payment platforms, as their corresponding owners (i.e., Apple and Google) have different technology philosophies on how value is created. Apple is known for its proprietary nature and exercises control over its highly integrated systems such as Apple Pay. In this sense, Apple exercises its house rules in being selective towards third-party developers in these third parties interact with Apple's products and services. Google, on the other hand, is known for its open approach (Android is open-source), which gives more leeway to third parties in how third-party developers make use of Google products and services to expand its service research (e.g., Google search). The findings suggest that the studied mobile payment services make use of strategic boundary resources to become either highly (1) integrative or (2) integratable. Integrative platforms like Apple Pay propagate the idea of channeling and anchoring (open) innovation (e.g., third-party apps) into Apple's ecosystem to enhance its products and services with selective third parties. In this scenario, Apple absorbs selective innovations from its business network and has the strategy of enforcing a selective commercialization. Integratable platforms like Google Wallet, on the other hand, have the strategy to distribute their digital platform—in this case, the service layer—into as many third-party systems as possible. Accordingly, Google Wallet practices inclusive innovations with its business network and has a strategy of indiscriminate commercialization with its third parties (see Table 7).

Table 7. Findings from Solo Article Published in ICMB Proceedings

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

Business Design Findings

On the first glance, Apple and Google, known for having different technology strategies (i.e., closed and proprietary) would suggest similar *Business Design* profiles for their mobile payment platforms as well. But surprisingly, Apple Pay and Google Wallet exhibit the same *Business Design* profile: an ***Analyzer Business Design*** profile. Both services complement core products (e.g., iPhone) or services (e.g., Google search) of their respective owners. Nevertheless, the payment context sets boundaries for both services as to how flexible and explorative they can offer their payment services, which obstructs to achieve a *Prospector Business* Design profile. Specifically, payment is largely controlled by credit card networks (i.e., MasterCard, Visa), which have stringent rules how their services and networks are used. Clearly limiting mobile payment services like Apple Pay and Google Wallet in being flexible and explorative, as the *Prospector Business* Design profile prescribes.

Architecture Design Findings

Both mobile payment platforms exhibit ***Hybrid Architecture Desig*n** profiles with varying degrees, where Apple Pay, however, tends towards having a *Centralized Architecture Desig*n profile. If we consider Apple Pay layers, the service layer is the only avenue that is shared with third parties in a highly controlled fashion (see *Technology Design* findings section), whereas the remaining layers are entirely controlled by its owner Apple. To the contrary, Google Wallet limits its control over its service and content layers, whereas the remaining layers are either owned by third-party mobile vendors (i.e., device layer), open-source (e.g., system layer), or controlled by credit card firms (i.e., network layer).

Technology Design Findings

Both mobile payment services exhibit the ***Compatibility Technology Design*** profile. Apple Pay and Google Wallet issue APIs and SDKs for third parties to integrate payment functionalities into their own applications. A *Compatibility Technology Design* profile is suggested, because both mobile payment services restrict third parties in how their services are used to fulfill legal or technical requirements demanded by credit card networks. In this case, limiting the conditions to achieve an *Agnosticism Technology Design* profile, which prescribes that third parties can create unpredictable or uncontrolled applications, which, however, contradicts with credit card networks' use requirements.

Fourth Study: JMIS

In this fourth and last study, the study JMIS working paper contrasts six traditional and new payment providers in regards to their architectural setup and discusses how platform architecture results in competitive advantages. Although all studied services offer similar services, which is the secure movement of value (i.e., payment), the findings reveal that the six cases differ significantly in how they create and deliver payments, which provide cues about their competitiveness. To be specific, new payment services exploit differentiating configurations that are atypical to established payment services; however, they have similar value propositions as to established ones. Changing the interworking of services shares the notion of architectural innovation (Henderson et al. 1990). As previously discussed in the theory section, architectural innovation maintains product and service value propositions (e.g., payment) while it alters their blueprint and composition, which may in turn dilute the knowledge base of established organizations. Put it differently, the same value output based on a different configuration base, which echoes with the findings of Pagani (2013), stating that "*the ability to coordinate among the modules will become the most valuable business skill*" to achieve competitive advantages.

In the payment context, digital payment platforms would practice process innovation to deliver payments in a cost-effective manner. At the end, these differentiating value configurations broadly adopted may create conditions to disrupt predominant creation and capture logics. In regards to the theoretical footing, the JMIS study combined strategic groups (Hunt 1972; Porter 1980) and layered modular architecture (Yoo et al. 2010) theories to identify and classify payment platform in the UK payment market. In general, strategic groups can be perceived as a collection of firms that compete with one another within the same market environment while exhibiting similar strategies and possessing comparable industry-specific resources (e.g., architecture/technology design attributes, configurations), which is useful for firm classification purposes. For this study, we selected six different mobile payment platforms in the UK market. In so doing, the study derives six characteristic profiles that are grounded on two strategic dimensions of (1) digital platforms (i.e., focus on the service layer) and (2) digital infrastructures (i.e., focus on the network layer). Digital platforms are innovation hubs, where value (i.e., payments) is created, and the latter relies on digital infrastructures to deliver value to their respective platform stakeholders. Similar to my ICMB study, the study discovered that mobile payment platforms can be described as (1) integrative, or integratable digital platforms, and (2) having direct, indirect, or open access to digital infrastructures to deliver their payment services (see Figure 9). Integrative digital platforms have the tendency to be single entities that have the assets and methods to exercise monopolistic power over their services and can decide whether or not access to third parties is disclosed (opaque or documented), whereas integratable digital platforms in this study achieve competitiveness by inviting similar partners (e.g., banks) to compensate shortcomings. Based on these attributes, we identified three generic competitive platform strategies: (1) germination, (2) orchestration, or a (3) transformation strategy. The germination strategy by a mobile payment platform aims to grow isolated and private networks by capturing value without third parties. In this sense, possessing the assets and methods to operate a self-sufficient service with no third parties, which in turn promises higher value capture possibilities. Orchestration strategy relies on third parties (e.g., joint venture) at the platform level to orchestrate a unified mobile payment service based on different platform stakeholders. Lastly, mobile payment platforms with a transformation strategy practice process innovation to deliver payment or value through open digital infrastructures (i.e., Bitcoin blockchain). Mobile payment platforms with open access achieve their competitiveness by leveraging on new and emerging digital infrastructures that imitate direct access rights—but in a permissionless manner. In this study, the Bitcoin blockchain vies with legacy digital infrastructures (i.e., Faster Payments Network) to deliver payments in an unobstructed fashion. If payment industries are tipping towards digital infrastructures based on blockchain logic, it presents architectural innovation that reconfigures payment services at the network layer of a digital platform (Henderson et al. 1990; Pagani 2013).

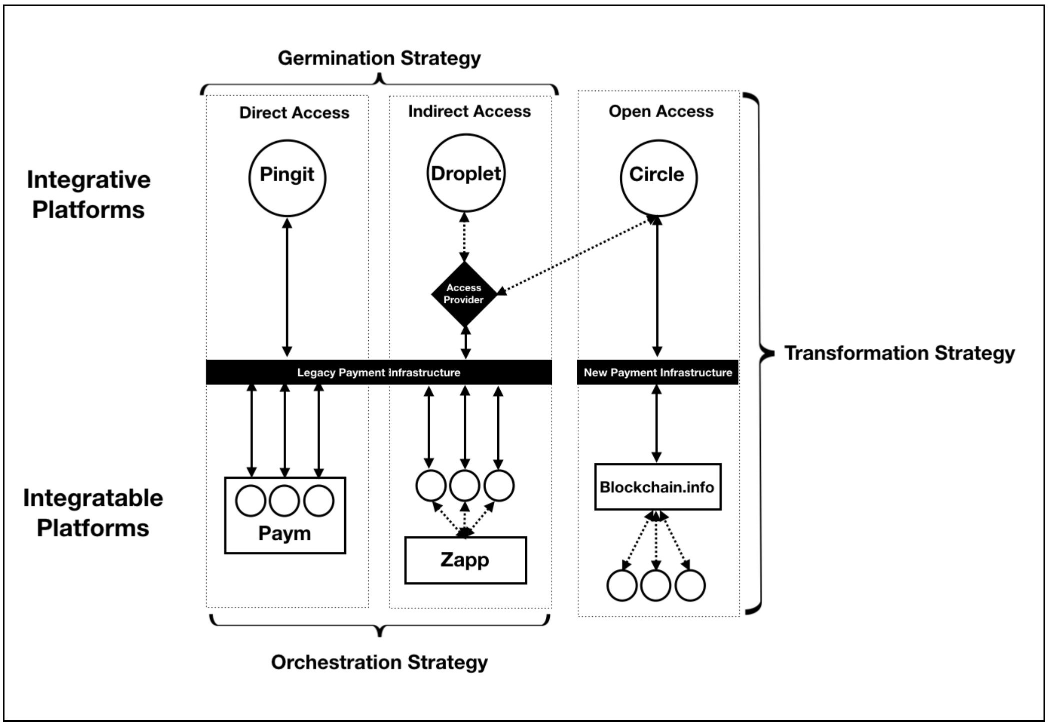


Figure 10. Findings from Published Article in Journal of Management Information Systems (JMIS)

<u>*Business Design Findings*</u>

This study exhibits ***Analyzer*** and ***Prospector Business Design*** profiles. Banks (i.e., Pingit, Paym) showcase the *Analyzer Business Design* profile, as both mobile payment platforms aim to complement and strengthen their existing core services (i.e., banking, payment) while maintaining/increasing the customer base with new innovations. Banks have entered the mobile payment market as fast second movers, after carefully studying mobile payment startups. In regards to startups, they fulfill the criteria of a *Prospector Business Design* profile (i.e., explorative and risk takers). Startups in this study are peculiar, as I observe two types of startups: startups that leverage on legacy payment infrastructures (e.g., Faster Payments) while imitating the service offered by banks while using simpler means (e.g., cloud computing) at the platform level and startups that leverage on new payment infrastructures (i.e., Bitcoin Blockchain), which achieve similar service attributes (e.g., efficient payments)—new payment infrastructures are not established compared to legacy ones. In this light, startups deviate from established innovations by exploring alternative or untested means (cloud computing, or blockchain) in the hope that it may result in competitive advantages that match incumbent ones.

Architecture Design Findings

As the abovementioned observations illustrate, mobile payment platforms in this study display largely a ***Hybrid Architecture Design*** profile. All mobile payment platforms leverage consumer devices (i.e., device & system layers), which reduce the value creation and capture opportunities on (1) network, (2) service, and (3) content layers. Mobile payment platforms using legacy payment infrastructures (i.e., network layers) protect their content layers against third parties as payment data is utilized to derive business value. In regards to service layers, they are opaquely treated (i.e., Pingit) or basically not available (i.e., Paym) to third parties. As mobile payment startups leveraging on new payment infrastructures, the platform layer dynamics are different. Organizations using the Bitcoin blockchain as their payment infrastructure to deliver payments cannot impose strategic resource constraints, as the network and content layers are open. Accordingly, the competitive ground is located on the service layer, where (Bitcoin) startups invite third parties to expand their platform reach (e.g., blockchain.info) or don't have a third-party developer program at all (e.g., Circle), as they are adequately equipped with assets and methods to operate isolative service.

Technology Design Findings

In regards to boundary resources to facilitate component exchanges between third parties, I observe ***Proprietary*** and ***Agnosticism Technology Design*** profiles. Among all mobile payment platforms, which use legacy payment infrastructures, they do not promote third-party developer programs as known by Google or Apple, because access points do not exist (e.g.., Paym) or are not disclosed (Pingit) to the public as they are based on selective invitations—in this sense, reducing collaboration opportunities in a significant manner. An *Agnosticism Technology Design* profile was observed by one mobile payment platform: blockchain.info. The Bitcoin startups operate in an open financial network and provides unrestricted boundary resources in the form of unmoderated APIs for creating Bitcoin wallets or accessing blockchain data. In so doing, blockchain.info cannot anticipate which services third parties will create.

Open Innovation

To answer my SRQ2, digital platforms strategically open up platforms to mobilize third parties to complement platforms in areas such as service reach and innovation (Kazan et al. 2014b). In so doing, digital platforms with *Compatibility and Agnosticism Technology Design* profiles are favorable design elements to obtain open innovation. Secondly, digital platforms apply two modes of open innovation integrations: (1) integrative and (2) integratable. Lastly, the studied digital platforms practice open innovation exploitation (i.e., commercialization) in a (1) selective or (2) inclusive fashion.

Obtaining Open Innovation

Apparent form the abovementioned studies, digital payment platforms with a *Proprietary Technology Design* profile (e.g., Pingit, Paym) do not have the priority to obtain open innovation from third parties, as they have the assets and methods to develop their own isolative services. Although Pingit indeed has boundary resources (e.g., APIs), they are not advertised to the public compared to Apply Pay. Thus, acting opaque to third-party developers, which reduces open innovation efforts in a significant manner. In this context, circumventing or reducing interfirm modularity with third parties has the benefit of higher control over value creation and capture streams. On the contrary, digital payment platforms with a *Compatibility and Agnosticism Technology Design* (e.g., Apple Pay or Blockchain.info, do indeed actively seek out third parties to obtain open innovations, which is manifested in the form of having active developer programs and providing documentations to facilitate favorable collaborations condition.

Integrating and Exploiting Open Innovation

Integrative Open Innovation & Selective Commercialization.
Digital platforms that are rich in their assets and methods (e.g., Apple, Pingit) can exercise higher control over their layers and architecture overall. Hence, they have the choice to be more independent or to be more selective with third parties, which suggests a more verticalized architecture setup (e.g., Hybrid/Centralized Architecture Design). To put it differently, these platforms exhibit an *integrative* open innovation approach that positions their digital platforms first and at the center of the value creation process. By positioning themselves in the center of value creation, integrative platforms have the ability to dictate the conditions, which value layers are shared, and which third parties are invited for commercialization opportunities. If we take Apple Pay as an example, Apple exercises monopolistic power over its NFC chips that are embedded on Apple's device layers, such as iPhone or Apple Watch. To obtain NFC chip access, usually reserved for large commercial entities such as banks, third parties have to enter into contractual negotiations as NFC access is opaque towards external actors. In this way, Apple demonstrates a highly selective procedure towards potential business and innovation partners to co-create and capture value. On the service layer, though, Apple is more accommodative to third parties. Apple provides third-party documented boundary resources, which grants access to Apply Pay functions (i.e., Touch ID), excluding NFC access. After an internal and automated review process, third-party applications with built-in Apple Pay functionality are hosted on Apple's App Store, which functions only on Apple devices. Considering Apple's open innovation and commercialization efforts on its payment device and service layers, Apple practices *selective commercialization* with its business partners, whereas

open innovation efforts are largely anchored within Apple's platform boundaries, which absorb and integrate external innovation streams within Apple Pay.

Integratable Open Innovation & Inclusive Commercialization.

For digital platforms that do not have needed resources at their disposal, they have to engage with third parties to achieve comparable service reach and innovation outputs. In this case, it suggests an integratable approach towards open innovation, where a digital platform has to be proactive and distribute platform layers among many suitable third parties to establish an interorganizational platform (e.g., Google). As this type of open innovation depends more on third-party collaborations, it depicts an inclusive approach towards commercialization efforts, where value capture is shared and circulated within and beyond platform boundaries. To exemplify, Google Wallet has a reversed approach towards integrating and commercializing open innovation. With Google's HCE solutions, which store and administer payment-sensitive data in the cloud, Google has basically opened up the device layer to any third party, which allows the operation of Google's payment service on any NFC Android device. On Google Wallet's service layer, Google offered like Apple boundary resources (i.e., SDK and API) to integrate Google's payment service into various third-party apps. However, Google's payment service exceeds Apple Pay by being highly integratable into various external systems such as email, mobile, and desktop webpages, which give third parties the freedom to install Google's mobile payment service on various external systems without major interferences from Google's side. Regarding open innovation integration, Google designed its payment systems in a way to be highly *integratable* into external systems, spreading Google Wallet beyond platform boundaries with the help of external systems. Considering Google's open innovation commercialization efforts on its payment device and service layers, Google practices an *inclusive commercialization* strategy with its business partners, which includes even rival payment services.

Discussion

The findings from this dissertation support the proposed three digital platform design elements for digital platforms for achieving supportive conditions for facilitating disruption. Specifically, the proposed three interrelated design elements share the attributes of being strategic (i.e., *business design*), tactical (i.e., *architecture design*), and operational (i.e., *technology design*) in how digital platforms operate within competitive business environments. Conjointly considered, these three design elements and their resulting configurations culminate in new and differentiating value creations logics that are atypical to incumbent digital (payment) platforms. Having a supply perceptive on digital platforms, this dissertation offers in the following evidence of the applicability of my proposed *Digital Platform Disruption Model*, which illustrates design principles (cf. Hevner et al. 2004) in how digital platforms can be designed and configured towards supportive conditions that facilitate disruption.

Business Design Element

Digital platforms with an *Analyzer* & *Prospector Business Design* have the *conditions and readiness* to support market-changing dynamics in their strategic posture (e.g., see JMIS study). Both *Business Design* profiles embrace new business endeavors, either in a conservative and ambidextrous fashion that balances exploitative and explorative business opportunities (i.e., *Analyzer*) or in a more aggressive fashion (i.e., *Prospector*) that emphasizes exploration and the acceptance of high risk. For instance, *Prospectors* feel comfortable in causing introducing technology compatibilities and frictions (e.g., see telcos in the CAIS study) that challenge the business logic of existing business environments. To illustrate (see JMIS study), blockchain startups leverage on alternative component innovations on their network layer (i.e., bitcoin network) to move value between payer and payee. In this setup, no established innovations (e.g., payment infrastructures by incumbents) are used. If this type of (component) innovation gains popularity, it could potentially challenge and disrupt incumbents and their existing network layers (i.e., legacy payment infrastructures).

This is in alignment with the disruptive innovation literature (Christensen et al. 1996) that suggests that organizations leveraging on niche and unproven technologies (e.g., the use of open blockchain networks) create initially inferior services compared to established ones, thus not matching the value proposition of established innovations offered by incumbent ones. However, these inferior innovations improve and exceed established innovations over time, thus having supportive conditions for facilitating disruption. Those that get disrupted are usually *Defenders* (e.g., banks). *Defender* digital platforms (e.g., see CAIS study) pursue the strategy of maintaining the status quo to exploit existing knowledge, assets, and methods (e.g., contactless payment cards) to defend the current business logic in how value is created (e.g., using existing payment infrastructures and bank ATMs). In this line, a *Defender* follows the path of established innovations to exploit and refine its existing assets and methods to offer a standardized high quality and volume service, which is (retail) payments (Christensen et al. 1996).

I therefore propose that ***Analyzer*** and ***Prospector Business Design*** profiles are suitable digital platform design elements that facilitate disruption.

Architecture Design Element

As the *Analyzer* and *Prospector Business Design Profiles* propagate strategic readiness for disruption, their profiles suggest adequate equipment with regards to strategic resources and dynamic capabilities to pursue new business endeavors (Teece et al. 1997). Strategic resources and dynamic capabilities, however, are theoretical concepts that have their roots in value chain economies. If we translate these concepts into network economies, network promoting organizations, such as digital platforms, achieve their competitiveness through strategic modularity (Pagani 2013), which are superior configurations of digital components across platform layers.

In so doing, it impacts the overall platform architecture structure in being either vertical (i.e., *Centralized Architecture Design*) or to a platform structure leaning towards being more horizontal (e.g., *Hybrid or Distributed Architecture Design)*. As the JMIS and CAIS studies suggest, digital platforms with an *Analyzer* (e.g., retailer) or *Prospector* (e.g., Blockchain.info) *Business Design* profile are inherently willing use different digital components for their platform layers compared to *Defenders* (i.e., banks). To be specific, the *Analyzer* and *Prospectors* are willing to share or outsource platform layers by either using alternative and unproven components at their network layers (e.g., bitcoin blockchain) or using different but ubiquitously available components at the device layer, such as mobile phones owned by end users, to achieve a competitive edge (see JTAER study). At the time of writing, payment cards were the dominant payment instrument within Europe, where payments with mobile phones were uncommon (see CAIS study). Accordingly, if we contrast *Architecture Design and Business Design Profiles*, *Analyzers and Prospectors* exhibit both a *Hybrid Architecture Design* profile with varying degrees towards leaning centralization to control more value layers (i.e., the *Analyzer*) or leaning towards being more distributed to share value layers with third parties to a greater extent (i.e., the *Prospector*).

In regards to open innovation, which is the exchange or providing access to platform layers with third parties, a *Hybrid Design Architecture Design* suggests a minimum condition to support open innovation capabilities. The quantity, quality, and freedom of open innovation are again shaped by *Technology Design Profiles*, which determines the level of freedom in how third parties access or integrate platform layers. A *Distributed Architecture Design* profile has not been observed, as this would indicate a digital payment platform without an owner, who could exercise governance on platform layers. Moreover, payment as my empirical context of my study requires control by the platform owner to enforce legal requirements (e.g., laws to avoid anti-money laundering). Nevertheless, digital platforms in open blockchain economies have the technical conditions to exhibit a *Distributed Architecture Design* profile (e.g., autonomous organizations) not observed in my studies.

<u>I therefore propose that a ***Hybrid Architecture Design*** profile is a suitable and minimum design element for digital platforms that facilitates disruption.</u>

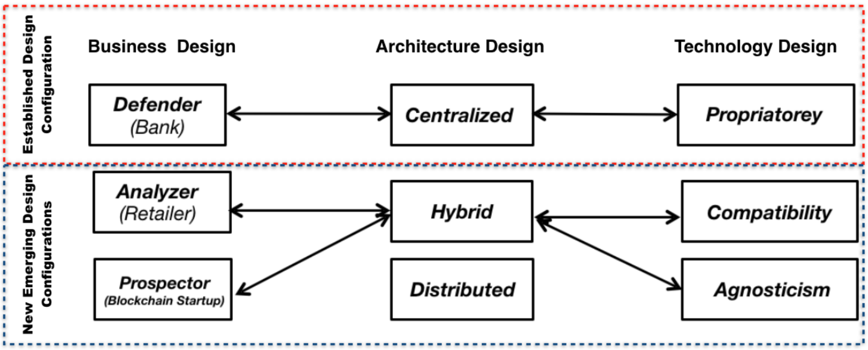
Technology Design Element

As the *Analyzer* and *Prospector* both exhibit a *Hybrid Architectures Design* profile, *Technology Design* determines how platform layers are accessed or distributed among third parties, which is done either in an integrative or integratable fashion (see JMIS or ICMB studies). The studied *Analyzers'* (e.g., Apple) and *Prospectors'* (e.g., Blockchain.info) platforms practice interfirm modularity for layers that expand their platform reach and growth, while guarding the most precious ones for themselves to maintain control. For instance, *Prospectors* platforms are generous with their service layers, by being integratable into heterogeneous external systems (e.g., Google Wallet). As these external systems are controlled by third parties, it would usually create conditions for generativity, which usually leads to unknown or unpredictable innovations (Zittrain 2006). But the payment context requires stricter control on third-party innovations.

In legacy payment networks, unknown or unpredictable innovations are less likely to occur due to strict regulations imposed on payment platforms by credit card firms (e.g., Visa), which leave little room for digital platforms to allow unpredictable innovations by third parties (e.g., services that are against the law). Unpredictable or undesired innovations could result in penalties for the platform owner or, more severely, the revocation of access rights to legacy payment infrastructures. In this sense, exercising control over third-party innovations suggests a *Compatibility Technology Design* profile for *Analyzer* and *Prospector* platforms that operate in legacy payment networks. Though to illustrate an *Agnosticism Technology Design* profile, which supports unpredictable innovations by third parties, *Agnosticism Technology Design* has been observed by *Prospectors* (i.e., Blockchain.info). However, an *Agnosticism Technology Design profile* has been identified by *Prospectors* that operate in an open and unregulated payment network (e.g., Bitcoin), which grants third parties the freedom to create unpredictable innovations.

I therefore propose that ***Agnosticism*** and ***Compatibility Technology Design*** profiles are suitable design elements for digital platforms that facilitate disruption.

Figure 10 illustrates the observed design element configurations that have supportive conditions for facilitating disruption. They facilitate disruption, as they present new emerging design principles for digital platforms that deviate from established ones used by incumbents or *Defender* digital platforms.



Business Design	***Defender*** Platform strategy that prefers control, exploitation, and efficiency in offering payments.	***Analyzer*** Platform strategy profile that emphasizes control, moderated flexibility in offering payment services.	***Prospector*** Platform strategy profile that accepts risk, emphasizes exploration and flexibility in offering payment services.
Architecture Design	***Centralized*** Overall guarded platform layers	***Hybrid*** Combination of shared and guarded layers that share the attributes of being valuable & commodity	***Distributed*** Not observed
Technology Design	***Proprietary*** Non existent or opaque boundary resources	***Compatibility*** • Integrative or Integratable • Visible boundary resources • Innovations are known	***Agnosticism*** • Integrative or Integratable • Visible boundary resources • Innovations are unknown

Figure 11. Observed Digital Platform Configurations

Implications for Theory and Practice

This thesis contributes to the disruptive innovation literature from a supply perspective (Henderson et al. 1990) that provides prescriptive knowledge about how to design and configure digital platforms towards supportive conditions for facilitating disruption. Apparent from the Blockchain.info case, modularity allows digital payment platforms to practice *architectural innovations* by leveraging on new network layer components (e.g., bitcoin blockchain network). The integration and use of a new network layer component with a different knowledge base (e.g., open blockchain), but with a similar value proposition (i.e., moving payments), could indeed overturn the network layer of incumbent platforms (i.e., legacy payment infrastructures) in the event of broader adoptions (Christensen et al. 1996; Henderson et al. 1990). Furthermore, the integration of new components into digital platforms may cause additional ripple effects across platform layers with transformative consequences (Yoo et al. 2010).

For instance, the nature of blockchain technologies, which are digital, decentralized or distributed, have the ability to transform digital services into being more granular in their feature set (e.g., nano smart contract payments). These new features in turn could impact and decompose other platform layers (e.g., service layer), which may create favorable conditions for *radical innovations* (Henderson et al. 1990). Radical innovation overturns established architectures and components of predominant products and services. In the digital platform context, radical innovation would share the notion of autonomous digital platforms, where platform owners are not identifiable and non-existent.

This thesis bridges knowledge gaps between platform and management research streams by deriving a taxonomy of interrelated strategic design elements, which, properly configured, give rise to supportive conditions for facilitating disruption. Specifically, this study aims to contribute to extant literature on digital platforms (Gawer et al. 2002; Ghazawneh et al. 2013; Iyer et al. 2010; Thomas et al. 2014; Yoo et al. 2010) and open innovation (Chesbrough 2003; Chesbrough et al. 2006; West et al. 2014a). By applying configuration theory (El Sawy et al. 2010), this study bears managerial implications for digital platform owners and researchers as well as specific theoretical contributions.

First, this study extends the strategic typology of organizations by the seminal works of Miles et al. (1978) and Sabherwal et al. (2001) to the context of digital platforms. To my knowledge, the application of strategy typologies specifically on digital platforms has not been done previously. *Second*, this research contributes to the IS strategy literature (Chen et al. 2010). Past studies have investigated the attributes of *internal* IT systems of organizations and their strategic implications (cf. Henderson et al. 1993). This research aims to extend this research stream by exploring the implications of intertwined and interdependent *internal* (i.e., platform owner) and *external* information systems (i.e., third parties). *Lastly*, as we have a good understanding about organizations operating in value chain economies, and how internal assets and methods translate to strategy profiles (Porter 1980; Porter 1985; Teece et al. 1997), less was known about organizations in network economies (Stabell et al. 1998). In this regard, this thesis presents a first attempt to explain how organizations in network economies strategically design and configure their digital platforms that result into characteristic platform strategies (see Table 8).

Table 8. Competitive Advantage in Value Chain & Value Network Economies

	Value Chain Economies	Value Network Economies	Digital Platforms
Source of Innovation	**Schumpeterian Innovation** *Innovation emerges within organizational boundaries.*	**Open Innovation** *Innovation emerge inside & outside organizational boundaries.*	**Coupled Open Innovation** *Innovation emerge inside & outside in a continuous fashion.*
Assets	*Resource-Based View*	*Strategic Linkages*	*Strategic Interfirm Modularity*
Method	*Dynamic Capabilities*	*Network Orchestration*	*Configuration of Digital Platform Design Elements*
Business Strategy	• *Cost Leadership* • *Differentiator*	*Research Gap*	*Research Contribution* • *Defender* • *Analyzer* • *Prospector*

Conclusion

This thesis presents a fitting response to Bharadwaj et al.'s (2013) and de Reuver et al.'s (2017) call and research agenda for more digital platform studies to better compare and understand transformative digital platforms. In the same vein, this dissertation provides prescriptive knowledge in the form of design principles for digital platform practitioners and researchers to strategically design and configure digital platforms towards supportive conditions that facilitate disruption. Findings suggest that digital platforms with an *Analyzer* and *Prospector* strategy profile (i.e., *Business Design*) have supportive conditions to facilitate disruption. This dissertation is constrained in its generalizability, as the studied cases were primarily originating from European payments markets with an emphasis on the UK. Nevertheless, these limitations are future research avenues for replicating the study in other geographies and empirical contexts (e.g., social media or mobile computing platforms) to test its applicability. Another interesting avenue for future research would be to measure the performances of certain design principles and their configurations (e.g., revenue or market share growth), or identifying tipping points points towards a new dominant design or standard that would indeed replace established innovations. Lastly, as more organizations and individuals join open blockchain economies, future research could explore further open and distributed digital platforms to derive pertinent knowledge and characteristic design principles.

References

Abernathy, W. J., and Clark, K. B. 1985. "Innovation: Mapping the winds of creative destruction," *Research Policy* (14:1) 2//, pp 3-22.

Ansari, S. S., Garud, R., and Kumaraswamy, A. 2015. "The disruptor's dilemma: TiVo and the US television ecosystem," *Strategic Management Journal*).

Assink, M. 2006. "Inhibitors of disruptive innovation capability: a conceptual model," *European Journal of Innovation Management* (9:2), pp 215-233.

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).

Benlian, A., Hilkert, D., and Hess, T. 2015. "How open is this platform? The meaning and measurement of platform openness from the complementors' perspective," *Journal of Information Technology*).

Besen, S. M., and Farrell, J. 1994. "Choosing How to Compete: Strategies and Tactics in Standardization," *The Journal of Economic Perspectives* (8:2), pp 117-131.

Boudreau, K. 2010. "Open platform strategies and innovation: Granting access vs. devolving control," *Management Science* (56:10), pp 1849-1872.

Boudreau, K. J. 2012. "Let a Thousand Flowers Bloom? An Early Look at Large Numbers of Software App Developers and Patterns of Innovation," *Organization Science* (23:5), pp 1409-1427.

Boyatzis, R. E. 1998. *Transforming qualitative information: Thematic analysis and code development*, (Sage.

Braun, V., and Clarke, V. 2006. "Using thematic analysis in psychology," *Qualitative research in psychology* (3:2), pp 77-101.

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.

Burrell, G., and Morgan, G. 1979. *Sociological paradigms and organisational analysis*, (london: Heinemann.

Burton-Jones, A., McLean, E. R., and Monod, E. 2015. "Theoretical perspectives in IS research: from variance and process to conceptual latitude and conceptual fit," *European Journal of Information Systems* (24:6), pp 664-679.

Ceccagnoli, M., Forman, C., Huang, P., and Wu, D. J. 2012. "Cocreation of value in a platform ecosystem: the case of enterprise software," *MIS Q.* (36:1), pp 263-290.

Cennamo, C., and Santalo, J. 2013. "Platform competition: Strategic trade-offs in platform markets," *Strategic Management Journal* (34:11), pp 1331-1350.

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.

Christensen, C., and Raynor, M. 2013. *The Innovator's Solution: Creating and Sustaining Successful Growth*, (Harvard Business Review Press.

Christensen, C. M., Anthony, S. D., Berstell, G., and Nitterhouse, D. 2007. "Finding the right job for your product," *MIT Sloan Management Review* (48:3), p 38.

Christensen, C. M., and Bower, J. L. 1996. "Customer Power, Strategic Investment, And The Failure Of Leading Firms," *Strategic Management Journal* (17:3), pp 197-218.

Chua, W. F. 1986. "Radical developments in accounting thought," *Accounting review*), pp 601-632.

Cohen, W. M., and Levinthal, D. A. 1990. "Absorptive Capacity: A New Perspective on Learning and Innovation," *Administrative Science Quarterly* (35:1), pp 128-152.

Crossan, M. M., and Apaydin, M. 2010. "A multi-dimensional framework of organizational innovation: A systematic review of the literature," *Journal of management studies* (47:6), pp 1154-1191.

Crotty, M. 1998. *The foundations of social research: Meaning and perspective in the research process*, (Sage.

Damanpour, F., and Wischnevsky, J. D. 2006. "Research on innovation in organizations: Distinguishing innovation-generating from innovation-adopting organizations," *Journal of engineering and technology management* (23:4), pp 269-291.

Danneels, E. 2004. "Disruptive technology reconsidered: A critique and research agenda," *Journal of product innovation management* (21:4), pp 246-258.

Darlin, D. 2005. "Bargains in a Flash," The New York Times.

David, P. A. 1985. "Clio and the Economics of QWERTY," *The American Economic Review* (75:2), pp 332-337.

de Reuver, M., Sørensen, C., and Basole, R. C. 2017. "The digital platform: a research agenda," *Journal of Information Technology*), pp 1-12.

Dougherty, D., and Hardy, C. 1996. "Sustained product innovation in large, mature organizations: Overcoming innovation-to-organization problems," *Academy of Management Journal* (39:5), pp 1120-1153.

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.

Eisenmann, T., Parker, G., and Van Alstyne, M. 2011. "Platform envelopment," *Strategic Management Journal* (32:12), pp 1270-1285.

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.

Farrell, J., and Saloner, G. 1985. "Standardization, Compatibility, and Innovation," *The RAND Journal of Economics* (16:1), pp 70-83.

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.

Ghazawneh, A., and Henfridsson, O. 2015. "A paradigmatic analysis of digital application marketplaces," *Journal of Information Technology*).

Goldkuhl, G. Year. "Anchoring scientific abstractions–ontological and linguistic determination following socio-instrumental pragmatism," Proceedings of European Conference on Research Methods in Business, Reading2002.

Govindarajan, V., and Kopalle, P. K. 2006. "Disruptiveness of innovations: measurement and an assessment of reliability and validity," *Strategic Management Journal* (27:2), pp 189-199.

Gregor, S. 2006. "The Nature of Theory in Information Systems," *MIS Quarterly* (30:3), pp 611-642.

Guba, E. G., and Lincoln, Y. S. 1994. "Competing paradigms in qualitative research," *Handbook of qualitative research* (2:163-194), p 105.

Gulati, R., Nohria, N., and Zaheer, A. 2000. "Strategic networks," *Strategic Management Journal* (21:3), pp 203-215.

Hagiu, A., and Wright, J. 2011. "Multi-Sided Platforms," *Working Papers -- Harvard Business School Division of Research*), pp 1-37.

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.

Hanseth, O., Monteiro, E., and Hatling, M. 1996. "Developing Information Infrastructure: The Tension between Standardization and Flexibility," *Science, Technology, & Human Values* (21:4), pp 407-426.

Harrigan, K. R. 1984. "Formulating vertical integration strategies," *Academy of management review* (9:4), pp 638-652.

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

Henderson, R. M., and Clark, K. B. 1990. "Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms," *Administrative Science Quarterly* (35:1), pp 9-30.

Henfridsson, O., and Bygstad, B. 2013. "THE GENERATIVE MECHANISMS OF DIGITAL INFRASTRUCTURE EVOLUTION," *MIS Quarterly* (37:3), pp 907-A905.

Hevner, A. R., March, S. T., Park, J., and Ram, S. 2004. "Design Science in Information Systems Research," *MIS Quarterly* (28:1), pp 75-105.

Hill, C. W. L., and Rothaermel, F. T. 2003. "The Performance of Incumbent Firms in the Face of Radical Technological Innovation," *The Academy of Management Review* (28:2), pp 257-274.

Hirschheim, R. 1985. "Information systems epistemology: An historical perspective," *Research methods in information systems*), pp 13-35.

Hirschheim, R., and Klein, H. K. 1989. "Four paradigms of information systems development," *Communications of the ACM* (32:10), pp 1199-1216.

Hunt, M. 1972. "Competition in the Major Home Appliance Industry," *Harvard University*).

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.

Katz, M. L., and Shapiro, C. 1986. "Product Compatibility Choice in a Market with Technological Progress," *Oxford Economic Papers* (38), pp 146-165.

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., and Damsgaard, J. Year. "An Investigation Of Digital Payment Platform Designs: A Comparative Study Of Four European Solutions," Proceedings of the European Conference on Information Systems (ECIS) 2014, Tel Aviv, Israel, Association for Information Systems2014a, p. 15.

Kazan, E., Tan, C.-W., and Lim, E. T. K. 2014b. "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.

Kazan, E., Wee Tan, C., and Lim, E. T. 2016. "Towards a Framework of Digital Platform Competition: A Comparative Study of Monopolistic & Federated Mobile Payment Platforms," *Journal of theoretical and applied electronic commerce research* (11:3), pp 50-64.

Krotov, V., and Junglas, I. 2008. "RFID as a disruptive innovation," *Journal of theoretical and applied electronic commerce research* (3:2), pp 44-59.

Lee, A. S. 1991. "Integrating Positivist and Interpretive Approaches to Organizational Research," *Organization Science* (2:4), pp 342-365.

Lee, A. S., and Baskerville, R. L. 2003. "Generalizing generalizability in information systems research," *Information systems research* (14:3), pp 221-243.

Lucas, H. C., and Goh, J. M. 2009. "Disruptive technology: How Kodak missed the digital photography revolution," *The Journal of Strategic Information Systems* (18:1), pp 46-55.

Makadok, R., and Coff, R. 2009. "Both market and hierarchy: An incentive-system theory of hybrid governance forms," *Academy of Management Review* (34:2), pp 297-319.

Maxwell, J. 1992. "Understanding and validity in qualitative research," *Harvard educational review* (62:3), pp 279-301.

Miles, R. E., Snow, C. C., Meyer, A. D., and Coleman, H. J., Jr. 1978. "Organizational Strategy, Structure, and Process," *The Academy of Management Review* (3:3), pp 546-562.

Miranda, S. M., and Saunders, C. S. 2003. "The social construction of meaning: An alternative perspective on information sharing," *Information systems research* (14:1), pp 87-106.

Ondrus, J., Gannamaneni, A., and Lyytinen, K. 2015. "The impact of openness on the market potential of multi-sided platforms: a case study of mobile payment platforms," *Journal of Information Technology*).

Orlikowski, W. J., and Baroudi, J. J. 1991. "Studying information technology in organizations: Research approaches and assumptions," *Information systems research* (2:1), pp 1-28.

Pagani, M. 2013. "DIGITAL BUSINESS STRATEGY AND VALUE CREATION: FRAMING THE DYNAMIC CYCLE OF CONTROL POINTS," *MIS Quarterly* (37:2), pp 617-632.

Pfeffer, J., and Salancik, G. R. 2003. *The external control of organizations: A resource dependence perspective*, (Stanford University Press.

Pil, F. K., and Cohen, S. K. 2006. "Modularity: Implications for Imitation, Innovation, and Sustained Advantage," *The Academy of Management Review* (31:4), pp 995-1011.

Pon, B., Seppälä, T., and Kenney, M. 2014. "Android and the demise of operating system-based power: Firm strategy and platform control in the post-PC world," *Telecommunications Policy* (38:11) 12//, pp 979-991.

Porter, M. E. 1980. "Competitive strategy: Techniques foranalyzing industries and competitors," *FreePress, New York*).

Porter, M. E. 1985. *Competitive advantage: Creating and sustaining superior performance*, (Free Press: New York.

Porter, M. E. 1991. "Towards a dynamic theory of strategy," *Strategic Management Journal* (12:S2), pp 95-117.

Rochet, J. C., and Tirole, J. 2002. "Cooperation among competitors: Some economics of payment card associations," *Rand Journal of economics*), pp 549-570.

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

Rosen, M. 1991. "Coming To Terms with the Field: Understanding And Doing Organizational Ethnography*," *Journal of Management Studies* (28:1), pp 1-24.

Sabherwal, R., and Chan, Y. E. 2001. "Alignment Between Business and IS Strategies: A Study of Prospectors, Analyzers, and Defenders," *Information Systems Research* (12:1), pp 11-33.

Saloner, G. 1990. "Economic Issues In Computer Interface Standardization," *Economics of Innovation and New Technology* (1:1-2) 1990/01/01, pp 135-156.

Sanchez, R., and Mahoney, J. T. 1996. "Modularity, flexibility, and knowledge management in product and organization design," *Strategic Management Journal* (17:S2), pp 63-76.

Sandström, C., Magnusson, M., and Jörnmark, J. 2009. "Exploring factors influencing incumbents' response to disruptive innovation," *Creativity and Innovation Management* (18:1), pp 8-15.

Sarker, S., Sarker, S., Sahaym, A., and Bjørn-Andersen, N. 2012. "Exploring value cocreation in relationships between an ERP vendor and its partners: a revelatory case study," *MIS quarterly* (36:1), pp 317-338.

Schilling, M. A. 2000. "Toward a General Modular Systems Theory and Its Application to Interfirm Product Modularity," *The Academy of Management Review* (25:2), pp 312-334.

Schumpeter, J. A. 1934. *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle*, (Transaction Publishers.

Schumpeter, J. A. 1962. *Capitalism, socialism and democracy*, (Harper & Row New York.

Shamsie, J., Phelps, C., and Kuperman, J. 2004. "Better late than never: A study of late entrants in household electrical equipment," *Strategic Management Journal* (25:1), pp 69-84.

Shapiro, C., and Varian, H. R. 1998. "Information Rules: A Strategic Guide to the Network Economy," *Harvard Business School Press Books*), p 1.

Shapiro, C., and Varian, H. R. 1999. "The Art of Standards Wars," *California Management Review* (41:2) Winter99, pp 8-32.

Stabell, C. B., and Fjeldstad, Ø. D. 1998. "Configuring value for competitive advantage: On chains, shops, and networks," *Strategic Management Journal* (19:5), p 413.

Star, S. L., and Ruhleder, K. 1996. "Steps toward an ecology of infrastructure: Design and access for large information spaces," *Information systems research* (7:1), pp 111-134.

Staudenmayer, N., Tripsas, M., and Tucci, C. L. 2005. "Interfirm Modularity and Its Implications for Product Development*," *Journal of Product Innovation Management* (22:4), pp 303-321.

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

Tan, B., Pan, S. L., Lu, X., and Huang, L. 2015. "The Role of IS Capabilities in the Development of Multi-Sided Platforms: The Digital Ecosystem Strategy of Alibaba. com," *Journal of the Association for Information Systems* (16:4), pp 248-280.

Teece, D. J. 1986. "Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy," *Research policy* (15:6), pp 285-305.

Teece, D. J., Pisano, G., and Shuen, A. 1997. "Dynamic capabilities and strategic management," *Strategic Management Journal* (18:7), pp 509-533.

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

Tilson, D., Lyytinen, K., and Sørensen, C. 2010. "Research Commentary—Digital Infrastructures: The Missing IS Research Agenda," *Information Systems Research* (21:4), pp 748-759.

Tilson, D., Sorensen, C., and Lyytinen, K. Year. "Platform Complexity: Lessons from the music industry," System Sciences (HICSS), 2013 46th Hawaii International Conference on, IEEE2013, pp. 4625-4634.

Tiwana, A., and Konsynski, B. 2010a. "Complementarities Between Organizational IT Architecture and Governance Structure," *Information Systems Research* (21:2), pp 288-304.

Tiwana, A., Konsynski, B., and Bush, A. A. 2010b. "Research commentary-Platform evolution: Coevolution of platform architecture, governance, and environmental dynamics," *Information Systems Research* (21:4), pp 675-687.

Tushman, M. L., and Anderson, P. 1986. "Technological Discontinuities and Organizational Environments," *Administrative Science Quarterly* (31:3), pp 439-465.

Utterback, J. M., and Suárez, F. F. 1993. "Innovation, competition, and industry structure," *Research Policy* (22:1) 2//, pp 1-21.

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.

Wernerfelt, B. 1984. "A resource-based view of the firm," *Strategic Management Journal* (5:2), pp 171-180.

West, J. 2003. "How open is open enough?: Melding proprietary and open source platform strategies," *Research policy* (32:7), pp 1259-1285.

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

West, J., and Dedrick, J. 2000. "Innovation and Control in Standards Architectures: The Rise and Fall of Japan's PC-98," *Information Systems Research* (11:2), pp 197-216.

West, J., Salter, A., Vanhaverbeke, W., and Chesbrough, H. 2014b. "Open innovation: The next decade," *Research Policy* (43:5) 6//, pp 805-811.

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

Yoo, Y., Boland, R. J., Lyytinen, K., and Majchrzak, A. 2012. "Organizing for Innovation in the Digitized World," *Organization Science* (23:5), pp 1398-1408.

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.

Zittrain, J. L. 2006. "The Generative Internet," *Harvard Law Review* (119:7), pp 1974-2040.

Zobel, A.-K. 2016. "Benefiting from Open Innovation: A Multidimensional Model of Absorptive Capacity*," *Journal of Product Innovation Management*), pp n/a-n/a.

Collection of Papers

Paper 1 – CAIS

Towards a Market Entry Framework for Digital Payment Platforms

Abstract

This study presents a framework to understand and explain the design and configuration of digital payment platforms and how these platforms create conditions for market entries. By embracing the theoretical lens of platform envelopment, we employed a multiple and comparative-case study in a European setting by using our framework as an analytical lens to assess market-entry conditions. We found that digital payment platforms have acquired market entry capabilities, which is achieved through strategic platform design (i.e., platform development and service distribution) and technology design (i.e., issuing evolutionary and revolutionary payment instruments). The studied cases reveal that digital platforms leverage on payment services as a mean to bridge and converge core and adjacent platform markets. In so doing, platform envelopment strengthens firms' market position in their respective core markets. This study contributes to the extant literature on digital platforms, market entries, and payment.

Keywords: Payment Platforms, Digital Payment, Multi-Sided, Platforms, Market Entry, Platform Envelopment.

A version of the paper is published as Kazan, E. and Damsgaard, J. (2016). Towards a Market Entry Framework for Digital Payment Platforms, Communications of the Association for Information Systems: Vol. 38, Article 37.

Introduction

The digital-payment landscape is a crowded place. New payment actors with different industry backgrounds (e.g., retail) and novice start-ups are attempting to gain a foothold in the once-protected payment market. In so doing, new payment actors are betting on various technologies (e.g., near field communication (NFC)) to connect payers and payees in novel ways. These new dynamics in the payment market are largely driven by falling operating costs, as new payment actors leverage on agile and affordable cloud systems. But more importantly through regulation. European policymakers introduced new regulations to reduce market-entry barriers for new payment actors to foster competition, innovation, and consumer welfare (European Commission, 2009).

To illustrate the competitive market space, AngelList, a well-known service for connecting start-ups with investors, lists about 996 U.S. and European mobile payment start-ups (AngelList, 2015) without including established actors such as MasterCard, PayPal or Visa. As more actors enter the payment market to diversify risk and tap into new business opportunities, payment actors increasingly find themselves in a saturated market space. This in turn transforms payment into a commoditized service. For instance, new actors (e.g., start-ups) deconstruct existing payment value streams (e.g., customer relationships) to their own benefit. This clearly challenges the business logic of incumbents in their own core markets.

As existing payment business models become less profitable (e.g., payment fee business models), payment actors have to explore new revenue sources. One avenue lies in creating entirely new markets by creating new products and services that have not existed before (Christensen & Bower, 1996; Schumpeter, 1962). Another way is the entry into existing markets, where products and services are based on proven business logics. Creating new markets, however, bears many risk factors (e.g., predicting demand). On the contrary, risk-averse organizations generally find entering existing markets more amenable since they can more easily predict risk, market size, and competitive positioning. In platform-driven markets (e.g., payment markets), a predominant way to enter other existing markets is via platform envelopment (Eisenmann, Parker, & Van Alstyne, 2011). Platform envelopment prescribes that owners of digital platforms equip their existing user bases (e.g., payers, payees) with new services (e.g., mobile ticketing) to bridge them into other existing platform markets (e.g., public transportation). In other words, platform envelopment refers to leveraging an installed user base and complementary services to enter other existing platform markets.

Digital platforms drive many markets, such as the payment market. Digital platforms are layered, modular technology artifacts (Yoo, Henfridsson, & Lyytinen, 2010) that have the logic to match different users (e.g., payers and payees) to derive business value (Eisenmann, Parker, & Van Alstyne, 2006; Stabell & Fjeldstad, 1998). Because these layered, modular IT artifacts create value through mediation, digital platforms are considerably sophisticated in their technology attributes. Contemporary digital platforms (e.g., PayPal) are equipped with application programming interfaces (APIs), which are access and distribution points for internally or externally developed services. Furthermore, digital platforms deliver services increasingly through physical means (e.g., mobile phones), which, in essence, represent physical proxies of digital platforms. Take PayPal as an example of a digital payment platform owner: PayPal offers APIs to third parties (e.g., app developers) to integrate payment functionalities into their own mobile services. In this way, PayPal empowers third parties' business, which ultimately supports PayPal's goal to increase its footprint in the payment market.

Based on the abovementioned observations, payment platforms comprise various components (e.g., APIs and mobile phones) in delivering their services. Accordingly, to support conditions for platform envelopment, one has to accordingly design and configure platforms and their corresponding components in the first place. Platform envelopment, however, is a complex task and novel for some prior protected markets, such as the traditional payment market. As new payment actors with different industry backgrounds encroach the payment market and, thereby, disturb market equilibrium, established payment actors in their core markets are compelled to respond to remain relevant. To shed light on platform envelopment in the payment market, we study and explain how digital platforms leverage payment services as a mean to enter other existing platform markets. Thus, we investigate:

> **RQ:** How are digital payment platforms designed and configured to create conditions for platform envelopment?

To answer the research question, we draw on pertinent literature on 1) multi-sided platforms (Eisenmann et al., 2006; Hagiu & Wright, 2011; Rochet & Tirole, 2003b), 2) technology standards (Besen & Farrell, 1994; Shapiro & Varian, 1999; West & Dedrick, 2000), and 3) platform envelopment (Eisenmann et al., 2011). Accordingly, we provide insights and conceptual clarity on different design and configuration options to acquire platform envelopment capabilities to enter other existing platform markets.

Our findings suggest that digital platforms create conditions for platform envelopment by leveraging payment services as a mean to bridge and converge core and adjacent platform markets. In so doing, the design and configuration of digital platforms and their corresponding components (e.g., payment instruments) have an impact on their market-entry capabilities. Because we have a platform-envelopment (i.e., the entry into existing markets) and platform-centric approach, we exclude end users and new market creation from our analysis.

In providing a framework to study the design and configuration of digital payment platforms, we contribute to the digital platform and payment literature by creating a descriptive and explanatory theory (Gregor, 2006). Specifically, this paper contributes to the platform market-entry literature (Eisenmann et al., 2011) by demonstrating how one can achieve the conditions for platform envelopment in the payment market. We are not aware of prior research that studies specifically the design and configuration of digital payment platforms to acquire platform-envelopment conditions.

The paper proceeds as follows. In Section 2, we provide the study's theoretical background. In Section 3, we present our framework by synthesizing key concepts that others have identified as being important in designing multi-sided payment platforms and how one can successfully enter platform markets. In Section 4, we present our research method. In Section 5, we analyze eight different European payment platforms. In Section 6, we synthesize our findings, discuss our limitations, and propose promising areas for further research. Finally, in Section 7, we conclude the paper.

Theoretical Background

In this section, we review pertinent literature to study and understand platform market entries. We focus specifically on the concept of platform envelopment (Eisenmann et al., 2011). Platform envelopment is a theoretical lens that originates from studies on network theory in industrial organization economics (Katz & Shapiro, 1985). Platform envelopment prescribes that firms in value networks (Stabell & Fjeldstad, 1998) enter into other platform markets by leveraging service-bundling and network effects. We also discuss the payment literature through the conceptual lens of multi-sided platforms (Hagiu & Wright, 2011; Rochet & Tirole, 2003b). We selected the multi-sided platform literature based on the notion that payment services (e.g., PayPal) are, in essence, manifestations of multi-sided platforms that have the function to connect and equip various platform stakeholders. Moreover, multi-sided payment platforms have the technological capability to provide bundled services, which is amenable with the concept of platform envelopment to enter other platform markets.

Business Design: Platform Market Entry

Firms constantly face complex and hyper-competitive business environments (D'Aveni, Canger, & Doyle, 1995) in gaining or maintaining market leadership. Firms enter markets to increase business value, reduce competitive pressure, or diversify risk (Porter, 1980; Stabell & Fjeldstad, 1998). Eisenhardt and Martin (2000, p. 1107) define dynamic capabilities as "organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die". In this sense, firms' dynamic capabilities play a vital role, as it enables the reconfiguration of existing resources and capabilities to achieve organizational goals, such as market entry (Eisenhardt & Martin, 2000; Teece, Pisano, & Shuen, 1997).

In value chain-dominated markets (e.g., manufacturing), firms enter and compete by converting inputs into valued market outputs in a sequential manner (e.g., outputs based price or quality) (Porter, 1985). In platform-driven markets (e.g., payment), however, firms create value and compete through efficient mediated products or services (Eisenmann et al., 2006; Stabell & Fjeldstad, 1998). Industrial organization research (Katz & Shapiro, 1985; Rochet & Tirole, 2003b) suggests that firms in platform markets obtain their competitiveness by having the capability to induce positive network effects. Specifically, competitive platform firms design their offerings in a way that creates reciprocal business value among different types of users (e.g., payer and payee) that, in turn, creates a self-reinforcing and expanding network effects. In other words, the stronger and durable the network effects are, the more dominant the firm becomes. In this sense, aspiring and existing platform firms need to strategically design their platform resources to ensure conditions for positive network effects in markets.

Few studies have focused on entering the platform market (Eisenmann et al., 2011). Gawer and Henderson (2007) studied the chip manufacturer Intel and its decision about whether or not to enter the adjacent markets of third party providers. It decided to do so because 1) it had the organizational capabilities to serve these markets and 2) the adjacent markets were characterized by high growth, which, in turn, could support Intel's business in its core market (i.e., computer chips). Intel was concerned about losing its market leadership towards upcoming and dominating third parties. These upcoming third parties could, in turn, dictate a new PC design (e.g., support of other chips) that could challenge Intel's business in its core market. In this sense, Intel entered into adjacent platform markets to solidify its position in its core market.

Besides protecting core markets, market saturation is another driver to enter (platform) markets. Burgelman and Grove (2007), who studied Apple as a "cross-boundary disrupter" (i.e., from the computer to the music and mobile phone industry), suggest that Apple was compelled to explore new revenue sources as its high-end computer market became increasingly saturated. Apple recognized opportunities in the music and mobile phone industry, which, in turn, could indirectly support Apple's computer business line. Literature on platform market entry illustrates that firms enter into adjacent (e.g., Intel) or unrelated markets (e.g., Apple) to remain competitive. Platform firms that may lose the ability to define and protect their core markets could share IBM's fate. IBM was once the dominant actor in the PC market but failed to defend its core business as third parties (e.g., Microsoft) originating from other markets (e.g., operating systems) took the lead to define what a PC constitutes (Gawer & Cusumano, 2002, p. 29). History demonstrates that digital platforms likewise have to evaluate their organizational resources and capabilities as markets change, emerge, or collide.

Market Entry through Platform Envelopment

Entering platform markets is particularly challenging for platform firms. Platform markets are sheltered by switching costs and network effects that enact barriers for other platform firms to enter markets (Chen & Hitt, 2002; Eisenmann et al., 2006, 2011; Katz & Shapiro, 1985). One way for platform firms to overcome market-entry barriers is in platform envelopment. Platform envelopment refers to leveraging an existing user base (e.g., payers, payees) by bundling a current platform service (e.g., mobile payment) with another service (e.g., mobile ticketing) (Eisenmann et al., 2011). In this sense, previously single-purpose platforms convert into multi-purpose platforms and, thus, simultaneously serve users with different needs (e.g., commuting). Compared to single-purpose platforms, multi-purpose platforms have the competitive advantage to entice new users from other platform services that are designed for a single purpose (see Figure 1). Specifically, multi-purpose platforms provide function overlaps, which may entice users to join multi-purpose platforms and abandon prior single-purpose platforms (Eisenmann et al., 2011). Nevertheless, single-purpose platforms can counteract platform envelopment by offering a matching service to increase market-entry barriers (Nalebuff, 2004).

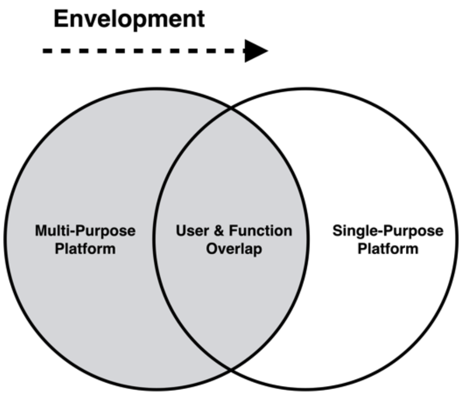


Figure 1. Platform Envelopment

Platform envelopment is already pervasive in the payment industry. Take PayPal as an example: in the beginning, PayPal was purely on online payment service provider that connected payers and payees on ecommerce websites (e.g., eBay). However, PayPal started to evolve by entering the physical payment market by bundling existing payment terminals with PayPal software (Verifone, 2012). By leveraging its large user base, PayPal attempted to encroach the retail payment market in brick-and-mortar stores. In addition, PayPal collects highly valuable payment data to provide additional value-added services (e.g., customer analytics), an area dominated by credit card firms. With its large user base, PayPal has the attributes to be a platform enveloper for large credit card networks.

Payment as Multi-sided Platforms

Most payment services are based on a four-party scheme (i.e., payer, payee, acquirer, card issuer), where these actors process payment transactions through orchestrated business models. To have access to these payment services, payment actors are technically and commercially affiliated to a digital payment platform (e.g., VISA) that prescribes authorized payment instruments (e.g., NFC payment cards) and binding business agreements (e.g., payment fees). Scholars have studied payment services through the theoretical lens of two-sided platforms or markets that need to attract and match two types of users to create value (Evans, 2003; Rochet & Tirole, 2002, 2003b).

In the payment context, these user types are typically payers (e.g., cardholders) and payees (e.g., merchants). We adopt Hagiu and Wright's (2011, p. 2) definition for a multi-sided platform: "an organization that creates value primarily by enabling direct interactions between two (or more) distinct types of affiliated customers". Primarily, platforms coordinate and facilitate direct interactions in a controlled manner that provides the architecture and a set of rules (Eisenmann et al., 2006). In the payment context, these are efficient connections between payers and payees, which is achieved through the technical means of digital payment platforms (Evans, 2003; Rochet & Tirole, 2003a, 2003b, 2006). Research has emphasized that a payment platform's viability largely depends on whether it creates positive network effects whereby each additional user on one side (e.g., payer) adds demand on the other side (payee) (Rochet & Tirole, 2002). To ensure that initial positive network effects can occur, payment platforms mostly subsidize one side (e.g., payers with free payment instruments) to create a critical user base, which, in turn, attracts the revenue side (e.g., payees) (Eisenmann et al., 2006; Evans & Schmalensee, 2005). Figure 2 demonstrates the notion and logic of a two-sided (single-purpose) and multi-sided (multi-purpose) digital payment platform.

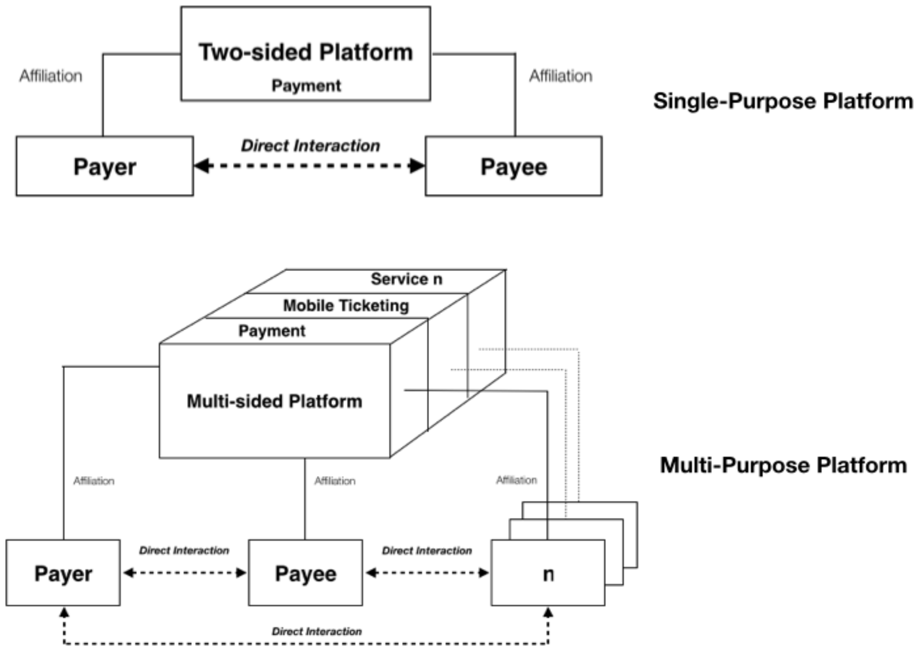


Figure 2. Two Types of Digital Payment Platforms

Evans, Hagiu, and Schmalensee (2006, p. 347) were among the first scholars to coin the term multi-sided payment platforms in studying the historical failure of "smart cards" in the U.S. payment market. Smart cards were novel and advanced payment instruments at their time. However, smart card proponents faced considerable challenges. Compared to the magnetic-stripe payment card, smart cards were more sophisticated payment instruments because they had a built-in computer chip that could store and execute Java applications. Furthermore, smart cards and their corresponding systems could use APIs. APIs enabled smart card providers to offer payment and payment-unrelated services, which gave them the ability to operate beyond the payment market. However, the initial attempt to introduce smart cards failed. The inability to mobilize a critical user base on the payment side (i.e., the lack of users with smart cards and compatible payment terminals) and on the software side (i.e., lack of software) has resulted in the classic chicken-and-egg problem.

Governance of Digital Payment Platforms

Because contemporary digital payment platforms inherently have the capability to offer multiple services to different markets, digital payment platforms face the new and challenging task of governance. In the past, payment platforms were largely closed IT systems with rigid, few, or no access points. New digital payment platforms, however, are altering this notion because they provide third parties with access opportunities via APIs. As such, platform governance, which refers to managing third parties and their corresponding services, arises (Boudreau, 2010; Ghazawneh & Henfridsson, 2013). The technical and cultural shift in providing access to previously closed financial systems has a considerable impact on platform development from an internal viewpoint and on how services are distributed. Specifically, digital payment platforms have taken the new role to consider how deep the technical involvement with third parties should be to maintain platform control and resiliency. Another question is how to distribute services that are developed by third parties (i.e., moderated or unmoderated)? Most digital payment platforms have not explored the integration and governance of third party services, which ultimately effects service variety and the entry into different markets.

To summarize, past studies have laid the conceptual foundation to understand digital payment platforms as a multi-sided phenomenon, which have the capability to distribute multiple services to different users in platform-driven markets. By supporting and distributing payment-unrelated services, digital payment platforms can enter other platform markets, which corresponds to the notion of platform envelopment (Eisenmann et al., 2011).

In extending the literature that we reference above, in Section 3, we propose a framework that incorporates the aforementioned theories and concepts. First, we showcase different platform governance schemes (i.e., platform design) based on platform development and service distribution. Secondly, we leverage on technology standards literature to understand payment instruments in regards to compatibility (i.e., technology design). Technology compatibility is key in competitive technology-driven markets because it impacts market access and one’s ability to create network effects.

Digital Payment Platform Design Framework

In this section, we present our framework (see Figure 4) that incorporates business design (i.e., platform envelopment) from Section 2 with platform design (i.e., platform governance) and technology design (i.e., technology standards). By embracing the contextual lens of digital payments, we argue that digital payment platforms can create conditions for platform envelopment by strategically designing and configuring platform - and technology-design elements to enter platform markets (i.e., business design).

We exclude payers and payees in this study because we focus on digital payment platforms and their corresponding payment instruments. We are aware that payers and payees are subject to network effects and switching and homing costs (Kazan & Damsgaard, 2013), and we realize that a payment platform is sine qua none without the payers and payees; however, we investigate the design logic of payment platforms and their corresponding instruments in achieving platform envelopment conditions. Prior studies have indeed investigated the design of digital payment platforms from different research angles (e.g., architecture, adoption patterns, platform ignition) and focused largely on the competitive dynamics *within* the *payment market* (Kazan & Damsgaard, 2014; Mallat, 2007; Ondrus, Gannamaneni, &

Lyytinen, 2015; Ozcan & Santos, 2014). However, we study specifically how digital payment platforms are designed and configured to create platform envelopment conditions to enter other existing platform markets.

Platform Design: Platform Development and Service Distribution

Digital platforms apply different types of governance schemes on third parties while interacting with them to create and capture value. To make sense of different governance schemes, we adapted Iyer and Henderson's (2010) API management framework, which is a suitable theoretical lens to analyze and understand different types of governance schemes a platform owner can apply. Figure 3 illustrates that a digital payment platform may exercise 1) monopolistic power or collaboration with third parties in developing the platform (i.e., closed or open) and 2) how platform services developed by third parties are distributed to the market (i.e., moderated or unmoderated).

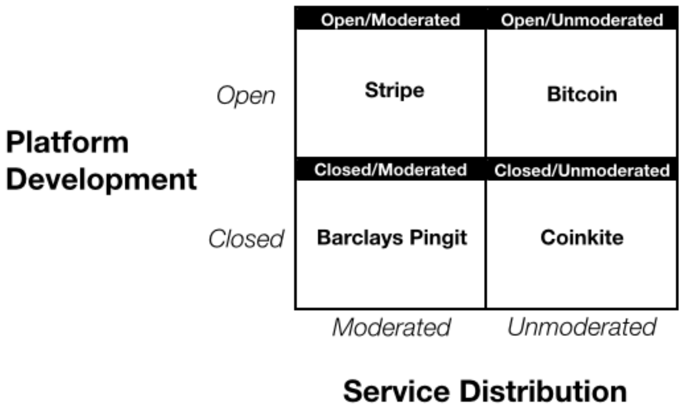


Figure 3. Platform Design

Platform development: we define platform development as the degree to which digital payment platforms and third parties co-develop and maintain a digital payment platform. Payment platforms, which follow the closed development approach, exercise monopolistic power in developing their platform and exclude third party participation. Barclays' mobile payment service "Pingit" represents such a payment platform. On the contrary, open platform development involves third parties (i.e., platform co-development). For instance, the payment start-up Stripe has a presence on GitHub.com, which is an online forum and repository service for sharing code. By being active on GitHub.com, Stripe invites third party developers to come up with new ideas and solutions to co-develop Stripe's platform further in a moderated manner.

Service distribution: we define platform service distribution as the ability and the degree of freedom that a payment platform grants third parties to distribute their own services. The moderated service distribution approach enables payment platforms to exercise control on third party service distribution. Barclays' mobile payment service Pingit, for instance, has moderated APIs, which grants authorized third parties access to their APIs. The unmoderated approach allows third parties the freedom to distribute their own services without platform approval. Coinkite, a Canadian Bitcoin merchant service that offers open and permissionless API towards third parties that does not interfere in their service provisioning, illustrates an unmoderated approach.

Based on these concepts, we can derive four different and generic platform governance schemes, which we define as platform design options (see Figure 3):

1. The open and unmoderated platform approach allows the highest degree of freedom to modify a payment platform and to distribute services without approval (e.g., Bitcoin).
2. The closed and moderated approach represents a closed system that excludes third parties from developing the platform. The distribution of third party services is moderated (e.g., Pingit).
3. The open and moderated strategy allows third parties to assist in developing the platform; however, the platform moderates service distribution (e.g., Stripe).
4. Lastly, the closed and unmoderated approach allows third parties to distribute services without approval. However, third parties cannot develop the platform (e.g., Coinkite).

Payment Platform Design Implications

Each of these four platform design options has its benefits and shortcomings. The closed and moderated approach requires a digital payment platform to have the organizational capabilities to review and distribute platform services, especially as the number of third party services grows (cf. Iyer & Henderson, 2010). Furthermore, payment platforms have to consider the risks of competing against their own user base (i.e., third parties), which may takeover valuable customer relationships (cf. Gawer & Cusumano, 2002, p. 29). The open and unmoderated approach may lead to permissionless and innovative platform developments and uncontrolled service distributions, but it bears the risk of fragmentation, which may impact the platform's reputation and its incentive to develop services (Boudreau, 2012; West & Gallagher, 2006). Platform design has an impact on the quantity, quality, and distribution of platform services, which ultimately determines how effectively the platform can acquire platform envelopment conditions on the platform-design level. Next, we portray different payment instruments, which are physical proxies and components of digital payment platforms, and discuss their implications for technology compatibility and entering the platform market.

Technology Design: Compatibility of Digital Payment Instruments

Technology standards (or dominant design) are a set of rules that provide compatibility and interoperability between different components (Chen & Forman, 2006; Weitzel, Beimborn, & König, 2006). Various payment providers compete to establish a dominant design for payment instruments to obtain a favorable market position (Besen & Farrell, 1994; Suárez & Utterback, 1995). A standardized payment instrument, which is basically a proxy of a payment platform (e.g., a payment card), allows the platform owner to reap economy-of-scale gains, gain positive network effects, and reach and serve an existing user base (e.g., merchants with their existing payment terminals). However, to establish a technology standard, temporary standard fragmentations and intended technology incompatibilities occur, which creates a competitive cycle of market inclusion and exclusion (cf. Anderson & Tushman, 1990; Utterback & Suárez, 1993).

One can classify physical devices as evolutionary or revolutionary devices in their attributes (Shapiro & Varian, 1999). Evolutionary devices offer a migration path to a new technology and have simultaneously backward compatibility to an existing standard system. The major benefit of these bridging technologies is that they allow one to access an existing user base in specific markets and set the ground for future technology transitions. For example, (plastic) payments cards are increasingly equipped with NFC chips that are evolutionary in their technology design attributes because, with them, one can make contactless payments. At the same time, NFC payment cards are backward compatible with existing payment terminals based on chips and PIN. As such, evolutionary devices exhibit the attributes of incremental innovation and, at the same time, compatibility with widely available technologies.

Revolutionary devices offer better performance and may provide a first-mover advantage. However, releasing revolutionary devices to the market is a risky endeavor. First, the technology itself may be incompatible with the prevalent industry standard and, hence, not accessible for a large user base. Second, it is uncertain whether or not a revolutionary technology design will take off to create a critical user base in the first place. In the payment context, mobile phones equipped with NFC chips have revolutionary technology-design attributes because they offer superior payment experience and functionality compared to payment cards (e.g., digital receipt management software). However, mobile payment based on NFC is incompatible with widely available chip and PIN payment terminals, which reduces market access on the merchant side. To illustrate different technology design options on the payer and payee side, Table 1 showcases four predominant payment instruments in the payment market (Smart Card Alliance, 2011). In this study, payment instruments are evolutionary in their technology design attributes, if they are compatible with widely available and existing devices between payers and payees. On the contrary, payment instruments are revolutionary in their technology design attributes, if are incompatible with widely available and existing devices between payers and payees. In this case, revolutionary technology design requires the abolishment of existing payment instruments.

Table 1. Technology Design of Payment Instruments

	Payer	**Payee**	**Technology Design (Overall Assessment)**
SMS	**Evolutionary** Mobile payment based on SMS is evolutionary and functions well with existing and ordinary mobile phones on the payer side.	**Evolutionary** SMS payments are compatible with existing payment terminals (requires software update) on the payee side.	**Implications: evolutionary** SMS payment is compatible between both sides.
QR code	**Evolutionary** Mobile payment based on QR codes is evolutionary and functions with existing (camera-based) mobile phones on the payer side.	**Evolutionary** QR code payments are compatible with existing payment terminals. (requires software update) on the payee side.	**Implications: evolutionary** QR code payments are compatible between both sides.
NFC	**Evolutionary** NFC payment cards is evolutionary and uses the existing payment card form factor. NFC mobile payment is evolutionary and uses the existing mobile phone form factor on the payer side.	Revolutionary NFC payments are incompatible with existing chip and PIN payment terminals on the payee side.	**Implications: revolutionary** NFC payment technology is incompatible between both sides. Requires strong network effects on the payee side to become a prevalent payment instrument.
Mobile Card Reader	**Evolutionary** Mobile card readers are compatible with existing payment cards (magnetic stripe or chip/PIN) on the payer side.	**Revolutionary** Mobile card readers are incompatible with existing card-based payment terminals on the payee side.	**Implications: revolutionary** Payment technology is incompatible between both sides. Requires strong network effects on the payee side to become a prevalent payment instrument.

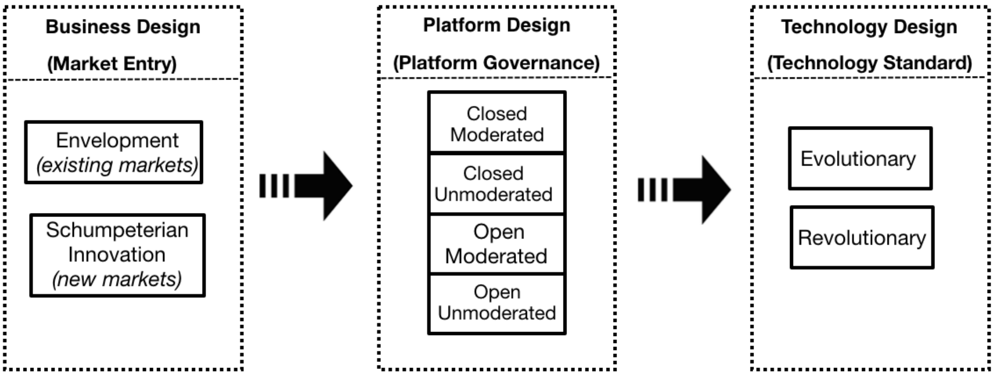
Technology Design Implications

Digital payment platforms that issue revolutionary payment instruments might benefit from a first-mover advantage to obtain a favorable market position compared to their competitors. However, platform users may be not willing to incur the high adoption and switching costs (e.g., new payment terminals on the payee side). Contrary, issuing an evolutionary payment instrument might be a safe bet to ensure market compatibility and, thus, market access. For instance, banks are predetermined to offer new NFC payment cards as an evolutionary payment instrument, as the NFC payment card with its form factor is still compatible with the prevalent card-based payment infrastructure. However, an evolutionary device strategy built on shared technology standards represents a low barrier to keep competitors at a distance.

In regards to platform envelopment, the choice of technology has additional implications for market-entry, which may serve either as an interface or obstacle to access platform markets from an operational viewpoint. Take the versatile QR code technology as an example. Many payment services leverage on the QR code technology (i.e., evolutionary technology) to offer their mobile-payment service. At the same time, the QR code technology is a standard in other industries, such as in the airline industry in the form of mobile boarding passes. Accordingly, besides considering an evolutionary or revolutionary technology design approach, the choice of certain payment technologies may impact to entry and by that the convergence of platform markets in the first place (Besen & Farrell, 1994).

Market Entry of Digital Payment Platforms Framework

To understand how business, platform and technology design are intertwined, Figure 4 overviews different design and configuration options. To reach platform envelopment conditions, a payment provider has eight possible configuration options in entering existing platform-based markets. For completeness, Schumpeterian innovation (i.e., new market creation) represents a subcategory of business design; however, it is beyond our scope here.



Business Design	Digital platforms can enter into existing platform-based markets by leveraging an 1) installed user base 2) and service bundling to create platform-envelopment conditions.
Platform Design	Platform co-development options and how platform services are distributed.
Technology Design	The technology in use that determines compatibility based on evolutionary or revolutionary payment-instrument strategies

Figure 4. Digital Payment Platform: Eight Different Design Configurations Options

In Section 4, we present our research method and eight cases, the latter of which serve as illustrative examples to demonstrate the applicability and usefulness of our proposed framework. Our framework's practicality lies in its analytical capabilities to identify commonalities and differences based on different design and configuration options for digital payment platforms.

Research Method

We synthesize and consolidate key concepts and literature into the proposed digital platform-design framework; as such, our approach is descriptive (i.e., theory type I.) and explanatory (i.e., theory type II.) in nature (Gregor, 2006). The proposed framework serves as an analytical template for our empirical data set, which we use both to understand how the three different design elements of a platform interrelate or differ in a simultaneous manner (Kochen, 1985). To answer our research question, we performed a multiple case study (Dubé & Paré, 2003; Yin, 2009) in a European setting. Employing a positivist approach, we test our proposed framework on eight cases to identify platform envelopment conditions. In so doing, we do not seek statistical generalizability but rather analytical generalizability of our proposed framework for different types of digital platforms (Yin, 2009).

The case study method has received ample attention in the IS community (Dubé & Paré, 2003), which has the advantage to answer "how" and "why" questions in situations in which the researcher has limited or no control over the study object (Yin, 2009). Because we analyze the logic of how digitals payment platforms are designed to achieve platform-envelopment conditions, a multiple case study approach is suitable. By analyzing the idiosyncrasies of different digital payment platforms, a multiple case study promises to yield more general results (Yin, 2009) for understanding complex platform, technology, and business structures.

Case Selection

We selected the cases based on several criteria: we focused on European companies that offer digital and proximity-based payment instruments, payment actors with and without prior payment experience, that provide sufficient online data to test our conceptual framework, and that have a promising future to establish digital payment platforms based on their size or support from large firms. We divided the eight cases into four categories based on their industry backgrounds. From these four categories, banks are, according to our definition, the payment incumbents, whereas the other three actors (i.e., payment start-ups, merchants and mobile network operators) are new in the payment market and act as payment envelopers. Note that the cases are illustrative examples that we use to showcase different design and configuration options of digital payment platforms.

Table 2. Eight Digital Payment Platforms

Banks	Mobile network operators	Merchants	Payment start-ups
- Swish (Sweden) - girogo (Germany)	- Orange (France) - Turkcell (Turkey)	- Yapital (Germany) - Flash'N pay (France)	- iZettle (Sweden) - Payleven (Germany)

Data Collection

We collected publicly available data from different online sources: press releases, online news and industry articles, interviews, and speeches at conferences. We searched for data via online industry and technology magazines, search engines, and social media channels using certain relevant keywords: "(NFC) mobile payment", "NFC payment card", "NFC Micro SD card", "NFC SIM card", "NFC phone payment", "mobile phone payment", "contactless payment", "QR code payments", and "payment card readers". We limited the time period to May 2011 to March 2013. Online industry and technology magazines were particularly useful since they comprehensively cover factual reports on technological developments in the retail and payment area with in-depth background knowledge and cross-checked sources. Eight European companies emerged as we collected data due to large media coverage or their being leading market actors in their original industries (e.g., the mobile network operator Turkcell) with the potential to establish a dominant digital payment design. Table 3 presents the data sources we found.

We chose Web data because the selected digital payment systems were either planned, in the pilot stage, or currently (at the time of writing) in severe competition with their rivals and because collecting primary data through interviews is too sensitive and, thereby, partially inaccessible. Nevertheless, secondary data has its merits in information systems (IS) research (cf. Ghazawneh & Henfridsson, 2013; Romano, Donovan, Hsinchun, & Nunamaker, 2003) because it avoids potential biases between interviewers and interviewees as they mutually construct data (Silverman, 2006). Furthermore, secondary data is accessible and, more importantly, verifiable through replication studies. However, to overcome potential biases in our data set, we triangulated data from various publicly available Web sources (blogs, industry- and technology-focused magazines, press releases, and payment conferences) to provide enough data for to illustrate our conceptual framework.

Table 3. Data Sources for the Analysis

Data Sources	Description

Interviews	• Four interviews with Yapital's CEO Nils Winkler:
	  • Two transcribed interviews by derhandel.de and etailment.de.
	  • Two interviews in video format by empiria group (DE) and paperJam TV (LU).
	• One transcribed interview by mobilemoneyrevolution.co.uk with Turkcell's Cenk Bayrakdar, Chief New Technology Businesses Officer.
	• One interview in video format by empiria group (DE) with Magnus Nilsson, iZettle's CFO.

Press releases	All press releases related to new payment instruments: girogo (3), Swish (5), Orange (3), Turkcell (13), Yapital (13), Flash'N pay (1), iZettle (21), and Payleven (13).
Conference	One of the authors attended the payment conference "The Nordic and Baltic CAC Mobile & NFC Conference 2013", where Swish provided insights during and after the presentation.
Online articles and reports	girogo (18), Swish (2), Orange (4), Turkcell (2), Yapital (1), Flash'N pay (6), iZettle (9), and Payleven (7) (cisco.com, computersweden.se, derhandel.de, finextra.com, geldkarte.de, gsma.com, mobilepaymentstoday.com, nfctimes.com, nfcworld.com, spiegle.de, telecompaper.com, techcrunch.com, thenextweb.com, welt.de, WSJ.com).
Local radio news	Two radio news and radio interview about girogo (DAS HITRADIO and ddp direct)

Data Analysis

We adopted a differentiated role strategy to analyze the data (Adler & Adler, 1988). The first author acted as the primary data collector and coder. He was responsible for eliciting Web data sources, developing the coding schemes, and mapping relevant quotes to each of the components in our proposed framework. Conversely, the second author played the role of the devil's advocate by coming up with alternative interpretations and counterarguments.

To begin, the first author imported the Web data as PDF and audio files into Nvivo 10, a qualitative analysis software program that allows one to collect and categorize data in a structured way. Then, the first author performed directed content analysis (Hsieh & Shannon, 2005; Potter & Levine-Donnerstein, 1999). Directed content analysis is a suitable approach when prior or existing research about a phenomenon is incomplete or requires further explanation; as such, this method helps to support or extend key concepts and theories. Based on this notion, we initially derived coding categories from existing research, which served as a theoretical guide during the analysis process.

To analyze the data, we used a coding scheme based on our conceptual framework, which we synthesized from existing literature. Furthermore, we practiced flexible coding to capture prominent and intriguing events that did not fit directly into the coding scheme. Nevertheless, flexible coding failed to yield additional components beyond the proposed framework. As part of the coding process, the first author constantly consulted with the second author about intermediate codes that emerged. Whenever disagreements surfaced, we revisited and discussed the respective codes until we reached consensus. The entire coding process followed an iterative cycle, and we finished analyzing the data only when we agreed on the placement of quotes in accordance with the proposed framework. Table 4 overviews how we coded one of the cases.

Table 4. Coding Sample

Framework element	Frequency[1]	Exemplary quote	Synthesis	Finding
Platform Design	**3**	"Putting the secure element inside the SIM adds a very powerful layer of protection," says Hakan Tatlici, Product Manager for Turkcell Wallet. "It's like having a locked draw in a desk inside a locked room. I don't think the others can compete with this." (GSMA, 2013)	The secure element on the SIM card is a proprietary area to host third party services, which allows Turkcell to control third party distribution.	Turkcell follows a closed and moderated platform design approach.
Technology Design	**8**	About SMS mobile payment: "The advantage of such a service is that it is useable by every mobile phone, so growing the available audience for Turkcell's Cuzdan mobile wallet." (Handford, 2013)	Turkcell offers SMS mobile payment, which ensures compatibility with ordinary mobile phones.	Turkcell issues evolutionary mobile payment instruments.
Business Design	**9**	"Turkcell wants to introduce more nonpayment applications, such as couponing, loyalty and offers, which it sees as vital to ensuring the success of its wallet and earning more revenue for itself." (Balaban, *2012)*	Turkcell bundles its mobile payment service with third-party services, increasing thereby its value proposition.	Through bundling, Turkcell enters into other platform markets.

Eight Digital Payment Platforms

Banks

girogo (Germany)

The saving bank group Sparkasse, one of the largest financial institutions in Germany, initially equipped 1.5 million cardholders with NFC payment cards called girogo. The proprietary chip and PIN debit card also featured a built-in NFC prepaid card with the NFC payment functionality's tied to the prepaid payment mode. On the merchant side, girogo payment cards are compatible with existing chip and PIN payment terminals, but the NFC functionality stays dormant. Nevertheless, the NFC rollout was accompanied by several retailers from various industries (e.g., gas stations to grocery stores) who showed their support by replacing old terminals with new girogo-compatible ones (i.e., 12000 girogo-compatible payment terminals by March 2015 of 720K in total in Germany (European Central Bank, 2012, p. 94)). To increase girogo's value proposition further, the Sparkassen group teamed up with a small number of soccer clubs to bundle soccer season tickets with girogo payment cards, which allows soccer fans to enter the stadium and make NFC payments at soccer games.

[1] Number of relevant codes from data sample for a single case.

Swish (Sweden)

Swish is a SMS-based mobile payment solution by a Swedish bank consortium comprising the six largest banks in Sweden: Danske Bank, Handelsbanken, Länsförsäkringar Bank, Nordea, SEB, and Swedbank. By joining their forces, Swish has the ability to reach 94 percent of Swedish bank customers. Swish is a mobile-payment application for Android, iOS, and Windows mobile phones and enables individuals and merchants to make mobile payments between themselves. Swish users (i.e., individuals and businesses) are asked to connect their mobile phone numbers with their existing bank accounts, which brings the convenience that money is directly transferred to existing bank accounts and avoids any intermediaries. Feature phones, which cannot install the Swish application, are still compatible with the Swish payment platform though limited in their functionality in receiving payments. To date, Swish is purely a mobile payment service without third party services and payment terminal integrations. In the latter case, merchants accept Swish payments through their existing mobile phones.

Mobile Network Operators

Orange (France)

"Mobile NFC & Orange Money" is a proprietary NFC service by Orange, which is technically built on NFC SIM cards. The mobile network operator issues circa five million new and replacement post-paid SIM cards each year in hopes to equip 27 million customers with new payment instruments over the following years. Orange emphasized that it does not have the ambition to roll out its own payment service; rather, it considers itself a universal NFC hub for different contactless services. In doing so, Orange depends on agreements with third party NFC providers, such as banks or public transport firms, to be a viable NFC mobile platform service. On the merchant side, there are currently 300,000 contactless payment terminals deployed (circa 1.8 million in total in France (European Central Bank, 2012, p. 94)), and future payment terminals will be equipped with NFC functionalities.

Turkcell (Turkey)

In cooperation with the Turkish Yapi Kredit Bank and MasterCard, Turkcell, the largest mobile network operator in Turkey with more than 34 million customers, launched its mobile-payment initiative called Turkcell Cüzdan (Wallet), a mobile-payment service based on NFC. Initially, Turkcell issued smartphones with built-in NFC chips that the Chinese handset manufacturer Huawei produced. For subscribers who do not own NFC phones, NFC SIM cards served as a workaround solution. However, Turkcell acknowledged that the NFC rollouts were taking longer than expected. To accelerate the adoption, Turkcell started to offer a SMS person-to-person (P2P) payment service for mobile phones. In this context, mobile phone numbers serve as accounts to settle payments among users or to withdraw cash at ATMs. On the merchant side, Turkcell benefited from an existing NFC payment terminal infrastructure (66,000 units[2], 2.1 million terminals in total (Bank for International Settlements, 2013, p. 382)). Banks and terminal providers hope to increase units up to two million over the next few years. Turkcell has been successful in teaming up with third parties, such as Turkish banks (e.g., Akbank, Denizbank, İşbankası or Yapi Kredi, Garanti Bank), to host their contactless services on Turkcell's proprietary NFC SIM card. Turkcell is like Orange France only an NFC hub for these payment services:

[2] https://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns1058/Cisco_Turkcell_CS.pdf

Turkcell does not offer its own payment service. Besides payments, Turkcell increases its value proposition by hosting loyalty programs or location-based deals that inform subscribers about nearby deals. From these promotions, Turkcell receives a commission of 10 percent for each purchased deal. Turkcell's business model is based on a SIM rental model that charges NFC service providers a monthly fee for hosting their NFC applications.

Merchants

Yapital (Germany)

OTTO, the second-largest online retailer after Amazon, launched its own payment solution called Yapital, which is a mobile payment service based on QR codes. Yapital's mobile payment platform is specifically designed to be compatible with the existing payment terminals and smartphones. By updating the software of ordinary chip and PIN payment terminals to display QR codes, updated payment terminals are capable of processing Yapital payments. To date, the Görtz Group (shoe chain), SportScheck (sport equipment), and Baur (online fashion and furniture store)—all subsidiaries of the OTTO Group—accept Yapital. Furthermore, the parent company of Yapital acquired the mobile commerce company NuBon, which is a specialist for mobile loyalty and couponing. NuBon and Yapital have announced their intention to exchange their know-how to offer a better and richer payment experience. At this stage, Yapital has acted solely as a mobile payment service without any third party involvement.

Flash'N pay (France)

The Auchan group, a French multinational retail group, developed and launched a QR code-based mobile-payment solution called Flash'N pay. Auchan hopes to create a mobile-payment standard across the French retail industry by inviting other retailers to adopt Flash'N pay. Developed for iOS handsets, Flash'N pay asks users to link their bank accounts and loyalty cards with it. To initiate payment transactions, customers can scan QR codes at existing payment terminals. Users are also free to choose to store any card by simply scanning the barcode of loyalty cards. Auchan emphasizes that its mobile-payment service is an independent solution and compatible with existing payment terminals (i.e., after a software update), which allows them to circumvent the control of mobile network operators by using the open QR code technology.

Payment Start-ups

iZettle (Europe)

The Swedish payment start-up iZettle, known as the "Square of Europe", offers affordable mobile-payment card readers aimed at merchants. The initial service is based on chip card readers (signature for authentication) that transforms existing iOS and Android mobile devices into mobile payment terminals by simply plugging the card reader into the headphone jack. In February 2013, iZettle launched a more secure version of its mobile card reader that supports chip and PIN payments, a common payment method in Europe. The new card reader with a built-in keypad establishes via Bluetooth a connection with ordinary mobile phones to process chip and PIN payments. To increase its payment ecosystem further, iZettle offers permission-based APIs, which allows third party developers to integrate iZettle's payment functionalities into their own mobile applications. In this setting, iZettle processes payments in the background.

Payleven (Europe)

Payleven is a Berlin-based payment start-up. Like its rival iZettle, Payleven offers mobile card readers for Android and iOS mobile devices based for chip and PIN payments. As a side note, Payleven and iZettle use the same payment hardware, which is a white-label solution from the same vendor. Payleven also offers permission-based APIs that allows developers to integrate Payleven payment functionalities into third party own apps.

Comparative Case Analysis

In Table 5, we analyze the cases to identify similarities and differences. The proposed framework (see Figure 4) serves as our analytical lens to obtain insights into how digital payment platforms are designed and configured that create conditions for platform envelopment.

Table 5. The Design and Configuration of Eight Digital Payment Platforms

Business Design	Platform Design	Technology Design	Industry Configuration
girogo			**Banks** **Business design** In general, banks' payment platforms have the capability to enter other platform markets **Platform design** Closed **Technology design** Evolutionary
Market Entry: NFC hub girogo enters into the NFC service provisioning market by leveraging its existing user base. (Multi-sided payment platform)	**Closed & moderated** girogo controls platform development (closed) and controls third party service distribution (moderated).	**Evolutionary** The NFC payment card is compatible with existing chip and PIN terminals and uses the standard payment card form factor.	
Swish			
Market entry: not present Swish operates only in the payment market. (Two-sided payment platform)	**Closed** Swish's controls platform development (closed). Being solely a payment service, there is no third party service distribution.	**Evolutionary** The mobile payment app (SMS) is compatible with existing mobile phones.	
Orange			**Mobile network operators** **Business Design** Both mobile network operators enter into the market of moderating NFC services **Platform Design** Closed & moderated **Technology Design** Revolutionary
Market entry: NFC hub Orange enters into the NFC service provisioning market by leveraging its existing user base. (Multi-sided payment platform)	**Closed & moderated** Orange controls platform development (closed) and controls third party service distribution (moderated).	**Revolutionary** Mobile payments based on NFC-SIM cards are incompatible with chip and PIN payment terminals.	
Turkcell			
Market entry: NFC hub Turkcell enters into the NFC service provisioning market by leveraging its existing user base. (Multi-sided payment platform)	**Closed & moderated** Turkcell controls platform development (closed) and controls third party service distribution (moderated).	**Revolutionary** Mobile payments based on NFC-SIM cards are incompatible with chip & PIN payment terminals.	
Yapital			**Merchants** **Business design** Flash'N pay enters the marketing market. However, both parent companies enter
Market entry: not present Yapital operates only in the payment market. (Two-sided payment platform)	**Closed** Yapital controls platform development (closed). Being solely a payment service, there is no third party service distribution	**Evolutionary** Mobile payment based on QR-Codes is compatible with existing payment terminals and camera-based mobile phones.	

Flash‘N pay			from the retail to the payment market. **Platform design** Closed **Technology design** Evolutionary
Market entry: marketing Flash‘N pay’s enters the marketing market with loyalty card offerings. (Multi-sided payment platform)	**Closed & unmoderated** Flash‘N pay controls platform development (closed). The distribution of loyalty cards does not require approval (unmoderated).	**Evolutionary** Mobile payment based on QR codes is compatible with existing payment terminals and camera-based mobile phones.	
iZettle			**Payment start-ups** **Business design** As new actors in the payment market, payment start-ups have not entered other platform markets, **Platform design** Closed & moderated **Technology design** Revolutionary
Market entry: not present iZettle operates only in the payment market. (Two-sided payment platform)	**Closed & moderated** iZettle controls platform development (closed) and controls third party services distribution (moderated).	**Revolutionary** iZettle’s mobile card readers are incompatible with chip & PIN payment terminals.	
Payleven			
Market entry: not present Payleven operates only in the payment market. (Two-sided payment platform)	**Closed & moderated** Payleven controls platform development (closed) and controls third party service distribution (moderated).	**Revolutionary** Payleven’s mobile card readers are incompatible with chip & PIN payment terminals.	
Business design Four of the eight digital payment platforms enter into other existing platform markets.	**Platform design** Closed and moderated is the dominant platform design approach among payment platforms.	**Technology design** Technology design is balanced between evolutionary & revolutionary payment instruments.	

Discussion

By embracing platform envelopment as our theoretical lens (Eisenmann et al., 2011), we study how digital payment platforms are designed and configured to enter other platform markets. We analyze eight digital payment platforms, six of which originate from different industries or were new actors in the payment market. We glean insights about how platforms are developed (i.e., closed or open) and how services are distributed (i.e., moderated or unmoderated), which we label under the umbrella term “platform design”. In addition, we study the payment instruments, which are physical proxies of digital payment platforms in regards to technology compatibility, which we label under the umbrella term “technology design”. Table 6 illustrates the findings from the studied cases. Key findings are that multi-sided payment platforms enter into adjacent platform markets to exploit new business opportunities. In so doing, these market entries simultaneously attempt to support and reinforce existing market positions in their core markets. For instance, girogo, Orange, and Turkcell entered into the NFC service market, which, in turn, supports their respective platforms, payment instruments (payment card and mobile phones), and, thus, their position in their core markets. Lastly, evolutionary payment instruments that are compatible with existing infrastructures within different platform markets supports firms create positive platform envelopment conditions because it bridges users from core to adjacent platform markets. Payment as a service acts as the binding glue to connect core and adjacent platform markets.

Table 6. The Design and Configuration of Eight Payment Platforms

	Two-sided payment platforms (Swish, Yapital, iZettle, Payleven)	**Multi-sided payment platforms** (girogo, Orange, Turkcell, Flash'N pay)
Business Design	**Platform market entry: non-existent** The design and the configuration of all two-sided digital payment platforms do no support platform envelopment. Accordingly, conditions to enter other platform markets are not given.	**Platform market entry: NFC hub, marketing** The design and configuration of all multi-sided digital payment platforms support conditions for platform envelopment to enter other platform markets. **Identified markets:** • NFC Hub: girogo, Orange, Turkcell • Loyalty Marketing: Flash'N pay
Platform Design	**Platform development: closed (4x)** All two-sided payment platforms have a closed development approach, hence excluding third parties from co-development opportunities.	**Platform development: closed (4x)** All multi-sided digital payment platforms have a closed development approach, hence excluding third parties from co-development opportunities.
	Platform service distribution: moderated (2x) Two of the two-sided payment platforms have a moderated approach in regards to platform access and service distribution: • Moderated: iZettle, Payleven	**Platform Service Distribution: moderated (3x) & unmoderated (1x)** Three of the four multi-sided payment platforms have a moderated approach regarding platform access and service distribution, and one is unmoderated: • Moderated: girogo, Orange, Turkcell • Unmoderated: Flash'N pay
Technology Design	**Evolutionary (2x) and revolutionary (2x)** Two of the two-sided payment platforms issue evolutionary devices (i.e., SMS, QR code mobile payment) that are compatible between payers and payees. The other two-sided digital payment platforms issue revolutionary devices (i.e., payment dongles) that are incompatible on the payee side. • Revolutionary: iZettle and Payleven • Evolutionary: Swish and Yapital	**Evolutionary (2x) and Revolutionary (2x)** Two of the multi-sided payment platforms issue evolutionary devices (i.e., NFC payment card, QR-Code mobile payment) that are compatible between payers and payees. The remaining multi-sided payment platforms issue revolutionary devices (NFC mobile payment) that are incompatible on the payee side. • Revolutionary: Orange, Turkcell • Evolutionary: girogo, Flash'N pay

In Sections 6.1 to 6.2.3, we discuss the insights from the Table 6 about how technology and platform design impact firms' ability to enter other platform markets (i.e., business design).

Technology Design

Four of the eight payment platforms follow an evolutionary technology-design approach that supports users to adopt new payment instruments with relatively low switching costs (Eisenmann et al., 2006; Shapiro & Varian, 1999). The issuance of evolutionary payment instruments, in turn, enables the platform owner to extend the control over an existing user base. Furthermore, the findings suggest that industry background determines the type of payment instruments: new payment actors with no prior experiences in the payment market (i.e., payment start-ups and mobile network operators) have the tendency to issue revolutionary payment instruments. Contrary, actors with payment expertise in their daily operations (i.e., banks and merchants) support evolutionary payment instruments.

One can argue that banks and merchants prefer payment instruments that are highly compatible and accessible with their current payment infrastructure to reduce adoption costs and, thus, reinforce existing customer and business structures. Contrary, mobile network operators and payment start-ups issue payment instruments that are relatively incompatible with the existing payment infrastructure, especially on the payee side.

For instance, girogo's NFC payment card is particularly evolutionary because it is highly compatible with existing ATMs and chip and PIN payment terminals. On the other hand, payment solutions by the mobile network operators and payment start-ups are incompatible with current chip and PIN payment terminals on the payee side. One can argue that mobile network operators and payment start-ups pursue a deliberate revolutionary technology design strategy to lock-in their newly created user bases. Banks and merchants, on the other hand, pursue rather an evolutionary technology design strategy to maintain and grow their existing user bases.

Implications for Business Design

Controlling and leveraging an existing user base is a precondition for platform envelopment. The findings suggest that girogo and Flash N' pay have created the best conditions for platform envelopment. These two payment platforms equip their large and existing user bases on the payer and payee side with accessible and evolutionary payment instruments, which creates conditions to bridge users into the NFC hub market (girogo) or loyalty card market (Flash'N pay). Payment platforms that issue revolutionary payment instruments (i.e., mobile network operators, payment start-ups) face challenges in achieving similar platform-envelopment conditions because they lack the access and leverage of an installed user base, especially on the payee side. Additional findings suggest that the type of payment instruments determine market accessibility in the first place. Payment instruments based on NFC are suitable to serve contactless dominated markets, such as ticketing, which girogo illustrates (soccer season tickets). Alternatively, QR code-based payment instruments are more amenable to optical reader- and display-dominated markets such as the (online) retail and marketing industry (see, for example, Flash'N pay).

To summarize, using evolutionary payment instruments supports platform envelopment conditions in regards to technology design. Moreover, strategically choosing and using certain payment instruments (e.g., NFC or QR codes) impacts firms' platform envelopment capabilities to enter specific markets.

Platform Design

Platform Development

The findings suggest that all eight payment platforms exercise closed platform development, which provides monopolistic power about how their platforms advance regarding functionality and governance. One can argue that a closed platform-development approach fulfills a firm's need to exercise control over current and future value streams, reduce platform and service fragmentation. Alternatively, payment platforms simply lack organizational capabilities and resources to accommodate third parties. Lastly, payment service providers are highly regulated organizations (e.g., anti-money-laundering laws, security), which impacts the degree and number of platform co-development instances in the first place.

Platform Service Distribution

Six of the eight payment platforms offer platform access to third parties; however, the quality and type of service distribution differs. Among the two-sided payment platforms, only payment start-ups practice service distribution, however, payment start-ups exclude any service offered by third parties. More specifically, payment start-ups grant rather co-distribution rights for their own payment services (i.e., moderated). For example, iZettle and Payleven authorize app developers to make use of their payment APIs, which helps them to extend their footprint in the payment market.

Contrary, multi-sided payment platforms integrate and distribute third party services. These platforms predominantly use a moderated service-distribution approach (e.g., see girogo, Orange, and Turkcell). A moderated service-distribution approach may allow firms to select complementary services to increase overall platform value as with girogo (i.e., ticketing) and Turkcell (i.e., mobile location-based deals). Flash'N pay's merchant solution differs. Flash'N pay has an unmoderated service distribution approach that does not require approval because Flash‘N pay grants one the freedom to store any loyalty card. This kind of configuration may support Flash‘N pay’s intended data-collection efforts in the loyalty card market.

Our findings suggest that two-sided payment platforms primarily seek to operate and grow in the payment market and, accordingly, support design measures to achieve these goals. Thus, two-sided payment platforms are inherently designed and configured to operate in the payment market. Contrary, multi-sided payment platforms are inherently designed and configured to support payment-unrelated services, which corresponds with the notion of platform envelopment.

Implications for Business Design

To achieve platform envelopment conditions on the platform-design level, payment platforms need the necessary organizational and technical capabilities to incorporate and distribute payment-unrelated services to a large user base. In this study, girogo and Flash‘N pay have created the best conditions for platform envelopment on the platform design level. First, girogo and Flash‘N pay distribute payment-unrelated services to a ready-made user base. Second, girogo and Flash‘N pay effectively distribute their payment unrelated services to their user base by leveraging on accessible and evolutionary payment instruments. Orange and Turkcell distribute payment-unrelated services as well. However, they do not create platform envelopment conditions as well as girogo and Flash‘N pay do. Because they issue revolutionary payment instruments, which limits service delivery to existing users especially on the payee side.

To summarize, closed platform development and moderated/unmoderated platform service distribution are design options and configurations that support platform envelopment conditions on the platform-design level. The current design and configuration of two-sided payment platforms do not support platform envelopment conditions, as they are purposefully designed to operate in the payment market.

Theoretical and Practical Implications

We contribute to the literature on multi-sided platforms (Hagiu & Wright, 2011; Rochet & Tirole, 2002, 2003a, 2003b, 2006), technology standards (Besen & Farrell, 1994; Shapiro & Varian, 1999; Tassey, 2000; West & Dedrick, 2000), and platform market entry (Eisenmann et al., 2011) by proposing a framework to study the design and configuration of digital payment platforms and how these firms create conditions for platform envelopment.

Our findings are novel in that they suggest that, due to technological advancements in the digital payment space, one can conceptually extend the notion of two-sided payment platforms (i.e., single-purpose platforms) (Rochet & Tirole, 2002, 2003a) to multi-sided payment platforms (i.e., multi-purpose platforms). Multi-sided payment platforms can create platform envelopment conditions through strategic design and configurations while supporting multiple services. Our results illustrate that multi-sided payment platforms create conditions for platform envelopment by leveraging on (1) evolutionary payments instruments and (2) payment services as means to bridge users from core to adjacent platform markets. In so doing, core and adjacent platform markets reciprocally support each other, which, in turn, strengthen firms’ market positions in their respective core markets. We are not aware of prior work that has specifically studied the design and configuration of digital payment platforms in terms of platform market entry. As such, this paper provides a conceptual contribution to better describe and understand contemporary digital payment platforms and their market-entry options. Moreover, we help practitioners make decisions by increasing their awareness of different digital platform design and configurations options they have to enter other platform markets. For instance, managers can evaluate strategies for alternative platform configurations as digital payment platforms evolve and mature over time (e.g., extending their platform design towards open and moderated to create a valuable platform ecosystem).

Future Research
Future research could study different payment platform design and configurations to understand successful platform-envelopment strategies. Because our conceptual framework illustrates correlational relationships among the platform elements, future research could study the causality between platform governance, technology compatibility, and overlapping users to prescribe effective platform market entries. Lastly, research could also explore the different layers of payment platforms (Yoo et al., 2010). Mobile payment platforms consist of various technology layers that are provided by handset makers, app stores, and communication networks, which may impact platform envelopment capabilities.

Limitations
This paper has certain limitations. We adopt a platform-centric view, which does not cover an analysis about users, in-depth hardware specifications, or security requirements that may have an impact on market entries. Furthermore, because we only used triangulated data based on secondary sources, the proposed framework does not create theoretical generalizability. Nevertheless, we believe that this paper is a small but a concrete step to outline fruitful research avenues in the domain of multi-sided payment platforms. Another aspect that may reduce the framework's validity is that almost all presented cases were in their pilot stages; thus, current settings (e.g., partnerships or technology) may change in the future. In addition, we could not study actual clashes between different platforms and third party services that may hijack customer relationships. Studying tensions would provide valuable insights into the dynamics of platform control and platform envelopment.

Conclusion

This paper presents a conceptual framework that we distilled from existing literature to understand and explain the design and configuration of digital payment platforms and how payment platforms create conditions to enter other platform markets through platform envelopment. To provide an answer to our research question, we performed a multiple and comparative-case study in a European setting by using our framework as an analytical lens to identify similarities and differences among the cases. By synthesizing our observations, we identify that digital payment platforms enter into adjacent platform markets (i.e., business design), which is driven by platform design (i.e., platform development and service distribution) and technology design (i.e., the issuance of evolutionary and revolutionary payment instruments. The findings suggest that multi-sided payment platforms leverage on (1) evolutionary payment instruments and (2) payment services as a mean to bridge users from core to adjacent platform markets. In so doing, platform envelopment strengthens firms' market position in their respective core markets.

References

Adler, P. A., & Adler, P. (1988). Intense loyalty in organizations: A case study of college athletics. *Administrative Science Quarterly, 33*(3), 401-417.

Anderson, P., & Tushman, M. L. (1990). Technological discontinuities and dominant designs: A cyclical model of technological change. *Administrative Science Quarterly, 35*(4), 604-633.

AngelList. (2015). Markets/mobile payments startups. Retrieved from https://angel.co/mobile-payments

Balaban, D. (2012). Turkey's top telco plans major NFC push in 2012, but faces challenges. *NFC Times.* Retrieved from http://nfctimes.com/news/turkey-s-top-telco-plans-major-nfc-push-2012-faces-challenges

Bank for International Settlements. (2013). *Statistics on payment, clearing and settlement systems in the CPSS countries.* Retrieved from http://www.bis.org/publ/cpss116.pdf

Besen, S. M., & Farrell, J. (1994). Choosing how to compete: Strategies and tactics in standardization. *The Journal of Economic Perspectives, 8*(2), 117-131.

Boudreau, K. (2010). Open platform strategies and innovation: Granting access vs. devolving control. *Management Science, 56*(10), 1849-1872.

Boudreau, K. J. (2012). Let a thousand flowers bloom? An early look at large numbers of software app developers and patterns of innovation. *Organization Science, 23*(5), 1409-1427.

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

Chen, P.-Y, & Forman, C. (2006). Can vendors influence switching costs and compatibility in an environment with open standards? *MIS Quarterly*, *30*(1), 541-562.

Chen, P.-Y., & Hitt, L. M. (2002). Measuring switching costs and the determinants of customer retention in Internet-enabled businesses: A study of the online brokerage industry. *Information systems research, 13*(3), 255-274.

Christensen, C. M., & Bower, J. L. (1996). Customer power, strategic investment, and the failure of leading firms. *Strategic Management Journal, 17*(3), 197-218.

D'Aveni, R. A., Canger, J. M., & Doyle, J. J. (1995). Coping with hypercompetition: Utilizing the new 7S's framework. *The Academy of Management Executive, 9*(3), 45-60.

Dubé, L., & Paré, G. (2003). Rigor in information systems positivist case research: Current practices, trends, and recommendations. *MIS Quarterly*, *27*(4), 597-636.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal, 21*(10-11), 1105-1121.

Eisenmann, T., Parker, G., & Van Alstyne, M. (2006). Strategies for two-sided markets. *Harvard Business Review, 84*(10), 92-101.

Eisenmann, T., Parker, G., & Van Alstyne, M. (2011). Platform envelopment. *Strategic Management Journal, 32*(12), 1270-1285.

European Central Bank. (2012). *Payments statistics*. Retrieved from http://sdw.ecb.europa.eu/reports.do?node=1000004051

European Commission. (2009). *E-money directive* (2009/110/EC). Retrieved from http://ec.europa.eu/internal_market/payments/emoney/index_en.htm

Evans, D. S. (2003). Some empirical aspects of multi-sided platform industries. *Review of Network Economics, 2*(3), 191-209.

Evans, D. S., Hagiu, A., & Schmalensee, R. (2006). *Invisible engines*. Cambridge, MA: The MIT Press.

Evans, D. S., & Schmalensee, R. (2005). *Paying with plastic: The digital revolution in buying and borrowing*. Cambridge, MA: The MIT Press.

Gawer, A., & Cusumano, M. A. (2002). *Platform leadership*. Boston, MA: Harvard Business School Press

Gawer, A., & Henderson, R. (2007). Platform owner entry and innovation in complementary markets: Evidence from Intel. *Journal of Economics & Management Strategy, 16*(1), 1-34.

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

Gregor, S. (2006). The nature of theory in information systems. *MIS Quarterly, 30*(3), 611-642.

GSMA. (2013). *Case study: Turkcell Mobile Wallet*. Retrieved from http://www.gsma.com/mobilecommerce/wp-content/uploads/2013/10/MOBILE-WALLET-CASE-STUDY-TURKCELL-V3.pdf

Hagiu, A., & Wright, J. (2011). *Multi-sided platforms* (working paper). Harvard Business School Division of Research.

Handford, R. (2013). Turkcell takes NFC swipe at China Mobile. *Mobile World Live*. Retrieved from http://www.mobileworldlive.com/turkcell-china-mobile-weve-got-cheap-nfc-handsets

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

Iyer, B., & Henderson, J. C. (2010). Preparing for the future: Understanding the seven capabilities cloud computing. *MIS Quarterly Executive, 9*(2), 117-131.

Katz, M. L., & Shapiro, C. (1985). Network externalities, competition, and compatibility. *American Economic Review, 75*(3), 424-440.

Kazan, E., & Damsgaard, J. (2013). *A framework for analyzing digital payment as a multi-sided platform: A study of three European NFC solutions*. Paper presented at the the European Conference on Information Systems, Ulrecht.

Kazan, E., & Damsgaard, J. (2014). *An investigation of digital payment platform designs: A comparative study of four European solutions.* Paper presented at the Proceedings of the European Conference on Information Systems, Tel Aviv, Israel.

Kochen, M. (1985). Are MIS frameworks premature? *Journal of Management Information Systems, 2*(3), 92-100.

Mallat, N. (2007). Exploring consumer adoption of mobile payments—a qualitative study. *The Journal of Strategic Information Systems, 16*(4), 413-432.

Nalebuff, B. (2004). Bundling as an entry barrier. *The Quarterly Journal of Economics, 119*(1), 159-187.

Ondrus, J., Gannamaneni, A., & Lyytinen, K. (2015). The impact of openness on the market potential of multi-sided platforms: A case study of mobile payment platforms. *Journal of Information Technology*, *30*, 260-275.

Ozcan, P., & Santos, F. M. (2014). The market that never was: Turf wars and failed alliances in mobile payments. *Strategic Management Journal*, *36*(10), 1486-1512.

Porter, M. E. (1980). *Competitive strategy: Techniques foranalyzing industries and competitors.* New York: The Free Press.

Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance*. New York: The Free Press.

Potter, W. J., & Levine-Donnerstein, D. (1999). Rethinking validity and reliability in content analysis. *Journal of Applied Communication Research*, *27*, 258-284.

Rochet, J.-C., & Tirole, J. (2002). Cooperation among competitors: Some economics of payment card associations. *RAND Journal of Economics*, *33*(4), 549-570.

Rochet, J.-C., & Tirole, J. (2003a). An economic analysis of the determination of interchange fees in payment card systems. *Review of Network Economics*, *2*(2), 39-79.

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

Rochet, J.-C., & Tirole, J. (2006). Two-sided markets: A progress report. *RAND Journal of Economics, 37*(3), 645-667.

Romano, N. C., Donovan, C., Hsinchun, C., & Nunamaker, J. F. (2003). A methodology for analyzing Web-based qualitative data. *Journal of Management Information Systems, 19*(4), 213-246.

Schumpeter, J. A. (1962). *Capitalism, socialism and democracy*. New York: Harper & Row.

Shapiro, C., & Varian, H. R. (1999). The art of standards wars. *California Management Review, 41*(2), 8-32.

Silverman, D. (2006). *Interpreting qualitative data: Methods for analyzing talk, text and interaction*. Thousand Oaks, CA: Sage.

Smart Card Alliance. (2011). *The mobile payments and NFC landscape: A U.S. perspective*. Retrieved from http://www.smartcardalliance.org/resources/pdf/Mobile_Payments_White_Paper_091611.pdf

Stabell, C. B., & Fjeldstad, Ø. D. (1998). Configuring value for competitive advantage: On chains, shops, and networks. *Strategic Management Journal, 19*(5), 413-437.

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

Tassey, G. (2000). Standardization in technology-based markets. *Research Policy, 29*(4-5), 587-602.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*(7), 509-533.

Utterback, J. M., & Suárez, F. F. (1993). Innovation, competition, and industry structure. *Research Policy, 22*(1), 1-21.

Verifone. (2012). Verifone and PayPal Sign Pact to Bring Alternative Payments to Large Retailers. Retrieved from http://global.verifone.com/company/press-room/press-releases/2012/verifone-and-paypal-sign-pact-to-bring-alternative-payments-to-large-retailers/

Weitzel, T., Beimborn, D., & König, W. (2006). A unified economic model of standard diffusion: The impact of standardization cost, network effects, and network topology. *MIS Quarterly*, *30*(1), 489-514.

West, J., & Dedrick, J. (2000). Innovation and control in standards architectures: The rise and fall of Japan's PC-98. *Information Systems Research, 11*(2), 197-216.

West, J., & Gallagher, S. (2006). Challenges of open innovation: the paradox of firm investment in open-source software. *R&D Management*, *36*(3), 319-331.

Yin, R. K. (2009). *Case study research: Design and methods* (Vol. 5). Thousand Oaks, CA: Sage.

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

Paper 2 – JTAER

Towards a Framework of Digital Platform Competition: A Comparative Study of Monopolistic & Federated Mobile Payment Platforms

Abstract

This paper advances a framework for examining the competitive principles of mobile payment platforms. We postulate that the strategic interplay of platform layers will drive the competitive dynamics of platform-driven ubiquitous systems. This framework has been employed in a comparative case study between monopolistic (i.e., Pingit) and federated (i.e., Paym) mobile payment platforms to illustrate its applicability and yield principles on the nature and impact of competition among platform-driven ubiquitous systems. Preliminary findings indicate that monopolistic mobile digital platforms attempt to create unique configurals to obtain monopolistic power by tightly coupling platform layers, which are difficult to replicate. Conversely, federated digital platforms compete by dispersing the service layer to harness the collective resources from individual firms. Furthermore, the interaction and integration among platform layers give rise to commodity and value platform layers that translate into competitive battlegrounds among mobile payment services. This paper therefore represents a concrete step in unraveling the competitive dynamics of platform-driven ubiquitous systems from an architectural viewpoint.

Keywords: Digital platforms, layered modular architecture, Mobile payment, Centralized and distributed governance, Ubiquitous systems, UK payment industry

A version of the paper is published as Kazan, E., Tan, C.W. and Lim, E.T.K. (2016). Towards a Framework of Digital Platform Competition: A Comparative Study of Monopolistic & Federated Mobile Payment Platforms, Journal of Theoretical and Applied Electronic Commerce Research.

1 Introduction

Platformization of information technology (IT) has cultivated business ecosystems [2] that challenge the predominant business logics of traditional market structures. At its core, digital platforms mediate the production and consumption of goods and services (e.g., payment) in an efficient manner [45], [47]. As is apparent from the well-publicized cases of Apple's iTunes, iPhone and the App Store [cf. 0), [28], [30], [50], digital platforms not only possess the capability to deconstruct once vertically integrate value chains, but they also erode the viability of incumbents' business models at an unprecedented speed [20], [23], [39].

Increasingly, digitized goods and services are being distributed through ubiquitous computing systems in the form of mobile devices. As digital platforms and mobile devices become technologically intertwined, the latter typically function as physical proxies of the former. Together, digital platforms and their corresponding proxies resemble *platform-driven ubiquitous systems* that facilitate seamless access to cross-channel goods and services in order to aid users in accomplishing a multitude of tasks. As an illustration, the Android mobile operating system is reflective of a platform-driven ubiquitous system that encourages the creation and delivery of goods and services, which are interoperable across multiple devices. In other words, digital platforms constitute the technical foundation for realizing ubiquitous systems. An in-depth appreciation of digital platforms and their corresponding proxies is thus necessary to comprehend how ubiquitous systems emerge and compete.

As digital platforms constitute the technical foundation for ubiquitous systems, they tend to differentiate and compete on two key fronts: (1) architectural, and; (2) deliverables. Digital platforms differ considerably in their architectural design and configuration in the *delivery* of ubiquitous platform-driven services. Arguably, certain architectural designs and configurations might be more efficient (e.g., high level of vertical integration) due to their competitive and/or generative capabilities. This architectural differentiation, in turn, has an impact on the *attributes* of the delivered platform services (e.g., app user experience). In so doing, digital platforms are confronted with the challenge of striking an equilibrium between internal *stability* to ensure system resilience, and external *usability* to address ever-changing customer needs in the market (cf. 0). Accordingly, platform providers offering ubiquitous services are compelled to design and configure their digital platforms in a dualistic manner that balances technological flexibility and reliability in order to derive business value.

Platform-driven ubiquitous systems are predominant in the payment industry as well. With the emergence of mobile payment platforms, which are layered modular architectures offering payment services [57], payers and payees can be connected via mobile devices. Mobile devices basically serve as location-independent platform proxies. Although mobile payment is not a recent phenomenon, it is deemed as a novelty that has gained a recent foothold in European markets. For instance, Apple Pay was launched in Summer 2015 in the UK [7]. The delay can be attributed to the existence of well-accepted payment systems in Europe so much so that mobile payment solutions, which were introduced before, did not deliver a convincing value preposition, or that disagreements among stakeholders slowed the rollout of mobile payments services [42].

The number of users and transaction volumes for mobile payment services are growing steadily. For instance, in 2014, 3% of UK adults performed in-store mobile payment, and this figure rose to 13% in 2015 [22]. An outcome of this popular trend is that the mobile payment market becomes increasingly fragmented and competitive. To keep rivals at a distance, mobile payment providers usually strive for innovation to differentiate themselves. Yet, despite the growing prevalence of mobile payment services, there is a paucity of studies that has examined how mobile payment platforms, or more broadly, how *platform-driven ubiquitous systems* compete in the market, especially from an architectural viewpoint.

This paper hence advances a framework for unraveling the competitive logic of platform-driven ubiquitous systems. To do so, we embrace a granular view on mobile payment platforms and their corresponding proxies. Specifically, we expand on the work of Yoo, et al. [57] by delineating mobile payment platforms into five layers: (1) device; (2) (operating) system; (3) network; (4) service, and; (5) content. Furthermore, depending on the governance regime being enacted [4], [38], we argue that each of these aforementioned platform layers signifies a competitive space in its own right to wrestle for market leadership. Taken as a whole, the interaction and the integration among these five platform layers define and drive competition among platform-driven ubiquitous systems, which in turn gives rise to our conceptual distinction between *commodity* and *value platform layers*. Through this study, we endeavor to provide an answer to the following research question:

What are the constituent dimensions of platform-driven ubiquitous systems that drive competition in mobile payment markets?

This paper contributes to extant literature on digital platforms and ubiquitous systems [19], [21], [25], [26], [29], [41], [45], [57] by advancing a preliminary framework that situates competitive drivers of platform-driven ubiquitous systems between and within platform layers. This framework was then employed in a comparative case study between two leading UK mobile payment platforms (i.e., Paym and Pingit) to illustrate its applicability and yield principles on the nature and impact of competition among platform-driven ubiquitous systems.

It has to be emphasized that this paper focuses on the competition of digital platforms that operate as ubiquitous systems [57]. For this reason, discussions on different platform *categories* (e.g., product or multi-sided platforms) (cf. 0), [29] are beyond the scope of this research. The remainder of this paper proceeds as follows: In the next section, we provide a working definition for digital platforms and their relationship to ubiquitous systems. Based on this definition, we offer an overview of extant literature on digital platform layers and governance regimes that give rise to distant platform profiles. In Section 3, we present our research method. In Section 4, we present Paym and Pingit as illustrative cases of mobile payment providers that leverage on platform thinking for market competition. In Section 5, we synthesized insights gleaned from analyzing these two cases. In Section 6, we conclude by: (1) summarizing implications for theory and practice; (2) outlining limitations, and; (3) proposing avenues for future research.

2 Theoretical Background

In this section we present our theoretical footing to understand digital platforms that enable ubiquities systems.

2.1 Defining Digital Platform

To define digital platforms, it is imperative to first distinguish the concept of platform from that of architecture and infrastructure, terms often employed interchangeably in past studies. *Architecture* is the conceptual and logical structure (i.e., blueprint) of a functional system [51], [52], whereas infrastructure is the actual operationalization of a functioning architecture. Hanseth and Lyytinen [33] defined *infrastructure* as a *shared, open, heterogeneous and evolving socio-technical system* whose structural composition consists of other infrastructures, platforms, applications and technological capabilities, thereby underlining its *recursive* nature.

Conversely, Yoo, et al. [57] conceived layered modular architectures (or digital platforms) as hybrids that blend both modular and layered architectures. Whereas (1) *modular architecture* represent a '*nested and fixed*' boundary for the assimilation of modular components to build product-specific artifacts, the (2) *layered architecture* supports generativity over and above its modular counterpart by establishing the necessary requirements for creating agnostic platform derivatives (see Figure 1). Taking Apple's iPhone as an illustrative example, its modular architecture comprises modular components (e.g., chips and operating system), which when combined, constitutes a smartphone as a nested, fixed and ubiquitous IT artifact. On the other hand, the layered architecture of the iPhone gives rise to developmental toolkits that can be harnessed by third parties to construct software for the service layer or hardware (e.g., camera lens) on the device layer. Accordingly, digital *platform layers* have the attributes in being symbiotic that connect and expand the functionalities of *platform modules*.

For this study, we hence subscribe to Kazan, et al. [35] definition of digital platform as *a proprietary or open modular layered technological architecture that supports efficient development of innovative derivatives, which are embedded in a business or social context.* We find the preceding definition to be amenable to this study because as emphasized above, digital platforms should not be construed merely as monolithic artifacts, but rather, as the embodiment of both modular and layered architectures.

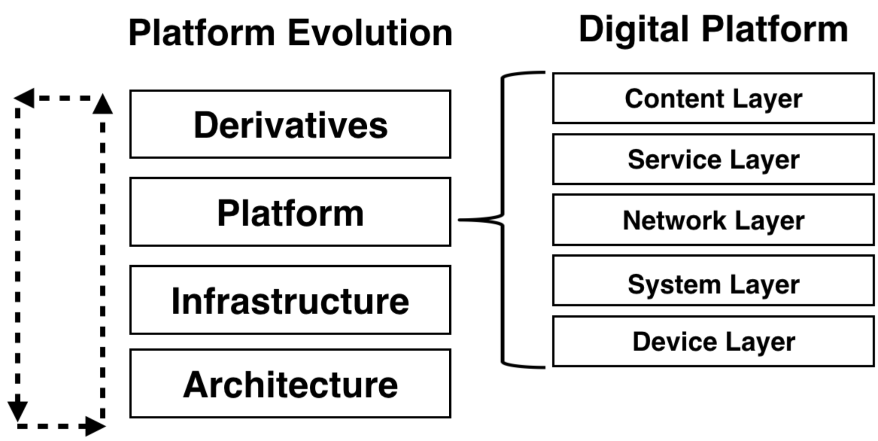


Figure 1: Platform evolution & layered platform

2.2 Digital Platforms and Ubiquitous Systems

Because digital platforms can be construed as a composition of technology layers and modules that facilitate the creation and delivery of goods and services within and across business networks [3], they basically function as building blocks for ubiquitous systems [41]. Ubiquitous systems are omnipresent IT artifacts that are deeply embedded in socio-economic environments through the delivery of location-independent digitized goods and services [40]. Most of these ubiquitous systems or devices (e.g., smartphones), however, do not possess the required computational foundation to deliver these services on their own. Digital platforms thus play a vital role by providing the necessary computational foundation and business logic to deliver services that cater to a network of interrelated ubiquitous devices. In so doing, digital platforms and ubiquitous devices complement and support each other by extending and augmenting functionalities in a conjoint manner. To put it differently, digital platforms enable platform-driven ubiquities systems.

Today's organizations face considerable challenges in offering platform-driven ubiquities services. Besides resolving complexities such as interoperability, revenue sharing or data ownership [56], organizational resources and capabilities are unevenly distributed among market participants in the delivery of competitive ubiquitous services.

To understand the logic of ubiquities services within competitive market environments, we subscribe to the layered modular architecture [57] as our theoretical and analytical lens to unpack the constituents and competitive dimensions of platform-driven ubiquitous systems. We posit that the interplay of platform layers is the foundation upon which market competition manifests. For instance, the governance regime of Apple and Google on the *service layer* (Apple Pay vs. Android Pay) differ in their degree of control by blocking or tolerating services on the device layer for conducting moderated or unmoderated contactless mobile payments (cf.0), [50]. As alleged by Amadeo [5], Android was deliberately introduced by Google as an open source project to mobilize third-party developers and pre-empt Apple from acquiring dominance within mobile industries.

2.3 Digital Platforms as Layered Modular Architectures

Past studies have laid the foundation for envisioning digital platforms as layered modular architectures [8], [9], [44], [51], [57], especially with respect to how technological capabilities affect interconnected digital platforms [33], as well as how platform owners exercise governance in an attempt to strike an equilibrium between control and openness to foster platform innovation [11], [12], [30], [34], [54].

Consistent with Yoo, et al. [57] conception of layered modular architectures, we theorize digital platforms as encapsulating five distinct and interlinked *platform layers*: (1) device; (2) system; (3) network; (4) service, and; (5) content. Each of these five platform layers can independently support modularity [46], [48] by permitting external parties (e.g., third-party developers) to contribute with their respective software and/or hardware resources in co-creating and capturing value. Modularity [46] in digital platforms thus gives birth to modularized, digital goods and services on each layer (e.g., iOS payment applications).

From a strategic viewpoint, layered modular architectures have the competitive advantage, as well as the challenge, in being *doubly distributed* [57]. They are *distributed* in that external actors collaborate and contribute with their respective resources towards different platform layers. At the same time, they are *doubly* in their nature as internal and external actors conjointly or independently (1) control and (2) generate component knowledge in select areas of a layered modular architecture. Consequently, organizations that mutually contribute to a single layer can be viewed as collaborators in pursuit of common business goals, but at the same time, they could be fierce competitors on other layers. Take Apple's iPad as an example. Amazon contributes with its Kindle eBook service towards iPad's content and service layer. But concurrently, Amazon competes with Apple on the device layer with its own Kindle eBook readers and tablets [57]. By drawing on the conceptual granularity of platform layers, we can better comprehend how the design and configuration of digital platforms (i.e., arrangement of platform layers) impact their competiveness within ubiquitous ecosystems.

In the following, we illustrate the five platform layers through the example of Apple Pay, Apple's mobile payment service (see Figure 2).

- Device Layer: A physical, programmable IT artifact for storing and processing digitally 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 Near-Field-Communication (NFC) payments.

- System Layer: A logical software system for controlling and executing software and hardware components. Apple's mobile payment solution Apple Pay requires iOS and Watch OS as operating systems to regulate the functional operations of the payment app (software), NFC chips and its secure element (physical).

- Network Layer: Communication channel for transporting data packages among different nodes. Apple's mobile payment service relies on the services of mobile operators (e.g., AT&T) and payment networks (e.g., Visa and MasterCard) to process and settle payments.

- Service Layer: Software applications for storing, generating and distributing proprietary and/or third-party data. Apple Pay is a payment service that not only mediates commercial transactions, but also offers Application Programming Interfaces (API) and Software Development Kits (SDK) to facilitate the integration of Apple Pay into third-party applications.

- Content Layer: Representation of digital data in terms of audio, video, text and images. Apple Pay generates payment data in the form of purchase amount, merchant, time and/or location, to name a few.

Arguably, each of the aforementioned five platform layers possesses the capability to support modularity and that the depth of access to these platform layers leads to (un)moderated generativity and competition opportunities [58], which in turn attests to the criticality of governance regime in digital platforms.

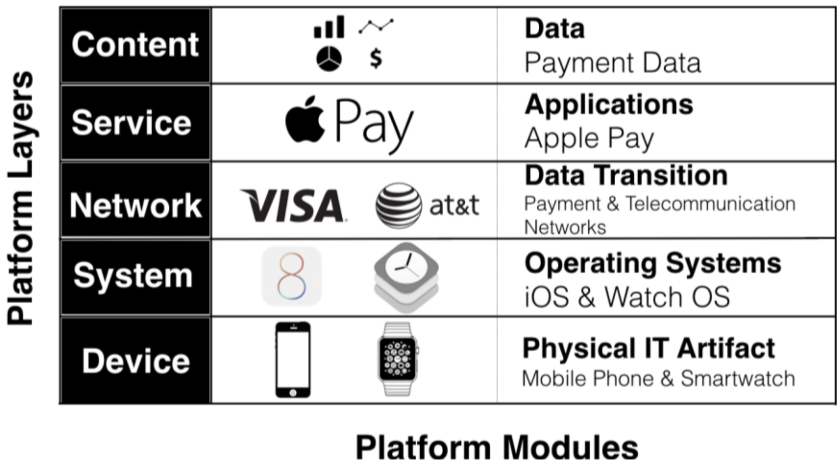


Figure 2: Digital platform layers & modules of Apple Pay

2.4 Digital Platform Governance

Extant literature on IT governance espouses the notion of alignment between IT functions and organizational structures to ensure the efficiency and effectiveness of firms' response to internal and external environments. Anecdotal evidence from these studies suggests that organizations typically adhere to one of three IT governance regimes: centralized, decentralized and hybrid governance, the latter being the simultaneous application of both centralized and decentralized governance in certain business units within the same organization [4], [16], [17], [27], [38].

Ahituv, et al. [4] defined centralized systems as those with the entire computing power concentrated in one site, and that all strategic decisions are made in one location. Conversely, decentralized systems deploy processors (computing power) in various locations, which are not linked through a network, and that strategic decisions are located in a core location, but other decisions can be made in an unrestricted number of locations. Likewise, Leifer [38] and Ahituv, et al. [4] employ the same terminologies, but define them differently. For instance, Leifer [38] emphasized the connectedness of decentralized systems, describing such systems as peer networks where no central processor exists through which communications must pass, offering a high degree of communication freedom. For instance, consider Apple Pay and Bitcoin. Both represent novel forms of payment systems, but their governance structures differ substantially. Whereas Apple moderates access to its payment service through boundary resources (i.e., centralized and closed) [30], Bitcoin is ungoverned (i.e., decentralized and open). Conceivably, distributed digital platforms resemble a hybrid of centralized and decentralized platforms, where governance and control is dispersed among various permissioned stakeholders.

In light of the above discussion, we differentiate and focus in this study on *centralized* and *distributed* governance for digital platforms. For *centralized digital platforms*, decision rights are concentrated with tightly coupled platform layers, what we labeled as *nested* and *fix* platform. This gives rise to monopolistic power over a digital platform and its layers exhibit the attributes of being vertically integrated. For *distributed digital platforms*, decision rights are dispersed among various permissioned third parties with loosely coupled platform layers, what we termed as *federated* platforms and its layers exhibit the attributes of being horizontal in nature.

3 Research Method

Research Method: Interpretive Case Study. The method of enquiry for this study is a comparative and interpretative case study aimed at uncovering how platform-driven ubiquitous ecosystems compete [53], [55]. Accordingly, we adopt a descriptive and exploratory approach [31] by synthesizing focal concepts from digital platform literature to craft an analytical lens for deriving competitive attributes pertinent to platform-driven markets and disentangling how competition plays out among platform layers. We deem the case study approach to be an appropriate mode of enquiry as it can answer *how* and *why* questions in complex and nebulous research environments [24], [55]. The case study approach is therefore suitable for untangling the intricate relationship between market forces and platform layers, both of which are responsible for shaping competition in the mobile payment market.

Research Setting: UK Mobile Payment Market. For this study, we turn to the UK mobile payment market as our empirical context. The UK payment industry is in the midst of a massive transformation. New actors with little or no prior industry backgrounds (e.g., mobile network operators and payment start-ups) have entered the payment industry and are beginning to encroach on the traditionally protected payment market. Institutionalized incumbents (e.g., banks) are thus under threat from these new actors, transforming payment to a commoditized service and a by-product for other lucrative services.

By offering accessible, interchangeable and novel payment instruments (e.g., smartphones), these new players are pursuing a strategy of cultivating new consumption habits. These new consumption habits may aid in establishing fresh customer relationships and yielding opportunities for potential disintermediation. In this sense, incumbents (i.e., banks) were forced to launch their own mobile payment solutions as a preemptive move to discourage potential entrants or safeguard existing market structures. Specifically, current market incumbents introduced following mobile payment solutions to preserve current market: (1) Pingit offered by Barclays with 2.7 million active users (September 2015) [10], and (2) Paym with 3.2 million strong user base (February 2016) [43].

Mobile Payment Platforms: Orchestrating IT Artifacts. Mobile payment platforms are complex financial technology (i.e., FinTech) IT artifacts that are embedded within innovative and competitive business networks to mediate payment transactions. Fundamentally, payment is the process of transferring money from a sender to a receiver that involves payment instruments, payment processing and payment settlement [37]. Most moderns payment systems or platforms are four-party schemes (e.g., Visa, Pingit), where platform owner primarily orchestrate and set the rules [32], [45] for how payment transactions are transferred among (1) payers; (2) payees; (3) acquirer (i.e., payee's bank), and; (4) issuer (i.e., payer's bank).

Figure 3 illustrates the logic of a mobile payment transaction within a four-part scheme. The payer authorizes the payee (e.g., merchant) with its mobile phone (e.g., through a QR-code scan) to debit a payment amount from the payer's bank account. The payee in turn, sends a debit payment request to its acquirer, and the acquirer forwards the debit payment request through the mobile payment platform provider (e.g., Pingit) to the relevant issuer. If the payer's bank account has sufficient liquidity, the issuer authorizes and settles the payment between the payment service provider and acquirer. The payee, at the end, gets notified about the successful transaction and hands over the (digital) goods to the payer.

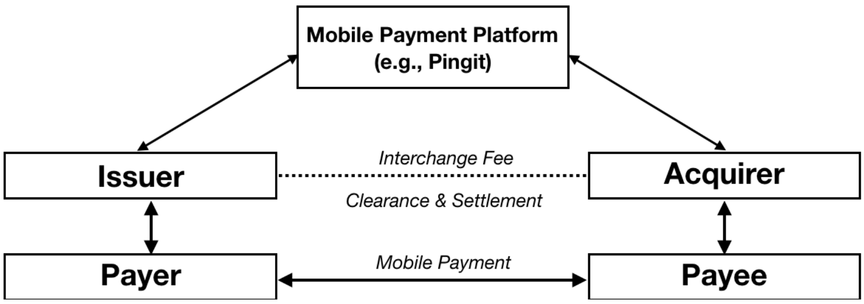


Figure 3: Mobile payment platform within a four-party scheme

Case Selections: Two UK Mobile Payment Platforms. To identify platform-driven competition in the UK mobile payment market, we began with four semi-structured interviews with experts, who are knowledgeable about the UK payment industry. These four experts were selected based on their familiarity with the UK payment industry and job capacity in prominent finance-related organizations. Interviews with these experts guided us in constructing an overview of the UK payment landscape and gleaning insights into the roles of various payment actors (e.g., banks, acquirers, technology providers, payment networks and infrastructure providers). From these interviews, we identified the two largest mobile payment platforms operating in the UK mobile payment: (1) Paym (a collaborative solution offered by UK banks), and; (2) Pingit (a proprietary solution promoted by Barclays).

Furthermore, industry experts aided us in identifying invisible payment actors (e.g., technology providers) that enable mobile payments behind the scenes. For instance, one expert states: *Paym itself is owned by the Payments Council […] they are the group responsible for setting the rules, running the overall project and getting it live. What Vocalink provides is the technical infrastructure behind that but maps the mobile phone numbers to your bank account [….] the connectivity between something like Visa, MasterCard would be at a Faster Payments Link BACS type level […] there's then connectivity at a level above that, those overlay type services of Pingit and Paym*.

Both mobile payment platforms offer payment solutions targeted towards businesses and individuals. We opted for these mobile payment solutions as our case organizations because Pingit and Paym are the dominant solutions in the UK mobile payment market. Large financial institutions do not only operate them, they also boast of large and growing user bases with rising transaction volumes. In addition, we deliberately selected these two mobile payment platforms for comparison because they are representative of two distinctively different governance regimes: centralized managed by one organization (i.e., Pingit) versus distributive managed by a group organizations (i.e., Paym).

Data Collection. The empirical basis for this study is based on two semi-structured interviews and secondary data. Specifically, we conducted in-depth and face-to-face interviews with: (1) the Head of Development at Paym, and; (2) the Senior Vice President (SVP) of mobile solutions at Barclays. Interview questions were adapted from extant literature on digital platform, paying particularly close attention to how platform layers are designed and configured. Our interview strategy is devised to unravel the mechanisms behind how each of the two mobile payment platforms functions in practice (i.e., narrative and visual reconstruction of mobile payment transactions) and ascertain external partners, who are vital in supplying complementary capabilities and resources to enable the corresponding payment service. Additionally, we triangulated the interview data with payment reports, white papers, press releases and archival records from industry associations (e.g., the European and UK Payments Council), payment industry online news outlets (e.g., Finextra) and payment news aggregators (i.e., The Paypers) in order to reconstruct the UK payment landscape with its respective stakeholders and pinpoint commercially active mobile payment platform providers and infrastructure providers.

Data Analysis. After a careful review of the secondary data, relevant data points were interpreted [53] to reconstruct the UK payment industry. We conceptualized what a typical mobile payment transaction looks like for Paym and Pingit respectively (see Figure 3). We then identified external partners on the network and service layer, who are vital in supplying complementary capabilities and resources to achieve and sustain an operational mobile payment service. Ultimately, our research goal was to discover similar and different platform layer configurations in order to derive competitive platform principles.

With regards to the fully transcribed semi-structured interviews, the first author performed thematic analysis [14], [15]. Thematic analysis is an analytical method to identify, analyze and report patterns (i.e., themes) within rich datasets. Specifically, we utilized theoretical thematic analysis, where codes or themes are guided by existing research to expand theory. The first author began by identifying emerging and recurring patterns from the dataset that exhibit architectural attributes (e.g., platform layers, modules) of platform-driven ubiquitous systems. These patterns were in turn filtered through the layered modular architecture framework (see Table 1) to derive competitive dynamics and principles on each platform layer. To do so, we adhered to an iterative approach similar to the one advocated by Klein and Myers [36] in that we go back and forth between our findings and the analytical framework.

To overcome potential biases on the part of the first author, we further pursued a differentiated role strategy during data analysis [1]. As the first author conducted the initial data analysis, the other co-authors play the role of the devil's advocate by coming up with alternative interpretations, and counter-arguments. The entire data analysis process followed an iterative cycle as well and it was only concluded when all authors agree on the findings in accordance with the analytical framework.

Table 1: Sample coding from Pingit

Platform Layers	Exemplary Quote	Synthesis
Content Layer	[…] it will be a lot of rigor around analyzing what those API's and what information they have access to […] it's very much about providing information into, or to, the Pingit app as opposed to integrating Pingit into another app, for example.	Pingit is guarding its data (i.e., payment data) and that the data flow is orientated inwards to enrich the payment service further.
Service Layer	It has to be, of course, then commercially relevant to be disclosing any API's to that party. So [Pingit] available to anybody in the UK with a UK mobile number and a UK current account so you don't have to be with Barclays to use Pingit.	Pingit is providing through application program interface (APIs) moderated access to its payment service. Furthermore, the payment service is accessible to all UK banks customers (i.e., including customers from rival banks).
Network Layer	So yeah, when we use the Faster Payment infrastructure we as, of course, is one of the founders of the Faster Payments infrastructure we'll have connectivity into the Payments Councils faster payments product […]	All major UK banks, including Barclays, have access to the Faster Payment infrastructure to send and clear payments across the UK.
System Layer	In terms of the support that we provide for Pingit for consumers, we're running on certainly iOS, on Android, on Blackberry or - and Microsoft now as well.	Pingit is compatible with major mobile operating systems.
Device Layer	So the consumer side, we provide the app that runs on the different smartphone platforms or tablets.	Pingit is designed to work on various ubiquitous devices.

4 Comparative Case Study of Two Mobile Payment Platforms

In this section, we present two distinctive mobile payment platforms: Paym and Pingit. Consistent with Hagiu and Wright [32], digital payment providers are multisided payment platforms that connect payers and payees. To illustrate the explanatory power of our proposed framework for deciphering competition of platform-driven ubiquitous systems, we perform a comparative cross-case analysis to pinpoint competition on different platform layers that give rise to competitive profiles.

Pingit by Barclays. In 2012, Barclays was the first UK high street bank to launch its own internally developed mobile payment service called Pingit. Pingit was initially designed to be a pure person-to-person (P2P) mobile payment service, enabling individuals to perform direct payments among one another. After successfully establishing a solid installed user base, Barclays grew its Pingit customer base further by targeting small business owners and online retailers, enabling businesses to conduct end-to-end mobile commerce for the first time.

Barclays was highly strategic in rolling out Pingit, having the ambition to attain market dominance in a rapid fashion. A key measure was garnering the support of all major mobile platforms right from the start (i.e., iOS, Android and Blackberry), which enabled Barclays to leverage on customers' smartphones (and smart watches lately) to issue digital payment instruments. Compared to conventional means (e.g., plastic payment card), the issuance of digital payment instruments (e.g., iOS app) has the advantage of issuing affordable payment instruments in a rapid manner with the latest features, directly into the hand of the customers. Moreover, the Pingit service is made available to users from rival UK banks as well. This sets the foundation for establishing new customer relationships in a subtle manner while harvesting valuable customer data over time.

To grow its Pingit ecosystem even further, Barclays operates an accelerator program in parallel, granting select startups with privileged access to Pingit APIs. After an internal review process, Barclays chose startups that can harness Pingit APIs to innovate new services with the ultimate objective of bolstering the value proposition of the mobile payment service. In general, these measures help to boost transaction volume on the Pingit platform, which in turn benefits from economies of scale effects while increasing prospects for data collection. With a 2.7 million strong user base, Barclays recently decided to expand Pingit's usefulness and market reach by improving its compatibility with Paym, an alternate consortium-driven mobile payment system.

To initiate Pingit payments, users enter the mobile phone numbers of the recipient where phone numbers serve as proxies for bank account details stored on the Pingit system. After receiving the payment instruction, Barclays applies a dual approach in processing and settling Pingit payment transactions. For Pingit users who are Barclays customers, the settlement occurs internally within the Pingit platform in real-time (see Figure 4). In elaborating it further, the SVP states that: *a consumer [pushes] the money which is what a Pingit transaction [is…] we can just move the money from one Pingit account to another Pingit account*. For Pingit users who are non-Barclays customers, Pingit routes the (push) payment through the Faster Payments network. As a founding member of the Faster Payments scheme, Barclays has express access to the Faster Payments network, enabling interbank transfers in near real-time. As the SVP states: *we use the Faster Payments infrastructure, of course, as one of the founders of the Faster Payments infrastructure we have connectivity*.

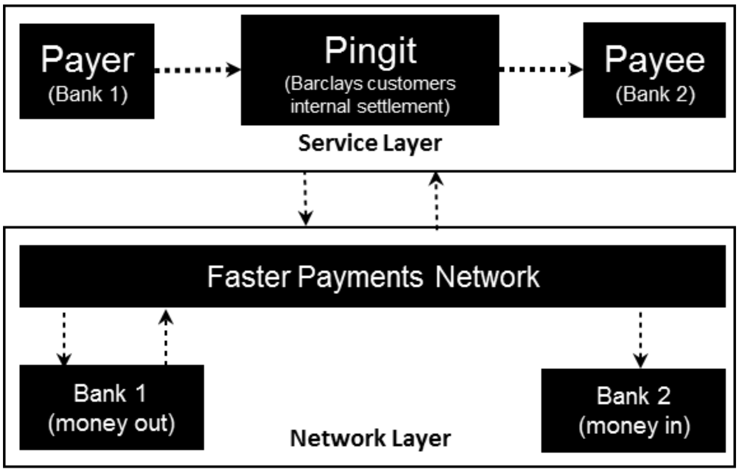


Figure 4: Pingit mobile payment platform

Paym – Industry Consortium Solution. Launched in April 2014, Paym is a mobile payment service developed by the UK Payment Council and is now jointly owned by its participating members of financial institutions. The UK Payment Council, an industry-wide consortium representing financial institutions, has the mission of fostering innovation and collaboration in the British payment landscape. As Barclays has proven market readiness and success with its own mobile payment service in the form of Pingit, the UK Payment Council was commissioned to develop a competitive, though, collaborative solution. Specifically, the Paym initiative has the intention of equipping bank institutions with basic mobile payment functionalities that serve as the foundation for an industry-wide standard. Arguably, the industry collaboration represents a preemptive move against Barclays to impede its market dominance and preserve pre-existing customer relationships.

At the same time, the Paym initiative was deliberately designed to leave room for differentiation in order to create competitive space among its members. Specifically, Paym differs from Barclays' Pingit standalone application in that it functions as a feature within existing mobile banking applications. Accordingly, Paym is identical in its functionality for each financial institution. However, the competitive turf among participating financial institutions occurs in their own mobile banking applications, competing through service differentiation and interface usability.

Paym's availability towards end-users (private or businesses) is determined by whether: (1) a financial institution has entered into a Paym service agreement, and; (2) a mobile banking app is supportive of certain mobile platforms (e.g., Android, Windows). Accordingly, the physical payment instrument, usually provided by financial institutions in the form of plastic payment cards, comes now in a digital form while leveraging on end-user smartphones. Consequently, the Paym platform acts as an overlay service on top of existing banks accountants that links bank account numbers with mobile phone numbers. As soon a Paym transaction is tied to a mobile phone number, the service initiates a traditional bank transfer to the associated bank account (see Figure 5).

Paym is hence a highly complementary service that supports existing bank-customer relationships, preserves existing customer data ownerships, and utilizes existing payment rails (i.e., Faster Payments and LINK). As the Head of Development states: *the idea is that you already trust your bank, you get this functionality and then everybody can send money to each other using their existing relationship [...] I'm then providing my bank with the instruction to make a payment and that payment will either go through Faster Payments or it will go through LINK and those are the two approved, two supported, payment schemes in this service.*

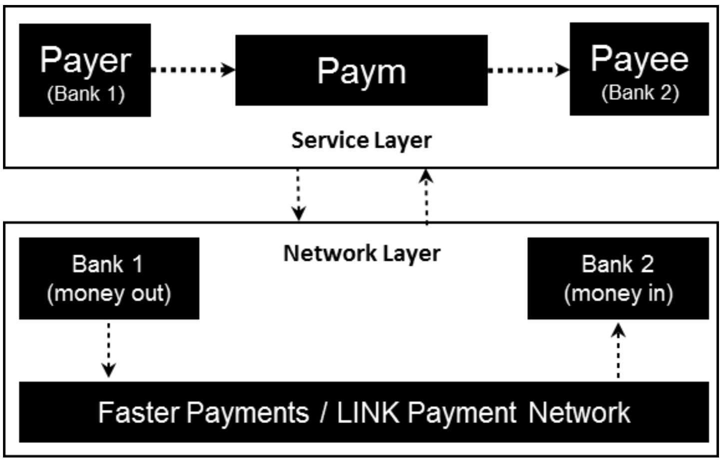


Figure 5: Paym mobile payment platform

5 Case Analysis and Findings

In this section, we present insights gleaned about the competitiveness of mobile payment platforms for each of the five platform layers through a comparative analysis of Paym and Pingit. For each layer, we will describe the layer dynamics and their underlying competitive principles. Whereas the platform layer dynamics depict how each platform layer is designed and configured from an internal viewpoint, the platform layer competitive principles reveal the underlying competitive principles that transpire in the marketplace.

5.1 Device Layer

Platform Layer Dynamics: Paym and Pingit leverage on customers' mobile devices to offer and distribute their mobile payment services to the market. Requirements for mobile devices to participate in these mobile payment services are relatively low, as they require simply an Internet connection and phones number to settle payments between payers and payees. By offering mobile payments to end users, both mobile payment platforms have the ability to issue *affordable* digital payment instruments in a rapid fashion. In so doing, Paym and Pingit demonstrate that these mobile payment platforms are neither interested nor capable of controlling the device layer (i.e., smartphones). In this sense, both mobile payment platforms have to adapt their payment applications accordingly in order to piggyback on customers' mobile devices to utilize them as ubiquitous distribution channels.

Competitive Principles: Both mobile payment platforms adhere to a cost-driven approach on their device layer by leveraging on readily available and affordable payment devices to realize service *ubiquity. We therefore propose that the adoption and leveraging of affordable mobile devices on the device layer creates a commodity layer and does not present a competitive ground between mobile payment platforms, due to easy replication by rival firms.*

5.2 System Layer

Platform Layer Dynamics: Both mobile payment services leverage on widely *available* mobile operating systems (i.e., iOS, Android, Blackberry) in offering their payment services to the market. Mobile payment platforms are highly dependent on mobile operating systems to offer reliable and secure payment services. Similar to the aforementioned device layer, Paym and Pingit have no control over the system layer of mobile devices. Therefore, both payment services have to accept and comply with systems specifications stipulated by the software vendors. Competitiveness may only occur between both mobile payment platforms by striving for high compatibility with the operating system to provide the best mobile payment application experience.

Competitive Principles: Both mobile payment platforms leverage on dominant and standardized mobile operating systems to avoid fragmentation and ensure *interoperability* in their service delivery. As these mobile operating systems are likewise highly accessible for rivals, it does not justify a competitive advantage. *We therefore propose that mobile payment platforms leverage on widely available mobile operating systems to achieve service interoperability. In so doing, both mobile payment platforms treat the system layer as a commodity platform layer due to the lack of control and ownership.*

5.3 Network Layer

Platform Layer Dynamics: Paym and Pingit depend on Faster Payments and LINK payment networks to send, process and settle payments. The aforementioned payment networks are vital, as they present the binding glue between financial institutions to transmit payments throughout the UK payment industry. The owners of Pingit (Barclays) and Paym (industry consortium) co-own these *inclusive* payment networks. Thus, competition is negligible due to mutual governance and ownership. Other mobile payment platforms (e.g., PayPal) that have no direct access to these payment networks are indeed disadvantaged, as they have to enter into contractual agreements to have access to the industry-specific resource. Nevertheless, the financial institutions behind Paym and Pingit have the economic interest to avoid transactions through these payment networks, as the costs for maintaining these networks are based on transactions volumes. As such, each financial institution has the business goal to maintain and increase transaction volumes within their own mobile payment services and by extension, to stay isolated as much as possible.

Competitive Principles: Payment networks are vital, as they connect financial institutions with each other with their corresponding mobile payment platforms. However, as the financial institutions behind Paym and Pingit have non-discriminatory *access* to the same payment networks, access to these payment networks does not constitute a competitive advantage. In this sense, the network layer of both mobile payment platforms (i.e., Paym and Pingit) exhibits attributes of a commodity layer. *We therefore propose that the adoption of inclusive network layer strategy by mobile platform providers does not contribute to competitive advantage over rivals, because it does not impose accessibility constraints.*

5.4 Service Layer

Platform Layer Dynamics: Barclays' Pingit payment platform obtains its competiveness by offering a tightly integrated *monopolistic* mobile payment service to provide the best payment and mobile commerce experience in the market place. To achieve this degree of control, Pingit goes beyond Paym by developing and offering a dedicated mobile payment application (i.e., Pingit app), which co-exists with Barclays' mobile banking application. From a customer viewpoint, Pingit also reduced multi-homing apps, as it allows customers to send payments from the Pingit application to Paym users, incentivizing users not to use Paym.

Paym, on the other hand, has the traits of a *federated* mobile payment platform that exist as a feature within heterogeneous and isolative mobile banking applications. It can be argued that Paym may not achieve user experience consistency as Pingit does, because each financial institution decides how Paym is implemented within their own mobile banking applications. With respect to user acquisition, Pingit has the competitive advantage in being an inclusive app by having the capability to serve non-Barclays customers. Therefore, Barclays has, through Pingit, the potential to build meaningful customer relationships. On the contrary, Paym, the industry consortium solution, does not have the same facility. Paym is not designed to collect customer data from rival institutions because it merely preserves existing customer relationships within each mobile banking application.

With regards to platform access, Barclays exercises monopolistic power over its own service by protecting its platform from external systems and granting exclusive API access to select partners. Pingit platform access is granted under the condition that these complementary third party services (e.g., startups) advance the Pingit ecosystem further by increasing usefulness and transaction volume with the ultimate objective of amplifying Pingit's value proposition. At this stage, Paym does not provide access options towards third parties.

Competitive Principles: Both mobile payment platforms are attempting to create a dominant design in the mobile payment space by creating their own value ecosystem. Barclays possesses the internal resources and the first mover advantage to protect and grow its Pingit ecosystem through its *germination* strategy to extract value. Paym, on the other hand, has entered the market as a second mover. It can be argued that the rollout of Paym is a preemptive move to erode Barclays' potential market dominance. Individually, these financial institutions would not have the leverage to create a competitive solution that could challenge Pingit. Nevertheless, to remain competitive with Pingit, Paym applies an *orchestration* strategy by augmenting the resources of individual financial institutions into a federated mobile payment platform. *We therefore propose that the service layer of mobile payment platforms presents a competitive ground to extract business value while applying a germination or orchestration strategy. Accordingly, the service layer represents a value layer for mobile payment platforms.*

5.5 Content Layer

Platform Layer Dynamics: Each financial institution is *protective* of its payment data because it serves as a valuable resource for generating competitive business insights and by extension, embodying the potential for value extraction. Accordingly, financial institutions are selective in sharing payment data with third parties and prefer to silo their content layer from external ones. Barclays, though, has the advantage to overcome this hurdle due to its own developed mobile payment application. As non-Barclays customers have the ability to install and link their personal data to the Pingit app and generate rich data through their payment habits, Barclays *absorbs* and collects valuable payment data to build future customer relationships (e.g., purchase behavior to for marketing purposes). On the contrary, Paym does not possess the same prospects for data collection. Paym does not exist as a standalone application, but rather as a feature within heterogeneous and isolated mobile banking applications that reinforce existing customer relationships.

Competitive Principles: The content layer is manifested in the form of payment data, which is a valuable and competitive industry specific resource for financial institutions to capture value. Both mobile payment platforms are guarding their content layer by isolating it from third parties. Barclays, however, *infiltrates* the content layer of rivals by applying a Trojan horse strategy through its standalone payment application Pingit, which is installed on non-Barclays customer smartphones. *We therefore propose that the content layer of mobile payment platforms constitutes a value layer to capture business value and that the issuance of dedicated and inclusive mobile payment applications enables data collection opportunities of customers belonging to competitors.*

5.6 Competitive Principles Across Platform Layers

To generalize our observations, mobile payment platforms embody two types of platform layers: value and commodity layers. In this study, commodity layers (i.e., device, system, and network) merely serve as a means to reach out and distribute services towards end customers. In other words, commodity layers are means to achieve platform-driven service ubiquity. Conversely, value layers (i.e., service and content layers) present value creation and capturing opportunities, translating into competitive battlegrounds among mobile payment services. Prior to mobile payments, traditional payment instruments (e.g., payment cards) were proprietary and vertically integrated into the organizational boundaries of a financial institution that enabled control and enforcing switching costs. With the prevalence of mobile payment services, previous vertically integrated payment platforms show early signs of deconstruction, which is driven by ubiquitous and affordable smartphones as a new form of payment instrument. In this sense, financial institutions lost the control and the right to issue propriety payment instruments and by that lock-in mechanisms. The result is that financial institutions concentrate their organizational efforts to protect the remaining value layers of digital payment platform. Table 2 summarizes the insights from our comparative case study.

6 Conclusion

This paper was motivated by a growing urgency to improve our comprehension of digital platforms and how the constituent dimensions of such platforms shape market competition for platform-driven ubiquitous systems. Prior platform research has typically treated digital platforms as a generic phenomenon. Whereas one research stream explores the pricing mechanisms among platform users, others either examine how certain platform management strategies induces growth and innovation or investigate the idiosyncrasies of different platform categories (e.g. product or multi-sided platforms) in order to better explain distinctions among these categories [49].

This study contributes to extant literature on digital platforms and ubiquitous systems by delineating platform-driven ubiquitous systems into five constituent dimensions that drive their potential for market competition. Our study serves as a fitting response to Yoo, et al. [57] call for a deeper understanding of the competitive strategies of layered modular architectures. Specifically, a key theoretical thrust of this paper is our postulation that platform-driven ubiquitous system competition manifests within and across five *platform layers* (i.e., device, system, network, service and content). Furthermore, we discovered that the industry context determines which of the platform layers are designated as: (1) commodity layers enabling service ubiquity, as well as; (2) value layers offering strategic business opportunities to create and capture value.

Table 2: Comparative cross-platform analysis

Platform Layers	Paym	Pingit	Competitive Principles within Platform Layers
Content Laye *(Value Layer)*	***Protected*** Paym adopts a guarded content layer approach by preserving existing data collection rights for each financial institution within heterogeneous mobile banking applications	***Protected & Absorptive*** Pingit adopts like Paym a guarded content strategy that does not share the payment data of Pingit users with third parties. The Pingit app, though, is inclusive by serving non-Barclays customers as well that creates data collection opportunities.	***Guarded vs. Infiltrative*** Both mobile payment platforms showcase protective behavior on their content layer as payment data serves as valuable industry resource to create value. By releasing a dedicated mobile payment application, Pingit performs a Trojan horse strategy that collects customer and payment data from rival institutions.
Service Layer *(Value Layer)*	***Federated and Isolative*** Paym is a federated mobile payment platform that attempts to augment the individual resources of various financial institutions. In so doing, it preserves existing market structures by being a mobile payment feature within existing mobile banking applications.	***Monopolistic and Breaching*** Like Paym, Pingit protects its service layer, moderating and shielding it platform from third parties. Access is granted if these services enhance the value proposition of Pingit. Lastly, Barclays uses the Pingit app as a mean enter in to the territory of rivals to build customer relationships with non-Barclays customers.	***Orchestration vs. Germination*** Paym has on its service layer the strategy to offer a competitive industry consortium mobile payment application that solidifies existing market structures and data sovereignties. Barclays has the strategy nurture its own Pingit ecosystem, but leverages on Pingit as a Trojan horse to challenge rivals on their content layer.
Network Layer *(Commodity Layer)*	***Inclusive*** Both mobile payment platforms have non-discriminatory access to the Faster Payment or Link payment network to clear mobile payments. Thus, not presenting a competitive advantage between these two mobile services.		***Accessibility*** Network layer for both payment services shares the traits of a commodity layer due to the inability to create access constrains.
System Layer *(Commodity Layer)*	***Availability*** Both mobile payment platforms leverage on widely available and standardized mobile operating systems. Competiveness may occur by developing the mobile payment application that makes the best use of the		***Interoperability*** System layer shares the attributes of a commodity layer, as the control and governance is not the realm of financial

	system resources to ensure best application experience.	institutions, but rather controlled by the smartphone vendor.
Device Layer *(Commodity Layer)*	***Affordability*** Both mobile payment platforms leverage on standardized smartphones in delivering their mobile payment services to end customers.	***Ubiquity*** Device layer has the attributes of a commodity layer, as the mobile phone as a new payment instrument is now owned by end users and designed by the smartphone vendor.
Competitive Principle across Platform Layers	***Value Layers: Content and Service*** Both mobile payment platforms treat the content and service layer as value layers, as they serve as industry specific resource to create and capture business value. ***Commodity Layers: Network, System and Device.*** Contrary to the content and service layers, the remaining layers serve merely as a mean to deliver the mobile payment as a ubiquitous service to the market.	

As observed in the mobile payment context, the content and the service layers represent value layers that give rise to value creation and capturing opportunities while harnessing payment data as an industry specific resource. The remaining platform layers, on the other hand, share the attributes of commodity layers that foster service ubiquity. Specifically, device, system and network layers of a mobile payment platforms are co-owned or governed by third parties (e.g., smartphones vendors) and that these commodity layers serve merely as *distribution layers*, which are accessible to rival firms and obstruct mobile payment providers from enforcing monopolistic power to acquire competitive advantage. We argue, though, that other industries may consider other platform layers as more valuable than the payment industry does. For instance, in the context of smartphone manufacturers, value layers are arguably concentrated on the device and system layers, as they present the most fitting competitive grounds for creating and capturing value.

From our comparative case study, we offer preliminary evidence of the applicability of our framework in unraveling how competition could manifest between monopolistic and federated platform providers offering ubiquitous services. Evidently, Paym, which exhibits attributes of a federated mobile payment platform, obtains its competiveness by augmenting the resources of individual financial institutions (mobile banking applications) on the service layer. This in turn allows the development of a competitive industry consortium solution that solidifies existing market structures and preserves payment data sovereignties on the content layer. Pingit, on the other hand, showcases the traits of a monopolistic platform that obtains its competiveness by tightly coupling the service and content layer. Moreover, Pingit, with its stand-alone mobile payment application attempts to increase its dominance in the market place by internalizing and monetizing valuable payment data of non-Barclays customers as well. In other words, Pingit functions as a Trojan horse on the service layer that attempts to establish new customer relationships that grants Barclays access to the content layer of rival banks.

Pragmatically, we provide decision support by increasing awareness of different platform governance regimes and layer configurations choices available to payment platform providers. Specifically, current and future mobile payment providers can utilize our proposed framework to: (1) identify commodity and value layers of a mobile payment service; (2) unearth their underlying competitive principles, as well as; (3) channel internal resources accordingly to reach their organizational goals. More broadly, our proposed framework supplies managers in other industries with a conceptual tool to analyze and comprehend the dynamics of other digital platform-driven markets in order to arrive at their own competitive strategies. Lastly, the study may assists policymakers and regulators in disentangling industry-specific competitive dynamics in order to design legal frameworks to foster effective market competition and innovation among various stakeholders.

This study is constrained in its generalizability as it utilizes only two cases of mobile payment providers. Furthermore, because we embrace a platform centric approach, this study is constrained in its analysis about privacy or security requirements that may have an impact on the competitive dynamics of platform-driven ubiquitous systems. Having said this, these limitations serve as impetus for future research in this direction, an undertaking we have planned for the near future. Future studies can explore the option of administering a quantitative survey on stakeholders of digital platforms to validate our proposed framework in Table 2. Other avenues for future research could include the exploration of necessary and sufficient conditions for market competition within and across layers as well as the prescription of effective mechanisms to defend against competition from an incumbent and challenger viewpoint.

References

[1] P. A. Adler and P. Adler, Intense Loyalty in Organizations: A case study of college athletics, Administrative Science Quarterly, vol. 33, no. 3, pp. 401-417, 1988.

[2] R. Adner, Match your innovation strategy to your innovation ecosystem, Harvard business review, vol. 84, no. 4, p. 98, 2006.

[3] R. Adner and R. Kapoor, Value creation in innovation ecosystems: How the structure of technological interdependence affects firm performance in new technology generations, Strategic Management Journal, vol. 31, no. 3, pp. 306-333, 2010.

[4] N. Ahituv, S. Neumann, and M. Zviran, Factors affecting the policy for distributing computing resources, MIS Quarterly, vol. 13, no. 4, 1989.

[5] R. Amadeo. (2013, May) Google's iron grip on Android: Controlling open source by any means necessary. Arstechnica. [Online]. Available: http://arstechnica.com/ gadgets/ 2013/10/googles- iron- grip-on- android-controlling-open-source-by-any-means-necessary/

[6] A. A. Angehrn and H.-J. Lüthi, Intelligent decision support systems: a visual interactive approach, Interfaces, vol. 20, no. 6, pp. 17-28, 1990.

[7] Apple. (2015, May) Apple pay coming to the UK. Apple. [Online]. Available: http://www.apple.com/uk/pr/library/ 2015/06/08Apple-Pay-Coming-to-the-UK.html

[8] C. Y. Baldwin and K. B. Clark, Design Rules: The Power of Modularity. Cambridge: MIT Press, 2000.

[9] C.Y. Baldwin and C.J. Woodard, The architecture of platforms: A unified view, Harvard Business School Finance, Boston, MA, Working Paper 09-034, 2008.

[10] Barclays. (2015, April) Pingit and verifone collaborate to offer consumers quick and easy mobile commerce solution. Newsroom. [Online]. Available: http://www.newsroom.barclays.com/r/3235/pingit_and_verifone_collaborate_to_offer_consumers_quick

[11] K. Boudreau, Open platform strategies and innovation: Granting access vs. devolving control, Management Science, vol. 56, no. 10, pp. 1849-1872, 2010.

[12] K. J. Boudreau, Let a thousand flowers bloom? An early look at large numbers of software app developers and patterns of innovation, Organization Science, vol. 23, no. 5, pp. 1409-1427, 2012.

[13] K. J. Boudreau and K. R. Lakhani, How to manage outside innovation, MIT Sloan management review, vol. 50, no. 4, pp. 69-76, 2009.

[14] R. E. Boyatzis, Transforming Qualitative Information: Thematic Analysis and Code Development. California, Sage Publications, Inc., 1998.

[15] V. Braun and V. Clarke, Using thematic analysis in psychology, Qualitative research in psychology, vol. 3, pp. 77-101, 2006.

[16] C. V. Brown, Examining the emergence of hybrid IS governance solutions: Evidence from a single case site, Information systems research, vol. 8, no. 1, pp. 69-94, 1997.

[17] C. V. Brown and S. L. Magill, Alignment of the IS functions with the enterprise: Toward a model of antecedents, Mis Quarterly, vol. 18, no. 3, pp. 371-403, 1994.
[18] R. A. Burgelman and A. S. Grove, Cross-boundary disruptors: powerful interindustry entrepreneurial change agents, Strategic Entrepreneurship Journal, vol. 1, no. 1, pp. 315-327, 2007.
[19] S. Chakravorti and R. Roson, Platform competition in two-sided markets: The case of payment networks, Review of Network Economics, vol. 5, no 1, pp 118-142 2006.
[20] C. M. Christensen and J. L. Bower, Customer power, strategic investment, and the failure of leading firms, Strategic Management Journal, vol. 17, no. 3, pp. 197-218, 1996.
[21] M. Cusumano, Technology strategy and management: The evolution of platform thinking, Communications of the ACM, vol. 53, no 1. pp. 32-34, 2010.
[22] Deloitte. (2015) The mobile consumer 2015: The UK cut. Deloittte. [Online]. Available: http://www.deloitte.co.uk/ mobileuk/assets/pdf/Deloitte-Mobile-Consumer-2015.pdf
[23] L. Downes and P. F. Nunes, Big-bang disruption, Harvard Business Review, vol. 91, no. 3, pp. 44-56, 2013.
[24] L. Dubé and G. Paré, Rigor in information systems positivist case research: Current practices, trends, and recommendations, Mis Quarterly, vol. 27, no. 4, pp. 597-636, 2003.
[25] T. Eisenmann, G. Parker and M. Van Alstyne, Platform envelopment, Strategic Management Journal, vol. 32, no. 12, pp. 1270-1285, 2011.
[26] T. Eisenmann, G. Parker and M. Van Alstyne, Strategies for two- sided markets, Harvard Business Review, vol. 84, no.10, pp. 92-101, 2006.
[27] K. D. Fiedler, V. Grover and J. T. Teng, An empirically derived taxonomy of information technology structure and its relationship to organizational structure, Journal of Management Information Systems, vol. 13, no.1, pp. 9-34, 1996.
[28] R. Garg and R. Telang, Inferring app demand from publicly available data, MIS Quarterly, vol. 37, no. 4, pp. 1253-1264, 2013.
[29] A. Gawer and M. A. Cusumano, Industry platforms and ecosystem innovation, Journal of Product Innovation Management, vol. 31, no.3, pp. 417-433, 2013.
[30] A. Ghazawneh and O. Henfridsson, Balancing platform control and external contribution in third-party development: the boundary resources model, Information Systems Journal, vol. 23, no.2, pp. 173-192, 2013.
[31] S. Gregor, The nature of theory in information systems, MIS Quarterly, vol. 30, no. 3, pp. 611-642, 2006.
[32] A. Hagiu and J. Wright, Multi-sided platforms, Working Papers - Harvard Business School Division of Research, Boston, MA, pp. 1-37, 2011.
[33] O. Hanseth and K. Lyytinen, Design theory for dynamic complexity in information infrastructures: The case of building internet, Journal of Information Technology, vol. 25, no. 1, pp. 1-19, 2010.
[34] B. Iyer and J. C. Henderson, Preparing for the future: Understanding the seven capabilities cloud computing, MIS Quarterly Executive, vol. 9, no. 1, pp. 117-131, 2010.
[35] E Kazan, E., Tan, C.-W. and Lim, E.T.K., 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, 2014.
[36] H. K. Klein and M. D. Myers, A set of principles for conducting and evaluating interpretive field studies in information systems, MIS quarterly, vol. 23, no. 1, pp. 67-93, 1999.
[37] T. Kokkola, The payment system, Payments, Securities and Derivatives, and the role of the eurosystem. Frankfurt am Main: ecB, 2010.
[38] R. Leifer, Matching computer-based information systems with organizational structures, Mis Quarterly, vol. 12, no. 1, pp. 63-73, 1988.
[39] K. Lyytinen and G. M. Rose, The disruptive nature of information technology innovations: The case of internet computing in systems development organizations, MIS Quarterly, vol. 27, no. 4, pp. 557-595, 2003.
[40] K. Lyytinen and Y. Yoo, Research commentary: The next wave of nomadic computing, Information systems research, vol. 13, no. 4, pp. 377-388, 2002.
[41] K. J. Lyytinen, Y. Yoo, U. Varshney, M. Ackerman, G. Davis, M. Avital, et al., Surfing the next wave: Design and implementation challenges of ubiquitous computing, Communications of the Association for information systems, vol. 13, no. 1, pp. 697-716, 2004.
[42] P. Ozcan and F. M. Santos, The market that never was: Turf wars and failed alliances in mobile payments, Strategic Management Journal, vol. 36, no. 10, pp. 1486-1512, 2014.
[43] Paym. (2016, April) Usage of service nearly doubling every 6 months. Paym. [Online]. Available: **Error! Hyperlink reference not valid.**
[44] F. K. Pil and S. K. Cohen, Modularity: Implications for imitation, innovation, and sustained advantage, The Academy of Management Review, vol. 31, no. 4, pp. 995-1011, 2006.

[45] J. C. Rochet and J. Tirole, Platform competition in two-sided markets, Journal of the European Economic Association, vol. 1, no.4, pp. 990-1029, 2003.
[46] M. A. Schilling, Toward a general modular systems theory and its application to interfirm product modularity, The Academy of Management Review, vol. 25, no. 2, pp. 312-334, 2000.
[47] C. B. Stabell and Ø. D. Fjeldstad, Configuring value for competitive advantage: On chains, shops, and networks, Strategic Management Journal, vol. 19, no. 5, p. 413, 1998.
[48] N. Staudenmayer, M. Tripsas and C. L. Tucci, Interfirm modularity and its implications for product development, Journal of Product Innovation Management, vol. 22, no. 4, pp. 303-321, 2005.
[49] L. Thomas, E. Autio and D. Gann, Architectural leverage: Putting platforms in context, The Academy of Management Perspectives, vol. 28, no. 2, pp. 198-219, 2014.
[50] D. Tilson, C. Sorensen and K. Lyytinen, Change and control paradoxes in mobile infrastructure innovation: The android and iOS mobile operating systems cases, in Proceedings System Science (HICSS), 45th Hawaii International Conference on, IEEE, Maui, HI, 2012, pp. 1324-1333.
[51] A. Tiwana, B. Konsynski and A. A. Bush, Research commentary-Platform evolution: Coevolution of platform architecture, governance, and environmental dynamics, Information Systems Research, vol. 21, no. 4, pp. 675-687, 2010.
[52] K. Ulrich, The role of product architecture in the manufacturing firm, Research Policy, vol. 24, no. 3, pp. 419-440, 5// 1995.
[53] G. Walsham, Interpretive case studies in IS research: Nature and method, European Journal of information systems, vol. 4, no.2, pp. 74-81, 1995.
[54] J. Wareham, P. B. Fo, and J. L. C. Giner, Technology ecosystem governance, Organization Science, vol. 25, no. 4, pp. 1195-1215, 2014.
[55] R. K. Yin, Case Study Research: Design and Methods. California: Sage Publications, Inc., 2009
[56] Y. Yoo, Computing in everyday life: A call for research on experiential computing, Mis Quarterly, vol. 34, no. 2, pp. 213-231, 2010.
[57] Y. Yoo, O. Henfridsson and K. Lyytinen, Research commentary - The new organizing logic of digital innovation: An agenda for information systems research, Information Systems Research, vol. 21, no. 4, pp. 724-735, 2010.
[58] J. L. Zittrain, The generative internet, Harvard Law Review, vol. 119, no. 7, pp. 1974-2040, 2006.

Paper 3 – ICMB

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

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

A version of the paper is published as Kazan, E. (2015). The Innovative Capabilities of Digital Payment Platforms: A Comparative Study of Apple Pay & Google Wallet. In Proceedings of the 14th International Conference on Mobile Business (ICMB). Fort Worth, USA, December 12.

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.

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.

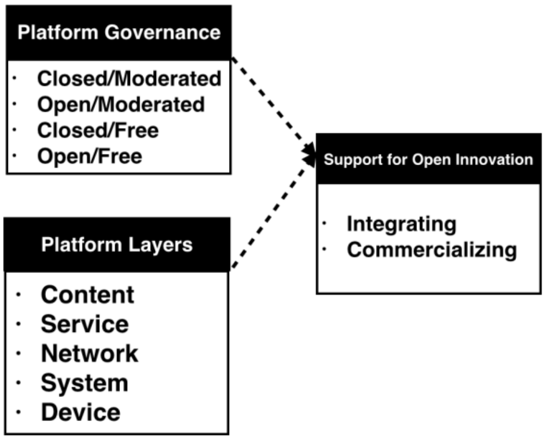


Figure 1. Digital Platform Innovation Model.

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.

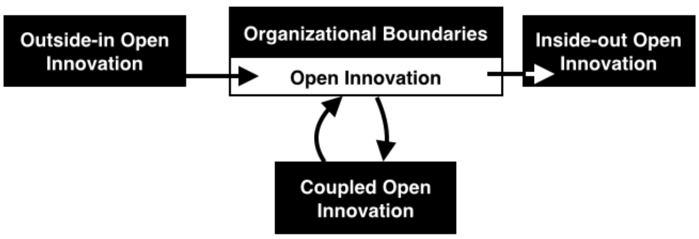


Figure 2. Three Types of Open Innovation.

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.

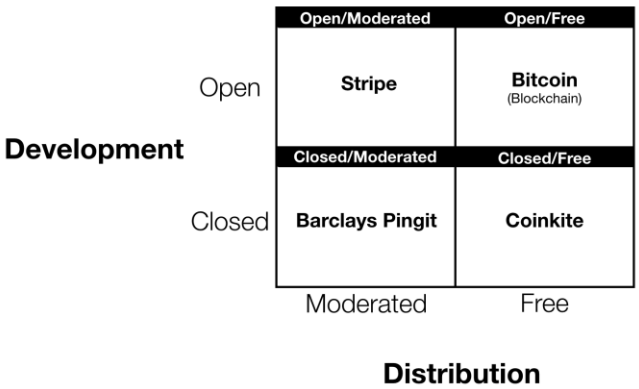


Figure 3. Digital Platform Governance.

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.

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.

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	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.

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

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.

Paper 4 – JMIS

Disentangling Digital Platform Competition:

The Case of UK Mobile Payment Platforms

Abstract

Digital platforms confer competitive advantage through superior architectural configurations. There is however still a dearth of research that sheds light on the competitive attributes which de-fine platform competition from an architectural standpoint. To disentangle platform competition, we opted for the mobile payment market in the United Kingdom (UK) as our empirical setting. By conceptualizing digital platforms as layered modular architectures and embracing the theoretical lens of strategic groups, this study supplements prior research by deriving a taxonomy of plat-form profiles that is grounded on the strategic dimensions of value creation and value delivery architectures. We discover that mobile payment platforms could be delineated based on whether they are: (1) integrative or integratable on their value creation architecture; and (2) have direct, indirect, or open access on their value delivery architecture. The preceding attributes of value creation architecture and value delivery architecture aided us in identifying six profiles associated with mobile payment platforms, which in turn led us to advance three competitive strategies that could be pursued by digital platforms in network economies.

Keywords: Competition, digital infrastructures, digital platforms, financial technologies, mobile payments, network economies, strategic groups

A version of the paper is published as Kazan, E., C.-W. Tan, E. T. K. Lim, C. Sørensen, & J. Damsgaard (Forthcoming): Disentangling Digital Platform Competition: The Case of UK Mobile Payment Platforms. Journal of Management Information Systems, Special issue on Financial IS, Underlying Technologies, and the FinTech Revolution.

1. INTRODUCTION

The *platformization of digital goods and services* is a growing trend in many industries. *Digital platforms* [16] (hereafter *platforms*) are layered modular information technology (IT) architectures [74, 80] embedded within business networks [2, 66]. Within these business networks, platforms function as innovation hubs in offering services (e.g., payments) that emphasize mediation and modularity [68, 80]. Platform owners (e.g., Apple) and platform complementors (e.g., developers) collaborate to develop respective firm-specific components to co-create *valued platform derivatives*[3] (e.g., apps) [20, 27, 62]. Because platforms constitute a vital source of competitive advantage within networked economies, there has been an enduring stream of research that examines how platforms effectively compete [7, 8, 60]. Scholars have attested to the criticality of matching mechanisms (e.g., pricing) in attracting and retaining stakeholders. A core premise of these studies is that successful platforms must induce positive and sustainable network effects to appeal to stakeholders. In the same vein, platformization has revolutionized the financial service industry by altering the manner through which value is created and delivered. Emerging technologies in the likes of blockchain and cryptocurrency have displaced conventional modes of transactions (e.g., centralized payment networks controlled by market incumbents) by introducing alternative value creation and delivery architectures that function as open, decentralized peer-to-peer (P2P) platforms. This in turn compels market incumbents to redesign their financial service offerings to harness the benefits of platformization and remain competitive within networked economies.

Yet, despite the disruption brought about by platformization, we have limited knowledge of how digital platforms compete from an architectural standpoint [5]. Responding to calls for an in-depth appreciation of the impact of architectural configurations on digital platform competition [5], we draw on previous literature on interfirm competition. Specifically, we espouse the theoretical lens of *strategic groups* to unpack the dimensions upon which interfirm rivalries are built [18, 44]. Research has delineated and clustered firms into strategic groups to account for their competitive dynamics. Past studies hold that firms belonging to the same strategic group possess comparable competitive attributes, and thus, compete more fiercely with group members (intragroup competition) than with members from another strategic group (intergroup competition). By embracing the theoretical lens of strategic groups, we aim to contribute to an in-depth appreciation of how different platform-driven strategic groups configure their technological architectures to bolster their competitiveness.

The mobile payments market in the United Kingdom (UK) is highly mature and competition is driven primarily by advances in financial technology – *fintech* innovation – among incumbents and contenders. Long-standing relationships among market incumbents and costly access to established payment infrastructures have compartmentalized competition by forcing select players to band together to compete with incumbents. The fragmentation of the UK mobile payments market into competing factions hence conforms to the classical conception of strategic groups, and serves as an excellent empirical context for our investigation into digital platform competition. Through case studies of multiple mobile payment platforms in the UK market, we strive to provide answers to two research questions: *What are the strategic attributes that define platform competition from an architecture standpoint? What are generic platform strategies within networked economies?*

[3] We employ the term *platform derivatives* to describe technological by-products of digital platforms that are constructed on the basis of developmental tools (e.g., application programming interfaces (APIs) or software development kits (SDKs)) supplied by these platforms.

This study contributes to a deeper understanding of how digital financial services such as mobile payments are leveraging on platform design to revolutionize their strategies within a regulated market environment. Synthesizing prior research, we identify two distinct strategic dimensions of digital platform competition: (1) *value creation architecture*, and; (2) *value delivery architecture*. In turn, the configuration of these two strategic dimensions shape the strategic orientation of platforms in the market. Our analysis generated six discrete platform profiles, each exemplified by a corresponding mobile payment service that seeks to revolutionize its offerings. The profiles serve as the basis on which to unravel digital platform competition. Our findings further reveal that these six platform profiles translate into three distinct platform strategies, each with its own merits and shortcomings.

2. THEORETICAL FOUNDATION

2.1 Overview of Literature on Mobile Platforms

Research into mobile payments has received substantial attention among scholars in their bid to explain the logic behind how mobile payment service providers innovate and compete [14, 32, 50]. Indeed, most mobile payment studies are centered on attempts to illuminate the drivers of service adoption [63], such as: exploring the cooperative and competitive dynamics among mobile payment providers within industries [17, 32]; prescribing the strategic design of mobile payment platforms/services towards market ignition [49]; revealing the challenges of creating a mobile payments market in the first place [50]; or scrutinizing the potential of novel mobile payment technologies (e.g., *near field communication* (NFC)) [15, 48]. A common theme among these studies is that they largely treat the external market as their unit of analysis (e.g., multi-sided platform perspective), thereby constraining our knowledge of how mobile payment platforms compete from an architectural standpoint. Past studies of digital platforms hint that such platforms achieve competitiveness through superior architectural configurations that are less susceptible to replication [51].

Arguably, one way of comprehending digital platform competition is to theoretically dissect such platforms into layered modular technology architectures [80]. We contend that competitive mobile payment platforms embody differentiated architectural configurations that mirror their strategic orientation. In turn, these strategic orientations in conjunction with their matching architectural configurations translate into distinct platform strategies, which when combined, form the basis for competition within the mobile payments market. We hence turn to the research stream on strategic groups as an appropriate theoretical lens for characterizing digital platform competition in the mobile payments market.

2.2 Strategic Groups: An Overview

Scholars have employed strategic groups as a theoretical lens [44] to uncover why certain firms in the same industry perform better than their rivals. The term *strategic groups* was first coined by Hunt [35] to explain firm competition in the home appliance industry. Firms belonging to the same strategic group exhibit similar competitive attributes and market orientations, they differ from those strategic groups that target other segments of the same industry [44, 70]. Porter [56, p. 129] proposed a more granular view on strategic groups, describing them as a "*group of firms in an industry following the same or a similar strategy along the strategic dimensions*". The methods by which firms compete are heterogeneous, as varying emphases are placed on different competitive attributes.

To derive strategic groups, scholars applied a myriad of competitive attributes, which include: *available resources* (e.g., distribution channels, assets, and technology) [6, 12, 45]; *cognitive factors* (e.g., top management perception, reputation, and identity) [24, 52, 58]; or *economic conditions* (e.g., product/service portfolio, firm performance and size, sales, margin, profit, and market share) [25, 42, 65].

Past studies further indicated that firms' dynamic capabilities can solidify the barriers of strategic groups [40, 69]. Yet, despite extensive research on strategic groups, previous work has centered on traditional industries and largely ignored firms situated in networked economies such as platform-driven market environments.

2.3 Strategic Groups within Industrialized Economies

Porter [56] claimed that firms' affiliation with strategic groups stems from having control over limited resources. By belonging to the same strategic group, members can install *mobility barriers* to preclude other firms from entering, or discouraging member firms from leaving the group at will [28]. Mobility barriers reflect segregation strategies adopted by strategic group members to designate and enforce conditions of loyalty through controlling member firms' access to exclusive shared resources.

Past studies suggest that competitive attributes underlying mobility barriers are typically idiosyncratic to the industry [44, 56]. Mascarenhas and Aaker's [43] work on the oil-drilling industry suggests that competitive attributes in one industry (e.g., offshore drilling capabilities) may not be applicable to others. The study by Mehra [45] in the US banking sector revealed that configurations of industry-specific resources also constitute definitive attributes of strategic groups. Mehra [45] noted that the ownership of strategic resources, by itself, does not necessarily generate competitive benefits, countering instead that optimal *"configurations of [strategic] resources*" are necessary to unlock their full potential. In light of the abovementioned studies, we contend that strategic groups are mainly shaped by industry specific resources and that the composition and configuration of these resources serve as the foundation for how firms within a given industry compete with one another.

2.4 Strategic Groups within Networked Economies

Increasingly, firm competition is driven by networked business logics in which strategic linkages are forged among multiple firms to pool complementary capabilities and resources to augment one another's products and services [4, 13, 19, 30]. The motivation for firms is to build up sustainable competitive advantage that is grounded in valuable, rare, and inimitable joint resources [cf. 13]. Gulati et al. [30] argued that a firm's network, comprising a set of strategic linkages, constitutes its own inimitable firm resource because they are rooted in complex managerial processes and difficult to replicate [4]. Within the automotive industry, Nohria and Garcia-Pont [47] maintained that strategic linkages among automakers (e.g., joint ventures) form an indispensable competitive resource, as they circumvent certain resource constraints (e.g., patents), and other organizational shortcomings. This aids firms in overcoming entry barriers installed by existing or emerging strategic groups. Accordingly, firms, which lack industry-specific resources, can forge linkages with other firms to compensate for their own organizational deficiencies. Similarly, in networked economies where firms are intricately connected, access or control over strategic linkages is a valuable resource [cf. 30, 53].

Beyond having access to strategic linkages, the configuration of such strategic linkages is equally important for realizing the potential of interfirm relationships [23, 45, 51]. Configuration is the purposeful arrangement and combination of functional elements to generate a desired output [23]. Similar to the notion of combinative capabilities [37, p. 508] where firms compete through "*new resource combinations [i.e. configurations] that are rare, valuable, hardly imitable, and non-substitutable*", firms purposely combine and (re)configure firm linkages to create valued market outputs. Possessing dynamic capabilities, which reflect one's "*ability to integrate, build, and reconfigure internal and external competences*" [69, p. 516], firms with access to strategic linkages respond to market changes by reconfiguring or even terminating existing strategic linkages with other firms. The study by Pagani [51] in the multi-media industry supports the notion of *network orchestration*. Pagani [51, p. 629] postulates that “*as modularization takes hold, the ability to coordinate among the modules will become the most valuable business skill*”. Strategic linkages and configurations are synonymous with interfirm modularity [68], where multiple platformized firms supply buildings blocks and components to create modularized goods and services within digitalized value networks [2, 80].

2.5 Digital Platform Competition

Extant literature has explored how platforms compete with one another from three perspectives, namely, product, multi-sided, and ecosystem [71]. From a *product platform perspective* [36, 38], competitiveness is achieved by controlling a stable platform core that acts the technological foundation for a family of platform derivatives. Firms with product platforms usually compete through economies of scale and scope, which are realized based on innovation of the core and peripheries. Originating from industrial economics, the *multi-sided platform perspective* [39, 41, 60] holds that competitive platforms embody positive networks effects whereby the value of a platform depends on the population and growth of distinguishable users (e.g., buyers and sellers on Amazon). Studies belonging to this research stream focuses on identifying efficient matching mechanisms (e.g., pricing) to entice and galvanize users against rival platforms. Finally, the *platform ecosystem perspective* places emphasis on the composition and configuration of technological components. Platforms in possession of superior technological components and configurations are deemed to be competitive in the marketplace [9, 10] because they tend to produce favorable conditions for soliciting contributions from third parties (e.g., external developers), thereby culminating in positive network effects.

Prior research on platform competition within the payment industry has largely subscribed to the multi-sided platform perspective [11, 59]. Beyond a few exceptions from the computer or software industry [9, 10], there is a paucity of studies that shed light on how platforms compete from a technological viewpoint in highly regulated industries such as that of the mobile payments market.

2.6 Digital Platforms

Digital platforms are layered modular technology architectures within business networks [54, 74, 80]. Within these business networks [3], platforms can orchestrate technological components to foster co-innovation with cooperative stakeholders, who might also be competitors among themselves [5, 51]. Additionally, platforms can house competitors within the same platform stack (e.g., Amazon and Apple) [80]. From the above description, it is thus conceivable that digital platforms resemble the technological manifestations of interfirm strategic linkages within networked economies. We therefore build on past studies about platform ecosystems to elicit determinants of digital platform competition that correspond to the modular composition (similar to strategic linkages) of such platforms as well as their configurations (similar to strategic linkage configurations).

Value Creation Architectures: The first strategic dimension of digital platform competition lies in the modular composition or strategic linkages among stakeholders in a network. Simply put, platforms supply the technical foundation for third parties (e.g., external developers) to develop complementary platform derivatives (e.g., iOS apps) on separate layers of a platform (e.g., service layer) [80]. In so doing, platform owners (e.g., Apple) leverage on boundary resources (e.g., APIs) [20, 27] to channel the creativity of network members towards the development of value-added derivatives. Because platforms supply developmental tools (or building blocks) for other platform members, an enduring challenge for platform owners is governance. Platform owners are constantly challenged to enforce control and support generativity (i.e., unprompted changes by heterogeneous audiences) [81], while ensuring reciprocal value appropriations [22, 73, 77]. Platforms have the (business) logic of transforming resources into valuable market outputs. In this regard, platforms compete within value networks by offering the best resource configuration (i.e., stable core and flexible derivatives) with the greatest added value. We hence define *value creation architecture* as modular components of a digital platform that can be exploited by third parties to develop value-added derivatives.

Value Delivery Architectures: The second strategic dimension of digital platform competition stems from the configuration of strategic linkages among stakeholders belonging to a value network. In other words, for platforms to efficiently diffuse derivatives across their value network, they rely on access to technological backbones in the form of digital infrastructures (e.g., Internet) [31, 33, 67, 72]. Hanseth and Lyytinen [31, p. 4] conceive digital infrastructures "*as a shared, open…heterogeneous, and evolving socio-technical system…of [IT] capabilities*". Likewise, Henfridsson and Bygstad [33, p. 908] equate digital infrastructures with "*the collection of technological and human components, networks, systems, and processes that contribute to the functioning of an information system*". Conversely, Tilson, et al. [72, p. 748] define digital infrastructures as "*basic information technologies and organizational structures, along with the related services and facilities necessary for an enterprise or industry to function*". Consistent with the preceding theorizations, we define *value delivery architecture* as omnipresent digital infrastructures that operate as technological backbones of value networks to facilitate the efficient delivery of standardized platform derivatives among stakeholders belonging to the same value network. One can see from our definition that the motivation behind why digital platforms strive for unimpeded access to digital infrastructures is to streamline the delivery of platform derivatives. Digital platforms lacking access to digital infrastructures, especially when these infrastructures are dominant and exclusive, will be compelled to either: (1) forge linkages with other firms that have access; or (2) utilize alternate access options that replicate established infrastructures.

Platforms within network economies vary in their modularity and, by extension, compete on two strategic architectural dimensions: namely (1) *value creation*, and; (2) *value delivery* (see Figure 1). Specifically, platforms practice modularity on their value creation architectures (i.e., platform level) to (*co*)*create* value-added derivatives. Likewise, platforms also practice modularity on value delivery architectures (i.e., infrastructure level) to deliver derivatives in a standardized format. We posit that platforms exhibiting similar attributes along these two strategic dimensions should share identical competitive instincts, and belong to the same strategic group (or platform profile).

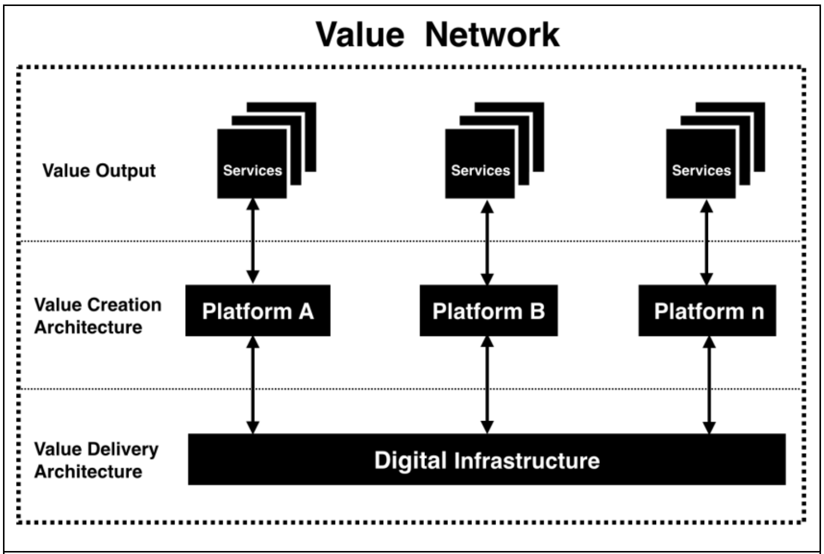


Figure 1. Value Network

3. METHODOLOGY

This study adopts an *interpretive multiple case study approach* to uncover competitive attributes that give rise to distinct platform-driven strategic groups (or platform profiles) [76, 79]. In this sense, we blend both exploratory (i.e., Theory I) and explanatory (i.e., Theory II) approaches [29] by synthesizing focal concepts from extant literature on platform and strategic groups to craft an analytical lens for: (1) identifying competitive attributes pertinent to platforms from an architectural standpoint; (2) deriving formal classifications of platform profiles, as well as; (3) disentangling how value creation, delivery, and competition unfold among these platform profiles. We deem the case study approach to be an appropriate method of inquiry as it can answer both "*how*" and "*why*" questions in complex and nebulous research environments [79], a setting similar to the context of this study. Through an analysis of key actors within the UK mobile payments market, we seek to untangle the intertwining relationship between technological architectures and the competitive strategies pursued by these platform profiles.

3.1 Research Setting: Mobile Payments Market in the United Kingdom (UK)

Payment is an indispensable service within national economies. To guarantee secure and reliable payment services for an entire country, access to established payment infrastructures is subjected to stringent and costly regulatory oversight. In this light, access to established payment infrastructures can be deemed to be an asset within the payment industry. To unravel the competitive attributes governing different platform profiles, we turn to the UK mobile payments market as our empirical context. The UK payments industry is in the midst of market convergence and transformation. Regulatory changes, falling transaction costs, and intensifying competition have culminated in the gradual deconstruction of once vertically integrated financial institutions (e.g., banks) by permitting new actors to enter the industry by disintermediating once lucrative value streams. Under this broader context, mobile payments have emerged as one of the most competitive market spaces in the payment industry.

Due to massive growth opportunities in the mobile payments market, new payment providers are encroaching on territories that are held by market incumbents. Payment instruments have evolved from simplistic plastic payment cards to sophisticated digital payment applications that are installed on consumers' mobile devices. These mobile payment platforms move value between payers and payees in a digitized fashion, which in turn pose a threat to the payment incumbents (e.g., banks) that have traditionally occupied this space. These new mobile payment platforms could foster new consumption habits and decouple long-standing customer relationships with incumbents. To compete, payment incumbents are compelled to launch their own mobile payment solutions (e.g., Barclay's Pingit) as a preemptive measure to maintain their relevance to existing customers.

Apart from the disruption brought on by emergent technologies, regulatory changes have also intensified market competition. UK payment regulators have called on incumbent payment scheme owners (e.g., Faster Payments[4]) to offer new payment providers non-discriminatory access to established payment infrastructures. These regulatory changes have enabled the new payment providers to interface their platforms with established payment infrastructures when moving value between payers and payees. Though the abovementioned regulatory changes are likely to accelerate competition among payment actors in the UK mobile payments market, there is notably little knowledge of how mobile payment providers, as owners of digital platforms, compete from an architectural standpoint.

[4] Faster Payments Service (FPS) is a UK banking initiative to reduce payment times between customer bank accounts from three working days, which transfers usually take via the long-established BACS system, to typically a few hours.

3.2 Case Selection: Six Distinct Platform Profiles

To derive distinct platform profiles within the UK mobile payments market, 16 semi-structured interviews were carried out with five industry experts and 11 financial institutions offering mobile payment services. We began by conducting five semi-structured interviews with UK payment industry experts who are well-acquainted with the industry due to their unique position in the midst of the shake up in the fintech landscape (see Table 1). These initial interviews allow us to construct an overview of the UK payment industry and glean insights into the: (1) roles of key actors (e.g., banks, payment start-ups, acquirers or merchants' bank, technology providers, payment infrastructure owners, and credit card firms) operating in the industry; as well as (2) explicit and implicit mechanisms underlying competition among these actors.

Table 1. Breakdown of Data Sources

Financial Institution	Primary Data		Secondary Data	
	Interviewee	Time	Source	No. Articles
Industry Experts				
Berenberg	VP / Equity Analyst on Financial Technology	61 mins	-	-
IBM	Executive Architect, Banking and Financial Markets	72 mins	-	-
Consult Hyperion	Director of Innovation	48 mins	-	-
Vocalink	Strategy Lead	125 mins	-	-
AMEX	Mobile Product Innovation and Strategy	153 mins	-	-
Banking Institutions				
Barclays (Pingit)	SVP of Mobile Solutions	66 mins	*Finextra.com*	120
			Thepaypers.com	10
Blockchain.info	Co-Founder	82 mins	*Finextra.com*	2
CEX.io	Chief Information Officer (CIO)	45 mins	*Thepaypers.com*	2
Circle	Chief Executive Officer (CEO)	45 mins	*Finextra.com*	13
CryptoPay	Founder	112 mins	*Thepaypers.com*	1
Droplet	Chief Technology Officer (CTO)	68 mins	*Thepaypers.com*	2
Google Wallet	Head of Europe, the Middle East and Africa	65 mins	*Thepaypers.com*	21
HSBC	Global Head of Mobile Payment	85 mins	*Finextra.com*	39
			Thepaypers.com	1
Paym	Head of Development	65 mins	*Finextra.com*	47
			Thepaypers.com	8
Santander	Innovation Analyst	210 mins	*Finextra.com*	29
			Thepaypers.com	1
Zapp	Chief Executive Officer (CEO)	44 mins	*Finextra.com*	71
			Thepaypers.com	10
Total	**16 interviews**	**1,346 mins**	**2 sources**	**377 articles**

From the expert interviews, we selected 11 UK financial institutions, which have been touted by the industry experts as revolutionary players in the mobile payments market, to serve as case companies for our study. Additional semi-structured interviews were conducted with representatives from these 11 financial institutions. Furthermore, to accurately position the 11 financial institutions within the UK payment industry landscape and authenticate claims made by the interviewees, we also gathered data from secondary sources (see Table 1). Guided by our analytical framework (see Figure 1), we inspected the 11 cases with respect to the two strategic dimensions of *value creation* and *value delivery* architectures. Our goal is to comprehend how these case companies design their respective mobile payment services to: (1) *create value through co-innovation*, and; (2) *deliver value through access to* *established payment infrastructure*s. From the analysis of the 11 cases, six distinct platform profiles (or platform-based strategic groups) surfaced according to attributes delineated across the strategic dimensions of value creation and delivery architecture. From our case pool, we present the six most prominent instantiations corresponding to each platform profile.

These six illustrative cases of mobile payment services are either operated by incumbent financial institutions or owned by market leaders in the payment industry, namely: (1) Pingit (Barclays); (2) Droplet (payment start-up); (3) Paym (collaborative payment solution devised by consortium of UK banking institutions); (4) Zapp (Vocalink, a payment technology provider); (5) Blockchain.info (blockchain start-up), and; (6) Circle (blockchain start-up). To capture novel fintech actors that differ significantly in their technological approach to payment processing, we have opted to include two blockchain start-ups. *Blockchain* is an emerging technology for digital value transfer (e.g., payment systems) that replicates the functionalities of established payment infrastructures. We selected two pervasive blockchain start-ups: Blockchain.info and Circle. Both startups leverage on the Bitcoin blockchain technology to transfer digital value (i.e., Bitcoins) among payers and payees. Whereas end users of Blockchain.info have to convert Bitcoins into fiat currency (e.g., British pounds) via a third party (e.g., Bitcoin exchange), their counterparts in Circle can perform direct conversion between Bitcoins and fiat currency. We chose these blockchain companies because they not only operate in the UK, they are also recognized as global leaders with respect to the level of venture capital investment garnered and the size of their user base. Besides, Circle is the first Bitcoin startup in the world to be granted an e-money license by UK regulators, thereby enabling the company to form sustainable banking relationships and negotiate access to established payment infrastructures [55].

3.3 Data Collection

Data for this study were gathered from two sources: 16 semi-structured interviews and secondary archival records (see Table 1). Semi-structured interviews have the advantage of permitting the interviewer to glean extra insights (e.g., publicly inaccessible data) that may enrich the study further. The interview protocol was devised in accordance with our analytical framework and contained questions that have been formulated to unravel the mechanisms underpinning how each of the 11 mobile payment services works in practice. Specifically, when interviewing representatives from the 11 financial institutions, we not only asked them to reconstruct both narratively and visually how a typical transaction could be executed on their respective mobile payment platforms, but we also probed them on the identity of external partners who are instrumental in supplying the necessary capabilities and resources to generate the service offering. All semi-structured interviews were recorded and subsequently transcribed for coding purposes. Apart from the interviews, we also distilled the product pages of the 11 mobile payment platforms together with payment reports, white papers, and press releases from industry associations (e.g., the European and UK Payments Council) as well as online news outlets (e.g., Finextra.com) and news aggregators (i.e., ThePaypers.com) reporting on the payment industry (see Table 1). Through the collection of data from secondary sources, we can triangulate insights gleaned from interviews with events documented in the public domain.

For detailed presentation of the six illustrative fintech cases of mobile payment services, we draw primarily on interviews conducted with the: (1) Senior Vice President (SVP) of Mobile Solutions at Barclays to shed light on Pingit; (2) Chief Executive Officer (CEO) of Zapp; (3) Head of Development at Paym; (4) Chief Technology Officer (CTO) of Droplet; (5) Co-Founder of Blockchain.info, and; (6) CEO of Circle, as well as secondary archival records that have been extracted for each service.

3.4 Data Analysis

The analysis of the empirical data was performed in three steps: (1) industry analysis, (2) intra-case analysis, and; (3) inter-case analysis. Table 2 gives a synopsis of how interview quotes were coded in accordance with content analytical techniques.

Table 2. Coding Examples from Data Analysis

		Exemplary Quote	Case	Inter Case Analysis
Value Creation Architecture	***Pingit***	**<u>Quote 1</u>**: *It has to be, of course, then commercially relevant to be disclosing any API's to that party…it's very much about* ***providing information into, or to, the Pingit app*** *as* ***opposed to integrating Pingit into another app****, for example.*	Pingit is moderating platform access such that co-creation value streams are inwards and orientated towards the platform.	Whereas Pingit maintains stringent control over the ability of external developers to develop value-added derivatives on its mobile payment platform, Paym practices the opposite. Consequently, Pingit competes by ensuring the consistency and quality of its service offerings while Paym competes by mobilizing third parties to engage in co-innovation.
Value Creation Architecture	***Paym***	**<u>Quote 2</u>**: *[Paym] facilitates payments but it doesn't do payments itself directly.* **<u>Quote 3</u>**: *The way the service works, assuming you and I both registered through our banks,* ***I would log into my mobile banking application, I would select the Paym option*** *and then I can send money to you by sending it to your phone number* **<u>Quote 4</u>**: *It's an extension of the functionality that a banking app that I have on my phone offers me.*	Paym shares its platform with third parties such that the co-creation value streams are reciprocal in nature.	
Value Delivery Architecture	***Pingit***	**<u>Quote 5</u>**: *when we use the Faster Payment infrastructure we as, of course, is one of the founders of the Faster Payments infrastructure we have connectivity into the Payments Councils Faster Payments product.*	Barclays, as the owner of Pingit and co-owner of the Faster Payments payment infrastructure, has direct access to send and receive payments in UK.	Both Pingit and Paym has direct access to an established payment infrastructure by virtue of their parent financial institution. Consequently, competitive differentiation between Pingit and Paym is hard to achieve in terms of their value delivery architecture.
Value Delivery Architecture	***Paym***	**<u>Quote 6</u>**: *Faster Payments is the UK's real-time account-to-account transfer banking [infrastructure], Paym is a way of driving more transactions through that banking [infrastructure].* **<u>Quote 7</u>**: *I'm then providing my bank with the instruction to make a payment and that payment will either go through Faster Payments or it will go through Link and those are the two approved, two supported, payment schemes in this service.*	Paym has direct access to an established value delivery architecture.	

- **Industrial Analysis**: After a careful review of the primary and secondary dataset, the first author reconstructed the empirical landscape to derive an overview of the underlying mechanisms in the UK payment industry: how it is structured and governed, who are the key actors, as well as; existing strategic linkages among these actors. The objective of this industrial analysis was to disentangle interorganizational linkages that are required for processing payment transactions throughout different payment infrastructures.
- **Intra-Case Analysis**: The first author drafted comprehensive case descriptions to outline the business logic underpinning each mobile payment service. Guided by the research questions and theoretical concepts from strategic groups and platform literature, the first author applied content analytical procedures [34, 57] to code and interpret the primary interview data in an iterative manner to unpack the logic of mobile payment platforms from an architectural viewpoint [21, 76, 79]. Specifically, the coding is aimed at pinpointing the modular attributes, which constitute the value

creation architecture of each platform, and the eventual configuration of strategic linkages with third parties that constitute their value delivery architectures (see Table 2).

- ***Inter-Case Analysis***: Inter-case analysis was performed to enhance the generalizability of our study [46, 79]. By comparing the cases in terms of their value creation and value delivery architectures, we discovered commonalities and discrepancies among these distinct platform profiles (see Table 2). Particularly, we identified six distinct platform profiles. To ensure the analytical consistency of our findings, we applied a differentiated role strategy after the initial data analysis [1]. The first author acted as the primary data collector and coder. The co-authors, on the other hand, played the role of the devil's advocate by putting forth alternative interpretations and counter-arguments. Whenever disagreements surfaced, codes were revisited and discussed until consensus was reached. The entire coding process followed an iterative cycle and data analysis was only completed when all authors agree on the placement of quotes in accordance with the analytical framework.

4. CASE ANALYSIS: ILLUSTRATIVE MOBILE PAYMENT PLATFORMS

Platformization has opened the door for mobile payment services to revolutionize how value is created and delivered through interfirm co-innovation. In this section, we present insights gleaned from analyzing the 11 mobile payment platforms. From our data analysis, we identified six *platform-driven strategic groups* (or *platform profiles*) within the UK mobile payment market, each with its own innovative approach to configuring its value creation and delivery architectures. Table 3 summarizes the platform profiles derived from our data analysis. We draw on these illustrative case examples to elaborate on the competitive attributes for each platform profile.

Table 3. Platform Profiles

		Value Delivery Architecture		
		Direct Access	***Indirect Access***	***Open Access***
Value Creation Architecture	***Integrative***	***Pingit (Monopolistic)*** <u>*Value Creation Architecture*</u> ***Integrative***: Internal development, vertically integrated platform, capturing value without third parties <u>*Value Delivery Architecture*</u> ***Direct***: Having direct access to established payment infrastructures (e.g., Faster Payments)	***Droplet (Assimilative)*** <u>*Value Creation Architecture*</u> ***Integrative***: Internal development, vertically integrated platform, capturing value without third parties <u>*Value Delivery Architecture*</u> ***Indirect Access***: Relying on third parties to have access to established payment infrastructures (e.g., BACS).	***Circle (Hybrid)*** <u>*Value Creation Architecture*</u> ***Integrative***: Internal development, vertically integrated platform, capturing value without third parties <u>*Value Delivery Architecture*</u> ***Indirect Access***: Relying on third parties to have access to established payment infrastructures (e.g., VISA, MasterCard) ***Open Access***: Unobstructed access to the bitcoin network
	Integratable	***Paym (Coopetitive)*** <u>*Value Creation Architecture*</u> ***Integratable***: Interorganizational platform, capturing value with third parties <u>*Value Delivery Architecture*</u> ***Direct***: Having direct access to established payment infrastructures (e.g., Faster Payments)	***Zapp (Inclusive)*** <u>*Value Creation Architecture*</u> ***Integratable***: Interorganizational platform, capturing value with third parties <u>*Value Delivery Architecture*</u> ***Indirect Access***: Relying on third parties to have access to established payment infrastructures (e.g., Faster Payments)	***Blockchain.info (Open)*** <u>*Value Creation Architecture*</u> ***Integratable***: Interorganizational platform, capturing value with third parties <u>*Value Delivery Architecture*</u> ***Open Access***: Unobstructed access to the bitcoin network.

4.1 Pingit

In 2012, Barclays launched its own internally-developed mobile payment service: Pingit (Figure 2). Pingit was initially designed to be a *person-to-person* (P2P) *mobile payment* service and as a standalone application, it registered solid growth in its user base, which in turn incentivized businesses to adopt Pingit. It is a proprietary mobile payment service as its design and development are fully internalized. As alleged by the Senior Vice President (SVP): "*We have a very rapid development cycle…we're doing a release every month [updates]…so anytime we're adding to those features…we're really adding to the long-term benefit of the product…we have a significant team that's developing and supporting those products or sub-products…under the Pingit umbrella*". Additionally, Pingit offers developmental tools to approved external developers to build related applications and extend the reach of its value creation architecture: "*It has to be, of course, commercially relevant to be disclosing any API's to that party…it's very much about providing information into, or to, the Pingit app as opposed to integrating Pingit into another app…the Techstars [start-up] accelerator program was enormously successful, [the goal is] to have a different set of APIs that kind of the startup app development world can use in a slightly different way*" (SVP).

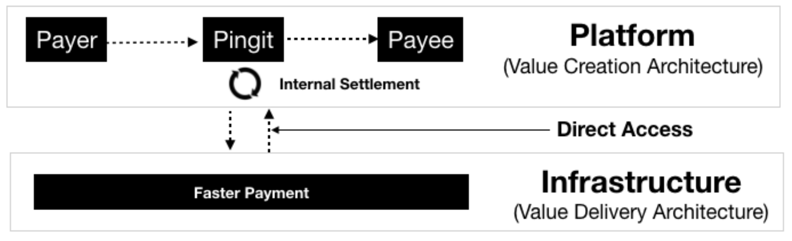


Figure 2. Pingit Mobile Payment Platform

Pingit (see Figure 2) has a dual approach to process payment transactions. For Pingit users (i.e., payers and payees) who are Barclays' customers, the settlement occurs internally within the Pingit platform in real-time. As the SVP elaborated: "*A consumer [pushes] the money which is what a Pingit transaction [is]…we can just move the money from one Pingit account to another*". By housing a closed loop system, Pingit harnesses efficiencies from economies of scale by processing transactions internally within its own platform. For Pingit users (i.e., payers and payees) who are not affiliated with Barclays, Pingit is still able to serve them by leveraging on its value delivery architecture. Barclays is a founding member of the Faster Payments scheme that grants Pingit direct access to an established payment infrastructure to process interbank transfers in near real-time. As the SVP remarked: "*we use the Faster Payments infrastructure, of course, as one of the founders of the Faster Payments infrastructure we have connectivity*".

Value Creation Architecture: Pingit pursues an independent approach to the development of its platform when competing with other mobile payment services. By denying other banking institutions from interfacing with Pingit, Barclays exercises total control over the value creation architecture of its inbuilt platform. But at the same time, Pingit is open to customers from rival banking institutions, who crave a mobile payment solution. As the SVP clarified: "*As a competitive bank, [rival banking institutions] can't use Pingit but as a consumer…it's an open market from a consumer perspective…it's our product and our service and we use it as a differentiator from the other banks in the space*". Having a large user base, Pingit is also in a comfortable position to dictate its collaborative relationships with external parties, who desire to develop approved platform derivatives for the mobile payment service. In turn, it expands the reach of Pingit's value creation architecture in both service diversity and quality.

Value Delivery Architecture: Through Barclays, Pingit possesses the competitive advantage of having direct access to the Faster Payments payment infrastructure, the dominant value delivery architecture for processing real-time payments. This enables Pingit to serve non-Barclays customers who have bank accounts at rival banking institutions. In this aspect, Barclays' value delivery architecture (i.e., Faster Payments) plays a pivotal role in bolstering the appeal of Pingit to potential customers beyond its own institutional borders.

Monopolistic Platform: By resembling a monopolistic, self-contained mobile payment service on its value creation architecture, Pingit maximizes the value to be gained from its proprietary platform technology. Furthermore, with respect to its value delivery architecture, Pingit has taken advantage of its direct access to an established payment infrastructure (i.e., Faster Payments) to reach out to customers at rival banking institutions in a cost-efficient manner.

4.2 Droplet

Launched in 2012, Droplet (see Figure 3) is a Birmingham-based mobile payment startup that allows small businesses and individuals to perform mobile payment transactions within brick and mortar stores.

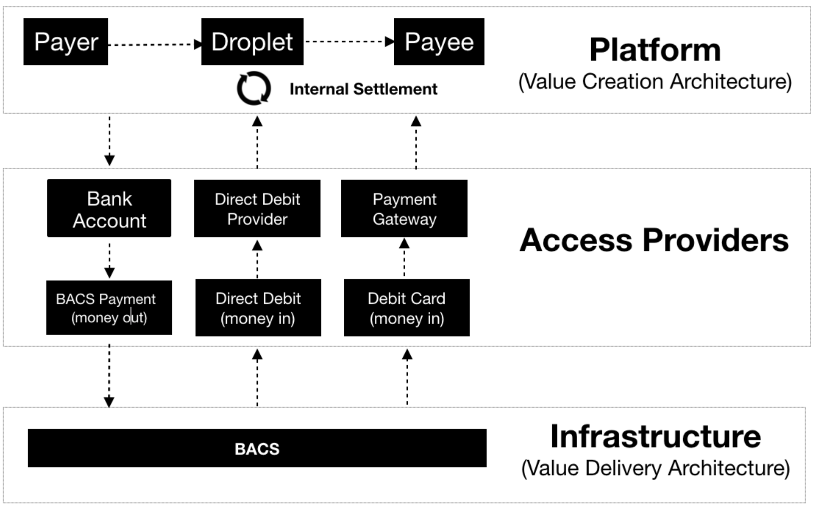


Figure 3. Droplet Mobile Payment Platform

By promoting itself as the 'Skype for payments', Droplet's core value proposition stems from its market position as a free payment service for both payers and payees. Built on standard hardware and open source software, Droplet's standalone application is an internally developed payment service that grants the company absolute control over how its service can be tailored to address market needs. As the Chief Technology Officer (CTO) explained: "*The software is Linux, we don't use any Microsoft technologies anywhere in the stack at all…the vast majority of our frameworks are open source, but obviously our [own software] isn't open source*". As for granting platform access to external developers, the CTO stated: "*We've seen a couple of companies build experimental things on Droplet which has been great and really exciting… but not to the level that we want…without [API keys[5]] it won't work so they need to apply to us for that [API key] …We can revoke that [API keys] at any time if we want to*".

[5] *API keys* are authentication codes that must be incorporated into third-party applications to gain access to the developmental tools (i.e., APIs) offered by Droplet.

To exploit the full potential of its value creation architecture in facilitating mobile payments between payers and payee, Droplet not only forges strategic linkages with financial institutions whereby payers can top-up their Droplet accounts via direct bank transfers or debit cards linked to their personal bank accounts, but it also offers approved developmental tools (i.e., APIs) to external developers for building their own Droplet-related applications. Through supplying boundary resources (i.e., approved developmental tools) as part of its value creation architecture, Droplet encourages external developers to generate their own platform derivatives with customized business rules to meet the ongoing needs of the market.

With regard to its value delivery architecture, Droplet is dependent on both direct debit providers to withdraw the top-up amount directly from customers' bank accounts (e.g., GoCardless) and payment infrastructure access providers (e.g., Ingenico) for debit card top-ups. As soon as a payment infrastructure access provider receives a top-up request on behalf of Droplet, it will credit the payment into Droplet's bank account. Afterwards, transactions among Droplet customers are instantly settled within its internal system. In this way, the money in Droplet's bank account remains untouched during transactions. As the CTO acknowledged: "*We are quite insulated from the real world of banking…* [*payment* transactions] *can carry on infinitely with no costs to us and no money movement*". For those customers who would like to withdraw money from their Droplet accounts and exit the platform, Droplet instructs its bank to send what are known as cost convenient payment batches (i.e., BACS[6] payment) to the beneficiaries.

Value Creation Architecture: Droplet adheres to an independent approach to the development of its platform to minimize its dependency on external developers. Droplet operates a self-contained mobile payment service that is realized through a blend of self-developed software, inbuilt APIs, and off-the-shelf hardware. By pursuing such an approach, Droplet achieves agility in platform development in that it can acquire capabilities externally [69] to respond to fast changing market environments. By housing a closed loop system, Droplet competes through the provision of instantaneous payments that occur within its platform boundaries. This in turn significantly reduces its variable cost structure: "*The plan is to grow the system to a scale where more transactions happen inside our economy and reduce our overall reliance on money in and money out…no money is moved at all. This can carry on infinitely with no cost to us and no money movement…so we have merchants in our economy that then buy things from other merchants using their Droplet balance*" (CTO).

Value Delivery Architecture: Droplet has indirect access to the BACS payment infrastructure to move money out of its platform. BACS is an established payment infrastructure renowned for its affordability but slow settlement speed. Droplet cooperates with multiple interchangeable access providers to maintain its flexibility. As the CTO admitted: "*[These payment providers] are all interchangeable, so if we want to switch suppliers, we switch suppliers and nothing changes [for Droplet]*". Consequently, in the absence of direct access to established payment infrastructures, Droplet partners with multiple payment infrastructure access providers to optimize indirect access for its value delivery architecture and acquire efficiency gains for market competition.

Assimilative Platform: Droplet is a self-contained mobile payment service that *assimilates* external resources to maintain independency on its value creation architecture. Likewise, Droplet's loose coalition with payment infrastructure access providers to indirectly access predominant value delivery architectures gives it the flexibility to depress its cost structure by switching partners when necessary.

[6] Bankers' Automated Clearing Services (BACS) is the payment infrastructure for the clearing and settlement of automated payment methods in the UK such as direct debit.

4.3 Paym

Launched in 2014, Paym (see Figure 4) is a mobile payment service that was initially owned by the UK Payment Council and later by its institutional members. The Payment Council is an industry consortium whose membership encompasses most major British financial institutions (e.g., banks and building societies).

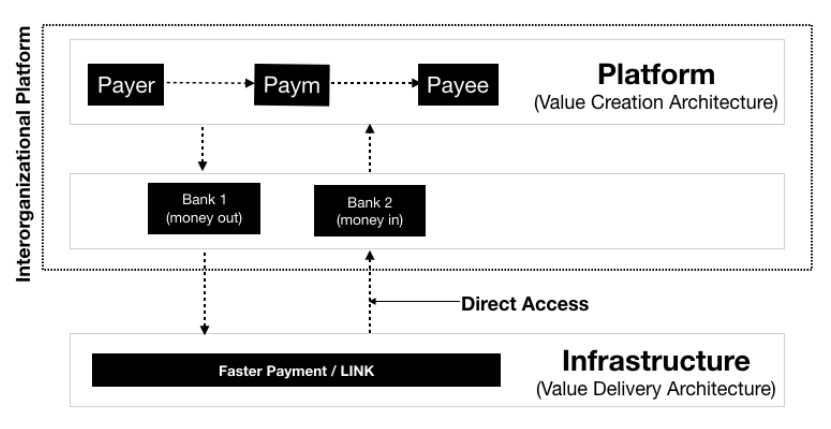


Figure 4. Paym Mobile Payment Platform

The Payment Council was inaugurated with a mandate of nurturing the continuous growth of the UK payment industry. Paym is fully developed and operated by an external payment technology provider called Vocalink. Interestingly, Vocalink is also the technology provider for several UK payment infrastructures (e.g., Faster Payments). As alluded to by the Head of Development: "*Vocalink [is] our IT provider…we've contracted with Vocalink to provide the database and the associated functionality around it…we went out to tender and Vocalink won the tender and then built the product that we had specified*". Born out of the collaboration between the Payment Council and Vocalink, Paym endows UK banking institutions with the capacity to offer mobile payment services to their existing customers. In contrast to Pingit and Droplet, Paym is not a standalone application, but rather operates as a module within existing mobile banking applications developed by institutional members of the Payment Council. Paym hence exists as an interoperable mobile payment service that accommodates diverse banking applications (e.g., HSBC and Santander). In this sense, Paym, unlike Pingit and Droplet, does not exercise control over its value creation architecture by vetting platform derivatives developed by partnering banking institutions. Instead, by positioning itself as a module which can be inserted into existing mobile banking applications, Paym functions as a interorganizational platform to connect Paym-linked bank accounts across partnering banking institutions for processing *push payments* and accommodate the development of firm-specific platform derivatives.

Paym perpetuates traditional relationships among banking institutions and payment infrastructures (e.g., Faster Payments). The Head of Development mentioned: "*The idea is that you already trust your bank, you get this functionality and then everybody can send money to each other using their existing relationship…I'm then providing my bank with the instruction to make a payment and that payment will either go through Faster Payments or it will go through LINK and those are the two approved, two supported, payment schemes in this service*".

Value Creation Architecture: Paym pursues a collaborative approach on its value creation architecture to encourage interfirm modularity among banking institutions to develop competitive mobile payment services. Envisioned as an interoperable mobile payment service, the development of Paym has been deliberately subcontracted to an external payment technology provider (i.e., Vocalink) who is familiar with pre-existing interorganizational dependencies among banking institutions and can ensure the interoperability of the platform across a wide range of mobile banking applications. By being highly integratable across heterogeneous banking applications, Paym attains its competitiveness by acting as an inclusive mobile payment service: "*The idea is that I can sign up for Paym and I don't need to create a new relationship with a new financial services provider…it's an extension of the functionality that my [mobile banking app] already offers*" (Head of Development).

Value Delivery Architecture: Paym, as a mobile payment service offered by the UK banking consortium, has, on its value delivery architecture, direct access to Faster Payments, an established payment infrastructure with real-time processing of financial transactions. Paym thus facilitates regular bank wire transactions so much so that it serves to solidify the current market positions of banking institutions. As the Head of Development asserted: "*The bank platform talks directly to Paym and Paym talks directly back to the bank platform…those are the only connections that exist*".

Coopetitive Platform: By integrating into existing mobile banking applications developed by banking institutions that are also engaged in rivalry with one another, Paym competes on its value creation architecture by fueling this rivalry to foster competition in developing firm-specific platform derivatives and better its payment services. Conversely, since banking institutions are already interconnected by having direct access to an established payment infrastructure (i.e., Faster Payments), the competitiveness of Paym on its value delivery architecture is miniscule.

4.4 Zapp

Zapp (see Figure 5) is a mobile payment service owned by the UK payment infrastructure provider, Vocalink.

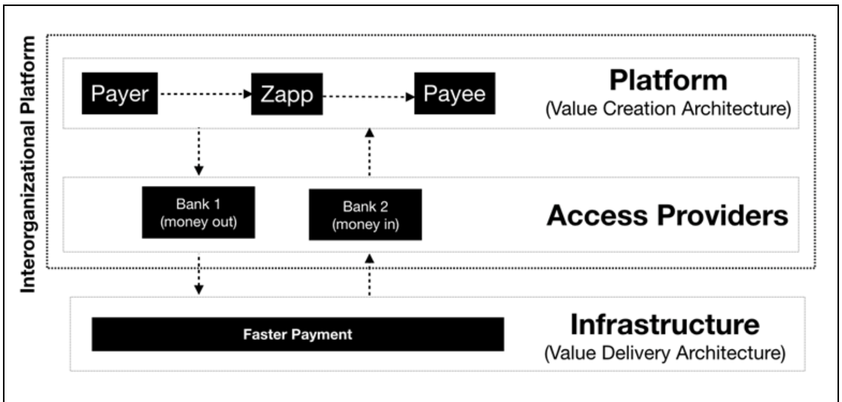


Figure 5. Zapp Mobile Payment Platform

Like the three aforementioned mobile payment solutions, Zapp is designed to facilitate mobile payments between payers and payees. However, for its value creation architecture, Zapp shares commonalities with Paym. Similar to Paym, Zapp's value creation architecture stems from its modularization: it is positioned as a module which can be inserted into existing mobile banking applications. For this reason, Zapp is reliant on contemporary banking partnerships. As the CEO explained: "*It's a feature within the [mobile banking] app … that essentially turns a banks mobile banking app into a vehicle to make payments. So, if you like, we are the messaging service that sits like a scheme between banks on one side and acquirers and merchants on the other side and we manage the flow of information in order to make a payment*". To initiate payments, Zapp has only indirect access to the Faster Payments payment infrastructure. In this setup, banks act as proxies to initiate payments on behalf of Zapp between payers' and payees' bank accounts. Not unlike Paym, Zapp reinforces traditional relationships among banking institutions and payment infrastructures. The CEO emphasized that "Zapp *works as part of their [mobile banking] app - it's re-intermediating the bank into [customers'] relationship*".

Value Creation Architecture: Zapp pursues a collaborative approach on its value creation architecture in that it primarily competes through modularity. It invites banking institutions and other businesses (i.e., merchants) to integrate its modularized mobile payment service into their applications and develop firm-specific platform derivatives. To achieve interoperability and resilience, technology development is developed partially in-house with certain operations being subcontracted to an external vendor (i.e., Oracle). Zapp thus attains competitiveness by being an inclusive mobile payment service that is amenable to a variety of businesses and financial institutions.

Value Delivery Architecture: Zapp has indirect access to the Faster Payments payment infrastructure because it functions primarily as an interorganizational platform to connect bank accounts across banking institutions to form a mobile payment network. Consequently, Zapp configured its strategic linkages with financial institutions in the form of indirect access to an established and fast processing value delivery architecture.

Inclusive Platform: Zapp competes by being an inclusive platform that strives to be readily accessible for various actors in the payment industry (e.g., banking institutions, merchants, and acquirers) by being integratable into external payment systems. Additionally, Zapp is dependent on collaborations to gain indirect access to established value delivery architectures for processing payments. This perpetuates conventional value streams within the payment industry and solidifies the competitive position of current market incumbents.

4.5 Blockchain.info

Founded in 2011, Blockchain.info is a London-based Bitcoin startup that offers three main products: search, bitcoin wallets, and Bitcoin developer tools. Through the free online wallet service, Bitcoin owners can store and transfer them through the Bitcoin network whereas the search engine provides analytics about the status of the network (e.g., recent transactions or volume). The Bitcoin wallet service is targeted towards non-technical users, whereas more adept users utilize Blockchain.info's open APIs. The APIs on this platform permit external developers to integrate the preceding services (e.g., bitcoin wallets or analytics) into their own service offerings. (See Figure 6.)

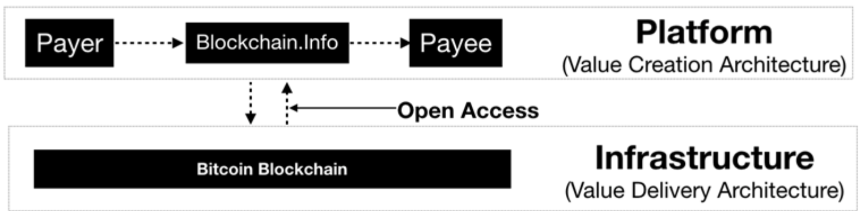


Figure 6. Blockchain.info Mobile Payment Platform

Access to the APIs is open to all. As proclaimed by the co-founder of Blockchain.info: "*We are technologists that focus on building APIs that make using Bitcoin protocol simple and easy…our APIs are tool sets for anyone who is impassioned to create innovative [bitcoin] ideas*". Referring to its free Bitcoin wallet service: "*We serve consumers who want a simple and easy way securely store their Bitcoins, and transact with anyone they want to*" (co-founder). Blockchain.info is an independent startup that is not reliant on other technology providers by operating its own local servers. At the same time, the platform is highly open and accessible to external developers by giving them the freedom to integrate parts of Blockchain.info's value creation architecture into their applications. As elaborated by the co-founder, Blockchain.info's APIs are documented and publicly available without restriction: "*Our APIs are basically gateways to interface with any type of protocol, so we are highly compatible, we are entirely open, there are no walled gardens*" (co-founder).

Value Creation Architecture: Like Paym and Zapp, Blockchain.info also subscribed to an integratable approach for its value creation architecture. Blockchain.info's source code for various services (e.g., Bitcoin wallet) is publicly accessible, thereby providing external developers with the opportunity to review and improve code quality. Moreover, external developers can copy and modify the code in accordance with their needs to create derivative service offerings. By crowdsourcing ideas from its developer community, Blockchain.info is able to improve the quality of its services by collating and integrating these ideas into its own services after an internal review process. As the co-founder stated: "*Our lead developer approves pull requests that come from the community and he obviously reviews the code, we go through a testing regiment…and then we release it.*"

With regards to its hardware, Blockchain.info is, to a large degree, an isolated service because it does not utilize cloud computing (e.g., Amazon AWS). Rather, it operates its own servers to ensure independence and security over customers' Bitcoin deposits. As the co-founder articulated: "*From a hardware perspective, we have a large amount of infrastructure, we use dedicated hardware, we never use cloud services…we do that for privacy reasons… [what we are doing], it's very unusual, most people would not do that, they would run hardware by Amazon, and would cost a fraction what we would pay*". Software-wise, the co-founder explained: "*On the Github repository, we have everything in the public domain and it [is being] constantly used and collaborated upon by people that [are not] Blockchain.info employees*".

Value Delivery Architecture: For its value delivery architecture, Blockchain.info depends solely on the Bitcoin network to deliver Bitcoins between payers and payees. As soon as the Bitcoin payment is broadcasted to the Bitcoin network, specialized computers (i.e., Bitcoin miners) around the globe receive transaction requests and verify them through cryptography. These verified transactions are then recorded in a publicly distributed ledger system (i.e., Bitcoin blockchain), which is essentially a P2P book-keeping system of all transactions since the inception of the Bitcoin blockchain.

Open Platform: Blockchain.info increases its market share by leveraging on external developers and subsidizing its service (e.g., Bitcoin wallets) for customers. In doing so, Blockchain.info, as a platform, derives value from the Bitcoin community by being integratable into various agnostic third-party services. This culminates in positive conditions to reinforce and extend Blockchain.info's competitive position. To deliver Bitcoins throughout the Bitcoin network, Blockchain.info operates on top of the Bitcoin Blockchain, which is an *open* value delivery architecture without access constraints.

4.6 Circle

Founded in 2013, Circle (see Figure 7) is a Boston-based Bitcoin startup that offers mobile payment service in the form of Bitcoin brokerage and free wallets targeted towards end users. Compared to Blockain.info, Circle does not endorse an open developer program that could harness Circle's APIs. With its independent value creation architecture, Circle, has the ambition to transform Bitcoin into an accepted payment currency.

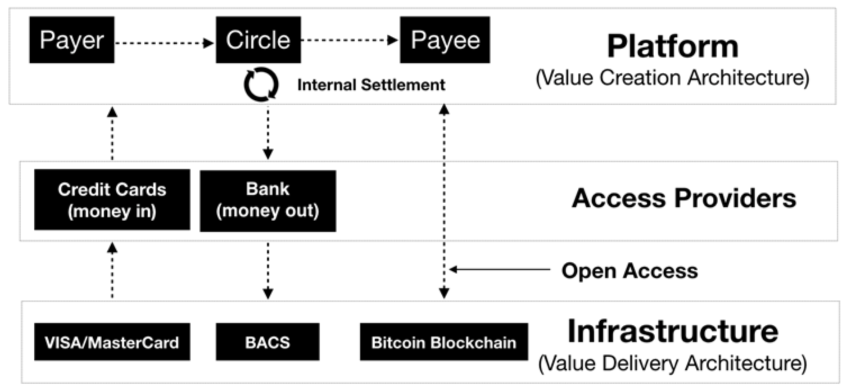


Figure 7. Circle Mobile Payment Platform

The CEO articulated: *"We want to make it easy to store and move value in the same way that people store and share content messages on the Internet…people use [currencies] in everyday life, they are paid in certain currencies and they understand their purchasing power in those currencies, goods and services are priced that way, but we also want that to work globally…in an interoperable way, the way the Internet works, which is…this instant and distributed system that supports the instantaneous movement of data and that is all money is, is just data*". Through its e-money license, which requires regulatory compliance (e.g., know your customer (KYC)), Circle, on its value delivery architecture, possesses an advantage of having indirect access to established payment infrastructures. Consequently, in addition to being able to settle transactions among Circle customers instantaneously within its own platform, payments can also be processed through: (1) established payment infrastructures (i.e., VISA and MasterCard), and; (2) the Bitcoin network.

Value Creation Architecture: Circle's value creation architecture is relatively independent as it has the internal resources and capabilities to operate its own payment service, and is not tied to any specialized external resources. As the CEO maintained: "*We've build our own digital banking platform from scratch in house, designed around kinds of user experiences that we think that are important for a global person-to-person payment application…we leverage on cloud infrastructure…our core transactional infrastructure of our payment and banking system is all built in house*".

Value Delivery Architecture: Circle, on its value delivery architecture, forged strategic linkages to gain access to two separate digital infrastructures: (1) established payment infrastructures (e.g., MasterCard, VISA), and; (2) the Bitcoin network. The CEO claimed that "*we want to support…an open Internet of value and so that's why in addition to integrating into the legacy central banking systems, legacy card networks…we also want to support an open protocol which is the Bitcoin Blockchain"*.

Hybrid Platform: Circle functions as an independent and hybrid platform that does not rely on interfirm modularity. Furthermore, Circle forged strategic linkages to harness efficiencies from two separate value delivery architectures: (1) established payment infrastructures to process transactions in fiat currencies, and; (2) the Bitcoin Blockchain for permissionless global value transfer to emulate direct access rights to an established payment infrastructure.

5. DISCUSSION

In networked economies, goods and services are derived from layered modular architectures in the form of digital platforms [26, 64, 68, 80]. Digital platforms play a pivotal role in networked economies because they constitute nodes within business networks from which value is concentrated [66]. Because past studies on digital platforms are confronted with conceptual ambiguities and challenges in comparability, de Reuver et al. [16] advanced a research agenda that places emphasis on the importance of a unified vocabulary and comparative analysis when investigating digital platforms.

In this study, we embrace a technological view of digital platforms that dissects mobile payment platforms as layered modular technology architectures [80]. From this viewpoint, we theorized that digital platforms compete through architectural configurations, which strive to generate more value in comparison to their rivals [51]. Specifically, we delineated platforms into value creation and delivery architectures, both of which constitute strategic dimensions pertinent for deciphering competition among mobile payment platforms. Competitive platforms differentiate among themselves through engaging in fintech innovations that emphasize the significance of modular composition and configurations to induce positive network effects within business networks [51, 78]. Figure 8 offers an overview of the core findings from our data analysis. By inductively deriving competitive attributes along the strategic dimensions of value creation and value delivery architectures, we arrived at a taxonomy of six platform profiles. Findings suggest that digital platforms compete in the marketplace by being: (1) either *integrative* or *integratable* on their *value creation architecture*, and; (2) having *direct*, *indirect*, or *open access* to pre-existing *value delivery architectures* to move value among stakeholders within the network.

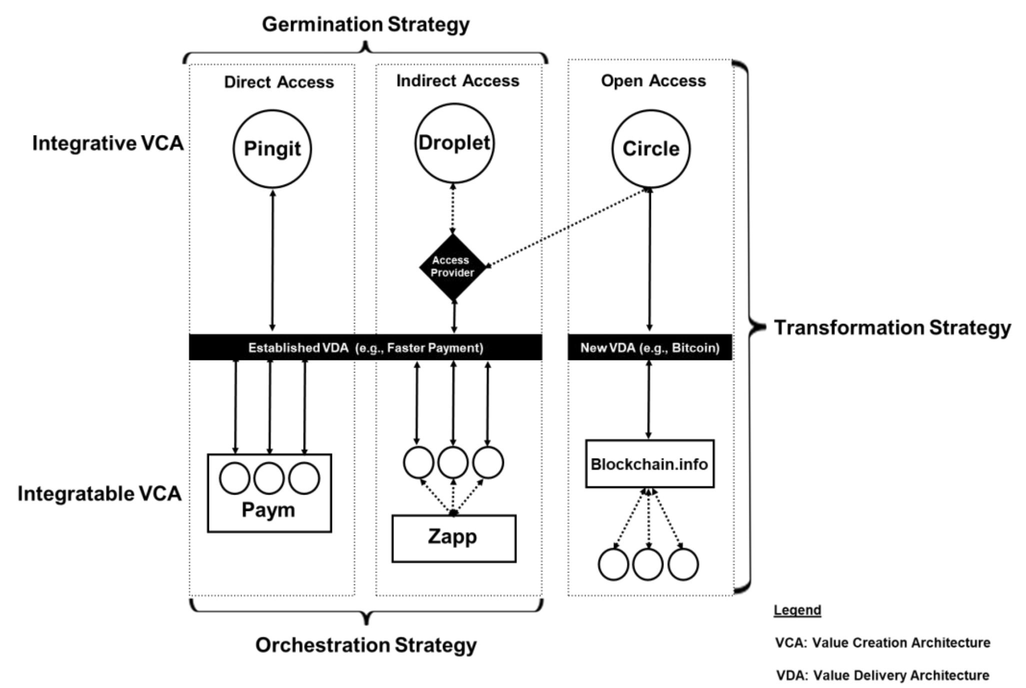


Figure 8. Value Creation & Delivery Architectures

5.1 Value Creation Architectures: Integrative and Integratable Approaches

Integrative Approach: Mobile payment platforms (i.e., Circle, Droplet, and Pingit), which subscribes to an integrative approach, can exert control on their value creation architectures at the platform level to co-create value with an exclusive selection of private business partners and shield their services from unauthorized parties. These platforms enact closed loop systems to settle payment transactions within their own boundaries. Settling payment transactions among users within the same payment system is virtually free, instantaneous, and guaranteed. Conversely, sending payments beyond the closed loop system contributes to the cost structure in terms of fees, time, and risk. Integrative platforms tend to assimilate resources and arrange access points in ways that culminate in an inward-looking, vertically-integrated, and closed-loop ecosystem (see Figure 9).

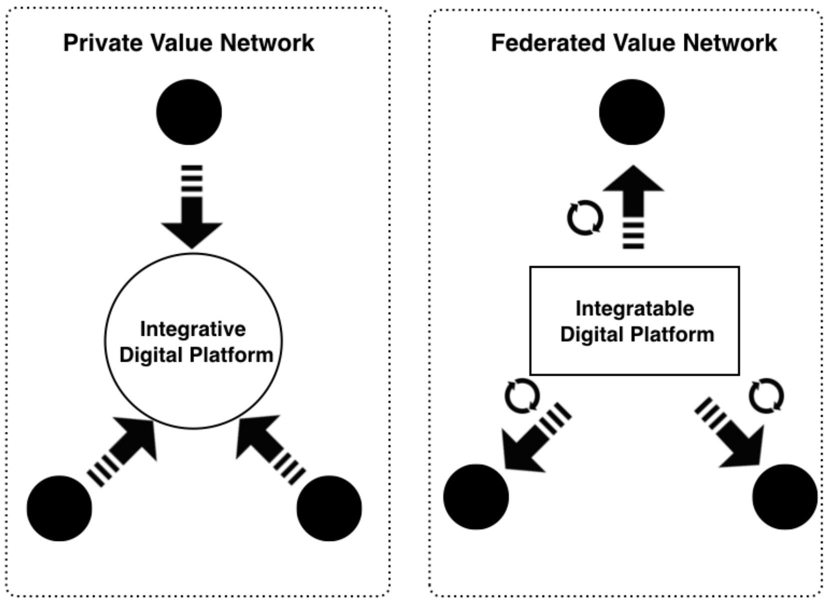


Figure 9. Integrative and Integratable Value Creation Architectures

But to reap rewards from economies of scale, integrative mobile payment platform must deliver a compelling service to attain critical mass. From the illustrated cases, all integrative platforms have their own standalone mobile payment service to regulate derivatives being developed on top of their value creation architectures and ensure a consistent user experience. Independence in the value creation architecture allows integrative platforms to be nimble in responding to dynamic markets environments [61]. However, to ensure competitive sustainability, owners of integrative platforms must be sufficiently equipped and adept to continuously nurture their internal developmental capabilities to remain an enticing option for business partners within such *private value networks*. Otherwise, integrative platforms may have to relinquish their tight control and embrace interfirm modularity to compensate for deficiencies in their value creation architectures. This in turn could dilute their integrative approach to value creation.

Integratable Approach: Platforms with integratable value creation architectures connect and mobilize stakeholders within business networks. The outcome is a mobile payment platform in which the responsibility of value creation and appropriation is distributed among stakeholders within the network (see Figure 9 again). Blockchain.info, Paym, and Zapp exhibit characteristics of integratable platforms in that their services are designed with collaboration in mind and they intentionally co-innovate with external developers to extend the capabilities and market reach of their value creation architecture. Paym's payment feature is designed with the explicit intention of complementing existing mobile banking applications. By integrating Paym's modularized payment service into mobile banking application, Paym connects these mobile banking applications to form an interorganizational mobile payment platform. Likewise, Zapp's value creation architecture, like that of Paym, is designed to be integratable into existing mobile banking applications as a modularized payment service, thereby leading to the formation of an interorganizational mobile payment platform. Conversely, even though

Blockchain.info has its own standalone applications targeted towards customers, Blockchain.info's mobile payment service is highly attractive for third parties (e.g., business startups) because it is designed to be integratable into their existing applications without the need for permission. Platforms with integratable value creation architectures modularize and exploit interorganizational resources to co-create value within an orchestrated business network. We define the structure from platforms taking such a collaborative approach as a *federated value network*.

On a cautionary note, an interorganizational platform encounters challenges from reduced control, increased transaction costs, misalignment between business and IT, as well as intense rivalry among stakeholders. In other words, if the costs of maintaining integratable platforms outweigh the benefits of cultivating interorganizational collaboration, owners of such platforms may be inclined to turn to an integrative approach to achieve flexibility in responding to business opportunities.

5.2 Value Delivery Architectures: Three Modes of Access

Direct Access: Mobile payment platforms with direct access to established value delivery architectures are often able to profit from these industry-specific resources (see Figure 10). Pingit (Barclays) and Paym, which have unobstructed access to established payment infrastructures, compete by exploiting their direct access rights to deliver guaranteed and instantaneous mobile payment services via these value delivery architectures. Direct transactions delivered through Pingit and Paym reinforce their direct access rights, their status as payment platforms, and ultimately their contemporary market positions. Direct access to established value delivery architectures, which offer the greatest possible market reach within an economy, is tantamount to a valuable configuration of strategic linkages that cannot be emulated by competing platforms readily.

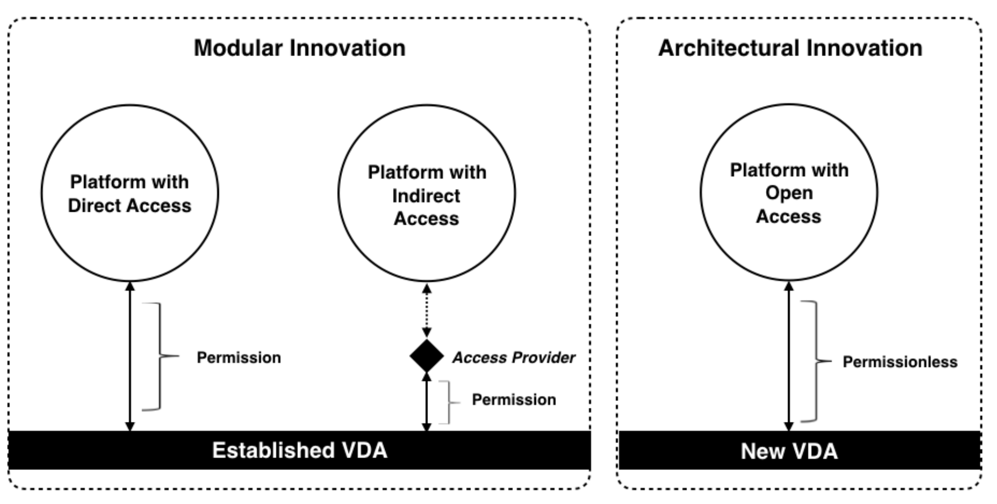


Figure 10. Direct, Indirect, and Open Value Delivery Architectures

Nonetheless, direct access comes with the burden of costly maintenance (e.g., monthly fix and variable costs) as well as extensive coordination between platform and infrastructure owners. Moreover, such value delivery architectures, being critical national infrastructures, are heavily regulated. Direct access owners (e.g., banking institutions) are legally obliged to offer non-discriminatory indirect access to rival institutions. To overcome this disadvantage, integrative payment platforms with direct access (e.g., Pingit) attempt to reduce direct access challenges by creating their own vertically-integrated, closed loop mobile payment system to settle payment transactions within its own boundaries. Transactions settled within integrative platforms suppress variable costs. For financial institutions that have direct access but do not possess the competency to develop an integrative platform (e.g., Paym), they join up with owners of interoperable mobile payment services (or interorganizational platforms) to achieve competitiveness and customers relevance. The downside is that such an arrangement demands costly direct access for each transaction to serve customers at other financial institutions even though these institutions operate on the same interorganizational platform. This in turn adds to the variable cost structure.

Indirect Access: Mobile payment platforms with indirect access to established value delivery architectures achieve competitiveness by cooperating with third parties (e.g., banking institutions) offering the best indirect access conditions (see Figure 10 again). In our study, Droplet and Zapp do not possess direct access rights. To compensate for the lack of this industry-specific resource, both platforms forged strategic linkages with third parties. For instance, Droplet is versatile by partnering with multiple financial intermediaries. Droplet applies a plug-and-play strategy in selecting interchangeable intermediaries that offer the most economical indirect access options. Zapp, on the other hand, formed hard-to-replicate strategic linkages with banking institutions that have privileged direct access rights to established payment infrastructures.

Challenges associated with indirect access stem from platforms' dependency on third parties and ongoing transaction costs that accompany each usage, alteration, and adjustment of the value delivery architecture. This also implies that third parties can impose constraints on mobile payment platforms whenever a transaction is initiated that requires access to established payment infrastructures. To outweigh these costs and ensure competitiveness, integratable mobile payment platforms with indirect access (e.g., Zapp) forged strategic linkages with select third parties in the business network that has the furthest market reach and can guarantee real-time processing of payments. Alternatively, integrative platforms with indirect access (e.g., Droplet) harness their internal capabilities to create a complementary closed loop system that emulates direct access attributes (i.e., instant and guaranteed payments). This way, platforms with indirect access can circumvent the restrictions of slow value delivery architectures (e.g., BACS) when sending payments across financial institutions.

Open Access: Mobile payment platforms with open access achieve competitiveness by leveraging novel value delivery architectures (e.g., Bitcoin blockchain). Open access endeavors to emulate direct access rights (i.e., unobstructed payment without intermediaries) in a cost-effective fashion (see Figure 10). Nevertheless, new value delivery architectures do not have the same market reach as that of established ones nor have they been comprehensively tested. To overcome this, Circle incorporates both indirect and open access to simultaneously access the fiat money network and also service customers within the Bitcoin network. Still, Circle's indirect access comes with its own costs. To maintain indirect access to established payment infrastructures and sustain partnerships with incumbent financial institutions, Circle must invest in internal resources to comply with national laws (e.g., anti-money laundering). This is because customers who transact purely within the Bitcoin network are normally not identifiable due to Bitcoin's permissionless and pseudonymous nature.

Blockchain.info does not possess connectivity to established payment infrastructures. Besides, Blockchain.info has no intention of leveraging on pre-existing value delivery architectures because it aims to acquire a dominant position within the Bitcoin network. To accomplish this, Blockchain.info is highly integratable on its value creation architecture while facilitating third part transactions through *open access* over its value delivery architecture (i.e., Bitcoin blockchain). However, Blockchain.info faces hurdles in that the Bitcoin network, at the time of writing, is still in its infancy with unproven business processes and competing technological standards. Consequently, it cannot match up to pre-existing value delivery architectures in terms of its speed, reliability, and market reach.

5.3 Three Types of Platform Competition Strategies

Germination Strategy: *Monopolistic* and *assimilative* platform profiles resonate with what we label as the strategy of germination. The germination strategy allows firms to cultivate and grow private business networks by capturing value without intervention from third parties at the platform level. In this sense, value streams are tightly controlled and directed inwards to reinforce an insular platform. Pingit (Monopolistic) and Droplet (Assimilative) possess the resources and capabilities to implement a self-sustaining platform by shielding their value creation architecture from third parties. For their value delivery architectures, both platforms showcase high independency and flexibility in channeling their value outputs (i.e., payments) through pre-existing value delivery architectures. The challenge here is to maintain agility by avoiding the enactment of strategic linkages with partners that will introduce long term legacy systems or platform derivatives on their value creation architectures. With regards to value delivery architectures, the germination strategy has an ambivalent relationship. Platforms rely on both direct and indirect access to value delivery architectures to process transactions, while at the same time, reduce their outflow as much as possible to reduce costs. Continuous payment outflows could undermine the germination strategy of platforms.

Orchestration Strategy: Platforms with *coopetitive* and *inclusive* profiles adhere to what we label as the orchestration strategy. In this regard, Paym (Coopetitive) and Zapp (Inclusive) designed their platforms to be highly integratable with existing mobile banking applications. The challenge of an orchestration strategy is to derive a value creation architecture that aligns the business and technology interests among platform stakeholders. For value delivery, the orchestration strategy is highly dependent on established value delivery architectures to connect stakeholders and attain high levels of joint market reach. However, each transaction on pre-existing value delivery architectures contributes to the cost structure for each platform stakeholder even though they belong to the same mobile payment service.

Transformation Strategy: Platforms with *hybrid* (Circle) and *open* (Blockchain.info) profiles reverberate with what we label as the transformation strategy. Transformations within technology industries are mainly driven by two factors: product and processes innovations [75]. Tushman and Anderson [75] argued that for *non-assembled goods* (i.e., commodities), process innovation is more critical as compared to product innovation. In this study, platforms with transformation strategy embrace process innovation to deliver payments through differentiated and cost-effective arrangements. This is realized through forging strategic linkages with novel value delivery architectures (i.e., Bitcoin blockchain). In this regard, Blockchain.info and Circle attempt to introduce architectural innovation in the mobile payments market. Particularly, both companies can circumvent the dominance of pre-existing value delivery architectures even though novel value delivery architectures, in the likes of Blockchain, bear the risk of failing to become a dominant standard in value movement.

5.4 Implications for Theory and Practice

In conclusion, this study touches on how fintech in the likes of mobile payment services have leveraged on digital platformization to revolutionize their value creation and delivery architectures. Digital platformization has also provided opportunities for new financial service providers to free themselves from traditional financial institutions such as banks by altering how these mobile payment services compete with one another. This study thus contributes to extant literature on digital platform competition on three fronts. First, we performed a comparative analysis of mobile payment services in the UK market to inductively derive attributes along the two strategic dimensions of value creation and delivery architectures through which these fintech innovate to compete with one another. From these attributes, we classify mobile payment services into six distinct platform profiles and articulate the competitive strategy associated with each profile. One of the key findings for this study is that the competitiveness of digital platforms is dictated by their competitive attributes, as derived from firm-specific resources and capabilities, along the two focal dimensions of value creation and delivery architectures. Specifically, the study identifies two competitive attributes (i.e., integrative and integratable) for the dimension of value creation architecture and three competitive attributes (i.e., direct, indirect, and open) for the dimension of value delivery architecture in determining the platform profile. In turn, the interplay between these two strategic dimensions shape platform strategy, leading to either germination, orchestration, or transformation strategy in relation to how these fintech seek to redefine their competitive landscape.

By adopting mobile payment services as our empirical context, this study contributes to extant literature on platform and strategic management by uncovering the direction of value streams and explicating how such value streams can be appropriated by these fintech. Specifically, integrative platforms tend to internalize value from private business networks by shielding themselves from third parties. Conversely, integratable platforms extract value from federated business networks by promoting the development of interorganizational platform derivatives in a reciprocal manner.

Lastly, this study extends prior research on innovation by showcasing how fintech innovations, when coupled with digital platforms, can support an ambidextrous approach towards innovation. As is evident from the case of Circle, the modularity of platforms enables these fintech to revolutionize the competitive landscape on two fronts concurrently. One, such platforms facilitate modular innovation on the value delivery architecture to sustain the logic of established payment infrastructures. Two, such digital platforms can culminate in architectural innovation in the same technology stack, which in turn could culminate in the replacement of pre-existing value delivery architectures with new ones (e.g., Bitcoin blockchain). Successful architectural innovation has the potential of delivering significant competitive advantage over market incumbents as it destroys the basis of their competitiveness, namely direct access to established payment infrastructures in the context of mobile payments market.

From a practitioner viewpoint, we not only support strategic planning on the part of platform owners by increasing their awareness for critical reflections of their architectural configurations and potential business partners, but we also inform policy makers in drafting legislative frameworks to foster innovation in the current revolutionary fintech landscape. This paper is constrained in its generalizability, as the case studies were conducted in the UK mobile payments market. These limitations translate into future research avenues for replicating our study in other platform-driven markets to validate and refine our taxonomy of platform profiles beyond the UK mobile payments market.

Brief Bios of the Authors

Erol Kazan is a PhD candidate at the Department of Digitalization, Copenhagen Business School, Denmark. His current research focuses on digital platforms and financial technology in the area of cryptocurrencies and blockchain. His research has been presented at numerous international conferences and published in peer-reviewed journals such as *Communications of the Association for Information Systems* and *Journal of Theoretical and Applied Electronic Commerce Research*.

Chee-Wee Tan is a Professor in the Department of Digitalization at Copenhagen Business School. His primary research interests center on design and innovation issues related to the delivery of digital services in various contexts such as e-business, e-commerce, e-government, e-health, e-marketplace and m-commerce. His research has been published in leading peer-reviewed journals including *MIS Quarterly*, *Information Systems Research*, *European Journal of Information Systems*, *Journal of the American Society for Information Science and Technology*, *Information & Management* and *Decision Support Systems*, among others. Chee-Wee currently serves as an Associate Editor for *MIS Quarterly*, *Internet Research* and *Journal of Management Analytics* as well as on the Editorial Board of *Industrial*

Management and Data Systems and *IEEE Transactions on Engineering Management*. He is a past recipient of the Outstanding Associate Editor Award for services rendered to MISQ.

Eric T.K. Lim is a tenured Senior Lecturer in the School of Information Systems & Technology Management at UNSW Business School, UNSW Sydney. Eric is interested in investigating phenomena on how technologically enabled open innovations in the likes of crowd platforms and social media can be harnessed to benefit society. Apart from being a regular presenter at prestigious international conferences, findings from Eric's research has also been published in leading academic journals such as *Information Systems Research*, *Journal of the American Society for Information Science and Technology*, *European Journal of Information Systems* and *Decision Support Systems* among others. Eric currently serves as an Associate Editor for *Internet Research*.

Carsten Sørensen is Associate Professor (Reader) in Digital Innovation within Department of Management at The London School of Economics and Political Science. Since the 1980s, he has researched digital innovation, for example, innovating the digital enterprise through mobile technology, and the innovation dynamics of mobile infrastructures and platforms. Carsten has published widely within Information Systems since 1989, for example, in *MIS Quarterly*, *Information Systems Research*, *Information Systems Journal*, *Journal of Information Technology*, *Information & Organization*, *The Information Society*, *Computer Supported Cooperative Work*, and *Scandinavian Journal of Information Systems*. Carsten has been engaged in assisting and assessing digital startups and has been actively engaged in academic consultancy and executive education with a broad range of organisations – IMF, Microsoft, Google, PA Consulting, Orange, Vodafone, Intel, GEMS, to name just a few.

Jan Damsgaard is Head of the Department of Digitalization, Copenhagen Business School, Denmark. He holds a PhD in Information Systems and a Master of Science degree in Computer Science. His research focuses, in general, on digitalization and disruption and in particular on the diffusion and implementation of networked technologies such as payment services, social media, and platform services. His work combines business and technological perspectives. The application domain is often the finance, IT and transportation sector. He has worked and done research at numerous institutions in Denmark, USA, China, Finland, and Australia.

REFERENCES

1. Adler, P.A., and Adler, P. Intense loyalty in organizations: A case study of college athletics. *Administrative Science Quarterly, 33*, 3 (1998), 401-417.
2. Adner, R., and Kapoor, R. Value creation in innovation ecosystems: How the structure of technological interdependence affects firm performance in new technology generations. *Strategic Management Journal 31*, 3 (2010), 306-333.
3. Adner, R. Match your innovation strategy to your innovation ecosystem. *Harvard Business Review, 84*, 4 (2006), 98.
4. Ahuja, G. The duality of collaboration: Inducements and opportunities in the formation of interfirm linkages. *Strategic Management Journal 21*, 3 (2000), 317-343.
5. Bharadwaj, A., El Sawy, O.A., Pavlou, P.A., and Venkatraman, N. Digital business strategy: toward a next generation of insights. *MIS Quarterly, 37*, 2 (2013), 471-482.
6. Bogner, W.C., Thomas, H., and McGee, J. A longitudinal study of the competitive positions and entry paths of European firms in the U.S. pharmaceutical market. *Strategic Management Journal, 17*, 2 (1996), 85-107.
7. Boudreau, K.J. Let a thousand flowers bloom? An early look at large numbers of software app developers and patterns of innovation. *Organization Science, 23*, 5 (2012), 1409-1427.
8. Boudreau, K.J. Open platform strategies and innovation: Granting access vs. devolving control. *Management Science 56*, 10 (2010), 1849-1872.

9. Bresnahan, T.F. and Greenstein, S. Technological competition and the structure of the computer industry. *The Journal of Industrial Economics, 47,* 1 (1999), 1-40.
10. Ceccagnoli, M., Forman, C., Huang, P., and Wu, D.J. Co-creation of value in a platform ecosystem: The case of enterprise software. *MIS Quarterly, 36,* 1 (2012), 263-290.
11. Chakravorti, S., and Roson, R. Platform competition in two-sided markets: The case of payment networks. *Review of Network Economics,* 5, 1 (2006).
12. Cool, K., and Dierickx, I. Rivalry, strategic groups and firm profitability. *Strategic Management Journal, 14,* 1 (1993), 47-59.
13. Cui, A.S., Calantone, R.J., and Griffith, D.A. Strategic change and termination of interfirm partnerships. *Strategic Management Journal, 32,* 4 (2011), 402-423.
14. Dahlberg, T., Guo, J., and Ondrus, J. A critical review of mobile payment research. *Electronic Commerce Research and Applications, 14,* 5 (2015), 265-284.
15. de Reuver, M., and Ondrus, J. When technological superiority is not enough: The struggle to impose the SIM card as the NFC secure element for mobile payment platforms. *Telecommunications Policy, 41,* 4 (2017), 253-262.
16. de Reuver, M., Sørensen, C., and Basole, R.C. The digital platform: a research agenda. *Journal of Information Technology,* (2016), 1-12.
17. de Reuver, M., Verschuur, E., Nikayin, F., Cerpa, N., and Bouwman, H. Collective action for mobile payment platforms: A case study on collaboration issues between banks and telecom operators. *Electronic Commerce Research and Applications, 14,* 5 (2015), 331-344.
18. DeSarbo, W.S., and Grewal, R. Hybrid strategic groups. *Strategic Management Journal, 29,* 3 (2008), 293-317.
19. Dyer, J.H., and Singh, H. The relational view: Cooperative strategy and sources of interorganizational competitive advantage, *Academy of Management Review, 23,* 4 (1998), 660-679
20. Eaton, B., Elaluf-Calderwood, S., Sørensen, C., and Yoo, Y. Distributed tuning of boundary resources: The case of Apple's iOS service system. *MIS Quarterly, 39,* 1 (2015), 217-243.
21. Eisenhardt, K.M. Building theories from case study research. *Academy of Management Review, 14,* 4 (1989), 532-550.
22. Eisenmann, T., Parker, G., and Van Alstyne, M. Platform envelopment. *Strategic Management Journal, 32,* 12 (2011), 1270-1285.
23. El Sawy, O.A., Malhotra, A., Park, Y., and Pavlou, P.A. Research commentary-seeking the configurations of digital ecodynamics: It takes three to tango. *Information Systems Research, 21,* 4 (2010), 835-848.
24. Ferguson, T.D., Deephouse, D.L., and Ferguson, W.L. Do strategic groups differ in reputation? *Strategic Management Journal, 21,* 12 (2000), 1195-1214.
25. Fiegenbaum, A., and Thomas, H. Strategic groups as reference groups: Theory, modeling and empirical examination of industry and competitive strategy. *Strategic Management Journal, 16,* 6 (1995), 461-476.
26. Gawer, A., and Cusumano, M.A. Industry platforms and ecosystem innovation. *Journal of Product Innovation Management, 31,* 3 (2014), 417-433.
27. Ghazawneh, A., and Henfridsson, O. Balancing platform control and external contribution in third-party development: The boundary resources model. *Information Systems Journal, 23,* 2 (2013), 173-192.
28. González-Moreno, Á., and Sáez-Martínez, F. Rivalry and strategic groups: What makes a company a rival? *Journal of Management & Governance, 12,* 3 (2008), 261-285.
29. Gregor, S. The nature of theory in information systems. *MIS Quarterly, 30,* 3 (2006), 611-642.
30. Gulati, R., Nohria, N., and Zaheer, A. Strategic networks. *Strategic Management Journal, 21,* 3 (2000), 203-215.
31. Hanseth, O., and Lyytinen, K. Design theory for dynamic complexity in information infrastructures: the case of building internet. *Journal of Information Technology, 25,* 1 (2010), 1-19.
32. Hedman, J., and Henningsson, S. The new normal: Market cooperation in the mobile payments

ecosystem. *Electronic Commerce Research and Applications, 14*, 5 (2015), 305-318.

33. Henfridsson, O., and Bygstad, B. The generative mechanisms of digital infrastructure evolution. *MIS Quarterly, 37*, 3 (2013), 907-931.
34. Hsieh, H.F., and Shannon, S.E. Three approaches to qualitative content analysis. *Qualitative Health Research, 15,* 9 (2005), 1277-1288.
35. Hunt, M. Competition in the major home appliance industry. Thesis, Harvard University, Boston, 1972.
36. Karimi, J., and Walter, Z. The role of dynamic capabilities in responding to digital disruption: A factor-based study of the newspaper industry. *Journal Management Information Systems, 32*, 1 (2015), 39-81.
37. Koruna, S. Leveraging knowledge assets: Combinative capabilities–theory and practice. *R&D Management, 34*, 5 (2004), 505-516.
38. Kumar, R.L. A framework for assessing the business value of information technology infrastructures. *Journal of Management Information Systems, 21*, 2 (2004), 11-32.
39. Lee, G., and. Raghu, T.S. Determinants of mobile apps' success: Evidence from the app store market, *Journal of Management Information Systems, 31*, 2 (2014), 133-170.
40. Lee, J., Lee, K., and Rho, S. An evolutionary perspective on strategic group emergence: A genetic algorithm-based model. *Strategic Management Journal 23*, 8 (2002), 727-746.
41. Mantena, R., and Saha, R.L. Co-opetition between differentiated platforms in two-sided markets. *Journal of Management Information Systems, 29*, 2 (2012), 109-140.
42. Mas-Ruiz, F.J., Ruiz-Moreno, F., and Ladrón de Guevara Martínez, A. Asymmetric rivalry within and between strategic groups. *Strategic Management Journal, 35*, 3 (2014), 419-439.
43. Mascarenhas, B., and Aaker, D.A. Mobility barriers and strategic groups. *Strategic Management Journal, 10,* 5 (1989), 475-485.
44. McGee, J., and Thomas, H. Strategic groups: Theory, research and taxonomy. *Strategic Management Journal, 7,* 2 (1986), 141-160.
45. Mehra, A. Resource and market based determinants of performance in the U.S. banking industry. *Strategic Management Journal, 17,* 4 (1996), 307-322.
46. Miles, M.B., and Huberman, A.M. *Qualitative Data Analysis: An Expanded Sourcebook*. London: Sage, 1994.
47. Nohria, N., and Garcia-Pont, C. Global strategic linkages and industry structure. *Strategic Management Journal, 12,* S1 (1991), 105-124.
48. Ondrus, J., and Pigneur, Y. An assessment of NFC for future mobile payment systems. In *Proceedings of the International Conference on the Management of Mobile Business*, Los Alamitos, CA: IEEE Computer Society Press, 2007, pp. 43-52.
49. Ondrus, J., Gannamaneni, A., and Lyytinen, K. The impact of openness on the market potential of multi-sided platforms: A case study of mobile payment platforms. *Journal of Information Technology, 30*, 3 (2015), 260-275.
50. Ozcan, P., and Santos, F.M. The market that never was: Turf wars and failed alliances in mobile payments. *Strategic Management Journal, 36*, 10 (2015), 1486-1512.
51. Pagani, M. Digital business strategy and value creation: Framing the dynamic cycle of control points. *MIS Quarterly, 37*, 2 (2013), 617-632.
52. Pegels, C.C., Song, Y.I., and Yang, B. Management heterogeneity, competitive interaction groups, and firm performance. *Strategic Management Journal, 21,* 9 (2000), 911-923.
53. Peteraf, M. The cornerstones of competitive advantage: A resource-based view. *Strategic Management Journal, 14*, 3 (1993), 179-191.
54. Pil, F.K., and Cohen, S.K. Modularity: Implications for imitation, innovation, and sustained advantage. *Academy of Management Review, 31*, 4 (2006), 995-1011.
55. Popper. N. Bitcoins start-up gets an electronic money license in Britain. Dealbook, *New York Times* (April 6, 2016).
56. Porter, M.E. *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. New York: FreePress, 1980.
57. Potter, W.J., and Levine-Donnerstein, D. Rethinking validity and reliability in content

analysis. *Journal of Applied Communication Research*, *27*, 3 (1999), 258-284.
58. Reger, R.K., and Huff, A.S. Strategic groups: A cognitive perspective. *Strategic Management Journal*, *14*, 2 (1993), 103-123.
59. Rochet, J.C., and Tirole, J. Cooperation among competitors: Some economics of payment card associations. *Rand Journal of Economics, 33,* 4 (2000), 549-570.
60. Rochet, J.C., and Tirole, J. Platform competition in two-sided markets. *Journal of the European Economic Association*, *1*, 4 (2003), 990-1029.
61. Sambamurthy, V., Bharadwaj, A., and Grover, V. Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. *MIS Quarterly, 27*, 2 (2003), 237-263.
62. Sarker, S., Sarker, S.. Sahaym, A., and Bjørn-Andersen, N. Exploring value cocreation in relationships between an ERP vendor and its partners: A revelatory case study. *MIS Quarterly, 36*, 1 (2012), 317-338.
63. Schierz, P.G., Schilke, O., and Wirtz, B.W. Understanding consumer acceptance of mobile payment services: An empirical analysis. *Electronic Commerce Research and Applications, 9*, 3 (2010), 209-216.
64. Schilling, M.A. Toward a general modular systems theory and its application to interfirm product modularity. *Academy of Management Review*, *25*, 2 (2000), 312-334.
65. Short, J.C., Ketchen, D.J., Palmer, T.B., and Hult, G.T.M. Firm, strategic group, and industry influences on performance. *Strategic Management Journal*, *28*, 2 (2007), 147-167.
66. Stabell, C.B., and Fjeldstad, Ø.D. Configuring value for competitive advantage: On chains, shops, and networks. *Strategic Management Journal*, *19*, 5 (1998), 413-417.
67. Star, S.L., and Ruhleder, K. Steps toward an ecology of infrastructure: Design and access for large information spaces. *Information Systems Research, 7*, 1 (1996), 111-134.
68. Staudenmayer, N., Tripsas, M., and Tucci, C.L. Interfirm modularity and its implications for product development. *Journal of Product Innovation Management, 22*, 4 (2005), 303-321.
69. Teece, D.J., Pisano, G., and Shuen, A. Dynamic capabilities and strategic management. *Strategic Management Journal, 18,* 7 (1997), 509-533.
70. Thomas, H., and Venkatraman, N. Research on strategic groups: progress and prognosis. *Journal of Management Studies, 25,* 6 (1998), 537-555.
71. Thomas, L., Autio, E., and Gann, D. Architectural leverage: Putting platforms in context. *Academy of Management Perspective, 28,* 2 (2014), 198-219.
72. Tilson, D., Lyytinen, K., and Sørensen, C. Research commentary-Digital infrastructures: The missing IS research agenda. *Information Systems Research, 21*, 4 (2010), 748-759.
73. Tiwana, A. Platform desertion by app developers. *Journal of Management Information Systems, 32*, 4 (2015), 40-77.
74. Tiwana, A., Konsynski, B., and Bush, A.A. Research commentary-platform evolution: Coevolution of platform architecture, governance, and environmental dynamics. *Information Systems Research*, *21*, 4 (2010), 675-687.
75. Tushman, M.L., and Anderson, P. Technological discontinuities and organizational environments. *Administrative Science Quarterly, 31*, 3 (1986), 439-465.
76. Walsham, G. Interpretive case studies in IS research: Nature and method. *European Journal of Information Systems*, *4,* 2 (1995), 74-81.
77. West, J. How open is open enough? Melding proprietary and open source platform strategies. *Research Policy, 32,* 7 (2003), 1259-1285.
78. Woodard, C.J., Ramasubbu, N., Tschang, F.T., and Sambamurthy, V. Design capital and design moves: The logic of digital business strategy. *MIS Quarterly, 37,* 2 (2013), 537-564.
79. Yin, R.K. *Case Study Research: Design and Methods*. London: Sage, 2009.
80. Yoo, Y., Henfridsson, O., and Lyytinen, K. Research commentary-The new organizing logic of digital innovation: An agenda for information systems research. *Information Systems Research, 21*, 4 (2010), 724-735.
81. Zittrain, J.L. The generative Internet. *Harvard Law Review, 119*, 7 (2006), 1974-2040.

TITLER I PH.D.SERIEN:

2004

1. Martin Grieger
Internet-based Electronic Marketplaces and Supply Chain Management

2. Thomas Basbøll
LIKENESS
A Philosophical Investigation

3. Morten Knudsen
Beslutningens vaklen
En systemteoretisk analyse of moderniseringen af et amtskommunalt sundhedsvæsen 1980-2000

4. Lars Bo Jeppesen
Organizing Consumer Innovation
A product development strategy that is based on online communities and allows some firms to benefit from a distributed process of innovation by consumers

5. Barbara Dragsted
SEGMENTATION IN TRANSLATION AND TRANSLATION MEMORY SYSTEMS
An empirical investigation of cognitive segmentation and effects of integrating a TM system into the translation process

6. Jeanet Hardis
Sociale partnerskaber
Et socialkonstruktivistisk casestudie af partnerskabsaktørers virkelighedsopfattelse mellem identitet og legitimitet

7. Henriette Hallberg Thygesen
System Dynamics in Action

8. Carsten Mejer Plath
Strategisk Økonomistyring

9. Annemette Kjærgaard
Knowledge Management as Internal Corporate Venturing
– a Field Study of the Rise and Fall of a Bottom-Up Process

10. Knut Arne Hovdal
De profesjonelle i endring
Norsk ph.d., ej til salg gennem Samfundslitteratur

11. Søren Jeppesen
Environmental Practices and Greening Strategies in Small Manufacturing Enterprises in South Africa
– A Critical Realist Approach

12. Lars Frode Frederiksen
Industriel forskningsledelse
– på sporet af mønstre og samarbejde i danske forskningsintensive virksomheder

13. Martin Jes Iversen
The Governance of GN Great Nordic
– in an age of strategic and structural transitions 1939-1988

14. Lars Pynt Andersen
The Rhetorical Strategies of Danish TV Advertising
A study of the first fifteen years with special emphasis on genre and irony

15. Jakob Rasmussen
Business Perspectives on E-learning

16. Sof Thrane
The Social and Economic Dynamics of Networks
– a Weberian Analysis of Three Formalised Horizontal Networks

17. Lene Nielsen
Engaging Personas and Narrative Scenarios – a study on how a user-centered approach influenced the perception of the design process in the e-business group at AstraZeneca

18. S.J Valstad
Organisationsidentitet
Norsk ph.d., ej til salg gennem Samfundslitteratur

19. Thomas Lyse Hansen
Six Essays on Pricing and Weather risk in Energy Markets

20. Sabine Madsen
Emerging Methods – An Interpretive Study of ISD Methods in Practice

21. Evis Sinani
The Impact of Foreign Direct Investment on Efficiency, Productivity Growth and Trade: An Empirical Investigation

22. Bent Meier Sørensen
Making Events Work Or, How to Multiply Your Crisis

23. Pernille Schnoor
Brand Ethos
Om troværdige brand- og virksomhedsidentiteter i et retorisk og diskursteoretisk perspektiv

24. Sidsel Fabech
Von welchem Österreich ist hier die Rede?
Diskursive forhandlinger og magtkampe mellem rivaliserende nationale identitetskonstruktioner i østrigske pressediskurser

25. Klavs Odgaard Christensen
Sprogpolitik og identitetsdannelse i flersprogede forbundsstater
Et komparativt studie af Schweiz og Canada

26. Dana B. Minbaeva
Human Resource Practices and Knowledge Transfer in Multinational Corporations

27. Holger Højlund
Markedets politiske fornuft
Et studie af velfærdens organisering i perioden 1990-2003

28. Christine Mølgaard Frandsen
A.s erfaring
Om mellemværendets praktik i en transformation af mennesket og subjektiviteten

29. Sine Nørholm Just
The Constitution of Meaning – A Meaningful Constitution?
Legitimacy, identity, and public opinion in the debate on the future of Europe

2005

1. Claus J. Varnes
Managing product innovation through rules – The role of formal and structured methods in product development

2. Helle Hedegaard Hein
Mellem konflikt og konsensus – Dialogudvikling på hospitalsklinikker

3. Axel Rosenø
Customer Value Driven Product Innovation – A Study of Market Learning in New Product Development

4. Søren Buhl Pedersen
Making space
An outline of place branding

5. Camilla Funck Ellehave
Differences that Matter
An analysis of practices of gender and organizing in contemporary workplaces

6. Rigmor Madeleine Lond
Styring af kommunale forvaltninger

7. Mette Aagaard Andreassen
Supply Chain versus Supply Chain
Benchmarking as a Means to Managing Supply Chains

8. Caroline Aggestam-Pontoppidan
From an idea to a standard
The UN and the global governance of accountants' competence

9. Norsk ph.d.

10. Vivienne Heng Ker-ni
An Experimental Field Study on the

Effectiveness of Grocer Media Advertising
Measuring Ad Recall and Recognition, Purchase Intentions and Short-Term Sales

11. Allan Mortensen
Essays on the Pricing of Corporate Bonds and Credit Derivatives

12. Remo Stefano Chiari
Figure che fanno conoscere
Itinerario sull'idea del valore cognitivo e espressivo della metafora e di altri tropi da Aristotele e da Vico fino al cognitivismo contemporaneo

13. Anders McIlquham-Schmidt
Strategic Planning and Corporate Performance
An integrative research review and a meta-analysis of the strategic planning and corporate performance literature from 1956 to 2003

14. Jens Geersbro
The TDF – PMI Case
Making Sense of the Dynamics of Business Relationships and Networks

15 Mette Andersen
Corporate Social Responsibility in Global Supply Chains
Understanding the uniqueness of firm behaviour

16. Eva Boxenbaum
Institutional Genesis: Micro – Dynamic Foundations of Institutional Change

17. Peter Lund-Thomsen
Capacity Development, Environmental Justice NGOs, and Governance: The Case of South Africa

18. Signe Jarlov
Konstruktioner af offentlig ledelse

19. Lars Stæhr Jensen
Vocabulary Knowledge and Listening Comprehension in English as a Foreign Language
An empirical study employing data elicited from Danish EFL learners

20. Christian Nielsen
Essays on Business Reporting
Production and consumption of strategic information in the market for information

21. Marianne Thejls Fischer
Egos and Ethics of Management Consultants

22. Annie Bekke Kjær
Performance management i Proces-innovation
– belyst i et social-konstruktivistisk perspektiv

23. Suzanne Dee Pedersen
GENTAGELSENS METAMORFOSE
Om organisering af den kreative gøren i den kunstneriske arbejdspraksis

24. Benedikte Dorte Rosenbrink
Revenue Management
Økonomiske, konkurrencemæssige & organisatoriske konsekvenser

25. Thomas Riise Johansen
Written Accounts and Verbal Accounts
The Danish Case of Accounting and Accountability to Employees

26. Ann Fogelgren-Pedersen
The Mobile Internet: Pioneering Users' Adoption Decisions

27. Birgitte Rasmussen
Ledelse i fællesskab – de tillidsvalgtes fornyende rolle

28. Gitte Thit Nielsen
Remerger
– skabende ledelseskræfter i fusion og opkøb

29. Carmine Gioia
A MICROECONOMETRIC ANALYSIS OF MERGERS AND ACQUISITIONS

30. Ole Hinz
Den effektive forandringsleder: pilot, pædagog eller politiker?
Et studie i arbejdslederes meningstilskrivninger i forbindelse med vellykket gennemførelse af ledelsesinitierede forandringsprojekter

31. Kjell-Åge Gotvassli
Et praksisbasert perspektiv på dynamiske
læringsnettverk i toppidretten
Norsk ph.d., ej til salg gennem Samfundslitteratur

32. Henriette Langstrup Nielsen
Linking Healthcare
An inquiry into the changing performances of web-based technology for asthma monitoring

33. Karin Tweddell Levinsen
Virtuel Uddannelsespraksis
Master i IKT og Læring – et casestudie i hvordan proaktiv proceshåndtering kan forbedre praksis i virtuelle læringsmiljøer

34. Anika Liversage
Finding a Path
Labour Market Life Stories of Immigrant Professionals

35. Kasper Elmquist Jørgensen
Studier i samspillet mellem stat og erhvervsliv i Danmark under
1. verdenskrig

36. Finn Janning
A DIFFERENT STORY
Seduction, Conquest and Discovery

37. Patricia Ann Plackett
Strategic Management of the Radical Innovation Process
Leveraging Social Capital for Market Uncertainty Management

2006

1. Christian Vintergaard
Early Phases of Corporate Venturing

2. Niels Rom-Poulsen
Essays in Computational Finance

3. Tina Brandt Husman
Organisational Capabilities, Competitive Advantage & Project-Based Organisations
The Case of Advertising and Creative Good Production

4. Mette Rosenkrands Johansen
Practice at the top
– how top managers mobilise and use non-financial performance measures

5. Eva Parum
Corporate governance som strategisk kommunikations- og ledelsesværktøj

6. Susan Aagaard Petersen
Culture's Influence on Performance Management: The Case of a Danish Company in China

7. Thomas Nicolai Pedersen
The Discursive Constitution of Organizational Governance – Between unity and differentiation
The Case of the governance of environmental risks by World Bank environmental staff

8. Cynthia Selin
Volatile Visions: Transactons in Anticipatory Knowledge

9. Jesper Banghøj
Financial Accounting Information and Compensation in Danish Companies

10. Mikkel Lucas Overby
Strategic Alliances in Emerging High-Tech Markets: What's the Difference and does it Matter?

11. Tine Aage
External Information Acquisition of Industrial Districts and the Impact of Different Knowledge Creation Dimensions

A case study of the Fashion and Design Branch of the Industrial District of Montebelluna, NE Italy

12. Mikkel Flyverbom
Making the Global Information Society Governable
On the Governmentality of Multi-Stakeholder Networks

13. Anette Grønning
Personen bag
Tilstedevær i e-mail som inter-aktionsform mellem kunde og med-arbejder i dansk forsikringskontekst

14. Jørn Helder
One Company – One Language?
The NN-case

15. Lars Bjerregaard Mikkelsen
Differing perceptions of customer value
Development and application of a tool for mapping perceptions of customer value at both ends of customer-suppli-er dyads in industrial markets

16. Lise Granerud
Exploring Learning
Technological learning within small manufacturers in South Africa

17. Esben Rahbek Pedersen
Between Hopes and Realities: Reflections on the Promises and Practices of Corporate Social Responsibility (CSR)

18. Ramona Samson
The Cultural Integration Model and European Transformation.
The Case of Romania

2007

1. Jakob Vestergaard
Discipline in The Global Economy
Panopticism and the Post-Washington Consensus

2. Heidi Lund Hansen
Spaces for learning and working
A qualitative study of change of work, management, vehicles of power and social practices in open offices

3. Sudhanshu Rai
Exploring the internal dynamics of software development teams during user analysis
A tension enabled Institutionalization Model; "Where process becomes the objective"

4. Norsk ph.d.
Ej til salg gennem Samfundslitteratur

5. Serden Ozcan
EXPLORING HETEROGENEITY IN ORGANIZATIONAL ACTIONS AND OUTCOMES
A Behavioural Perspective

6. Kim Sundtoft Hald
Inter-organizational Performance Measurement and Management in Action
– An Ethnography on the Construction of Management, Identity and Relationships

7. Tobias Lindeberg
Evaluative Technologies
Quality and the Multiplicity of Performance

8. Merete Wedell-Wedellsborg
Den globale soldat
Identitetsdannelse og identitetsledelse i multinationale militære organisatio-ner

9. Lars Frederiksen
Open Innovation Business Models
Innovation in firm-hosted online user communities and inter-firm project ventures in the music industry
– A collection of essays

10. Jonas Gabrielsen
Retorisk toposlære – fra statisk 'sted' til persuasiv aktivitet

11. Christian Moldt-Jørgensen
Fra meningsløs til meningsfuld evaluering.
Anvendelsen af studentertilfredsheds-målinger på de korte og mellemlange videregående uddannelser set fra et psykodynamisk systemperspektiv

12. Ping Gao
Extending the application of actor-network theory
Cases of innovation in the tele-communications industry

13. Peter Mejlby
Frihed og fængsel, en del af den samme drøm?
Et phronetisk baseret casestudie af frigørelsens og kontrollens sam-eksistens i værdibaseret ledelse!

14. Kristina Birch
Statistical Modelling in Marketing

15. Signe Poulsen
Sense and sensibility:
The language of emotional appeals in insurance marketing

16. Anders Bjerre Trolle
Essays on derivatives pricing and dynamic asset allocation

17. Peter Feldhütter
Empirical Studies of Bond and Credit Markets

18. Jens Henrik Eggert Christensen
Default and Recovery Risk Modeling and Estimation

19. Maria Theresa Larsen
Academic Enterprise: A New Mission for Universities or a Contradiction in Terms?
Four papers on the long-term implications of increasing industry involvement and commercialization in academia

20. Morten Wellendorf
Postimplementering af teknologi i den offentlige forvaltning
Analyser af en organisations kontinuerlige arbejde med informations-teknologi

21. Ekaterina Mhaanna
Concept Relations for Terminological Process Analysis

22. Stefan Ring Thorbjørnsen
Forsvaret i forandring
Et studie i officerers kapabiliteter under påvirkning af omverdenens forandringspres mod øget styring og læring

23. Christa Breum Amhøj
Det selvskabte medlemskab om managementstaten, dens styringsteknologier og indbyggere

24. Karoline Bromose
Between Technological Turbulence and Operational Stability
– An empirical case study of corporate venturing in TDC

25. Susanne Justesen
Navigating the Paradoxes of Diversity in Innovation Practice
– A Longitudinal study of six very different innovation processes – in practice

26. Luise Noring Henler
Conceptualising successful supply chain partnerships
– Viewing supply chain partnerships from an organisational culture perspective

27. Mark Mau
Kampen om telefonen
Det danske telefonvæsen under den tyske besættelse 1940-45

28. Jakob Halskov
The semiautomatic expansion of existing terminological ontologies using knowledge patterns discovered

on the WWW – an implementation and evaluation

29. Gergana Koleva
European Policy Instruments Beyond Networks and Structure: The Innovative Medicines Initiative

30. Christian Geisler Asmussen
Global Strategy and International Diversity: A Double-Edged Sword?

31. Christina Holm-Petersen
Stolthed og fordom
Kultur- og identitetsarbejde ved skabelsen af en ny sengeafdeling gennem fusion

32. Hans Peter Olsen
Hybrid Governance of Standardized States
Causes and Contours of the Global Regulation of Government Auditing

33. Lars Bøge Sørensen
Risk Management in the Supply Chain

34. Peter Aagaard
Det unikkes dynamikker
De institutionelle mulighedsbetingelser bag den individuelle udforskning i professionelt og frivilligt arbejde

35. Yun Mi Antorini
Brand Community Innovation
An Intrinsic Case Study of the Adult Fans of LEGO Community

36. Joachim Lynggaard Boll
Labor Related Corporate Social Performance in Denmark
Organizational and Institutional Perspectives

2008

1. Frederik Christian Vinten
Essays on Private Equity

2. Jesper Clement
Visual Influence of Packaging Design on In-Store Buying Decisions

3. Marius Brostrøm Kousgaard
Tid til kvalitetsmåling?
– Studier af indrulleringsprocesser i forbindelse med introduktionen af kliniske kvalitetsdatabaser i speciallægepraksissektoren

4. Irene Skovgaard Smith
Management Consulting in Action Value creation and ambiguity in client-consultant relations

5. Anders Rom
Management accounting and integrated information systems
How to exploit the potential for management accounting of information technology

6. Marina Candi
Aesthetic Design as an Element of Service Innovation in New Technology-based Firms

7. Morten Schnack
Teknologi og tværfaglighed
– en analyse af diskussionen omkring indførelse af EPJ på en hospitalsafdeling

8. Helene Balslev Clausen
Juntos pero no revueltos – un estudio sobre emigrantes norteamericanos en un pueblo mexicano

9. Lise Justesen
Kunsten at skrive revisionsrapporter.
En beretning om forvaltningsrevisionens beretninger

10. Michael E. Hansen
The politics of corporate responsibility: CSR and the governance of child labor and core labor rights in the 1990s

11. Anne Roepstorff
Holdning for handling – en etnologisk undersøgelse af Virksomheders Sociale Ansvar/CSR

12. Claus Bajlum
Essays on Credit Risk and Credit Derivatives

13. Anders Bojesen
The Performative Power of Competence – an Inquiry into Subjectivity and Social Technologies at Work

14. Satu Reijonen
Green and Fragile
A Study on Markets and the Natural Environment

15. Ilduara Busta
Corporate Governance in Banking
A European Study

16. Kristian Anders Hvass
A Boolean Analysis Predicting Industry Change: Innovation, Imitation & Business Models
The Winning Hybrid: A case study of isomorphism in the airline industry

17. Trine Paludan
De uvidende og de udviklingsparate
Identitet som mulighed og restriktion blandt fabriksarbejdere på det aftayloriserede fabriksgulv

18. Kristian Jakobsen
Foreign market entry in transition economies: Entry timing and mode choice

19. Jakob Elming
Syntactic reordering in statistical machine translation

20. Lars Brømsøe Termansen
Regional Computable General Equilibrium Models for Denmark
Three papers laying the foundation for regional CGE models with agglomeration characteristics

21. Mia Reinholt
The Motivational Foundations of Knowledge Sharing

22. Frederikke Krogh-Meibom
The Co-Evolution of Institutions and Technology
– A Neo-Institutional Understanding of Change Processes within the Business Press – the Case Study of Financial Times

23. Peter D. Ørberg Jensen
OFFSHORING OF ADVANCED AND HIGH-VALUE TECHNICAL SERVICES: ANTECEDENTS, PROCESS DYNAMICS AND FIRMLEVEL IMPACTS

24. Pham Thi Song Hanh
Functional Upgrading, Relational Capability and Export Performance of Vietnamese Wood Furniture Producers

25. Mads Vangkilde
Why wait?
An Exploration of first-mover advantages among Danish e-grocers through a resource perspective

26. Hubert Buch-Hansen
Rethinking the History of European Level Merger Control
A Critical Political Economy Perspective

2009

1. Vivian Lindhardsen
From Independent Ratings to Communal Ratings: A Study of CWA Raters' Decision-Making Behaviours

2. Guðrið Weihe
Public-Private Partnerships: Meaning and Practice

3. Chris Nøkkentved
Enabling Supply Networks with Collaborative Information Infrastructures
An Empirical Investigation of Business Model Innovation in Supplier Relationship Management

4. Sara Louise Muhr
Wound, Interrupted – On the Vulnerability of Diversity Management

5. Christine Sestoft
Forbrugeradfærd i et Stats- og Livsformsteoretisk perspektiv

6. Michael Pedersen
Tune in, Breakdown, and Reboot: On the production of the stress-fit self-managing employee

7. Salla Lutz
Position and Reposition in Networks – Exemplified by the Transformation of the Danish Pine Furniture Manufacturers

8. Jens Forssbæck
Essays on market discipline in commercial and central banking

9. Tine Murphy
Sense from Silence – A Basis for Organised Action
How do Sensemaking Processes with Minimal Sharing Relate to the Reproduction of Organised Action?

10. Sara Malou Strandvad
Inspirations for a new sociology of art: A sociomaterial study of development processes in the Danish film industry

11. Nicolaas Mouton
On the evolution of social scientific metaphors:
A cognitive-historical enquiry into the divergent trajectories of the idea that collective entities – states and societies, cities and corporations – are biological organisms.

12. Lars Andreas Knutsen
Mobile Data Services:
Shaping of user engagements

13. Nikolaos Theodoros Korfiatis
Information Exchange and Behavior
A Multi-method Inquiry on Online Communities

14. Jens Albæk
Forestillinger om kvalitet og tværfaglighed på sygehuse
– skabelse af forestillinger i læge- og plejegrupperne angående relevans af nye idéer om kvalitetsudvikling gennem tolkningsprocesser

15. Maja Lotz
The Business of Co-Creation – and the Co-Creation of Business

16. Gitte P. Jakobsen
Narrative Construction of Leader Identity in a Leader Development Program Context

17. Dorte Hermansen
"Living the brand" som en brandorienteret dialogisk praxis:
Om udvikling af medarbejdernes brandorienterede dømmekraft

18. Aseem Kinra
Supply Chain (logistics) Environmental Complexity

19. Michael Nørager
How to manage SMEs through the transformation from non innovative to innovative?

20. Kristin Wallevik
Corporate Governance in Family Firms
The Norwegian Maritime Sector

21. Bo Hansen Hansen
Beyond the Process
Enriching Software Process Improvement with Knowledge Management

22. Annemette Skot-Hansen
Franske adjektivisk afledte adverbier, der tager præpositionssyntagmer indledt med præpositionen à som argumenter
En valensgrammatisk undersøgelse

23. Line Gry Knudsen
Collaborative R&D Capabilities
In Search of Micro-Foundations

24. Christian Scheuer
Employers meet employees
Essays on sorting and globalization

25. Rasmus Johnsen
The Great Health of Melancholy
A Study of the Pathologies of Performativity

26. Ha Thi Van Pham
Internationalization, Competitiveness Enhancement and Export Performance of Emerging Market Firms:
Evidence from Vietnam

27. Henriette Balieu
Kontrolbegrebets betydning for kausativalternationen i spansk
En kognitiv-typologisk analyse

2010

1. Yen Tran
Organizing Innovationin Turbulent Fashion Market
Four papers on how fashion firms create and appropriate innovation value

2. Anders Raastrup Kristensen
Metaphysical Labour
Flexibility, Performance and Commitment in Work-Life Management

3. Margrét Sigrún Sigurdardottir
Dependently independent
Co-existence of institutional logics in the recorded music industry

4. Ásta Dis Óladóttir
Internationalization from a small domestic base:
An empirical analysis of Economics and Management

5. Christine Secher
E-deltagelse i praksis – politikernes og forvaltningens medkonstruktion og konsekvenserne heraf

6. Marianne Stang Våland
What we talk about when we talk about space:
End User Participation between Processes of Organizational and Architectural Design

7. Rex Degnegaard
Strategic Change Management
Change Management Challenges in the Danish Police Reform

8. Ulrik Schultz Brix
Værdi i rekruttering – den sikre beslutning
En pragmatisk analyse af perception og synliggørelse af værdi i rekrutterings- og udvælgelsesarbejdet

9. Jan Ole Similä
Kontraktsledelse
Relasjonen mellom virksomhetsledelse og kontraktshåndtering, belyst via fire norske virksomheter

10. Susanne Boch Waldorff
Emerging Organizations: In between local translation, institutional logics and discourse

11. Brian Kane
Performance Talk
Next Generation Management of Organizational Performance

12. Lars Ohnemus
Brand Thrust: Strategic Branding and Shareholder Value
An Empirical Reconciliation of two Critical Concepts

13. Jesper Schlamovitz
Håndtering af usikkerhed i film- og byggeprojekter

14. Tommy Moesby-Jensen
Det faktiske livs forbindtlighed
Førsokratisk informeret, ny-aristotelisk ἦθος-tænkning hos Martin Heidegger

15. Christian Fich
Two Nations Divided by Common Values
French National Habitus and the Rejection of American Power

16. Peter Beyer
Processer, sammenhængskraft og fleksibilitet
Et empirisk casestudie af omstillingsforløb i fire virksomheder

17. Adam Buchhorn
Markets of Good Intentions
Constructing and Organizing Biogas Markets Amid Fragility and Controversy

18. Cecilie K. Moesby-Jensen
Social læring og fælles praksis
Et mixed method studie, der belyser læringskonsekvenser af et lederkursus for et praksisfællesskab af offentlige mellemledere

19. Heidi Boye
Fødevarer og sundhed i senmodernismen
– En indsigt i hyggefænomenet og de relaterede fødevarepraksisser

20. Kristine Munkgård Pedersen
Flygtige forbindelser og midlertidige mobiliseringer
Om kulturel produktion på Roskilde Festival

21. Oliver Jacob Weber
Causes of Intercompany Harmony in Business Markets – An Empirical Investigation from a Dyad Perspective

22. Susanne Ekman
Authority and Autonomy
Paradoxes of Modern Knowledge Work

23. Anette Frey Larsen
Kvalitetsledelse på danske hospitaler
– Ledelsernes indflydelse på introduktion og vedligeholdelse af kvalitetsstrategier i det danske sundhedsvæsen

24. Toyoko Sato
Performativity and Discourse: Japanese Advertisements on the Aesthetic Education of Desire

25. Kenneth Brinch Jensen
Identifying the Last Planner System
Lean management in the construction industry

26. Javier Busquets
Orchestrating Network Behavior for Innovation

27. Luke Patey
The Power of Resistance: India's National Oil Company and International Activism in Sudan

28. Mette Vedel
Value Creation in Triadic Business Relationships. Interaction, Interconnection and Position

29. Kristian Tørning
Knowledge Management Systems in Practice – A Work Place Study

30. Qingxin Shi
An Empirical Study of Thinking Aloud Usability Testing from a Cultural Perspective

31. Tanja Juul Christiansen
Corporate blogging: Medarbejderes kommunikative handlekraft

32. Malgorzata Ciesielska
Hybrid Organisations.
A study of the Open Source – business setting

33. Jens Dick-Nielsen
Three Essays on Corporate Bond Market Liquidity

34. Sabrina Speiermann
Modstandens Politik
Kampagnestyring i Velfærdsstaten.
En diskussion af trafikkampagners styringspotentiale

35. Julie Uldam
Fickle Commitment. Fostering political engagement in 'the flighty world of online activism'

36. Annegrete Juul Nielsen
Traveling technologies and transformations in health care

37. Athur Mühlen-Schulte
Organising Development
Power and Organisational Reform in the United Nations Development Programme

38. Louise Rygaard Jonas
Branding på butiksgulvet
Et case-studie af kultur- og identitets-arbejdet i Kvickly

2011

1. Stefan Fraenkel
Key Success Factors for Sales Force Readiness during New Product Launch
A Study of Product Launches in the Swedish Pharmaceutical Industry

2. Christian Plesner Rossing
International Transfer Pricing in Theory and Practice

3. Tobias Dam Hede
Samtalekunst og ledelsesdisciplin
– en analyse af coachingsdiskursens genealogi og governmentality

4. Kim Pettersson
Essays on Audit Quality, Auditor Choice, and Equity Valuation

5. Henrik Merkelsen
The expert-lay controversy in risk research and management. Effects of institutional distances. Studies of risk definitions, perceptions, management and communication

6. Simon S. Torp
Employee Stock Ownership:
Effect on Strategic Management and Performance

7. Mie Harder
Internal Antecedents of Management Innovation

8. Ole Helby Petersen
Public-Private Partnerships: Policy and Regulation – With Comparative and Multi-level Case Studies from Denmark and Ireland

9. Morten Krogh Petersen
'Good' Outcomes. Handling Multiplicity in Government Communication

10. Kristian Tangsgaard Hvelplund
Allocation of cognitive resources in translation - an eye-tracking and key-logging study

11. Moshe Yonatany
The Internationalization Process of Digital Service Providers

12. Anne Vestergaard
Distance and Suffering
Humanitarian Discourse in the age of Mediatization

13. Thorsten Mikkelsen
Personligheds indflydelse på forretningsrelationer

14. Jane Thostrup Jagd
Hvorfor fortsætter fusionsbølgen udover "the tipping point"?
– en empirisk analyse af information og kognitioner om fusioner

15. Gregory Gimpel
Value-driven Adoption and Consumption of Technology: Understanding Technology Decision Making

16. Thomas Stengade Sønderskov
Den nye mulighed
Social innovation i en forretningsmæssig kontekst

17. Jeppe Christoffersen
Donor supported strategic alliances in developing countries

18. Vibeke Vad Baunsgaard
Dominant Ideological Modes of Rationality: Cross functional

integration in the process of product innovation

19. Throstur Olaf Sigurjonsson
Governance Failure and Icelands's Financial Collapse

20. Allan Sall Tang Andersen
Essays on the modeling of risks in interest-rate and inflation markets

21. Heidi Tscherning
Mobile Devices in Social Contexts

22. Birgitte Gorm Hansen
Adapting in the Knowledge Economy
Lateral Strategies for Scientists and Those Who Study Them

23. Kristina Vaarst Andersen
Optimal Levels of Embeddedness
The Contingent Value of Networked Collaboration

24. Justine Grønbæk Pors
Noisy Management
A History of Danish School Governing from 1970-2010

25. Stefan Linder
Micro-foundations of Strategic Entrepreneurship
Essays on Autonomous Strategic Action

26. Xin Li
Toward an Integrative Framework of National Competitiveness
An application to China

27. Rune Thorbjørn Clausen
Værdifuld arkitektur
Et eksplorativt studie af bygningers rolle i virksomheders værdiskabelse

28. Monica Viken
Markedsundersøkelser som bevis i varemerke- og markedsføringsrett

29. Christian Wymann
Tattooing
The Economic and Artistic Constitution of a Social Phenomenon

30. Sanne Frandsen
Productive Incoherence
A Case Study of Branding and Identity Struggles in a Low-Prestige Organization

31. Mads Stenbo Nielsen
Essays on Correlation Modelling

32. Ivan Häuser
Følelse og sprog
Etablering af en ekspressiv kategori, eksemplificeret på russisk

33. Sebastian Schwenen
Security of Supply in Electricity Markets

2012

1. Peter Holm Andreasen
The Dynamics of Procurement Management
- A Complexity Approach

2. Martin Haulrich
Data-Driven Bitext Dependency Parsing and Alignment

3. Line Kirkegaard
Konsulenten i den anden nat
En undersøgelse af det intense arbejdsliv

4. Tonny Stenheim
Decision usefulness of goodwill under IFRS

5. Morten Lind Larsen
Produktivitet, vækst og velfærd
Industrirådet og efterkrigstidens Danmark 1945 - 1958

6. Petter Berg
Cartel Damages and Cost Asymmetries

7. Lynn Kahle
Experiential Discourse in Marketing
A methodical inquiry into practice and theory

8. Anne Roelsgaard Obling
Management of Emotions in Accelerated Medical Relationships

9. Thomas Frandsen
Managing Modularity of Service Processes Architecture

10. Carina Christine Skovmøller
CSR som noget særligt
Et casestudie om styring og meningsskabelse i relation til CSR ud fra en intern optik

11. Michael Tell
Fradragsbeskæring af selskabers finansieringsudgifter
En skatteretlig analyse af SEL §§ 11, 11B og 11C

12. Morten Holm
Customer Profitability Measurement Models
Their Merits and Sophistication across Contexts

13. Katja Joo Dyppel
Beskatning af derivater
En analyse af dansk skatteret

14. Esben Anton Schultz
Essays in Labor Economics
Evidence from Danish Micro Data

15. Carina Risvig Hansen
"Contracts not covered, or not fully covered, by the Public Sector Directive"

16. Anja Svejgaard Pors
Iværksættelse af kommunikation
- patientfigurer i hospitalets strategiske kommunikation

17. Frans Bévort
Making sense of management with logics
An ethnographic study of accountants who become managers

18. René Kallestrup
The Dynamics of Bank and Sovereign Credit Risk

19. Brett Crawford
Revisiting the Phenomenon of Interests in Organizational Institutionalism
The Case of U.S. Chambers of Commerce

20. Mario Daniele Amore
Essays on Empirical Corporate Finance

21. Arne Stjernholm Madsen
The evolution of innovation strategy
Studied in the context of medical device activities at the pharmaceutical company Novo Nordisk A/S in the period 1980-2008

22. Jacob Holm Hansen
Is Social Integration Necessary for Corporate Branding?
A study of corporate branding strategies at Novo Nordisk

23. Stuart Webber
Corporate Profit Shifting and the Multinational Enterprise

24. Helene Ratner
Promises of Reflexivity
Managing and Researching Inclusive Schools

25. Therese Strand
The Owners and the Power: Insights from Annual General Meetings

26. Robert Gavin Strand
In Praise of Corporate Social Responsibility Bureaucracy

27. Nina Sormunen
Auditor's going-concern reporting
Reporting decision and content of the report

28. John Bang Mathiasen
Learning within a product development working practice:
- an understanding anchored in pragmatism

29. Philip Holst Riis
Understanding Role-Oriented Enterprise Systems: From Vendors to Customers

30. Marie Lisa Dacanay
Social Enterprises and the Poor
Enhancing Social Entrepreneurship and Stakeholder Theory

31. Fumiko Kano Glückstad
Bridging Remote Cultures: Cross-lingual concept mapping based on the information receiver's prior-knowledge

32. Henrik Barslund Fosse
Empirical Essays in International Trade

33. Peter Alexander Albrecht
Foundational hybridity and its reproduction
Security sector reform in Sierra Leone

34. Maja Rosenstock
CSR - hvor svært kan det være?
Kulturanalytisk casestudie om udfordringer og dilemmaer med at forankre Coops CSR-strategi

35. Jeanette Rasmussen
Tweens, medier og forbrug
Et studie af 10-12 årige danske børns brug af internettet, opfattelse og forståelse af markedsføring og forbrug

36. Ib Tunby Gulbrandsen
'This page is not intended for a US Audience'
A five-act spectacle on online communication, collaboration & organization.

37. Kasper Aalling Teilmann
Interactive Approaches to Rural Development

38. Mette Mogensen
The Organization(s) of Well-being and Productivity
(Re)assembling work in the Danish Post

39. Søren Friis Møller
From Disinterestedness to Engagement
Towards Relational Leadership In the Cultural Sector

40. Nico Peter Berhausen
Management Control, Innovation and Strategic Objectives – Interactions and Convergence in Product Development Networks

41. Balder Onarheim
Creativity under Constraints
Creativity as Balancing 'Constrainedness'

42. Haoyong Zhou
Essays on Family Firms

43. Elisabeth Naima Mikkelsen
Making sense of organisational conflict
An empirical study of enacted sense-making in everyday conflict at work

2013

1. Jacob Lyngsie
Entrepreneurship in an Organizational Context

2. Signe Groth-Brodersen
Fra ledelse til selvet
En socialpsykologisk analyse af forholdet imellem selvledelse, ledelse og stress i det moderne arbejdsliv

3. Nis Høyrup Christensen
Shaping Markets: A Neoinstitutional Analysis of the Emerging Organizational Field of Renewable Energy in China

4. Christian Edelvold Berg
As a matter of size
THE IMPORTANCE OF CRITICAL MASS AND THE CONSEQUENCES OF SCARCITY FOR TELEVISION MARKETS

5. Christine D. Isakson
Coworker Influence and Labor Mobility
Essays on Turnover, Entrepreneurship and Location Choice in the Danish Maritime Industry

6. Niels Joseph Jerne Lennon
Accounting Qualities in Practice
Rhizomatic stories of representational faithfulness, decision making and control

7. Shannon O'Donnell
Making Ensemble Possible
How special groups organize for collaborative creativity in conditions of spatial variability and distance

8. Robert W. D. Veitch
Access Decisions in a Partly-Digital World Comparing Digital Piracy and Legal Modes for Film and Music

9. Marie Mathiesen
Making Strategy Work An Organizational Ethnography

10. Arisa Shollo
The role of business intelligence in organizational decision-making

11. Mia Kaspersen
The construction of social and environmental reporting

12. Marcus Møller Larsen
The organizational design of offshoring

13. Mette Ohm Rørdam
EU Law on Food Naming The prohibition against misleading names in an internal market context

14. Hans Peter Rasmussen
GIV EN GED! Kan giver-idealtyper forklare støtte til velgørenhed og understøtte relationsopbygning?

15. Ruben Schachtenhaufen
Fonetisk reduktion i dansk

16. Peter Koerver Schmidt
Dansk CFC-beskatning I et internationalt og komparativt perspektiv

17. Morten Froholdt
Strategi i den offentlige sektor En kortlægning af styringsmæssig kontekst, strategisk tilgang, samt anvendte redskaber og teknologier for udvalgte danske statslige styrelser

18. Annette Camilla Sjørup
Cognitive effort in metaphor translation An eye-tracking and key-logging study

19. Tamara Stucchi
The Internationalization of Emerging Market Firms: A Context-Specific Study

20. Thomas Lopdrup-Hjorth
"Let's Go Outside": The Value of Co-Creation

21. Ana Alačovska
Genre and Autonomy in Cultural Production The case of travel guidebook production

22. Marius Gudmand-Høyer
Stemningssindssygdommenes historie i det 19. århundrede Omtydningen af melankolien og manien som bipolære stemningslidelser i dansk sammenhæng under hensyn til dannelsen af det moderne følelseslivs relative autonomi. En problematiserings- og erfarings-analytisk undersøgelse

23. Lichen Alex Yu
Fabricating an S&OP Process Circulating References and Matters of Concern

24. Esben Alfort
The Expression of a Need Understanding search

25. Trine Pallesen
Assembling Markets for Wind Power An Inquiry into the Making of Market Devices

26. Anders Koed Madsen
Web-Visions Repurposing digital traces to organize social attention

27. Lærke Højgaard Christiansen
BREWING ORGANIZATIONAL RESPONSES TO INSTITUTIONAL LOGICS

28. Tommy Kjær Lassen
EGENTLIG SELVLEDELSE En ledelsesfilosofisk afhandling om selvledelsens paradoksale dynamik og eksistentielle engagement

29. Morten Rossing
Local Adaption and Meaning Creation in Performance Appraisal

30. Søren Obed Madsen
Lederen som oversætter
Et oversættelsesteoretisk perspektiv på strategisk arbejde

31. Thomas Høgenhaven
Open Government Communities
Does Design Affect Participation?

32. Kirstine Zinck Pedersen
Failsafe Organizing?
A Pragmatic Stance on Patient Safety

33. Anne Petersen
Hverdagslogikker i psykiatrisk arbejde
En institutionsetnografisk undersøgelse af hverdagen i psykiatriske organisationer

34. Didde Maria Humle
Fortællinger om arbejde

35. Mark Holst-Mikkelsen
Strategieksekvering i praksis
– barrierer og muligheder!

36. Malek Maalouf
Sustaining lean
Strategies for dealing with organizational paradoxes

37. Nicolaj Tofte Brenneche
Systemic Innovation In The Making
The Social Productivity of Cartographic Crisis and Transitions in the Case of SEEIT

38. Morten Gylling
The Structure of Discourse
A Corpus-Based Cross-Linguistic Study

39. Binzhang YANG
Urban Green Spaces for Quality Life
- Case Study: the landscape architecture for people in Copenhagen

40. Michael Friis Pedersen
Finance and Organization:
The Implications for Whole Farm Risk Management

41. Even Fallan
Issues on supply and demand for environmental accounting information

42. Ather Nawaz
Website user experience
A cross-cultural study of the relation between users´ cognitive style, context of use, and information architecture of local websites

43. Karin Beukel
The Determinants for Creating Valuable Inventions

44. Arjan Markus
External Knowledge Sourcing and Firm Innovation
Essays on the Micro-Foundations of Firms' Search for Innovation

2014

1. Solon Moreira
Four Essays on Technology Licensing and Firm Innovation

2. Karin Strzeletz Ivertsen
Partnership Drift in Innovation Processes
A study of the Think City electric car development

3. Kathrine Hoffmann Pii
Responsibility Flows in Patient-centred Prevention

4. Jane Bjørn Vedel
Managing Strategic Research
An empirical analysis of science-industry collaboration in a pharmaceutical company

5. Martin Gylling
Processuel strategi i organisationer
Monografi om dobbeltheden i tænkning af strategi, dels som vidensfelt i organisationsteori, dels som kunstnerisk tilgang til at skabe i erhvervsmæssig innovation

6. Linne Marie Lauesen
Corporate Social Responsibility in the Water Sector: How Material Practices and their Symbolic and Physical Meanings Form a Colonising Logic

7. Maggie Qiuzhu Mei
LEARNING TO INNOVATE: The role of ambidexterity, standard, and decision process

8. Inger Høedt-Rasmussen
Developing Identity for Lawyers Towards Sustainable Lawyering

9. Sebastian Fux
Essays on Return Predictability and Term Structure Modelling

10. Thorbjørn N. M. Lund-Poulsen
Essays on Value Based Management

11. Oana Brindusa Albu
Transparency in Organizing: A Performative Approach

12. Lena Olaison
Entrepreneurship at the limits

13. Hanne Sørum
DRESSED FOR WEB SUCCESS? An Empirical Study of Website Quality in the Public Sector

14. Lasse Folke Henriksen
Knowing networks How experts shape transnational governance

15. Maria Halbinger
Entrepreneurial Individuals Empirical Investigations into Entrepreneurial Activities of Hackers and Makers

16. Robert Spliid
Kapitalfondenes metoder og kompetencer

17. Christiane Stelling
Public-private partnerships & the need, development and management of trusting A processual and embedded exploration

18. Marta Gasparin
Management of design as a translation process

19. Kåre Moberg
Assessing the Impact of Entrepreneurship Education From ABC to PhD

20. Alexander Cole
Distant neighbors Collective learning beyond the cluster

21. Martin Møller Boje Rasmussen
Is Competitiveness a Question of Being Alike? How the United Kingdom, Germany and Denmark Came to Compete through their Knowledge Regimes from 1993 to 2007

22. Anders Ravn Sørensen
Studies in central bank legitimacy, currency and national identity Four cases from Danish monetary history

23. Nina Bellak
Can Language be Managed in International Business? Insights into Language Choice from a Case Study of Danish and Austrian Multinational Corporations (MNCs)

24. Rikke Kristine Nielsen
Global Mindset as Managerial Meta-competence and Organizational Capability: Boundary-crossing Leadership Cooperation in the MNC The Case of 'Group Mindset' in Solar A/S.

25. Rasmus Koss Hartmann
User Innovation inside government Towards a critically performative foundation for inquiry

26. Kristian Gylling Olesen
Flertydig og emergerende ledelse i folkeskolen
Et aktør-netværksteoretisk ledelses-studie af politiske evalueringsreformers betydning for ledelse i den danske folkeskole

27. Troels Riis Larsen
Kampen om Danmarks omdømme 1945-2010
Omdømmearbejde og omdømmepolitik

28. Klaus Majgaard
Jagten på autenticitet i offentlig styring

29. Ming Hua Li
Institutional Transition and Organizational Diversity: Differentiated internationalization strategies of emerging market state-owned enterprises

30. Sofie Blinkenberg Federspiel
IT, organisation og digitalisering: Institutionelt arbejde i den kommunale digitaliseringsproces

31. Elvi Weinreich
Hvilke offentlige ledere er der brug for når velfærdstænkningen flytter sig – er Diplomuddannelsens lederprofil svaret?

32. Ellen Mølgaard Korsager
Self-conception and image of context in the growth of the firm – A Penrosian History of Fiberline Composites

33. Else Skjold
The Daily Selection

34. Marie Louise Conradsen
The Cancer Centre That Never Was
The Organisation of Danish Cancer Research 1949-1992

35. Virgilio Failla
Three Essays on the Dynamics of Entrepreneurs in the Labor Market

36. Nicky Nedergaard
Brand-Based Innovation
Relational Perspectives on Brand Logics and Design Innovation Strategies and Implementation

37. Mads Gjedsted Nielsen
Essays in Real Estate Finance

38. Kristin Martina Brandl
Process Perspectives on Service Offshoring

39. Mia Rosa Koss Hartmann
In the gray zone
With police in making space for creativity

40. Karen Ingerslev
Healthcare Innovation under The Microscope
Framing Boundaries of Wicked Problems

41. Tim Neerup Themsen
Risk Management in large Danish public capital investment programmes

2015

1. Jakob Ion Wille
Film som design
Design af levende billeder i film og tv-serier

2. Christiane Mossin
Interzones of Law and Metaphysics
Hierarchies, Logics and Foundations of Social Order seen through the Prism of EU Social Rights

3. Thomas Tøth
TRUSTWORTHINESS: ENABLING GLOBAL COLLABORATION
An Ethnographic Study of Trust, Distance, Control, Culture and Boundary Spanning within Offshore Outsourcing of IT Services

4. Steven Højlund
Evaluation Use in Evaluation Systems – The Case of the European Commission

5. Julia Kirch Kirkegaard
AMBIGUOUS WINDS OF CHANGE – OR FIGHTING AGAINST WINDMILLS IN CHINESE WIND POWER
A CONSTRUCTIVIST INQUIRY INTO CHINA'S PRAGMATICS OF GREEN MARKETISATION MAPPING CONTROVERSIES OVER A POTENTIAL TURN TO QUALITY IN CHINESE WIND POWER

6. Michelle Carol Antero
A Multi-case Analysis of the Development of Enterprise Resource Planning Systems (ERP) Business Practices

Morten Friis-Olivarius
The Associative Nature of Creativity

7. Mathew Abraham
New Cooperativism:
A study of emerging producer organisations in India

8. Stine Hedegaard
Sustainability-Focused Identity: Identity work performed to manage, negotiate and resolve barriers and tensions that arise in the process of constructing or ganizational identity in a sustainability context

9. Cecilie Glerup
Organizing Science in Society – the conduct and justification of resposible research

10. Allan Salling Pedersen
Implementering af ITIL® IT-governance - når best practice konflikter med kulturen Løsning af implementerings-problemer gennem anvendelse af kendte CSF i et aktionsforskningsforløb.

11. Nihat Misir
A Real Options Approach to Determining Power Prices

12. Mamdouh Medhat
MEASURING AND PRICING THE RISK OF CORPORATE FAILURES

13. Rina Hansen
Toward a Digital Strategy for Omnichannel Retailing

14. Eva Pallesen
In the rhythm of welfare creation
A relational processual investigation moving beyond the conceptual horizon of welfare management

15. Gouya Harirchi
In Search of Opportunities: Three Essays on Global Linkages for Innovation

16. Lotte Holck
Embedded Diversity: A critical ethnographic study of the structural tensions of organizing diversity

17. Jose Daniel Balarezo
Learning through Scenario Planning

18. Louise Pram Nielsen
Knowledge dissemination based on terminological ontologies. Using eye tracking to further user interface design.

19. Sofie Dam
PUBLIC-PRIVATE PARTNERSHIPS FOR INNOVATION AND SUSTAINABILITY TRANSFORMATION
An embedded, comparative case study of municipal waste management in England and Denmark

20. Ulrik Hartmyer Christiansen
Follwoing the Content of Reported Risk Across the Organization

21. Guro Refsum Sanden
Language strategies in multinational corporations. A cross-sector study of financial service companies and manufacturing companies.

22. Linn Gevoll
Designing performance management for operational level
- A closer look on the role of design choices in framing coordination and motivation

23. Frederik Larsen
Objects and Social Actions
– on Second-hand Valuation Practices

24. Thorhildur Hansdottir Jetzek
The Sustainable Value of Open Government Data
Uncovering the Generative Mechanisms of Open Data through a Mixed Methods Approach

25. Gustav Toppenberg
Innovation-based M&A
– Technological-Integration Challenges – The Case of Digital-Technology Companies

26. Mie Plotnikof
Challenges of Collaborative Governance
An Organizational Discourse Study of Public Managers' Struggles with Collaboration across the Daycare Area

27. Christian Garmann Johnsen
Who Are the Post-Bureaucrats?
A Philosophical Examination of the Creative Manager, the Authentic Leader and the Entrepreneur

28. Jacob Brogaard-Kay
Constituting Performance Management
A field study of a pharmaceutical company

29. Rasmus Ploug Jenle
Engineering Markets for Control: Integrating Wind Power into the Danish Electricity System

30. Morten Lindholst
Complex Business Negotiation: Understanding Preparation and Planning

31. Morten Grynings
TRUST AND TRANSPARENCY FROM AN ALIGNMENT PERSPECTIVE

32. Peter Andreas Norn
Byregimer og styringsevne: Politisk lederskab af store byudviklingsprojekter

33. Milan Miric
Essays on Competition, Innovation and Firm Strategy in Digital Markets

34. Sanne K. Hjordrup
The Value of Talent Management
Rethinking practice, problems and possibilities

35. Johanna Sax
Strategic Risk Management
– Analyzing Antecedents and Contingencies for Value Creation

36. Pernille Rydén
Strategic Cognition of Social Media

37. Mimmi Sjöklint
The Measurable Me
- The Influence of Self-tracking on the User Experience

38. Juan Ignacio Staricco
Towards a Fair Global Economic Regime? A critical assessment of Fair Trade through the examination of the Argentinean wine industry

39. Marie Henriette Madsen
Emerging and temporary connections in Quality work

40. Yangfeng CAO
Toward a Process Framework of Business Model Innovation in the Global Context
Entrepreneurship-Enabled Dynamic Capability of Medium-Sized Multinational Enterprises

41. Carsten Scheibye
Enactment of the Organizational Cost Structure in Value Chain Configuration
A Contribution to Strategic Cost Management

2016

1. Signe Sofie Dyrby
Enterprise Social Media at Work

2. Dorte Boesby Dahl
The making of the public parking attendant
Dirt, aesthetics and inclusion in public service work

3. Verena Girschik
Realizing Corporate Responsibility Positioning and Framing in Nascent Institutional Change

4. Anders Ørding Olsen
IN SEARCH OF SOLUTIONS
Inertia, Knowledge Sources and Diversity in Collaborative Problem-solving

5. Pernille Steen Pedersen
Udkast til et nyt copingbegreb
En kvalifikation af ledelsesmuligheder for at forebygge sygefravær ved psykiske problemer.

6. Kerli Kant Hvass
Weaving a Path from Waste to Value: Exploring fashion industry business models and the circular economy

7. Kasper Lindskow
Exploring Digital News Publishing Business Models – a production network approach

8. Mikkel Mouritz Marfelt
The chameleon workforce:
Assembling and negotiating the content of a workforce

9. Marianne Bertelsen
Aesthetic encounters
Rethinking autonomy, space & time in today's world of art

10. Louise Hauberg Wilhelmsen
EU PERSPECTIVES ON INTERNATIONAL COMMERCIAL ARBITRATION

11. Abid Hussain
On the Design, Development and Use of the Social Data Analytics Tool (SODATO): Design Propositions, Patterns, and Principles for Big Social Data Analytics

12. Mark Bruun
Essays on Earnings Predictability

13. Tor Bøe-Lillegraven
BUSINESS PARADOXES, BLACK BOXES, AND BIG DATA: BEYOND ORGANIZATIONAL AMBIDEXTERITY

14. Hadis Khonsary-Atighi
ECONOMIC DETERMINANTS OF DOMESTIC INVESTMENT IN AN OIL-BASED ECONOMY: THE CASE OF IRAN (1965-2010)

15. Maj Lervad Grasten
Rule of Law or Rule by Lawyers?
On the Politics of Translation in Global Governance

16. Lene Granzau Juel-Jacobsen
SUPERMARKEDETS MODUS OPERANDI – en hverdagssociologisk undersøgelse af forholdet mellem rum og handlen og understøtte relationsopbygning?

17. Christine Thalsgård Henriques
In search of entrepreneurial learning – Towards a relational perspective on incubating practices?

18. Patrick Bennett
Essays in Education, Crime, and Job Displacement

19. Søren Korsgaard
Payments and Central Bank Policy

20. Marie Kruse Skibsted
Empirical Essays in Economics of Education and Labor

21. Elizabeth Benedict Christensen
The Constantly Contingent Sense of Belonging of the 1.5 Generation Undocumented Youth
An Everyday Perspective

22. Lasse J. Jessen
Essays on Discounting Behavior and Gambling Behavior

23. Kalle Johannes Rose
Når stifterviljen dør…
Et retsøkonomisk bidrag til 200 års juridisk konflikt om ejendomsretten

24. Andreas Søeborg Kirkedal
Danish Stød and Automatic Speech Recognition

25. Ida Lunde Jørgensen
Institutions and Legitimations in Finance for the Arts

26. Olga Rykov Ibsen
An empirical cross-linguistic study of directives: A semiotic approach to the sentence forms chosen by British, Danish and Russian speakers in native and ELF contexts

27. Desi Volker
Understanding Interest Rate Volatility

28. Angeli Elizabeth Weller
Practice at the Boundaries of Business Ethics & Corporate Social Responsibility

29. Ida Danneskiold-Samsøe
Levende læring i kunstneriske organisationer
En undersøgelse af læringsprocesser mellem projekt og organisation på Aarhus Teater

30. Leif Christensen
Quality of information – The role of internal controls and materiality

31. Olga Zarzecka
Tie Content in Professional Networks

32. Henrik Mahncke
De store gaver
- Filantropiens gensidighedsrelationer i teori og praksis

33. Carsten Lund Pedersen
Using the Collective Wisdom of Frontline Employees in Strategic Issue Management

34. Yun Liu
Essays on Market Design

35. Denitsa Hazarbassanova Blagoeva
The Internationalisation of Service Firms

36. Manya Jaura Lind
Capability development in an off-shoring context: How, why and by whom

37. Luis R. Boscán F.
Essays on the Design of Contracts and Markets for Power System Flexibility

38. Andreas Philipp Distel
Capabilities for Strategic Adaptation: Micro-Foundations, Organizational Conditions, and Performance Implications

39. Lavinia Bleoca
The Usefulness of Innovation and Intellectual Capital in Business Performance: The Financial Effects of Knowledge Management vs. Disclosure

40. Henrik Jensen
Economic Organization and Imperfect Managerial Knowledge: A Study of the Role of Managerial Meta-Knowledge in the Management of Distributed Knowledge

41. Stine Mosekjær
The Understanding of English Emotion Words by Chinese and Japanese Speakers of English as a Lingua Franca An Empirical Study

42. Hallur Tor Sigurdarson
The Ministry of Desire - Anxiety and entrepreneurship in a bureaucracy

43. Kätlin Pulk
Making Time While Being in Time
A study of the temporality of organizational processes

44. Valeria Giacomin
Contextualizing the cluster Palm oil in Southeast Asia in global perspective (1880s–1970s)

45. Jeanette Willert
Managers' use of multiple Management Control Systems: The role and interplay of management control systems and company performance

46. Mads Vestergaard Jensen
Financial Frictions: Implications for Early Option Exercise and Realized Volatility

47. Mikael Reimer Jensen
Interbank Markets and Frictions

48. Benjamin Faigen
Essays on Employee Ownership

49. Adela Michea
Enacting Business Models An Ethnographic Study of an Emerging Business Model Innovation within the Frame of a Manufacturing Company.

50. Iben Sandal Stjerne
Transcending organization in temporary systems Aesthetics' organizing work and employment in Creative Industries

51. Simon Krogh
Anticipating Organizational Change

52. Sarah Netter
Exploring the Sharing Economy

53. Lene Tolstrup Christensen
State-owned enterprises as institutional market actors in the marketization of public service provision: A comparative case study of Danish and Swedish passenger rail 1990–2015

54. Kyoung(Kay) Sun Park
Three Essays on Financial Economics

2017

1. Mari Bjerck
Apparel at work. Work uniforms and women in male-dominated manual occupations.

2. Christoph H. Flöthmann
Who Manages Our Supply Chains? Backgrounds, Competencies and Contributions of Human Resources in Supply Chain Management

3. Aleksandra Anna Rzeźnik
Essays in Empirical Asset Pricing

4. Claes Bäckman
Essays on Housing Markets

5. Kirsti Reitan Andersen
Stabilizing Sustainability in the Textile and Fashion Industry

6. Kira Hoffmann
Cost Behavior: An Empirical Analysis of Determinants and Consequences of Asymmetries

7. Tobin Hanspal
Essays in Household Finance

8. Nina Lange
Correlation in Energy Markets

9. Anjum Fayyaz
Donor Interventions and SME Networking in Industrial Clusters in Punjab Province, Pakistan

10. Magnus Paulsen Hansen
Trying the unemployed. Justification and critique, emancipation and coercion towards the 'active society'. A study of contemporary reforms in France and Denmark

11. Sameer Azizi
Corporate Social Responsibility in Afghanistan – a critical case study of the mobile telecommunications industry

12. Malene Myhre
The internationalization of small and medium-sized enterprises: A qualitative study

13. Thomas Presskorn-Thygesen
The Significance of Normativity – Studies in Post-Kantian Philosophy and Social Theory

14. Federico Clementi
Essays on multinational production and international trade

15. Lara Anne Hale
Experimental Standards in Sustainability Transitions: Insights from the Building Sector

16. Richard Pucci
Accounting for Financial Instruments in an Uncertain World Controversies in IFRS in the Aftermath of the 2008 Financial Crisis

17. Sarah Maria Denta
Kommunale offentlige private partnerskaber Regulering I skyggen af Farumsagen

18. Christian Östlund
Design for e-training

19. Amalie Martinus Hauge
Organizing Valuations – a pragmatic inquiry

20. Tim Holst Celik
Tension-filled Governance? Exploring the Emergence, Consolidation and Reconfiguration of Legitimatory and Fiscal State-crafting

21. Christian Bason
Leading Public Design: How managers engage with design to transform public governance

22. Davide Tomio
Essays on Arbitrage and Market Liquidity

23. Simone Stæhr
Financial Analysts' Forecasts Behavioral Aspects and the Impact of Personal Characteristics

24. Mikkel Godt Gregersen
Management Control, Intrinsic Motivation and Creativity – How Can They Coexist

25. Kristjan Johannes Suse Jespersen
Advancing the Payments for Ecosystem Service Discourse Through Institutional Theory

26. Kristian Bondo Hansen
Crowds and Speculation: A study of crowd phenomena in the U.S. financial markets 1890 to 1940

27. Lars Balslev
Actors and practices – An institutional study on management accounting change in Air Greenland

28. Sven Klingler
Essays on Asset Pricing with Financial Frictions

29. Klement Ahrensbach Rasmussen
Business Model Innovation The Role of Organizational Design

30. Giulio Zichella
Entrepreneurial Cognition. Three essays on entrepreneurial behavior and cognition under risk and uncertainty

31. Richard Ledborg Hansen
En forkærlighed til det eksisterende – mellemlederens oplevelse af forandringsmodstand i organisatoriske forandringer

32. Vilhelm Stefan Holsting
Militært chefvirke: Kritik og retfærdiggørelse mellem politik og profession

33. Thomas Jensen
Shipping Information Pipeline: An information infrastructure to improve international containerized shipping

34. Dzmitry Bartalevich
Do economic theories inform policy? Analysis of the influence of the Chicago School on European Union competition policy

35. Kristian Roed Nielsen
Crowdfunding for Sustainability: A study on the potential of reward-based crowdfunding in supporting sustainable entrepreneurship

36. Emil Husted
There is always an alternative: A study of control and commitment in political organization

37. Anders Ludvig Sevelsted
Interpreting Bonds and Boundaries of Obligation. A genealogy of the emergence and development of Protestant voluntary social work in Denmark as shown through the cases of the Copenhagen Home Mission and the Blue Cross (1850 – 1950)

38. Niklas Kohl
Essays on Stock Issuance

39. Maya Christiane Flensborg Jensen
BOUNDARIES OF PROFESSIONALIZATION AT WORK An ethnography-inspired study of care workers' dilemmas at the margin

40. Andreas Kamstrup
Crowdsourcing and the Architectural Competition as Organisational Technologies

41. Louise Lyngfeldt Gorm Hansen
Triggering Earthquakes in Science, Politics and Chinese Hydropower - A Controversy Study

2018

1. Vishv Priya Kohli
Combatting Falsifi cation and Counterfeiting of Medicinal Products in the E uropean Union – A Legal Analysis

2. Helle Haurum
Customer Engagement Behavior in the context of Continuous Service Relationships

3. Nis Grünberg
The Party -state order: Essays on China's political organization and political economic institutions

4. Jesper Christensen
A Behavioral Theory of Human Capital Integration

5. Poula Marie Helth
Learning in practice

6. Rasmus Vendler Toft-Kehler
Entrepreneurship as a career? An investigation of the relationship between entrepreneurial experience and entrepreneurial outcome

7. Szymon Furtak
Sensing the Future: Designing sensor-based predictive information systems for forecasting spare part demand for diesel engines

8. Mette Brehm Johansen
Organizing patient involvement. An ethnographic study

9. Iwona Sulinska
Complexities of Social Capital in Boards of Directors

10. Cecilie Fanøe Petersen
Award of public contracts as a means to conferring State aid: A legal analysis of the interface between public procurement law and State aid law

11. Ahmad Ahmad Barirani
Three Experimental Studies on Entrepreneurship

12. Carsten Allerslev Olsen
Financial Reporting Enforcement: Impact and Consequences

13. Irene Christensen
New product fumbles – Organizing for the Ramp-up process

14. Jacob Taarup-Esbensen
Managing communities – Mining MNEs' community risk management practices

15. Lester Allan Lasrado
Set-Theoretic approach to maturity models

16. Mia B. Münster
Intention vs. Perception of Designed Atmospheres in Fashion Stores

17. Anne Sluhan
Non-Financial Dimensions of Family Firm Ownership: How Socioemotional Wealth and Familiness Influence Internationalization

18. Henrik Yde Andersen
Essays on Debt and Pensions

19. Fabian Heinrich Müller
Valuation Reversed – When Valuators are Valuated. An Analysis of the Perception of and Reaction to Reviewers in Fine-Dining

20. Martin Jarmatz
Organizing for Pricing

21. Niels Joachim Christfort Gormsen
Essays on Empirical Asset Pricing

22. Diego Zunino
Socio-Cognitive Perspectives in Business Venturing

23. Benjamin Asmussen
Networks and Faces between Copenhagen and Canton, 1730-1840

24. Dalia Bagdziunaite
Brains at Brand Touchpoints A Consumer Neuroscience Study of Information Processing of Brand Advertisements and the Store Environment in Compulsive Buying

25. Erol Kazan
Towards a Disruptive Digital Platform Model

TITLER I ATV PH.D.-SERIEN

1992

1. Niels Kornum
Servicesamkørsel – organisation, økonomi og planlægningsmetode

1995

2. Verner Worm
Nordiske virksomheder i Kina
Kulturspecifikke interaktionsrelationer ved nordiske virksomhedsetableringer i Kina

1999

3. Mogens Bjerre
Key Account Management of Complex Strategic Relationships
An Empirical Study of the Fast Moving Consumer Goods Industry

2000

4. Lotte Darsø
Innovation in the Making
Interaction Research with heterogeneous Groups of Knowledge Workers creating new Knowledge and new Leads

2001

5. Peter Hobolt Jensen
Managing Strategic Design Identities
The case of the Lego Developer Network

2002

6. Peter Lohmann
The Deleuzian Other of Organizational Change – Moving Perspectives of the Human

7. Anne Marie Jess Hansen
To lead from a distance: The dynamic interplay between strategy and strategizing – A case study of the strategic management process

2003

8. Lotte Henriksen
Videndeling
– om organisatoriske og ledelsesmæssige udfordringer ved videndeling i praksis

9. Niels Christian Nickelsen
Arrangements of Knowing: Coordinating Procedures Tools and Bodies in Industrial Production – a case study of the collective making of new products

2005

10. Carsten Ørts Hansen
Konstruktion af ledelsesteknologier og effektivitet

TITLER I DBA PH.D.-SERIEN

2007

1. Peter Kastrup-Misir
Endeavoring to Understand Market Orientation – and the concomitant co-mutation of the researched, the re searcher, the research itself and the truth

2009

1. Torkild Leo Thellefsen
Fundamental Signs and Significance effects
A Semeiotic outline of Fundamental Signs, Significance-effects, Knowledge Profiling and their use in Knowledge Organization and Branding

2. Daniel Ronzani
When Bits Learn to Walk Don’t Make Them Trip. Technological Innovation and the Role of Regulation by Law in Information Systems Research: the Case of Radio Frequency Identification (RFID)

2010

1. Alexander Carnera
Magten over livet og livet som magt
Studier i den biopolitiske ambivalens