The rise of logistics startups and their impact on the logistics industry

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Abstract

Startups have become an important factor in the logistics market. Despite their enormous innovation potential, however, their role as partners or competitors for established logistics service providers (LSPs) has not been explored so far. In order to investigate this new phenomenon, this inductive study applies two different qualitative methods. First, we conduct a qualitative content analysis of 75 logistics startups' websites resulting in four major types of logistics startups. We use this classification for our second study, which collects case study data from 19 companies (logistics startups and LSPs) and investigates how logistics startups affect established LSPs.

Keywords: digitization, logistics startups, LSPs

Introduction

In the era of digitization, customers are used to easily book flights, hotel rooms, or to just compare prices on almost every commodity online. When it comes to cargo, however, it regularly takes several days for companies to book a standard shipment from Hamburg to Shanghai – without having full transparency regarding costs. Internet accustomed shippers are thus increasingly urging their logistics service providers (LSPs) to adapt their service offering to the digital age. Incumbent LSPs apparently struggle to satisfy these changing customer needs. Especially, LSPs' general lack of innovativeness (Wagner, 2008) is potentially hampering their ability to develop the necessary digitization capabilities.

This situation is highly attractive for new entrants such as the Berlin-based digital freight forwarder *FreightHub*. Its value proposition is simple: *FreightHub* offers real-time freight quotations and booking to shippers and carriers, making cargo shipments as easy as booking apartments via *Airbnb*. Founded in 2016, *FreightHub* recently raised over USD 20 million, which is a comparatively large amount for a young European venture. *FreightHub*, however, is only the tip of the iceberg. Overall, global venture capital

investments in logistics startups multiplied from only USD 0.3 billion in 2012 to over five billion USD in 2016 (CB Insights, 2016). In the same time, the number of newly founded logistics startups worldwide has more than doubled from 34 in 2012 to 74 in 2015 (Oliver Wyman, 2017).

Only a few established logistics players have started reacting to this development. One of the largest LSPs in Europe, *Kühne + Nagel*, recently announced a partnership with the *startupbootcamp* accelerator in Berlin while other companies such as UPS directly invest in new logistics ventures like the "last mile startup" *Deliv*. Notably, the academic literature has largely ignored this development. Only a few scholars investigated related phenomena such as crowd logistics startups (Carbone et al., 2017; Frehe et al., 2017). However, a comprehensive study on logistics startups has not been published so far. Therefore, the purpose of this study is to explore the rise and potential impact of startup firms in the logistics industry. Accordingly, our research questions are: (1) how can logistics startups be classified? And (2) how do logistics startups affect incumbent players in the logistics market?

Background

Characteristics of logistics startups

To be considered as a startup (or new venture), studies apply different cut-off points regarding the maximum age. Song et al. (2008) report that most empirical studies allow for a maximum age of six to eight years. More recent studies lie within this range (Zaremba et al., 2017, Wagner et al., 2017). In addition to their age, new ventures are typically demarked from established companies by several other characteristics. For example, new ventures differ from established firms by having less legitimacy in the marketplace (Singh et al., 1986), fewer financial or human resources (Shepherd et al., 2000), they also lack routines for customer interaction, and they possess only rudimentary operational and management capabilities (Terjesen et al., 2011). Consequently, they show a higher risk of defaulting (Aldrich and Ruef, 2006).

Despite these organizational handicaps, new ventures make fast decisions and communicate directly and informally which provides them with advantages in terms of flexibility and agility compared to mature companies (Das and He, 2006). Their fast pace is particularly driven by the necessity to introduce new products quickly in order to generate cash flows to secure survival. Furthermore, aspiring growth is an underlying characteristic of most entrepreneurial firms (Zimmerman and Zeitz, 2002). Essentially, new ventures need to pursue a strategy of sacrificing financial performance in the present and nearer future to increase sales and market share, i.e. to grow (Covin et al., 1990). Perhaps most importantly, however, new ventures are recognized for being a source of innovation and a driver of technological change (Song and Di Benedetto, 2008), whereas established firms such as legacy LSPs lack innovativeness (Wagner, 2008).

In the logistics context, Flint et al. (2005, 114) define innovation as "any logistics related service from the basic to the complex that is seen as new and helpful to a particular focal audience. The audience could be internal where innovations improve operational efficiency or external where innovations better serve customers". Wagner (2008, 220-221) further adds that both "the development of a new logistics concept on the one hand and the adaption and implementation of an existing logistics concept on the other are part of a LSP's innovation activities". Hence, a logistics startup cannot be a newly founded company that simply replicates a conventional logistics business (e.g. starting a trucking business), but rather one that introduces an innovation for LSPs' themselves or to a subset of LSPs' customers. Therefore, we define a logistics startup as a new venture whose value creation process is closely linked to the logistical activities of LSPs.

LSPs and innovation

The literature suggests that LSPs' competitiveness increasingly rely on their capability to embrace innovations for adding value to a shipper's value creation setup (Panayides and So, 2005). Especially the logistics industry, however, scores lower in terms of innovation expenditures and innovation output, in comparison to other industries (Wagner, 2008). Wagner (2008, 219) found that R&D expenditures "if existing at all, [were] usually only marginal". He links this finding to the industry's role as a technology adopter and to its service-based nature. Furthermore, when investigating the innovation activities of 13 LSPs in Germany, Busse and Wallenburg (2014) could not find a single firm that had established a dedicated group of people responsible for innovation topics, not to mention a formal innovation department.

Since LSPs often lack necessary competencies to innovate internally, external relationships are considered to be suitable for acquiring knowledge and for compensating this lack of internal innovativeness. For example, Wagner's (2013) findings indicate that customers, suppliers, and competitors are valuable sources for improving service offerings of LSPs, while for developing new services, only partnerships with customers seem to be beneficial for LSPs. Another study shows that close relations to current customers are positively associated with internal process innovations and new service offerings for existing customers, while close relations to other service providers improve LSPs' propensity to introduce new services for new customers (Bellingkrodt and Wallenburg, 2013). In addition, the same authors stress the importance of deploying broad scanning approaches to tap not only into the knowledge of existing companies but also to identify new sources of innovation.

Given the highly attractive characteristics of new ventures described above, logistics startups might be such a new source for established LSPs. New ventures typically operate in a trial and error mode, they experiment with different ways of creating value and they pivot when their current business models turn out to be not suitable for seizing the expected opportunities (Ries, 2011). However, such a behavior in combination with their organizational limitations makes collaborations particularly difficult. Therefore, partnering succesfully with new ventures requires special capabilities from established firms that allow them to leverage startups' unique resources (Zaremba et al., 2017). These partnering capabilities, however, are organizational capabilities that need to be learned over time as they cannot be acquired externally. Consequently, for LSPs, such collaborations can become very challening especially without having an innovation department.

Methodology

This paper is based on two qualitative studies. We chose a qualitative research design, as it fits well with the unexplored nature and the explorative character of the new phenomenon of logistics startups (Edmondson and McManus, 2007). While the first study aims to answer our first research question regarding the classification of logistics startups, the second study addresses our second research question about the logistics ventures' potential impact on established LSPs.

Study 1: Qualitative Content Analysis

In order to understand what logistics startups are and how they can be classified, we conducted a qualitative content analysis. Qualitative content analysis is suitable for analyzing and identifying similarities and differences in the descriptive and latent content of the text (Graneheim et al., 2017). This method not only has been widely used in general management research (Scandura and Williams, 2000) but also in supply chain management

(Montabon et al., 2007). Recently, Carbone et al. (2017) investigated the related phenomenon of crowd logistics by examining the content of the websites of different crowd logistics initiatives.

In order to identify suitable startups for our investigation, we used the startup database from the market research firm *CB Insights* (www.cbinsights.com) which is one of the largest international startup databases. We restricted our search by the following four criteria: (1) firms from the logistics and supply chain category, (2) firms founded between 2012 and 2017, (3) firms based in Germany, Austria, or Switzerland, and (4) firms currently operating. This process resulted in a list of 54 companies. Then, we checked for every startup whether its main focus was on B2B. Thereby, mainly moving startups were sorted out. But also startups which were founded by established LSPs were removed. Finally, startups that were clearly out of interest for LSPs and shippers were sorted out such as *Minodes* who offers a platform for in-store retail analytics. After this process, the list contained 43 startups. In order to identify additional logistics startups fitting with our criteria, we screened practitioner publications on logistics startups, specialized startup websites (e.g. gruenderszene.de), and *CrunchBase*, which is another startup database. Thereby, many startups overlapped with the startups we already identified via *CB Insights*. Nevertheless, we could add 32 additional logistics startups such that our final sample resulted in a comprehensive list of 75 logistics startups from Germany, Austria, and Switzerland.

For our content analysis, we used the websites of these startups as the main data source. Websites offer easy access to secondary data and they are considered to be particularly reliable (Carbone et al., 2017). All websites were downloaded and stored to be able to analyze them systematically. Following the rules of a conventional content analysis (Hsieh and Shannon, 2005), one researcher inductively coded all the data without any predefined coding structure. The coding process led to several categories which share common characteristics. A category describes the "what?" (Morse, 2008) and is used to describe variations in texts mainly on manifest content. Subsequently, we moved from the concrete to a more abstract level and grouped the sub-categories into four broader main categories. To increase reliability, a second researcher screened all websites again and compared them with the codes. Disagreements were discussed and, if needed, startups were put into another category until a full agreement was reached. We conducted this analysis between September and October 2017 and updated it in March 2018.

Study 2: Multiple Case Study

As a second method, we chose an inductive, multiple case study design to explore this new phenomenon more deeply. Case study research is particularly suitable for new topic areas (Eisenhardt, 1989) and contemporary phenomena in their real-world settings (Yin, 2009). Case study research, thus, fits well with the nascent logistics startups phenomenon, which has only attracted a lot of interest in the business world but still lacks academic coverage. The unit of analysis is logistics startups' potential impact on established logistics companies. To gain a comprehensive understanding of this phenomenon, we selected startups as well as established firms. For the startups, we used the database built in study 1 such that we contacted equal numbers of firms from each of the four identified categories. Regarding the established logistics firms, we only selected firms which had made first experiences with logistics startups as we wanted to interview managers who were familiar with the topic and who could refer to real examples. We reached out to these companies in two ways. First, we applied the snowball sampling approach in the startup interviews (Denzin and Lincoln, 2011) and asked our informants to refer us to managers from established LSPs who are knowledgeable about this topic. Often, the recommended

managers and firms have been collaborating with the interviewed logistics startups or with their competitors. Second, we purposefully screened the internet for startup initiatives of LSPs, accelerator programs which offer logistics tracks in collaboration with an established LSP or simply announcements of startup collaborations from established LSPs. Overall, the sample consists of 19 companies – 11 logistics startups and eight established logistics companies, whereby not only the logistics startups belong to different categories. We also tried to increase the heterogeneity of our LSP sample by selecting LSPs with different business models. Therefore, we selected three forwarders and 3PLs, four freight carriers focusing on different transport modes (road, rail, sea, air) and one Courier, Express and Parcel (CEP) company. Through this sampling strategy, we could cover all major established and upcoming players in the logistics sector. We grouped them into seven cases. Table 1 and Table 2 summarize their characteristics.

Table 1 – Overview of startup case firms

Case	Category	Firm	Subcategory	Founding year	# Employees	Informant(s)
1	Intermediation platforms	IP-1	Digital freight forwarder (sea)	2016	30	Regional lead
		IP-2	Digital freight forwarder (land)	2016	20	CMO
		IP-3	Freight marketplace	2016	4	Managing director
		IP-4	Other intermediation platforms	2015	15	Managing director
2	Software providers	ST-1	Tracking and tracing	2015	29	CFO
		ST-2	Tracking and tracing	2012	100	Sales director
3	Hardware technologies	HT-1	External logistics	2013	< 5	CEO
		HT-2	Intralogistics	2014	30	Sales engineer
4	CEP services	CEP-1	CEP infrastructure	2013	12	Sales director
		CEP-2	API integration	2013	13	CFO
		CEP-3	API integration	2015	50	Managing director

Table 2 – Overview of established case firms

Case	Category	Firm	Business focus	Revenues [EUR]	Employees	Informant(s)
5	3PL and forwarding	3PL-1	General	>10bn	>50.000	(1) Senior VP innovation (2) CEO largest shareholder
		3PL-2	General	>10bn	>50.000	Global innovation manager
		3PL-3	General	5-10bn	10.000-20.000	Head of digital innovation
6	Freight carrier	FC-1	Sea transport	5-10bn	10.000-20.000	Global director container logistics
		FC-2	Air transport	1-5bn	500-1.000	Head of cargo business development
		FC-3	Rail transport	1-5bn	20.000-50000	Innovation manager
		FC-4	Road transport	0,1-1bn	500-1.000	Division manager forwarding
7	CEP service provider	CEP	General	5-10bn	20.000-50000	Global innovation manager

Data collection. The main source of data are 20 interviews with representatives of logistics startups and established logistics companies. To account for the different perspectives, we used different semi-structured interview instruments for startups and for established firms. Moreover, the guidelines differ slightly from case to case in order to

address the different settings of the cases. The interviews lasted between 35 minutes and 1:26 hours (62 minutes on average) and were conducted between October and December 2017. There was no notable difference in average length between interviews with startups and established companies. For 19 out of 20 interviews a recording was permitted by the interviewees. These 19 interviews created a rich database of 239 pages of transcripts (single-spaced, 11pt). We guaranteed anonymity to all informants to promote openness and a sufficient level of detail. We complemented our interview data with archival data from internal and external sources. Besides the stored startup websites from study 1, we always asked our informants for internal reports and presentations. Moreover, we collected press releases, the most recent annual report(s), blog posts, and newspaper articles. For the startups, more or less all of the published data were of interest, as they helped us to better understand their business models and their potential impact. Conversely, the publicly available data about established LSPs had to be related to their startup activities. Overall, we collected 422 pages of archived data (approx. 21 pages per firm without annual reports), which served as a second data source for our analysis. Saturation was reached when certain topics and relationships started to reoccur which justified finishing the data collection in each of the seven cases.

Data analysis. Data collection and analysis overlapped in an iterative manner to adapt the procedure and to better cater emergent themes (Eisenhardt, 1989). The data analysis is divided into within-case analyses and a traversal analysis of all cases to balance unique and generalized patterns (Eisenhardt, 1989). For each of the seven cases, we developed a comprehensive case description which we concluded with our main learnings. For the cross-case analysis, we used the software MAXQDA. To thoroughly investigate the question of 'how' and 'why' B2B logistics startups might impact incumbents, a balanced code scheme was developed. The coding structure was inductively developed during the data collection process, catering to the incremental approach of case study research. The cross-case part is structured by different levels of analysis to create a rich, multi-faceted perspective.

Results

We structure the study's results in accordance with our two research questions. While the first section presents a classification scheme for logistics startups, the second section outlines how these young firms might affect incumbent logistics companies.

Towards a classification of logistics startups

The qualitative content analysis of 75 logistics startups' websites resulted in several subcategories which we could aggregate into four main categories (Table 3). In the following, we will briefly describe them.

Intermediation platforms. Intermediation platforms enable the interaction of different logistics parties via a digital interface. The focus of these platforms lies in matching supply and demand of logistics activities. In the digital age, a platform serving an intermediary purpose between two (or more) user groups develops significant market power by profiting from network effects, i.e. the user value increases with the user base.

Software providers. Startups from this category consider the developed software as the core of their value proposition. Also for startups of this category with a hardware component (e.g. tracking and tracing), the principal innovation is mainly the software and only partly the hardware as sensors are often bought. Nevertheless, as software startups can easily extend their service offerings or pivot their business models, the borders between the subcategories might be slightly blurred. For example, tracking and tracing functionality is often an enabler for additional services such as fleet management.

Hardware technologies. This category is about tangible technologies, i.e. hardware applicable in a logistics context. Startups of this category typically have filed patents on a tangible innovation and in contrast to the software category, hardware logistics startups use software, if at all, only to support the functionality of their tangible product.

CEP services. This category includes all business models which directly relate to the activities of incumbent CEP service providers such as the delivery of goods, fulfillment services, the necessary infrastructure, or the interconnection of shipping parties and carriers for data exchange. The last mile is not only the most expensive part of the delivery process but has also gained attractiveness as demand for last mile services has been continuously increasing due to the expanding online retail market. This environment creates many opportunities for startups which is also indicated by a large number of startups we identified.

Table 3 – Classification scheme for logistics startups (= # of identified startups)*

Categories	Sub-Categories	Representative Quotes	Startup Examples
Intermediation platforms	Digital freight Forwarding (7*)	"The Digital Freight Forwarder" (Freighthub)	Freighthub; Instafreight; Cargonexx
	Freight marketplaces (5)	"The price comparison tool for sea freight" (Freightfinders)	Cargo-Bee; Freightfinders; Pickwings
	Storage and warehousing marketplaces (3)	"You can find your storage space and fulfilment capacity online and book flexibly without any extra effort" (DepotCity)	Log-hub; StoreMe; DepotCity
	Other intermediation platforms (8)	"A bulletin board for logistics services" (Cargohit)	Cargohit; Demogate; xChange
Software providers	Tracking and tracing (10)	"The sensors record environmental conditions that goods are subject to while in transit." (Modum)	Cargosteps; Modum; Nexiot
	Fleet management & route optimization (7)	"Flutaro makes route planning easy" (Flutaro)	Flutaro; Fleet-link; Bestmile
	Big data analytics (3)	"Using a big data approach, we analyze the routes travelled by our participants in order to be able to offer them the perfect match." (Algotruck)	Algotruck; Genlots; Riskmethods
Hardware technologies	External logistics hardware (4)	"Safest Pharma Containers. Worldwide." (Skycell)	Twortybox; Skycell; Wingcopter
	Intralogistics hardware (7)	"Magazino develops and builds perception-controlled, mobile robots for intralogistics" (Magazino)	Magazino; Proglove; Picavi
CEP services	CEP delivery (9)	"Ship your products with byrd and save time & money" (byrd)	Liefery; byrd; packator
	CEP infrastructure (7)	"Staff can legitimately receive private packages at their place of work" (Packadoo)	Emmasbox; Pakadoo; Parcellock
	API integration (4)	"Vendors can use an intuitive and easily integrated standard interface (RESTful API) to connect their store or enterprise resource planning (ERP) system directly to all major package shipping providers" (Shipcloud)	Shipcloud, Sevensenders; Sendcloud

Logistics startups' potential impact on LSPs

The findings from our multiple case study suggest that the rise of logistics startups is associated with several positive and negative effects on established LSPs. In order to provide a comprehensive picture, we summarize the potential effects for freight carrying, 3PL, and forwarding, as well as for CEP service providers separately in Table 4.

The results of our multiple case study reveal that the four startup categories affect the three major logistics players differently. For instance, while startups focusing on the delivery and infrastructure of parcels exclusively affect established CEP service providers,

other logistics startups types, especially intermediation platforms, seem to have a much wider impact on the logistics market. Intermediation platforms aim to create full price transparency which is a significant threat for the business models of many freight carriers, 3PLs, forwarders and CEP service providers, as price discrimination among their customers is one of their major profit levers. Indeed, full price transparency could erode the already low margins of the logistics industry, but there might be even more far-reaching consequences. Freight carriers could become more independent from 3PLs and forwarders as they could offer capacities via digital platforms directly to shippers. Moreover, freight carriers could systematically try to engage with new customers, offer additional value-creating services (e.g. tracking and tracing) without the need to involve a third party into the collaboration and gather direct feedback from these customers about their service offerings.

Table 4 – Logistics startups' potential impact on established LSPs ("+" = positive effect; "–" = negative effect)

	Freight Carrier	**3PL & Forwarder**	**CEP Service Provider**
Intermediation platforms	+ Increased capacity usage of transport assets + Improved customer experience (facilitation of post-booking process) + Reduction of manual work through automation of order processing + Acquisition of new customers (without 3PLs) + Decrease dependence from 3PLs – Full price transparency	+ Short term availability and immediate booking of additional capacities + Reduction of manual work through automation of order processing – Full price transparency – Loss of market share – Pure brokers become redundant – Weaker position in carrier relationship	+ Booking of additional capacities (e.g. truck carriers for tours to and from hubs) + Offer fulfilment services via intermediation platforms – Full price transparency
Software providers	+ Improved operational efficiency (e.g. improved capacity usage) + Offer additional services to customers (e.g. tracking & tracing) + Direct access to data (not through 3PLs)	+ Improved operational efficiency (e.g. lower safety stocks) + Offer additional services to customers (e.g. integrated risk management)	+ Improved operational efficiency (e.g. routing) + Offer additional services to customers (e.g. tracking & tracing)
Hardware technologies	+ Improved operational efficiency (e.g. flexible transport assets)	+ Improved operational efficiency (e.g. faster picking)	+ Improved operational efficiency (e.g. faster picking)
CEP services	*No effects found*	*No effects found*	+ Improved integration of shippers and CEP carriers + Higher transparency of carrier performance + Improved customer service – More competition – Loss of market share

Concluding Discussion

This is the first study which offers insights into the new phenomenon of logistics startups. Based on an extensive content analysis of 75 logistics startup websites, we propose a systematic and comprehensive classification scheme for logistics startups. We inductively developed 12 sub-categories which we then grouped into four major logistics startups

categories. The classification contributes to a better understanding of how logistics startups create value and how they affect established LSPs.

The results of our multiple case study revealed that some logistics startup types affect the logistics market differently. Specifically, forwarders and 3PLs seem to be the most severely affected companies in the market. They already lose market shares to digital platforms and for some shipments, they could even become obsolete. Especially for smaller, standardized, and less complex shipments intermediation platforms are already a viable alternative for many shippers. Therefore, intermediation platforms are perhaps a more attractive object of investigation for LSPs and for scholars than the related crowd logistics phenomenon (Carbone et al., 2017; Frehe et al., 2017) which is covered by the CEP service category that shows only very specific implications for a small fraction of the logistics market.

Furthermore, our results suggest that startups not only affect logistics firms' established relationships and business models but that they can also be a viable source of innovation for LSPs. So far, the logistics literature has largely ignored the innovation potentials that startups as an external source offer. Instead, past studies concentrated on customers, suppliers or on other LSPs as innovation sources (Wagner, 2013, Bellingkrodt and Wallenburg, 2013). Especially software and hardware startups, however, are predominantly associated with positive effects on all three types of established LSPs. Through innovative tangible and intangible technologies, they primarily improve LSPs operational efficiency or enable LSPs to create new value through offering new services to their customers.

To fully realize this innovation potential, however, LSPs need to partner effectively with these startups which could become challenging due to their little experience in such asymmetric collaborations. Notably, all LSPs of our study acknowledged that they just have begun with their startup activities and that they are still experimenting with possible ways to collaborate effectively. Compared to previous studies, however, this means that LSPs show a substantially stronger propensity towards innovation activities which is also reflected in the fact that all case firms have established dedicated innovation teams or even formal R&D departments which is a substantial improvement to the findings of earlier studies (Busse and Wallenburg, 2014).

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