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The impact of digital logistics start-ups on incumbent firms: a business model perspective

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The impact of digital logistics start-ups on incumbent firms: a business model perspective

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Abstract

Purpose – Digital freight forwarder (DFF) start-ups and their associated business models have gained increasing attention within both academia and industry. However, there is a lack of empirical research investigating the differences between DFFs and traditional freight forwarders (TFF) and the impact of digital start-ups on incumbents' companies. In response, this study aims to examine the key business model characteristics that determine DFFs and TFFs and propose a framework illustrating the extent to which digital logistics start-ups influence incumbent logistics companies.

Design/methodology/approach – Based on the primary data gathered from eight interviews with experts from start-ups' and incumbents' logistics companies, as well as secondary data, the authors identify the main factors of DFFs start-ups that have an impact on TFFs and analyze the similarities and differences in regard to the business model components' value proposition, value creation, value delivery and value capture.

Findings – The results show that differences between DFFs and TFFs appear in all four business models' components: value proposition, value creation, value delivery and value capture. In particular, the authors identify three main factors that need to be considered when assessing the impact of DFFs on TFFs: (1) the company size, (2) the market cultivation strategy and (3) the transport mode.

Originality/value – This is one of the first studies to specifically examine the key business model differences between DFFs and TFFs and to propose a conceptual framework for understanding the impact of digital logistics start-ups on incumbent companies.

Keywords Digital freight forwarders, Logistics, Business models, Start-ups

Paper type Research paper

1. Introduction

Marketplaces such as Uber and Airbnb are a rapidly emerging form of platforms that provide transactions between independent participants on both the supply and the demand side, offering new ways of business and creating radical changes in economic activities (Gawer, 2014; Mcintyre and Srinivasan, 2017; Parker *et al.*, 2016). Acting as intermediaries, these transaction platforms are characterized by their open business model. Because they trigger network effects between participants (Hagiu and Wright, 2014), they are associated with rapid growth and the opportunity to dominate the market in which they operate. Common technologies such as the internet, mobile technologies, artificial intelligence (AI) and Big Data store varying customer preferences and patterns of consumption, which fuel the growth of business platforms (Wirtz *et al.*, 2019). Increasingly, digitalization and digital marketplaces are of strategic importance in the logistics services industry for both businesses and corporations, as they have an impact on established structures, business models and industry boundaries (Barrett *et al.*, 2015; Chapman *et al.*, 2003; Cichosz *et al.*, 2020; Klötzer and Pflaum, 2017; Kummer *et al.*, 2020). In particular, digital logistics start-ups acting as intermediaries are challenging incumbent companies by offering a range of services that are traditionally provided by established logistics companies or providers (Bharadwaj *et al.*, 2013; Dobrovnik *et al.*, 2018; Sandström *et al.*, 2009; Sucky and Asdecker, 2019). Often, these start-ups promise to provide better and more cost-efficient, real-time and on-demand transport arrangements. During the past decade, investments in logistics start-ups have been growing constantly, with a growth of around US$3.5bn in 2017 alone (Wyman, 2017). Recent technological innovations such as matching and search algorithms, or pricing and routing algorithms, offer opportunities for innovative business models in the marketplace, often providing an entirely new value proposition for their customers, e.g. by applying new revenue models (Parker *et al.*, 2016; Täuscher and Laudien, 2018). Hofmann and Osterwalder (2017), for example, found that new digital providers can affect the entire value chain, and thus, digitalization and new technologies have a significant influence on the business models of third-party logistics providers.

However, to date, there has been a lack of understanding about digital business models in logistics. As such, an examination of how traditional companies and marketplaces create, deliver and capture value through their business models may help to analyze the similarities and differences in the business models in existing companies. Such an examination may also reveal how new digital marketplaces affect incumbent firms. To show the impact of digital marketplaces on existing business models, we aim to compare platform business models from digital freight forwarders (DFFs) with the pipeline business models of traditional freight forwarders (TFFs) through a systematic study of the business model components. This paper, thus, aims to answer the following two questions:

RQ1. What are the differences in business models between DFFs and TFFs?

RQ2. How do DFFs impact traditional freight forwarding companies?

To answer these research questions, we examine the similarities and differences between logistics pipeline business models and logistics service marketplaces enabled by digital technologies. In particular, this paper aims to compare the business models of TFFs and DFFs to build a framework to explain the influences digital business models have over incumbent business models.

The remainder of this paper is structured as follows. In the next section, we identify and define the key components of a business model in the field of logistics, as no unique definition of a business model exists. Then, we describe the freight forwarding industry and the existing generic business models, followed by an outline of the research design. Further, we reveal how digital business models exceed and/or differ from these components. We conclude

by proposing a conceptual framework to explain the impact of digital logistics start-ups on incumbent freight forwarding companies. In addition, we summarize the main insights and contributions of this research and outline scientific challenges and opportunities for future research.

2. Background

2.1 Business model components in logistics

Even though there are numerous publications on business model concepts, so far, there is no clear definition of it. Because of its application in various contexts, business model research varies and is presented in different forms, ranging from describing the elements (Abdelkafi *et al.*, 2013; Osterwalder and Pigneur, 2010) to the identification of design themes (Amit and Zott, 2001; Brettel *et al.*, 2012).

Similarly, in the logistics field, only few authors have attempted to create a business model concept. This is because the logistics industry can be characterized in various ways, e.g. it is diverse and complex due to the increase in size of these service sectors over the past decades, and also because of the strong interaction between people and technology due to global supply chain networks and new technologies (Andriani, 2001; Hodgson, 2003). For this reason, the logistics industry is confronted with uncertainty, and it must be ready to adapt to rapid changes (Neubauer, 2011; Wytenburg, 2001). The different perspectives on the characteristics of the logistics sector and its related services result in different interpretations of a logistics business model (Dębkowska, 2017).

However, to provide an understanding of the business model concept, this research follows the definitions of Osterwalder and Pigneur (2010, p. 14): "a business model describes the rationale of how an organization creates, delivers, and captures value," and Teece (2010, p. 172) who defines the business model as: "the design or architecture of the value creation, delivery and capture mechanisms employed." Correspondingly, this paper refers to four main business model dimensions (Figure 1): (1) value proposition, (2) value creation, (3) value delivery and (4) value capture (Teece, 2010).

(1) The first building block, value proposition, refers to a firm's products or services that are offered to a segment of customers. In the context of logistics, it describes the services offered by different types of forwarders (e.g. organization of transportation, customs). Furthermore, it includes the strategy of differentiation that a company follows to differ from its competitors (Abdelkafi *et al.*, 2013). This differentiation
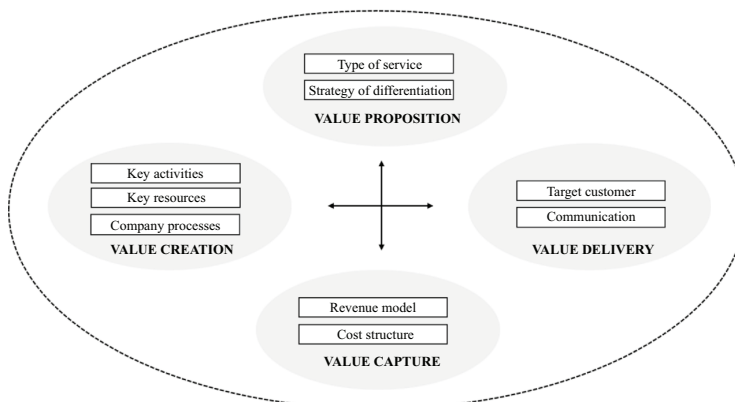
strategy could include, e.g. increasing price/cost/time efficiency and ease of use for customers, or risk reduction (Teece, 2010).

(2) The second building block, value creation, is expressed in the company's organization of processes and resources (Johnson *et al.*, 2008). It includes factors that are related to the resource constructs that create value (Delmond *et al.*, 2016), meaning that this dimension describes the core processes and resources needed to implement the business model. These resources can be tangible, e.g. the physical infrastructure, or intangible, e.g. knowledge. Value creation can also be expressed in human resources, e.g. having managerial aptitude. Furthermore, core competencies such as the architecture or organizational infrastructure are included in value creation (Osterwalder and Pigneur, 2010).

(3) The component value delivery describes the customer segments that a company wants to attract and offer their values to. These segments could be, for example, mass-markets, niche markets, segmented customers or multi-sided platforms (MSPs). Additionally, this building block implies the interaction between the firm and its customers. In particular, it shows the kinds of links a company establishes with its customers, such as personal assistance, self-service, automated services or community engagement (Osterwalder and Pigneur, 2010).

(4) The fourth building block, value capture, defines the sources of revenue or profit formula, which describes how a company transforms the delivered value into revenue and profit (Baden-Fuller and Mangematin, 2013; Täuscher and Laudien, 2018). This component describes the revenue stream, e.g. whether it is based on commission, or usage fees, third party and/or a revenue model. In addition, value capture is used to demonstrate the pricing mechanism, which could be characterized by, for example, fixed prices, market pricing, differentiated pricing or quantity-based pricing (Osterwalder and Pigneur, 2010; Täuscher and Laudien, 2018). Moreover, this component indicates that the main cost factors associated with the business model can be fixed or variable (Osterwalder and Pigneur, 2010).

Using these components, we describe and compare traditional and digital business models in the freight forwarding industry in the results section. This approach helps us to analyze the business models of DFFs and, respectively, to analyze a pipeline business model of TFFs. The comparison between the DFFs and the TFFs allows us to gain an understanding of the similarities and differences to identify the extent to which digital business models exceed or differ from the components, and what impact DFF business models have on existing business models.

2.2 Freight forwarding industry
Over time, multiple different types of (traditional) freight forwarders have arisen, ensuring the transportation of goods for shippers using their own transport capacity or external freight carriers [1]. Within the logistics service providers' (LSPs') industry, the different generic business models can be described as follows (Berglund *et al.*, 1999; Dębkowska, 2017; Delfmann *et al.*, 2002; Hertz and Alfredsson, 2003; Hofmann and Osterwalder, 2017; Lemoine and Dagnæs, 2003):

(1) *Standard regional providers* offer standardized short-haul transportation services and transportation within a predictive area (countries, states, cities, regions). Although those logistics providers offer services such as warehousing and inventory management, they do not provide comprehensive additional services. As the business model of standard third-party logistics (3PLs) companies is very basic, it is similar to

that of freight forwarders. Due to a lack of resources and capabilities, the implementation of advanced digital services is limited; however, standard regional providers can offer basic digital services such as tracking and tracing.

(2) *Niche regional service specialists* provide transportation, warehousing and inventory services, operating at a regional level. These small-sized companies have specific knowledge enabling them to develop solutions for business-to-business (B2B) customers who have particular requirements for their services. As standard regional providers, niche regional service providers merely offer a limited range of digital services.

(3) *Standard international service providers* tender long-haul transportation, warehousing and inventory management to international networks. Mostly they are medium- or large-sized firms that have a business model that offers different modes of transportation (road, rail, sea and air), to cover global services. Due to their size and their wide service portfolio, their activities in transportation and warehousing are rather complex and include services like crossdocking or terminal handling. In the age of digitalization, standard international service providers offer basic services such as electronic data interchange (EDI) with customers and/or digital transportation management services.

(4) *International service specialists* offer transportation services, warehousing and inventory management services globally, supplemented by a large number of additional services. These companies provide global supply chain management solutions. Tailored services companies with this business model mainly focus on business customers. As this is the most complex business model of all LSPs, they provide the most complex digital services in managing their supply chains.

Digitalization has led to the emergence of DFFs; however, because of the novelty of the field, there is limited analysis in the extant literature, and little dedicated research has been undertaken. Only a few authors have paid attention to logistics start-ups or the definition of DFFs. For example, Stölzle *et al.* (2018) found that the focus of DFFs is their potential for automation. In this sense, DFFs are online platforms with no assets, calculating routes based on algorithms and offering instant quoted prices. Dietrich and Fiege (2017) claim that DFFs offer the same functional spectrum as conventional forwarders, but use only a digital platform to handle all processes and document exchanges. In this sense, DFFs do not own transport capacity but rather rely only on external transport capacity (Elbert and Gleser, 2019).

Existing literature has also classified two specific types of DFFs (Elbert and Gleser, 2019; Oláh *et al.*, 2018):

(1) *Full-service international digital forwarders* offer different modal services on an international basis. As international LSPs, they focus on gaining a large share of the forwarding market. Further, they aim for long-term relationships and focus as freight forwarders on contract logistics.

(2) *Direct contract trucking digital forwarders* provide logistics services solely for the highly flexible trucking business. With their business model, they directly contract carriers via their online platform while securing their transport capacity. For this reason, the services of this type of digital forwarders are, in general, regional.

Most of these DFFs are still in the start-up phase, with some aggressively expanding their market size by offering operational benefits such as lower operational costs or easier market access, which puts pressure on TFFs (Oláh *et al.*, 2018). While some of the incumbent logistics

companies see this development as a threat to their own businesses, others have a confident outlook (Elbert and Gleser, 2019). As the business of freight forwarders is strongly information based (e.g. transport capacity acquisition or transport coordination), an increasing number of DFFs see opportunities to attack established players in the market (Elbert and Gleser, 2019; Oláh *et al.*, 2018).

However, although DFFs have become an increasingly prevalent presence in industry and topic in academia, it is not clear to what extend these DFFs influence existing business models. This paper is an attempt to close this gap by investigating the DFFs' and the TFFs' business models, and subsequently constructing a framework that classifies the impact of the start-ups on incumbent companies.

3. Methodology

3.1 Research approach

This research adopts a two-step approach: as a first step, we identified four business model components ((1) value proposition, (2) value creation, (3) value delivery and (4) value capture, see Figure 1) that can be used to compare the business models of TFFs and DFFs and to develop a conceptual framework that illustrates the extent to which digital logistics start-ups impact incumbents' companies. As a second step, we followed a multiple-case studies approach, utilizing eight semi-structured interviews with four TFFs and four DFFs (Denzin and Lincoln, 2013; Marshall and Rossmann, 1999; Yin, 2014). The value of case studies is well established in management research, especially its interest in context offers insights into complex, new and real-world phenomena (Eisenhardt, 1989; Mintzberg, 1979; Pettigrew and Fenton, 2000; Yin, 2014) and is recommended for conceptual development and exploratory as well as theory-building research (Edmondson and McManus, 2007; Gammelgaard, 2017).

3.2 Selection of cases

Theoretical sampling (Eisenhardt, 1989; Eisenhardt and Graebner, 2007) was used to select cases that are "particularly suitable for illuminating and extending relationships and logic among constructs" (Eisenhardt and Graebner, 2007, p. 27), thus to identify appropriate cases that can be used against the identified four business model components. Consequently, the selection of the case was carried out with two purposes in mind: first, to compare the business models between TFFs and DFFs, we restricted the selection to companies to the freight forwarding industry, consisting of four TFFs from German-speaking countries and four DFFs. Second, to produce meaningful results, the selected companies covered all generic business models and all modes of transport (road, rail, sea, air). As the aim of this research is to get in-depth knowledge, and the business model components are critical parts of a corporation (especially for start-ups), we guaranteed anonymity to the informants. General information about the companies is provided in Table 1.

3.3 Data collection

We collected primary data via semi-structured interviews, interviewing informants from the selected companies described above. Semi-structured interviews were chosen, as they ensure that the content of the interview is focused on "the issues that are central to the research question, but the type of questioning and discussion allow for greater flexibility than does the survey interview" (Minichiello *et al.*, 2008, p. 65). A schedule for the interviews was used to reduce interviewer bias and to make sure that all questions were completed (Patton, 1987, 1990). The interview questions were short and open-ended, with a focus on the business model components to place the emphasis on the experience and personalization of the context. The aim of the interview was to provide the most detailed information possible as well as

Code	Company profile/informant	Number of employees	Mode of transport	Generic business model
TFF1	Groupage freight, FTL, warehousing, operating in Austria Owner	Approximately 50	Road	Standard regional providers
TFF2	Fresh/frozen food logistics; operating in Austria, Slovenia, Croatia (main focus Austria) Managing Director	Approximately 500	Road	Niche regional service specialists
TFF3	Groupage freight, cargo, FTL, LCL; warehousing, operating internationally in over 150 countries Sales Executive	Approximately 7,000	Road, rail, air, sea	Standard international service providers
TFF4	Groupage freight, cargo, FTL, LCL, warehousing, supplementary services (e.g. event, hotel logistics) operating internationally in over 200 countries Sales Executive	Approximately 76,000	Road, rail, air, sea	International service specialists
DFF1	Market-intermediary, real-time quotation, online booking, document management, tracking and tracing, real-time price quotation, operating internationally in 9 countries Co-founder	Approximately 250	Road, rail, air, sea	Full-service international digital forwarders
DFF2	Market-intermediary, online booking, document management, real-time price quotation, real-time data, customs experts, operating internationally in 116 countries Vice President	Approximately 4,000	Rail, air, sea, road	Full-service international digital forwarders
DFF3	Market-intermediary, tender and spot transactions, AI, combining shipments with data intelligence, real-time price quotation, online booking, tracking and tracing, operating in 4 countries Sales Executive	Approximately 90	Road	Direct contract trucking digital forwarders
DFF4	Market-intermediary, spot transactions, online booking, tracking and tracing, transport intelligence, operating in Europe Logistics Manager	Approximately 80	Road	Direct contract trucking forwarders

Table 1.
Description of case
freight forwarding
companies

personal descriptions (Thompson *et al.*, 1989; Wimpenny and Gass, 2000). The interviews were conducted either face-to-face or via Zoom, and all interviews were recorded and transcribed.

To expand the information we gained from the interviews, we collected data based on secondary data sources. According to Rabinovich and Cheon (2011), the use of secondary data has some unique advantages, e.g. they are less subject to biases, have higher internal validity and are available in great quantity. These advantages are valuable in gaining deep insights into logistics phenomena. Therefore, we used the internal (e.g. documentation, digital records, archival records) and external data sources (articles, reports of agencies, industry reports) of the companies (Parikh, 2002) to gain further knowledge about the business model

components. The main data source used was the websites of the start-ups, as they offer easy access and are considered to be reliable (Carbone *et al.*, 2017). In particular, we used the latest available data to describe TFFs, as earlier research has shown that this is a valid approach in analyzing business models (Täuscher and Laudien, 2018).

3.4 Data analysis
In the data analysis stage, we first analyzed each case individually and complied a within-case description (Eisenhardt, 1989) using the business model components for interpretation. By reading and rereading the transcripts individually, we aimed to interpret the text in context for each of the digital and traditional freight forwarding companies (Murray, 2002; Thompson, 1997). To present the similarities and differences of the business model components, we concluded with a detailed summary, which included a list of the major findings for every freight forwarding company investigated. This analysis stage aimed to provide all information in contextual detail. After that, we conducted a thematic analysis of cross-case patterns among freight forwarding companies. In this step, we searched for shared storylines concerning the business model components for the purpose of achieving a higher level of abstraction (Prasad, 2017). The identified commonalities or storylines represent the overarching themes, and they represent the building blocks of the framework on how DFFs impact incumbents' business models. Following the approach used by Arnould and Wallendorf (1994) and Osborne (1991), we repeated the process of thematic analysis until the business model components were contextualized. Finally, the contextualized business model components provided a foundation for assessing the impact level of DFFs on incumbents' business models and for the associated framework.

4. Results
The data analysis showed that although TFFs and DFFs have many similarities, DFF business models differ from TFF business models in all the components described: value proposition, value creation, value delivery and value capture. Table 2 and Figure 2 both highlight and describe the main characteristics and differences between the DFFs' and TFFs' business models, which is explained below. Moreover, it needs to be highlighted that the statements below are presented using the company codes TFF1–4 and DFF 1–4, but reflect the comments made by the respective company representatives included in Table 1.

4.1 Value proposition
The "value proposition" dimension describes the type of products or services offered by a firm and the strategy of differentiation that a company follows to distinguish itself from its competitors.

4.1.1 Type of service. Although TFFs and DFFs both offer transport arrangements for groupage freight, cargo, full truckload (FTL) and less than container (LTC), the offered service range differs depending on the business models. While TFFs rely on additional logistics services (such as warehousing or packaging, thereby having the ability to serve niche markets), DFFs, acting as market intermediaries, want to attract customers with new services (such as online booking, standardized document management, live data or instant price quoting via AI). Most of these services are new to the logistics industry; however, large incumbent TFF companies are already catching up with DFFs, as TFF4 and TFF3 indicated: "by implementing digital tools and online services." In comparison, small- and medium-sized companies are only able to implement easy software systems, such as tracking and tracing or enterprise resource planning (ERP) systems (TFF2), while, as TFF1 stated, small freight forwarders are "not able to implement such digital services." Moreover, DFFs rely on streamlined communication, of documents and information, meaning that they offer all information at any time to their customers in a transparent way. DFF3, for example,

	TFF	DFFs
(1) Value proposition		

1.1. Type of service	(1) Transport arrangements
	  • Groupage freight
	  • Cargo
	  • FTL
	  • LTC
	(2) Niche services
	(3) Warehousing
	(4) Packing
	(5) Additional services (e.g. event logistics)
	(6) Large TFF: digital services (online booking, tracking and tracing)
		(1) Market-intermediary
		(2) Transport arrangements (see incumbents)
		(3) Online booking
		(4) Standardized document management
		(5) Live data (tracking and tracing)
		(6) AI
		(7) Streamlined communication of information and documents

1.2. Strategy of differentiation	(1) Customize services (especially for consignments with special requirements) (2) Build on long-term relationships (3) Reduce transaction costs • Search costs	(1) Increasing time efficiency (2) Increasing price transparency (3) Seamless aggregated information (single interface) (4) Simplification of booking process
(2) Value creation		
2.1. Key activities	(1) Arrangement of transportation of goods (2) Fleet management (3) Handling complex transports (rail, sea) (4) Maintaining customer relations	(1) Selecting, contracting, combining carriers and shippers (2) Operating the platform (3) Promoting the platform (4) Finding investors
2.2. Key resources	(1) Tangible resources (physical infrastructure, logistics assets, vehicle fleet, warehouses) (2) Intangible resources (know-how, managerial aptitudes) (3) Financial resources (large companies: cash resources, creditworthiness; small companies: financial shortage) (4) Technological resources (large TFF: technical databases; small TFF: basic technology tools)	(1) Technological/intangible resources (technical databases, technical platforms) (2) Human resources (necessary to promote the platform, create trust; addressing investors) (3) Financial resources – depending on investors
2.3. Company processes	(1) Separated internal processes (e.g. separate departments for order placement, for acceptance, for dispatching) (2) Manual processes (importing manual orders: 15–25%) (rail and sea industry obsolete) (3) Large TFF: digital processes	(1) Digital supported internal processes (all information is stored online) (2) Replacement of manual paperwork (3) Seamless information chain
(3) Value delivery		
3.1. Target customer	(1) Segmented customers (slightly different requirements) (2) Niche customers (e.g. fresh food logistics, hazardous material) (3) Long-term customers with customized contracts	(1) MSPs, connect carriers and shippers online (2) Mass-market (3) Short-term spot-market customers

(continued)

Table 2.
Comparison of business models' components

	TFF	DFFs
3.2. Communication	(1) Common technologies (fax, telephone, e-mail) (2) Large TFF: digital technologies (chatrooms)	(1) Digital communication tools (internal and external) (2) Platform
(4) Value capture		
4.1. Revenue model	(1) Logistics service fees (2) Long-term contracts with variable elements, e.g. price of diesel, toll costs	(1) Logistics service fees (2) Real-time price quotation
4.2. Cost structure	(1) Fixed logistics assets (2) High fixed costs (especially for rail, sea sector)	(1) No fixed logistics assets

Table 2.
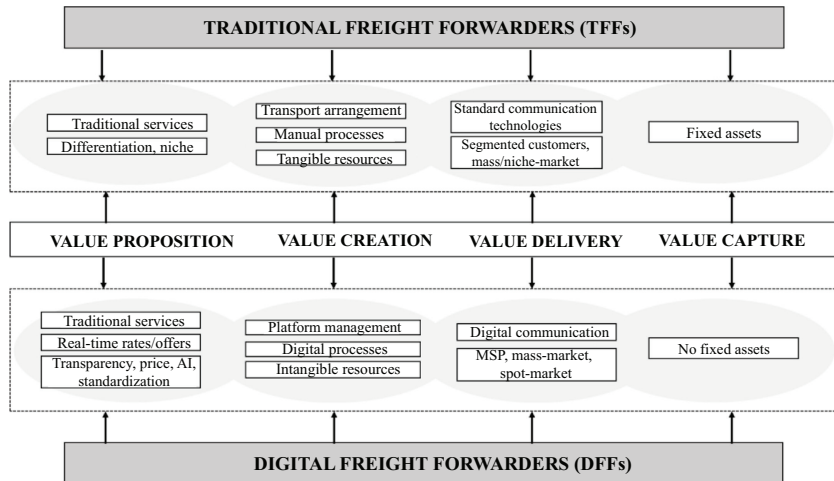
Figure 2.
Business model
differences

explained "all documents are available for our customers at any time"; DFF2 stated that "our customers have access to all documents at any time, as they are available online." DFF1 further admitted that "since every information is available online, we save operative effort and transaction costs."

4.1.2 Strategy of differentiation. As mentioned above, TFFs offer niche services and customized services to their customers (e.g. for consignments with special requirements), thereby building on long-term relationships to differentiate themselves from their competitors (TFF1, TFF2, TFF3, TFF4). This includes reducing transaction costs, in particular searching costs for customers, as a strategy of differentiation. DFFs also see cost reductions as a strategy of differentiation, but in terms of lower prices and faster processing of simple standard transport arrangements (time efficiency). Further, DFF1 admitted that they "build their value proposition on seamless aggregated information offered at a single interface, the platform", and DFF4 explained: "we aim to offer a simple booking process for by using a platform".

4.2 Value creation
The building block "value creation" refers to processes and resources of a firm that are used to create value. It includes the elements of key activities, key resources and company processes.

4.2.1 Key activities. Observing the value creation of TFFs, key activities include the arrangement of transportation, fleet management, handling complex transport (e.g. rail and sea) and the dispatch of consignments. Moreover, as TFF2 explained: "maintaining long-term relations with customers is a crucial activity in a traditional freight forwarding company, especially in small and medium sized ones," and as TFF3 stated: "our motto is 'service is excellence.'" On the other hand, the key activities of DFF comprise selecting, contracting and combining carriers and shippers, but more importantly, operating and promoting their services, i.e. their platform. As DFF3 reported: "addressing customers and promoting the platform has been an important part of our business model since the beginning," and DFF2 stated: "besides promoting the platform, one of our main tasks as a start-up is to find investors and convince them that our business model is valuable."

4.2.2 Key resources. The key resources mentioned by the interviewees in traditional freight forwarding companies included tangible resources. As TFF4 described: "we have our own fleet and warehouses and are therefore independent" and as TFF3 stated: "the physical infrastructure, especially in the trucking sector, is as important as our logistics know-how." Furthermore, the survey participants named intangible resources such as aptitude (TFF2) and financial resources (TFF1, TFF2, TFF3, TFF4) as key resources. However, while TFF1 and TFF2 both mentioned that they have limited financial resources due to their company size (small- and medium-sized enterprises (SMEs)), TFF3 and TFF4 talked about creditworthiness and cash resources when they explained that financial resources were key resources in their companies. Further, TFF4 stated: "our database is a key resource for our company," and TFF3 mentioned technological resources, whereas the other TFFs did not discuss this. One DFF (DFF1) sees technological resources, especially the databases and platform, as crucial resources. DFF1 stated: "our platform and the artificial intelligence we use are the most important part of our business model." Moreover, DFF1 explained: "contrary to public opinion labor plays a significant role in our start-up," and DFF4 stated: even if we can reduce staff through digital processes, we need it even more elsewhere. As DFF3 remarked: "Our employees are operating the customer services and more important, promote the platform." All DFFs (DFF1, DFF2, DFF3, DFF4) further explained that financial resources are very important; however, they are dependent on investors, as DFF4 explained: "approaching and convincing investors are important tasks, therefore we need a corresponding number of human resources."

4.2.3 Company processes. Looking at company processes, we can see that TFFs have separate departments for different tasks in circumstances where they have enough human resources, e.g. order placement, order acceptance and dispatch. As TFF3 explained: "each order passes through several departments," and as TFF2 stated: "our employees are specialized in certain processes." In addition, TFF1, TFF2 and TFF3 stated that some of the processes are still manual. For example, "15–25% of the orders are still placed by fax, for example, and therefore needed to be imported to the system manually." As TFF2 and TFF3 explained: "all orders are placed via e-mail, telephone or fax by the customer." On the other hand, as TFF4 explained, a large TFF has already implemented digital processes for order processing, especially in the trucking sector and "manual adjustments are rather uncommon." However, the rail and the sea industries are somewhat outdated, especially within the rail industry, where no online services are available from traditional providers (DFF1). In DFF companies, no manual processes exist, and all internal processes are supported digitally. Hence, all information is stored online, and the companies operate entirely paperless. As DFF2 remarked: "we work paperless throughout and thus reduce manual work steps at all," and DFF3 admitted that: "with every piece of information stored online we offer a seamless information chain to our customers."

4.3 Value delivery

The dimension "value delivery" describes the target customers of a company and its communication systems, internally within the firm, and externally with customers.

4.3.1 Target customer. The customer segment of TFFs consists of segmented customers, niche customers and long-term customers. First, TFF3 reported that: "we offer our services to customers with slightly different requirements," and TFF4 explained: "we segment our customers according to their requirements." Long-term customers with long-term arrangements represent a large part of TFFs' customers (TFF1, TFF2, TFF3, TFF4). Moreover, as already mentioned in the value proposition dimension, TFFs are able to serve niche customers who have special requests, such as fresh food logistics or hazardous material, while DFFs mainly focus on standard services (see value proposition), with their customer segment being the mass market and spot market. However, DFFs use their online platform to connect carriers and shippers. As DFF1 reported: "usually, carriers place their free capacity on the platforms while shippers state their demands," and DFF3 explained: "we aim to connect carriers and shippers." Therefore, the customer segment of digital forwarders consists of MSPs, which aim to connect different groups of customers (Eisenmann *et al.*, 2006). Further, as DFFs offer mainly standard services (see value proposition), their customer segment is the mass market. DFF4 stated: "we offer standard services to the mass market and address short-term spot market customers with easy booking options and price transparency."

4.3.2 Communication. Concerning the communication tools in traditional freight forwarding companies, TFF1 said: "we communicate in a traditional way, in person or via common means of communication such as telephone, e-mail or fax," while TFF2 stated: "we are currently implementing a new program to create a communication platform for our customers." TFF3 also explained: "we are currently implementing a customer portal for online communication, however, common communication tools like e-mail are still dominant." Larger TFF such as TFF4 already use digital communication tools such as "chatrooms" (TFF4). Within the digital business model, DFFs only use digital communication tools for both internal and external communication, and the platform serves as the communication instrument (DFF1, DFF2, DFF2, DFF4). DFF1 stated: "we use only one communication tool, our platform."

4.4 Value capture
The business model component "value capture" defines the revenue model of a company and the cost structure.

4.4.1 Revenue model. Although the revenue model, charging logistics service fees, is quite similar in traditional and digital business models, the price calculation is different. While TFFs have mainly fixed long-term contracts, with only some variable elements, e.g. the price of diesel or toll costs (TFF2) or spot prices, DFFs use AI to offer real-time price quotations. TFF3 explained: "normally our price commitments last for one year, however the margins are very low," while DFF1 reported: "our prices depend on the supply and the demand and are calculated automatically via the platform," and DFF3 stated: "we use machine learning, in particular artificial intelligence, to set prices." DFF2 further explained: "with our real time price quotation system we are able to offer the best price for every customer."

4.4.2 Cost structure. In addition, the cost structures of TFFs and DFFs are quite different. Freight forwarders traditionally have their own logistics assets and therefore have high fixed costs. This is especially true for the rail and sea sectors, as TFF4 explained. However, small- and medium-sized TFFs such as TFF1, TFF2 and TFF3 have only small logistics assets, working with external carriers (like DFFs) and thus are "more dependent" (TFF1), than their larger competitors. The cost structure of DFFs, on the other hand, is rather lean as they "own no physical logistics assets" and are working exclusively with subcontractors, as DFF1 and DFF3 explained.

Summarizing the results, we can see that the differences between TFFs and DFFs lie in all business model components (Figure 2). In particular, we see that next to traditional freight

forwarding services, DFFs offer services that are new to the logistics industry (e.g. real-time pricing, standardized document management, AI). Further, the strategies of differentiation DFFs use include simplification of bookings, transparency and price efficiency, while TFFs rely on differentiation and niche services. Moreover, DFFs carry out all internal and external processes digitally, while TFFs have manual processes and standard technological communication tools, especially in the rigid rail, sea and air industries. Further, the main task of TFFs is the arrangement of transports, thereby relying on tangible resources, while DFFs are mainly concerned with the platform management, which implies the management of intangible resources. However, we find that large TFFs have already implemented digital logistics services and processes, which allow them to catch up with the start-ups, while due to a lack of resources, small- and medium-sized companies are not able to implement digital services. In addition, the results show that TFFs and DFFs serve different customer groups. TFFs segment their customers according to their preferences and offer niche services for consignments with special requirements. On the other hand, DFFs serve MSPs, the mass market and short-term sport market customers with standardized services. Additionally, TFFs own logistics assets, while DFFs rely solely on external shippers.

5. Framework and discussion
The analysis of the similarities and differences in the business model components allowed us to derive three main factors that should be considered when assessing the impact of DFFs on TFFs: (1) company size, (2) market cultivation strategy and (3) mode of transport. These factors result in our framework, as presented in Figure 3. We present and discuss each factor below.

5.1 Company size
The interviews and the data analysis revealed that the smaller the traditional freight forwarding company, the smaller the pool of resources (e.g. financial, human) and the higher the impact of DFFs, as the former fail to adapt their business models regarding digitalization. This is in line with literature investigating company size, indicating certain differences between small- and medium-sized (SMEs) companies and large companies, especially concerning their resource pools (Hudson *et al.*, 2001). For example, due to their long-term
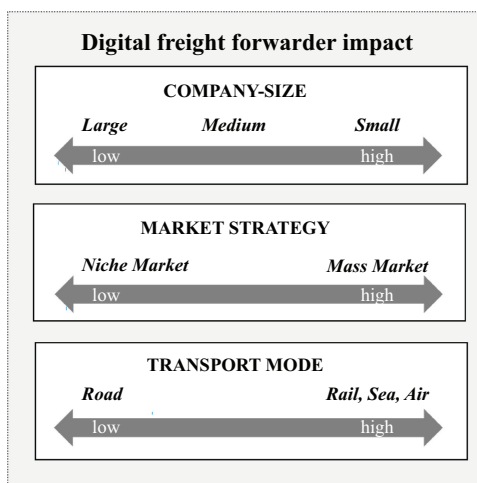

Figure 3.
Impact of DFFs
on TFFs

relationships with business partners, large logistics companies have, or own, financial resources, financial flexibility and creditworthiness. Therefore, they are able to invest in research and development (R&D) to implement new digital technologies and services (Cozzolino and Rothaermel, 2018; Huyghebaert and Van de Gucht, 2007). On the other hand, small- and medium-sized companies have limited resources, both human and financial. This lack of resources creates a barrier to innovation and hinders companies' digital development (Del Brìo and Junquera, 2003; Hudson *et al.*, 2001; Vermeulen, 2005). Moreover, many services in traditional companies might be subject to renewal; however, limited resources must be distributed over all projects, and therefore, only gradual changes are possible (Vermeulen, 2005). Furthermore, employees in SMEs already have a high workload; thus, extra time to modify services or implement new processes is costly (Del Brìo and Junquera, 2003; Hudson *et al.*, 2001; Vermeulen, 2005).

Small- and medium-sized traditional freight forwarding companies struggle to introduce new digital logistics services due to a lack of resources (financial, human). By contrast, larger TFFs have already started to implement digital services, processes and communication tools and to use them as key resources. Therefore, they are more able to catch up with a DFF start-up than are their smaller competitors. For this reason, we argue that the impact from DFFs on small- and medium-sized TFFs is higher than on large TFFs.

5.2 Market cultivation strategy
The analysis of the interviews and the secondary data also revealed that the more specialized the TFFs are, the less the influence of DFFs is, as their business models focus on standard services rather than on customized solutions. In the context of our research, the literature lists two different market strategy types: the undifferentiated market development strategy (mass market) and the focused market cultivation strategy (niche market). A niche market is often a small market within a very large overall market whose customers require special services, such as in fresh food logistics or hazardous material logistics (Toften and Hammervoll, 2009). Further, in contrast to generalists, niche competitors realize their competitive advantages through specialization, individualization and concentration and thus can profit from higher margins (Hashai and Markovich, 2017). On the other hand, a mass market is characterized by a strong demand for certain standard services. At the same time, there is a lot of competition on the supply side. According to Porter (1997) competitive matrix, the focus strategy appears to be a strategic concentration on specific customer groups or segments. The strategy is based on the assumption that a company is better able to supply this target with products or services than more widely competing competitors because of its narrowly defined objective. As a result, the company either achieves high differentiation by better serving the needs of a target group or by creating a more favorable cost situation, or both (Porter, 1980). Established companies in the logistics industry segment their customers to provide standard services, customize logistics services or provide niche services for different customer segments. This improves the company's effectiveness and the efficiency and can be used as a strategy to differentiate from competitors (Mentzer *et al.*, 2001). By contrast, start-ups in logistics serve MSPs and mass markets with standard services (Möller *et al.*, 2019).

Because of their long-term experience and expertise, TFFs (in contrast to DFFs) are able to operate both complex transportation arrangements, by offering niche services or specific additional services, as well as standard service, while DFFs provide standard services only. Moreover, we note that TFFs offer their services to different target customers, segmenting them, serving niche markets and building on long-term experience and relationships, while DFFs offer their standard services to MSPs and the mass market. Therefore, TFFs are able to achieve high differentiation and a more favorable cost situation. Thus, we argue that the more specialized the TFF is, the lesser the impact from DFFs.

5.3 Mode of transport
We also found that the influence of DFFs varies depending on the mode of transport (i.e. road, air, sea and rail). For example, upfront investments and strict legal systems are drivers of high costs, particularly in the air, rail and sea sectors. The rail and sea industries are characterized by low levels of innovation capabilities and digitalization, due to rigid structures and processes, slow adapting systems and high investments in infrastructure (Busse and Wallenburg, 2011; Fruth and Teuteberg, 2017; Yang, 2019). Therefore, DFFs are able to offer new digital business models with streamlined collaboration between all parties by using new technologies (FreightHub, 2019). On the other hand, the trucking industry is not as rigid as the rail, sea and air industries, so incumbents may find it easier to implement digital processes and thus make it harder for DFFs to gain a market share (Fruth and Teuteberg, 2017; Kayikci, 2018).

Our data suggest that TFFs invest more in the digitalization of road transport than in air, sea or rail operations. In other words, the rail and sea sectors are still dominated by manual processes (compared to road transport), thus opening up opportunities for DFFs to engage in digital solutions. Therefore, we argue that DFFs have more impact on TFFs in the sea, air and rail industries than in the trucking industry.

6. Conclusion
The aim of this study was to define and understand the differences between the business models of digital start-ups and traditional companies in the logistics industry to propose a framework to illustrate the impact of DFFs on TFFs. We adopted a qualitative research approach using primary data from eight interviews with DFFs and TFFs as well as secondary data to examine the similarities and differences between the business models within the issues of value proposition, value creation, value delivery and value capture.

The results show that differences between the business models of TFFs and DFFs lie in all business model components analyzed in this article: value proposition, value creation, value delivery and value capture. In particular, we see that DFFs, unlike TFFs, offer services that are new to the logistics industry (e.g. real-time pricing, standardized document management, AI). Further, DFFs carry out internal and external processes digitally, while TFFs operate with manual processes and common technological communication tools – this is especially true for the rail, sea and air industries. However, the results show that large TFFs have already implemented digital logistics services, processes and communication tools to catch up with the start-ups, while, due to a lack of resources, small- and medium-sized companies are not able to implement digital services. Moreover, TFFs have segmented customers and offer niche services for consignments with special requirements, whereas the customer segment of DFFs consists of MSPs and the mass market, which they serve with standardized services.

By investigating the differences between the business models of DFFs and TFFs, this study proposes a framework for explaining and understanding the impact of digital logistics start-ups on incumbent logistics companies. In particular, we identified three key factors that need to be considered when assessing the impact of DFFs on TFFs' business models and which have theoretical and managerial implications. First, we found that the smaller the TFF, the higher the influence of DFFs, as the former fail to introduce digital services due to a lack of resources. From a theoretical point of view, this finding adds an important twist to the relationship between small logistics companies and digitalization. The lack in the available resources required to keep up with the digitalization efforts of large logistics companies indicates that there is a threat to small companies, meaning that, increasingly, small logistics companies will have to look for alliances or partnerships in order to survive.

Second, we also argue that the more specialized the TFFs are, the less the influence of DFFs is, as the latter solely provides standard services for the mass market. From a

theoretical perspective, the findings indicate clearly that we can expect further consolidation of logistics companies in the future, as the advantages of digital processes will mostly benefit incumbent companies. From a managerial perspective, the findings may imply that logistics companies should seek further differentiation strategies, as standardized services will be subject to greater scrutiny. For example, standard shipping services from traditional LSPs may be subject to more price pressure as DFFs provide an easier way to compare and provide standard shipping solutions to customers.

Third, due to the rigid structures already in place, DFFs have more impact on TFFs in the sea, air, and rail industries than in the trucking industry. From a theoretical perspective, this finding clearly contributes to the knowledge that there are indeed differences in the levels of digitalization in transport modes. From a managerial perspective, this means that managers in incumbent logistic companies in the rail, sea or air freight sectors need to step up their digitalization efforts, or cooperate with DFFs to further grow their businesses and maintain or gain competitive advantage.

However, these findings need to be viewed in the light of their limitations. Although we are confident that our qualitative approach has produced interesting and valid results in the context of DFFs and TFFs, we are cautious about generalizing our findings to other digital start-ups and to other industries. Not only does the logistics industry have unique characteristics that make a generalization difficult, but we also specifically investigated a digital start-up that acted as an intermediary. Thus, we invite future researchers to examine the impact of start-ups on incumbent companies in different industries, or with a different start-up type, to further contribute to an understanding of the relationship between start-ups and incumbent companies. Moreover, although we discussed specific business model components, we have been relatively silent on the topic of business model innovation and the disruptive potential of these digital start-ups. Future research may examine the extent to which these start-ups have potential to "disrupt" incumbent companies.

We conclude that research into digital start-ups and their impact on incumbent companies is still in its infancy. By examining digital start-ups and their impact on incumbent companies in the logistics industry, we have taken the first step toward a better understanding of the impact of digitalization on organizations and businesses. We hope that both the findings and the framework presented in this research will spark discussions and projects in the logistics and digitalization sphere.

Note

1. The corresponding legal framework and definitions of freight forwarders in the German market can be found in §453-466 HGB.

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