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Recommended Citation

Queiroz, Magno; McGraw, Jessica L.; and Coltman, Tim, (2019). "INFORMATION TECHNOLOGY AND THE RENEWAL OF BUSINESS MODELS". In Proceedings of the 27th European Conference on Information Systems (ECIS), Stockholm & Uppsala, Sweden, June 8-14, 2019. ISBN 978-1-7336325-0-8 Research-in-Progress Papers.

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INFORMATION TECHNOLOGY AND THE RENEWAL OF BUSINESS MODELS

Research in Progress

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Abstract

With the advent of the information age, shrinking product lifecycles and intense competition, organizations continuously seek to renew their business models to exploit new market opportunities. Existing literature suggests that advances in IT and the rise of corporate-wide IT platforms facilitate the use of IT resources across the organization and can drive the evolution of business models. However, we still know little about the role of IT in enabling successful business models. This study investigates the relationship between corporate IT platforms and business model evolution. We examine the case of DHL Express to understand how its efforts to build a corporate IT platform influenced the company's business model. Drawing on insights from prior literature and findings from the DHL case, we discuss evidence that corporate IT platforms enable business model evolution to the extent that they generate digital options that can be exercised by managers to renew value propositions for customers.

Keywords: IT platform, business model, digital options, value propositions.

1 Introduction

In markets defined by frequent product launches, and where market leaders face unpredictable attacks from new sources of competition, competitive advantage is increasingly transient and elusive (McGrath, 2010; Sinfield et al., 2012; Hacklin et al., 2018). In response, the literature has directed attention to new and innovative *business models* that provide the basis for exploiting temporary market opportunities (Ritter and Lettl, 2018). A business model embodies the “architecture” of a business and, once adopted, defines the way the enterprise will operate to earn a profit (Teece, 2018). However, to remain competitive, firms must continuously renew their business models in response to market opportunities that both appear and disappear quickly.

Many companies such as Delta Airlines, Wal-Mart, and eBay have crafted successful business models by leveraging information technology (IT) platforms comprising both fixed and modular IT infrastructure components, IT applications, and data (Ross et al., 2006; Sako, 2012; Westerman and Bonnet, 2015). This is in line with studies that find that advances in IT and platform technologies are important drivers of new business models (Baden-Fuller and Haefliger, 2013; Osterwalder and Pigneur, 2013; Martins et al., 2015). For example, Ross et al. (2006) argue that an internal corporate-wide IT platform used to standardize business processes and meet the shared needs of various departments facilitates business change, thus enabling firms to cope with market threats and opportunities. Despite this growing literature, we still know little about how IT shapes and constrains business model change.

The ultimate goal of our research is to build a theory of how IT enables the renewal of business models. To do this, we will first examine the case of a company who has been leveraging IT successfully to improve its business model: DHL Express – the global logistics company, which Mocker et al. (2014) refers to as “the most international company on earth”. In a follow-up study, we will focus on

the use of case research for theory building (Eisenhardt and Graebner, 2007) by developing propositions about the relationship between IT and business models. The current research-in-progress paper takes the first step towards the completion of this project. It examines the link between IT and business models and reports on preliminary data collection and analysis pertaining to the DHL Express case.

We investigate the concept of corporate IT platform and how it can be used to support the renewal and evolution of business models. As Demil and Lecocq (2010) explain, *business model evolution* draws attention to the need for advancing innovative value propositions or refining existing value propositions to exploit market opportunities (e.g., extending a product line or adding new services to existing offerings). Prior research argues that investments in corporate IT platforms create digital options that when exercised can generate positive business outcomes (Fichman, 2004; Overby et al., 2006). These digital options refer to “IT-enabled capabilities in the form of digitized work processes and knowledge systems” (Overby et al., 2006, p. 126). Building on this body of research, we link corporate IT platforms to the renewal of business models. We then examine how DHL Express’ efforts to build a corporate IT platform led to improvements in value propositions. Our study identified three important stages for the use of IT to renew business models: (1) building IT capabilities as a shared IT platform across the organization, (2) generating new digital options for business execution, and (3) exercising digital options to create new value propositions for customers or to renew existing propositions. This study seeks to contribute to a growing body of literature investigating the role IT plays in supporting business model change (Demil and Lecocq, 2010; Osterwalder and Pigneur, 2013; Teece, 2018).

2 Theoretical Background

2.1 Towards IT-enabled business models

The business model construct has been defined as a “a system of interdependent activities that transcend the focal firm and spans its boundaries” (Zott and Amit, 2010, p. 216). A business model comprises three related attributes: first, the firm’s value proposition for the customer; second, the system of interrelated processes that create customer value; and third, the means by which the firm can appropriate or retain value while serving the customer (Teece, 2018). Prior research on business models draws attention to the central role of value propositions, in particular, to answer core questions related to “What need is met for the customer? What offering will we provide to address that need?” and “What role will our business play in providing the offering?” (Sinfield et al., 2012, p. 86). Value propositions demonstrate “the business logic of creating value for customers and/or to each party involved through offering products and services that satisfy the needs of their target segments” (Al-Debei and Avison, 2010, p. 366). As Demil and Lecocq (2010) explain, the evolution of business models occurs when organizations renew or update their value propositions.

However, while the concept of a business model offers a fresh perspective on how to leverage existing organizational capabilities such as IT to capitalize on market opportunities (Baden-Fuller and Haefliger, 2013; Hacklin et al., 2018), researchers have argued that there is a paucity of theories to explain how organizations capitalize on these opportunities through business models (Teece, 2010; Foss and Saebi, 2018). We suggest that advances in the IS literature can extend our understanding of business models and the way organizations leverage digital assets to renew their business models. This is in line with studies that argue that business model change is contingent on the development of corporate IT platform capabilities and the way organizations leverage those capabilities to support new value propositions (Ross et al., 2006; Baird and Raghu, 2015; Westerman and Bonnet, 2015).

2.2 The rise of corporate IT platforms

The market pressures arising from environmental turbulence provide the catalyst for a growing literature that identifies corporate-wide IT platforms as important drivers of organizational agility and performance (Yetton et al., 2013; Reynolds and Yetton, 2015). Corporate IT platform refers to the firm’s specific digital IT assets – including hardware, network, applications, and data – that are shared across

the organization to provide a foundation for business execution (Fichman, 2004; Ross et al., 2006). In a survey of 103 European and US firms, Ross et al. (2006) found that almost half of the firms surveyed have created a corporate IT platform and that those who have built a set of core reusable, shareable or modular processes on their platforms realized higher profitability, agility, IT satisfaction, and IT business value.

These findings are consistent with existing literature that suggests corporate IT platforms create value by enabling greater managerial control, predictable use of IT resources, and by facilitating business process integration (Fichman, 2004; Goodhue et al., 2009). As Goodhue et al. (2009) explain, the availability of unused capabilities in the platform, data integration capabilities, and “add-on” IT systems that can be attached to the platform creates a wide range of different capability configurations that organizations can deploy to meet their unique needs. For instance, Kraemer et al. (2000) explain the way Dell leveraged IT capabilities to extend its business model, that is, “finding ways to extend business with existing customers, to reach new customers, to reach new geographic markets, and to offer new products and services geared to those markets” (p. 12). Dell built a corporate IT platform through a three-phase IT transformation. Phase one was to stabilize the current environment by installing common hardware and operating systems. Phase two was an upgrade of IT infrastructure and services aimed at building new capabilities. Finally, phase three was the development of IT applications to achieve tighter integration of data and enable synergies across business functions. These efforts enabled a modular platform that “allows new data engines or applications to be added to the system without having to make changes throughout the system” (Kraemer et al., 2000, p. 15).

Since corporate IT platforms provide a foundation for other business systems, the ability of organizations to adjust their IT-enabled business models in response to new market opportunities is contingent on the rapid identification and deployment of IT platform capabilities. This logic has generated significant interest on the role of firm-wide IT platforms in enabling the development and evolution of business models (Sako, 2012; Osterwalder and Pigneur, 2013; Goldsby and Zinn, 2016; Ojala, 2016).

2.3 Generating digital options for business execution

Prior research investigating how firms build successful business models suggests that organizational resources “react with each other in unique combinations to determine the firm’s idiosyncratic bundle of capabilities that differentiate it in its sector” (Demil and Lecocq, 2010, p. 230). We extend upon Demil and Lecocq’s arguments by looking beyond the bundling of capabilities that enable differentiation to consider the way organizations *leverage* those capabilities to support new value propositions.

Sirmon and colleagues (2007, 2011) explain that the purpose of leveraging is to utilize capability bundles to create solutions for current and new customers. This provides the basis for a strategic logic known as the *logic of leverage* (Sambamurthy et al., 2003; Sirmon et al., 2007). It differs from the traditional logic of market positioning by drawing attention to the pace of market change and the way organizations exploit capabilities to take advantage of market opportunities as they emerge. For organizations investing in corporate IT platforms, this suggests that competitive advantage is contingent on their ability to build and leverage IT platform capabilities, which facilitates business transformation, to exploit emerging opportunities (Yetton et al., 2013).

Existing literature indicates that *real options reasoning* provides a valuable perspective to understand how firms build and leverage IT platform capabilities to capitalize on emerging market opportunities (Taudes et al., 2000; Sambamurthy et al., 2003; Fichman, 2004). As Sambamurthy et al. (2003) explain, “Real options theory describes how organizations position themselves to seize emergent opportunities... The holder of an option typically makes a small initial investment, holds it open until an opportunity arrives, and then exercises a choice to strike the option and capture the value inherent in that opportunity” (p. 247). According to this logic, investments in new IT platform capabilities can create digital options that confer the right (but not the obligation) to benefit from future IT deployments (Fichman, 2004). For example, if IT executives recognize that digital options allow firms to react faster to market change or to enact changes in their business models to take advantage of new marketplace opportunities, they might invest in incremental IT platform capabilities that they do not currently need

to support their current business needs but that could prove invaluable at some point in the future when moving to a new or significantly revised business model (Tallon et al., 2016). In this context, a corporate IT platforms rises as a key digital options generator to enable the renewal of value propositions (Overby et al., 2006).

3 Research Site and Methodology

Business model research seeks to understand, fundamentally, the firm's value creation and capture mechanisms. As we explore the role of IT in enabling business models, an inductive research approach allows us to uncover meaningful insights about IT-enabled business models. The method underpinning this research is based on field studies using interviews and an analysis of secondary data, including press releases and financial data from annual reports. Specifically, we examined the case of DHL Express. As a division of Deutsche Post DHL Group, Express is a premier logistics and express service provider with more than 90,000 employees servicing a global network of more than 220 countries and territories, generating more than €15 million in revenue.

DHL Express was chosen for this study based on the following considerations: (a) it relies heavily on IT to operate its business; (b) it has made significant investments in corporate IT platforms; and (c) it is a market leader that has achieved this status over a long period of time, enabling us to investigate past corporate IT platform investments and their influence on business model evolution.

Our data collection approach includes three data gathering efforts, as shown in Figure 1 (diagonal stripes indicates, for a given time period, data collection that has already been completed). **First**, collection of financial data and qualitative data from annual reports. The following financial data has been collected for the 1999-2017 period: revenue by region (Americas, Asia Pacific, etc.), profit from operating activities, return on sales, and operating cash flow (available from 2008 on). Qualitative data related to the company's strategic activities are currently being collected from annual reports. **Second**, gathering of data from DHL press releases (all press releases for the 2009-2016 period are available at <http://www.dhl.com/en/press/releases.html#express>). Each press release will be examined individually to identify any reference to value propositions, technology platforms, new products or services, changes to existing products or services, competitive actions, strategy, or business model. The relevant press releases will be subsequently analyzed using the NVivo software for qualitative data analysis. Data collection from press releases is currently underway, as indicated in Figure 1 (data for the 2009-2013 period have already been collected). **Third**, gathering of data from manager interviews. We accompanied DHL Express' actions and performance changes during a very consequential period: from 2005 (before the recession) and 2012 (when the company had recovered from the recession). Five interviews with DHL Express executives were conducted during this period. The respondent sample focused on senior IT executives and business managers with an understanding of the organizational role of IT. The interviews were semi-structured and each lasted about an hour. All interviews were audio recorded and transcribed verbatim. Critical passages were highlighted and coded, and initial interpretations recorded in observation notes. The authors read the interview transcripts, observation notes, and published documents (such as annual reports), looking for themes and patterns. Based on initial interpretation of notes, we generated memos around the following themes: (1) IT transformation to meet future business demands, (2) business-IT collaborations, and (3) IT-enabled business change.

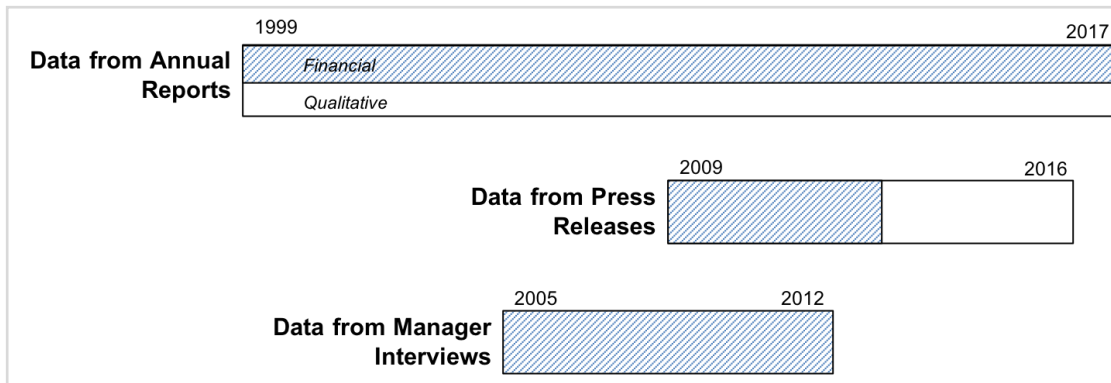


Figure 1. Three-stage data collection approach

4 Insights from Manager Interviews

Our research suggests three key stages that drive business model evolution: (1) building corporate IT platform capabilities for business execution, (2) leveraging corporate IT platform capabilities to foster internal business-IT collaborations, and (3) adapting the business model to exploit new market opportunities. The approach we employed for uncovering and examining these stages focused on the identification of key milestones that contributed to successful business change at DHL Express and the related actions and outcomes associated with those milestones. Our findings suggest that corporate IT platforms facilitate the strategic use of IT resources and generate digital options that can be exercised by business managers as they build new value propositions and renew existing propositions. We summarize these insights in Figure 2.

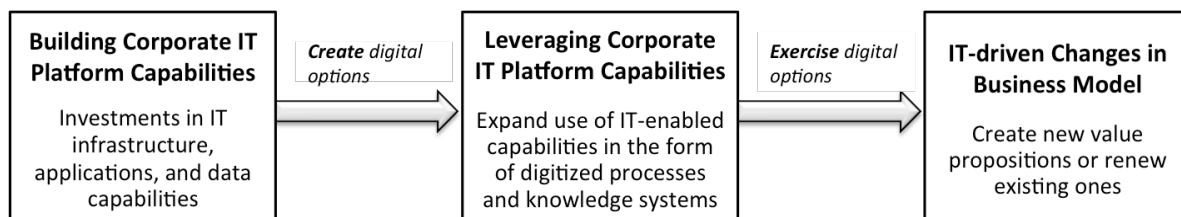


Figure 2. Corporate IT platform as an enabler of business model evolution

DHL Express built a corporate IT platform in the early 2000s to enable organization-wide processes across geographies and service offerings (Mocker et al., 2014). The emphasis of DHL is on market responsiveness based on integrated real-time response systems, where IT resources complement operational processes. Table 1 provides a summary of the three major stages of IT-enabled business model evolution at DHL Express.

Stages	Organizational Actions and Outcomes
<p><u>Stage 1:</u> Build IT platform capability</p>	<p><u>Action:</u> Major investment in IT infrastructure between 1998 and 2002. Focus on developing a shared IT platform to enable business process standardization.</p> <p><u>Outcome:</u> Reduction in system outages and consistent firm-wide data for internal and external customers.</p>
<p><u>Stage 2:</u> Leverage IT platform capability</p>	<p><u>Action:</u> Integration of real time information systems with standardized processes to enable rapid response to unfolding events.</p> <p><u>Outcome:</u> Digitization of business processes and greater market responsiveness.</p>
<p><u>Stage 3:</u> Exploit market op-</p>	<p><u>Action:</u> New value proposition to satisfy customers seeking a dynamic and proactive solution for international pre-defined delivery services. The value proposition is based on the <i>Global ProView</i> online tracking service. This application,</p>

portunities	<p>deployed on the IT platform, allows customers to track shipments using mobile devices and receive automatic updates via text. To ensure proactive response to unfolding events, Quality Control Centers (QCC) are used to monitor country activities, enable corrective actions and communicate contingency plans.</p> <p><u>Outcome:</u> Improved service quality and customer satisfaction with the growth of the Time Definite International (TDI) Express program. The TDI service is now DHL Express' main product and a cornerstone of its business model.</p>
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Table 1. Stages of IT-enabled business model evolution at DHL Express

The threat of commoditization created a considerable challenge for DHL Express as it sought to evolve from an emphasis on basic features – such as reliability of overnight delivery and second-day delivery – to a more proactive approach that could meet growing customer expectations. To address this issue, DHL Express underwent major IT infrastructure transformation in the early 2000s. Investments in new IT systems and data solutions provided new capabilities on top of the IT infrastructure. The IT solutions evolved into a corporate IT platform based on the integration of real time IT response systems with operational processes. This supports an IT-enabled business model at DHL Express. A senior manager explains the role of IT:

“We needed an IT system that would provide an alert in real time when we potentially were going to have an impact on delivery transit time as promised to the customer... Our customers require pro-active notification in the event we are unable to deliver on time. The digital system allows us and has a built-in proactive notification facility through our customer service interfaces to provide the required information to our customers.”

Interviews with DHL Express executives also indicated that customers were increasingly interested in proactive solutions instead of reactive actions. In 2006, while discussing the deployment of a Quality Shipment Monitoring System (QSMS) at the corporate IT platform, a senior executive stated:

“The QSMS system alerts analysts in DHL control centers across the network whenever operational actions do not occur on time. After 12 months of testing, the system was launched in 10 countries, including Australia, Hong Kong and Japan ... The company expects the system to be operational in all countries and territories in the Asia Pacific by the end of 2007”.

In 2012 the QSMS system was operational around the world. The standardized IT platform allows DHL Express to exploit a business model that generates differentiation based on quick identification and response to country-specific market threats and opportunities. From 2007 to 2012, DHL Express has improved its corporate IT platform to provide digital options for business execution. For instance, while the platform supports a centralized business model that prioritizes global applications, it also provides a range of IT deployment options to support country-specific requirements:

“The IT platform is modular and highly configurable. So Egypt, for instance, can configure the pieces that they want their customers to have ... and Jamaica doesn't have the same functionality that Egypt is using, although they're both using the same global application”.

However, an IT executive explains that the centralized IT platform has its drawbacks. Still, it confers advantage to DHL Express by enabling a global business model that covers a large network of countries:

“The drawback to the model that we're using is it takes longer to get things done. On the positive side, I think it's more cost effective than building and deploying local IT applications. And I think that also on the positive side ... our reach I think is greater than most of our competitors... FedEx and UPS tend to go for the top X countries. So they all go for top 40 or 50 countries, whereas we go for ... [a much larger] network”.

The modular IT platform is a key enabler of business model evolution at DHL Express. It allows tailoring services and developing new value propositions to specific customers and industries. For example, DHL's Medical Express transport solution offers various types of thermal packaging for temperature-controlled content and is tailored to new customers in the Healthcare industry. Moreover, the IT

platform allows individual countries to tailor their solutions to local customers and more easily address country-specific requirements such as differing customer expectations and government regulations.

5 Preliminary Findings from Analysis of Financial Data and Press Releases

Our preliminary analysis of financial data shows that, as expected, DHL Express faced significant challenges during the 2007-2008 recession, with a significant decrease in revenues and profit as illustrated in Figures 3 and 4. In addition, as shown in Figure 5, the sharpest decrease in revenues were due to poor results in Europe, where DHL Express has been a market leader since the early 2000s.

The evolution of DHL Express' business model has been based heavily on its use of IT. As the interviews and discussion above indicates, the focus of DHL Express during the 2000s was to build a corporate IT platform to increase IT flexibility and enable fast and proactive responses to emerging customer needs. The 2007-2008 recession put that corporate IT platform to test, in particular, because of the sudden increase in market turbulence and uncertainty that affected the global markets. As shown in Figure 3, DHL Express has been enjoying a steady growth in revenues since 2009. Furthermore, it has been able to significantly increase profit since 2009 (see Figure 4) despite the fact that revenues have not yet recovered to the 2003 and 2004 levels. Such an increase in profitability is consistent with an increase in operations efficiency, which often depends on the use of a standardized IT platform to reduce IT complexity, eliminate unnecessary IT operating costs, and standardize business processes (Ross et al., 2006; Mocker et al., 2014). As the market environments became more stable and predictable following the recession, DHL Express was able to leverage its IT platform and exercise digital options to address idiosyncratic customer needs in different countries and distinct market segments.

In its 2009 Annual Report, DHL highlighted how the Express division was able to benefit from a standardized and modular corporate IT platform:

“We have standardised numerous systems in all regions in order to optimise interfaces and maintenance costs. In the USA, for instance, we replaced 400 legacy systems with 100 global applications, reducing not only current IT costs but future costs as well. We also adapt our technology to the needs of our customers. Today, more than 50,000 customers can track their shipment status online and by mobile telephone in more than 40 countries using our ProView e-commerce solution. In 2010, we will make our e-commerce applications even more user-friendly and easily accessible.” (DHL's 2009 Annual report, p. 57)¹

Moreover, as discussed above, the use of a corporate IT platform allowed DHL Express to deploy its new QSMS system to support operations in a number of countries in the Asia Pacific region, including Australia and Japan, before committing further investments to make the system operational across the world. The system played an important role in addressing country-specific market threats in the Asia Pacific region at a time when market uncertainty was high and DHL Express was struggling to recover from the recession. As indicated in Figure 5, DHL Express revenues in the Asia Pacific region were barely affected by the recession and since then this region became the second largest source of revenues for DHL Express. These results reflect DHL Express' decision to renew its business model by increasing the presence in the Asia Pacific region – in particular by investing in delivery services such as TDI and expanding its operations in the Asia Pacific, while mitigating the risks associated with its high dependence on European markets.

The following press releases from 2009 and 2012 are reflective of DHL Express' business model evolution and the company's expansion in the Asia Pacific region:

¹ See DHL's 2009 Annual report at https://www.dpdhl.com/content/dam/dpdhl/en/media-center/investors/documents/annual-reports/DPDHL_Annual_Report_2009.pdf

- April 2009 press release: **DHL expands its express network capacities in Asia**
 “The two new gateways, the DHL Express Taipei Gateway at Taoyuan International Airport, Taiwan and the DHL Express Incheon Gateway at Incheon International Airport, South Korea, are equipped with most-advanced technology, which will help DHL further increase operational efficiency and enhance service quality as well as flexibility in express services”.²
- December 2012 press release: **DHL Express launches its US\$175 million North Asia Hub**
 “Frank Appel, CEO of Deutsche Post DHL, said: “DHL Express North Asia Hub is a logistics milestone in DHL’s Asia Pacific network and the culmination of a multi-hub and aviation strategy that cements our leadership position in terms of connections, convenience and cost-effectiveness”.³

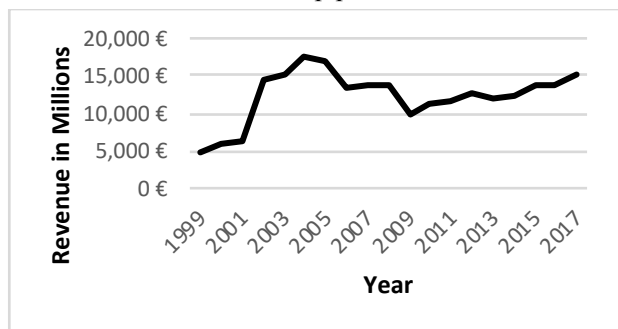


Figure 3. DHL Express revenues

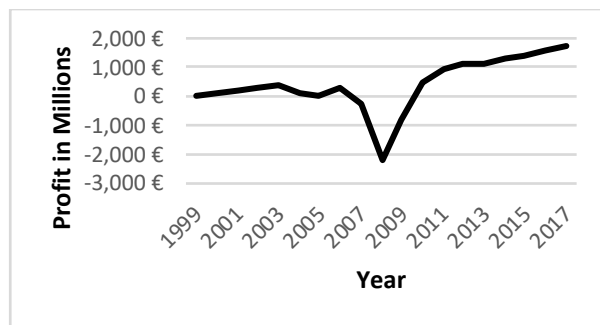


Figure 4. DHL Express profit

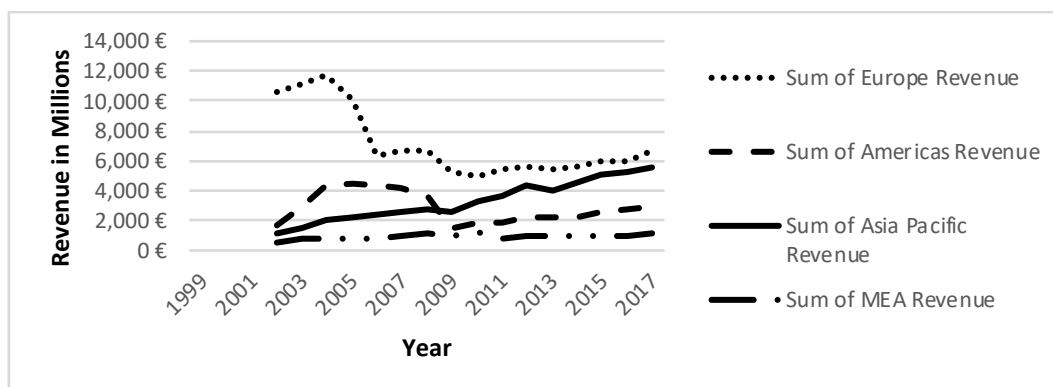


Figure 5. DHL Express revenues by region

6 Contribution and Future Research

This research-in-progress paper proposes that advances in IT and the rise of corporate IT platforms provide organizations with opportunities to renew their business models, thus facilitating adaptation to new market conditions. It seeks to contribute to our understanding of the link between corporate IT platforms and business models and provides initial evidence supporting that relationship. We will extend this research in three ways. **First**, we will conclude the data collection efforts indicated in Figure 1. **Second**, we will analyse DHL Express press release data for the 2009-2016 period and build a timeline to integrate insights uncovered from our qualitative and quantitative data analyses. **Third**, we will build a theory of how corporate IT platforms drive business model evolution. A number of propositions will be developed to explain how and under what conditions IT shapes and constrains the renewal of business models.

² Press release available at http://www.dhl.com/en/press/releases/releases_2009/express/290409.html

³ Press release available at http://www.dhl.com/en/press/releases/releases_2012/express/071212.html

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