

# The benefits of logistics clustering

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## Abstract

**Purpose** – The purpose of this paper is to analyze the benefits of logistics clustering, with the intent to explain their growth and popularity among private agents and policy makers during the last decade.

**Design/methodology/approach** – Because of limited knowledge about the benefits of logistics clustering a main objective of this paper is theory building. The authors employed a grounded theory approach and conducted 135 open and semi structured interviews with logistics executives, government officials, academics, and chambers of commerce representatives.

**Findings** – Study results revealed that, the agglomeration of logistics firms provides several key benefits to companies. Specifically, it was found that logistics clustering facilitates collaboration-related benefits, offering of value added services, career mobility for the logistics workforce within the cluster, and promotes job growth at multiple levels within the cluster. The authors offer a rich description of these benefits and the mechanisms that facilitate these outcomes.

**Research limitations/implications** – This paper uses a qualitative approach. Further research using a quantitative approach to measure the magnitude of the impacts and benefits of logistics clusters would be desirable.

**Originality/value** – This paper identifies the benefits associated with logistics clustering and thus provides justification for public authorities and private agents to invest in this phenomenon.

**Keywords** Agglomeration, Cluster, Benefits, Supply chain, Logistics

**Paper type** Research paper

## Introduction

The emergence of logistics clusters as an important research topic is highlighted by the increasing number of recent publications in this area (Chhetri *et al.*, 2014; Bolumole *et al.*, 2015; Zhou *et al.*, 2015; Qi and Liu, 2015). This is corroborated by industry evidence as governments are devoting significant resources to the creation and growth of various logistics clusters (Rivera *et al.*, 2014). Logistics clusters can be described as nodes on the intricate web of international trade routes and supply chain networks (Sheffi, 2012). As Sheffi (2010, 2013) indicates, logistics clusters include three types of companies: firms that offer logistics services such as transportation carriers and third party logistics services providers (3PLs), the logistics division of industrial and retail firms, and industrial firms for whom logistics operations represent an important part of their cost.

Although there is a notable industrial clusters literature, the research on logistics clusters is still in its infancy. The current literature offers insights into issues such as the process for identifying logistics clusters (Rivera *et al.*, 2014), the different types of logistics clusters (Mangan *et al.*, 2008; Qi and Liu, 2015), and the typical logistics



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functions performed within clusters (Chhetri *et al.*, 2014). However, the logistics clusters research offers little understanding of the benefits associated with the existence of logistics clusters as an industry. The main objective of this paper is to shed additional light on the benefits associated with this industry. Specifically, we seek to answer the following research question:

*RQ1.* What are the benefits of logistics clustering?

Addressing this important question extends the currently scarce body of literature and helps promote the development of logistics clusters. We directly address the call by Rivera *et al.* (2014) for additional research to better explain the benefits associated with logistics clustering. Several managerial implications are put forth as well.

Because of the limited knowledge about the benefits of logistics clustering a main objective of this paper is theory building. We employ a grounded theory approach to investigate the research question of interest (Glaser and Strauss, 1967; Strauss and Corbin, 1990). The data for this research are drawn from interviews conducted globally over a period of 27 months.

The remainder of this paper is structured as follows. First, we provide an overview of relevant literature on industrial and logistics clusters. Next, we offer a detailed description of the methodology employed to execute the research. Finally, we present our results and conclude by discussing inherent limitations and opportunities for future research.

### **Industrial agglomeration literature**

Before proceeding, it is important to highlight the core characteristics of industrial clusters and logistics clusters. Industrial clusters are groups of inter-related firms that cooperate and compete to create wealth within a certain geographical area (Porter, 2000). Logistics clusters include companies offering logistics services such as transportation, warehousing, distribution, and other logistics services providers. They also include industrial firms for whom logistics operations represent an important part of their operations; such firms are attracted to the cluster primarily because of the potential logistics-related benefits of co-locating (Sheffi, 2010). On the other hand, firms in industrial clusters have joined the cluster for other reasons, not necessarily logistics related. As such, logistics clusters are formed with the intent to pool logistics capabilities, while industrial clusters are formed with the intent to pool other capabilities. Although many of the reasons for agglomeration in industrial clusters (such as work force availability and development, suppliers moving into the cluster, and high rate of innovation and capital formation) are also factors in logistics clusters, there are some unique elements which characterize the latter. The main ones include reduced transportation costs and superior levels of transportation service (Sheffi, 2012). Next, we provide a relevant review of the literature on the benefits of industrial agglomeration in general and then focus on the limited references discussing logistics clusters.

#### *Industrial clusters benefits*

Firms have to operate and compete in a dynamic and global environment with inherent challenges associated with various locations (Chandler *et al.*, 1998). Inter-firm networking has been increasing in economic importance because it can regulate complex transactional interdependencies and cooperative interdependence among firms operating within such an environment (Grandori and Soda, 1995). Because of its growing importance, inter-firm networking has received significant attention over the last two decades (O'Reilly *et al.*, 2003). As such, several authors have studied the

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benefits of industrial agglomeration. We chronologically review some of the key research addressing this topic.

Marshall (1890) seminaly introduced three positive externalities of co-location: knowledge sharing, the formation of a labor pool, and the development of a supplier base. Appold (1995) also highlighted the importance of co-locating close to competitors. He argued that agglomeration facilitates high levels of inter-firm cooperation and allows firms to gain a number of benefits, such as stocking-related savings from the elimination of warehouse storage space and speedier development of new products. The author also argued that agglomeration yields higher levels of productivity and economic efficiency because companies share a larger amount of “nontradable business inputs” such as knowledge, information, and trust. In the 1990’s, Porter (1998) emphasized that agglomeration of industrial firms encourages them not only to collaborate but also to compete. The combination of collaboration and competition incentivizes firms to operate at higher levels of innovation and productivity, and also leads to the formation of new businesses in the cluster and economic growth. Later, Porter (2000, p. 17) added that clusters can “capture important linkages, complementarities, and spillovers in terms of technology, skills, information, marketing, and customer needs.” They provide an industrial base for the formation and development of public institutions such as educational organizations that provide training programs for the cluster’s workforce and research institutions that can further improve the technology and processes utilized within the cluster.

The 2000s revealed additional insights into this phenomenon. Boari (2001) showed that clusters of small companies have emerged around leading organizations in order to take advantage of the spillover effect of technology and managerial practices. Romanelli and Khessina (2005) found that the formation of clusters in a region specializes the type and the amount of resources that the region attracts; this further promotes economic growth and innovation. External and internal perceptions about the cluster determine the region’s industrial identity. Clusters can influence the macro-outcomes of a region (Romanelli and Khessina, 2005). Gambardella and Giarratana (2010) use data from 146 US cities to test the impact of knowledge clusters on regional salaries. They found that the average salaries in knowledge clusters were higher than in similar firms outside such clusters.

Rosenkopf and Padula (2008) studied the formation of alliances between new entrants and incumbents in mobile communication clusters. Their findings concluded that geographical proximity enhances the degree of involvement among firms. Perez-Aleman (2010) studied the inter-firm linkages in a cluster of dairy producers in Nicaragua. The author found that the cluster facilitated the development of collective learning capabilities. Reuer and Lahiri (2013) also analyzed the formation of strategic alliances among firms and the effects of geographical distance in the semiconductor industry. Their results showed that the larger the geographical distance between companies, the greater the difficulty for firms to build collaborative relationships.

Nonetheless, other researchers have pointed out several disadvantages of industrial agglomeration (Henderson and Shalizi, 2001; Karsten, 1996; Polenske, 2003). Industrial agglomeration may not be desirable because it can generate traffic congestion, lead to increases in land prices, and amplify negative externalities in the local environment, such as pollution (Karsten, 1996; Richardson, 1995). Other authors have claimed that spatial concentration is no longer needed because information technology “shortens distances” and improves coordination between companies even when companies do not share a common location (Cairncross, 1997). Polenske (2003) argued that the efficiency

of global supply chains decreases the need for geographical proximity (Polenske, 2003). Also, the distribution of benefits and costs resulting from collaboration can lead to some firms becoming free-riders; that is why some co-located establishments prefer not to engage in time-consuming activities like planning or coordinating (Van Der Horst and De Langen, 2008). Moreover, being in a cluster may not necessarily imply knowing or trusting colleague firms, thus not leading to additional collaboration (Dell'Orco *et al.*, 2009).

Therefore, industrial clusters do not always grow and some of them shrink and disappear. In contrast, logistics clusters seem to be growing, because the benefits of spatial agglomeration of logistics firms seem to outweigh potential negative consequences (Sheffi, 2012).

### *Logistics clusters*

Authors studying logistics clusters have focussed primarily on their structure, describing the agents and interactions involved or needed for their existence (Haezendonck, 2001). For example, Kasarda (2008) studies the urban development around an airport coining the term "aerotropolis," defined as "engines of local economic development, attracting aviation-linked businesses of all types to their environs" (Lindsay and Kasarda, 2011, p. 21). A similar trend can be observed with the growth of port-centric logistics (Mangan *et al.*, 2008). These businesses include distribution and time-sensitive manufacturing facilities as well as entertainment, hotel and office buildings for air-travel executives and professionals. Other authors investigate performance issues, including those elements that may establish why one cluster is better than another, either in terms of movement of cargo or in terms of their institutional structure (Klink and De Langen, 2001; De Langen, 2002, 2004).

The few researchers who have studied logistics clusters report that such clusters have a positive impact on various stakeholders. Logistics clusters can develop around mode-change terminals, such as airports, seaports, rail hubs, or central points that allow efficient distribution. Kasarda (2008, p. 17) argues that "the rapid expansion of airport-linked commercial facilities is turning today's air gateways into the anchors of 21st century metropolitan development." Researchers who mention the positive impacts of logistics clusters, focus on those impacts that the literature attributes to industrial clusters in general (e.g. FIAS, 2008; De Langen, 2002; Kasarda, 2008).

Logistics clusters can lead to the development of superior transportation infrastructure in the region due to the cluster's influence on local government's investment decisions; this further promotes economic development (Jing and Cai, 2010). Sheffi (2012) argued that operational advantages related to lower cost and better service lead firms to locate in logistics clusters. These advantages result from the interchangeability of logistics services, allowing for cooperation between non-competing firms serving different industries; the large amount of freight moving in and out of logistics clusters, allowing for the use of larger conveyances at higher utilization and leads to lower transportation costs as compared to non-cluster locations; and higher frequency of service and more direct connections to more destinations, leading to higher level of transportation services. Additional benefits of logistics clusters result from the liquidity of the transportation market in a cluster. Van den Heuvel *et al.* (2012) argue that firms located inside logistics clusters have better access to repair facilities and a higher expansion potential than firms that do not co-locate. They also have opportunities to share transportation capacity, leading to reduction in transportation costs (Buvik and Halskau, 2001; Krajewska *et al.*, 2008). Recent research also indicates that logistics clustering is a phenomenon that is evolving and supporting

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regional economies and employment in developed countries that experience a reduction in traditional manufacturing (Chhetri *et al.*, 2014). This can have important implications for policy makers when trying to mitigate for the loss of manufacturing jobs.

Economic geography literature also offers important insights into the benefits that logistics clusters can offer. Economic geography research seeks to explain the spatial evolution of firms, industries, and networks, as well as their locational behavior (Frenken and Boschma, 2015). Therefore, this body of literature explores how firms use logistics clusters to gain a competitive advantage. For example, Inditex's Zara has been able to successfully offer its "home-sewn exception to globalization" and keep most manufacturing at home by taking advantage of the strategically located Zaragoza logistics cluster (Tokatli, 2013). Indeed, logistics clusters offer important benefits to multinational enterprises (MNEs). As of 2010 the number of MNEs has risen to more than 100,000 (UNCTAD, 2011). These firms use global production networks and rely on logistics clusters for the nexus of interconnected operations through which goods and services are distributed to consumers (Johns *et al.*, 2015). These proposed benefits come to support Weber's foundational theory of industrial location which suggests that an industry will be located where the transportation cost of raw materials and final products is minimum (Weber, 1909/1929). Table I summarizes the benefits of clustering. The elements in this table provide the framework that guided the data collection and analysis for our study.

### Methodology

The choice of method should flow from the statement of the phenomenon to be studied. Due to the limited knowledge regarding the benefits of logistics clustering we employ a grounded theory approach (Glaser and Strauss, 1967; Strauss, 1987; Strauss and Corbin, 1990). This methodology is recommended for generating depth and understanding when little is known about a topic (Celsi *et al.*, 1993; Schouten, 1991). We adopted the Straussian model for conducting grounded theory because it offers a more structured analysis of the data (Strauss and Corbin, 1990). The methodological approach also addresses the call for increased use of grounded theory within the logistics discipline (Mello and Flint, 2009). In order to execute this research we rely on assumptions commonly accepted within interpretative studies (Isabella, 1990).

#### *Sampling and data collection*

According to grounded theory guidelines, we employed theoretical sampling (Strauss and Corbin, 1990). In theoretical sampling the data collection process is determined by the emergent theory. That is, the emergent theory dictates who to interview next. As such, as the interview data were collected, coded, and analyzed, we progressively decided which participants to interview next in order to develop the theory (Strauss and Corbin, 1990; Mello and Flint, 2009). We stopped collecting data when we reached theoretical saturation and subsequent interviews presented a preponderance of redundant information (Flint *et al.*, 2002). Consistent with the global aspects of our topic, we interviewed a total of 135 participants located in various countries.

Data were collected using a snowball technique (Biernacki and Waldorf, 1981). Following the McCracken (1988) guidelines for in-depth interviews the interviews were conducted in person and over the phone, in English and Spanish, and lasted between 30 and 60 minutes. An example of the interview guide is provided in the Appendix. The interview guide was modified as the snowballing technique allowed us to gain additional insights into the phenomenon under investigation. Specifically, each

Benefit	Sources														
	Marshall (1890)	Appold (1985)	Porter (1998)	Gambardella and Giarratana (2010)	Romanelli and Khessina (2005)	Perez-Aleman (2010)	Rosenkopf and Padula (2008)	Reuer and Lahiri (2013)	Kasarda (2008)	Mangan <i>et al.</i> (2008)	Chhetri <i>et al.</i> (2014)	Lindsay and Kasarda (2011)	Sheffi (2012)	Van den Heuvel <i>et al.</i> (2012)	Jing and Cai (2010)
Type of cluster	Industrial	Industrial	Industrial	Industrial, knowledge	Industrial	Industrial	Industrial, ITC	Industrial	Airport, logistics	Port, logistics	Logistics	Airport, logistics	Logistics	Logistics	Logistics
Knowledge sharing	X		X												
Larger labor pool	X														
Larger supplier base	X												X		
Increased operational efficiencies		X											X		
Speedier new product development		X													
Higher levels of productivity		X	X												
Higher levels of innovation			X			X									
Higher salaries															
Economic growth									X						
Increased inter-firm cooperation															X
Employment opportunities															
Better expansion opportunities															
Infrastructure development															X

Note: X, means the reference mentions the cluster provides the specific benefit

Table I. Clustering benefits

participant referred us to someone who could provide additional valuable information, thus allowing us to improve our interview guide. All interviews were audio-recorded and transcribed verbatim. Participants were asked to describe and discuss the logistics cluster operation, the reasons their companies choose those locations, and the advantages and disadvantages of their current location. Specific examples were sought when possible.

The data collection included two stages. In the first one, open interviews were conducted to collect data which were then analyzed using grounded theory tools to produce conceptual categories. In the second stage, more data were collected through semi-structured interviews and analyzed to provide further evidence and details on the previously defined conceptual categories. The second stage was deemed necessary because the team of analysts did not find evidence that theoretical saturation had been achieved.

The first stage comprised 62 interviews conducted during 2010 and 2011 with actors in and around logistics clusters, including executives of logistics service providers, logistics operations of shippers, top government officials, world port and airport authorities, non-governmental organizations such as chambers of commerce, real estate developers, academics, and consultants working in logistics and supply chain management. These interviews included meetings with multiple agents in logistics clusters in Singapore, the Netherlands (Amsterdam and Rotterdam), Spain (Zaragoza), Panama (Panama City and Colon), Malaysia (Penang), Canada (Hamilton), and the USA (Chicago, Dallas/Ft Worth, Memphis, Atlanta, Los Angeles, New York, Indianapolis, and Louisville). Each interviewee provided data about his/her career in logistics, work experience, and offered as much detail as possible on the reasons why their company located inside the cluster, including what makes that location preferable to others, and what makes that cluster “successful” (or not). Analyses were conducted after each interview to facilitate theoretical sampling. We moved back and forth between open, axial, and selective coding as new categories and insights emerged.

In the second stage, 73 interviews were conducted. The interviews were conducted during 2011 and early 2012 in logistics clusters in Germany (Dortmund and Frankfurt), the Netherlands (Amsterdam and Rotterdam), Spain (Zaragoza), Dubai, Colombia (Cartagena), Brazil (Campinas and Santos – both in the state of Sao Paulo), and the USA (Los Angeles, New York, Miami, Louisville, Atlanta, and Memphis). Table II presents respondent demographics.

#### *Data coding and analysis*

Three different types of coding are suggested in Strauss’ coding paradigm and used in this study: open coding, axial coding, and selective coding (Strauss and Corbin, 1990). The team of three researchers analyzed the transcripts on a sentence by sentence basis and coded for conceptual content. During open coding, we independently broke down the data into discrete incidents, ideas, events, and acts, and assigned a name/code to represent these. Once each researcher independently coded the interview transcripts available at the time, we met to compare codes. This was done in order to achieve inter-coder reliability. Where the codes were different, we reviewed and compared the specific sections to determine the causes of discrepancy and seek consensus. In order to facilitate inter-coder reliability each researcher kept detailed theoretical memos (the researcher’s record of analysis, thoughts, interpretations, questions, and directions for future data collection). When coding discrepancies existed, we reviewed each other’s theoretical memos for

Region	Type of company	Position	Number
<i>Stage 1</i>			
Panama	Logistics company	Manager	1
		Director	1
		Vice president	1
Singapore	Institution for collaboration <sup>a</sup>	Minister	1
		Advisor	1
	Logistics company	Manager	7
		Vice president	1
		Public agency	2
Illinois	Institution for collaboration	Manager	9
	Logistics company	Vice president	1
Memphis	Institution for collaboration	Manager	1
		Vice president	1
	Logistics company	Director of operations	2
		President	1
		Manager	3
Chicago	Institution for collaboration	Manager	1
		Vice president	1
	Logistics company	Coordinator	1
The Netherlands	Logistics company	Manager	2
		CEO	1
		Vice president	1
	Institutions for collaboration	Manager	2
		Researcher	2
Texas	Logistics company	Director	1
		Manager	1
		Vice president	3
Boston	Institutions for collaboration	Director	1
Dallas	Logistics company	Director	1
		Vice president	1
		CEO	1
	Institutions for collaboration	Director of operations	4
		Manager	2
		Managers	4
<i>Stage 2</i>			
Zaragoza	Logistics company	CEO	2
		Manager	5
		Director	4
	Institutions for collaboration	Advisor	1
		Director	3
Washington	Logistics company	Director	1
Los Angeles	Logistics company	Director	1
		Vice president	1
		COO	1
	Institutions for collaboration	Director	2
		CEO	1
Louisville	Logistics company	Executive	3
		Researcher	2
		Manager	2
	Institutions for collaboration	Vice president	3
		Director	3
		Worker	1
		Vice president	1
		Director	1

(continued)

**Table II.**  
Demographics



Region	Type of company	Position	Number
Miami	Logistics company	Vice president	3
		Director	1
	Institutions for collaboration	CEO	1
		Director	3
		Assistant	1
California	Logistics company	Vice president	1
New York	Logistics company	Vice president	2
New York	Institutions for collaboration	Managers	1
Oregon	Logistics company	Director	1
Ohio	Logistics company	Director	1
Atlanta	Logistics company	CEO	1
		Executive vice president	2
	Institutions for collaboration	Director	2
		Director	1
		Director	1
Brussels	Logistics company	Director	1
Dortmund	Institutions for collaboration	Director	2
		Professor	1
Frankfurt	Institutions for collaboration	Managers	2
Framingham	Logistics company	Director	1
Minneapolis	Logistics company	Director	1
Cartagena	Logistics company	Manager	1
Sao Paulo	Institutions for collaboration	Professor	1
San Luis de Potosi	Institutions for collaboration	Directors	5
Total			135

**Notes:** <sup>a</sup>Institutions for collaboration include: chambers of commerce, port and airport authorities, educational institutions, government institutions, and logistics park operators

Table II.

explanations of why certain concepts were coded and interpreted a certain way. This not only assured that the coding process was consistent across the team of researchers, but also verified that the resultant interpretations of the analysts emerged from logical and unbiased thought processes. This iterative process of individually coding transcripts and then working together to assure coding and interpretation consistency, was followed as additional interviews were conducted and transcripts became available. The coding process was not considered complete until the team of researchers reached consensus on each code. The process resulted in 100 percent inter-coder reliability between researchers and also provided a check on each researcher's individual biases. This process is consistent with grounded theory guidelines for establishing inter-coder reliability (Strauss and Corbin, 1990). Over 300 open codes were generated following the described process.

As we continued the data analysis, whenever another object, event, act, or happening that was identified as sharing some common characteristics with an object or a happening, it was assigned to the same code. Simultaneously, comparative analysis was employed (Strauss and Corbin, 1990). During this process, each incident was compared to other incidents at the property (general or specific characteristic of a category which allows a category to be defined and given meaning) or dimensional (range along which properties of a category vary; used to provide parameters for the purpose of comparison between categories) level for similarities and differences and placed into a category. We followed this dynamic reiterative process and grouped concepts into categories (e.g. operational advantages and economic development) for content analysis.

After initial categories emerged through open coding, we performed intense content analysis around each category, one at a time (i.e. axial coding). Through axial coding we began the process of reassembling data that were fractured during open coding. During this stage we related categories to each other to form more detailed and comprehensive explanations about the benefits of logistics clustering. We linked the data at the property and dimensional levels in order to form dense, well-developed and related categories. Throughout axial coding, as in open coding, we continued to make constant and theoretical comparisons. Importantly, although axial coding differs in purpose from open coding, these are not necessarily sequential analytical steps. Therefore, we iterated between open and axial coding.

Finally we performed selective coding, which is the process of integrating and refining revealed categories. We performed this process to delimit coding to only those variables that relate to the core variables of interest that have emerged from the study. In summary, during open coding the analysts were concerned with generating categories and their properties and sought to determine how these concepts vary dimensionally. During axial coding, we systematically developed and linked our categories. Finally, during the selective coding stage the process of integrating core categories took place. Table III presents the preliminary categories that emerged during axial coding, and the final coding categories that emerged during selective coding. In order to analyze the trustworthiness of our research we employed the criteria proposed by earlier social sciences research (Lincoln and Guba, 1985; Wallendorf and Belk, 1989) and the criteria that emerged from grounded theory itself (Strauss and Corbin, 1990). For a comprehensive overview of these two overlapping sets of criteria we refer the readers to Flint *et al.* (2002).

Preliminary categories	Examples	Final coding categories/benefits	Percentage of respondents who indicated the benefits
Operational advantages	Resource sharing Transportation capacity sharing Collaboration for solving common problems	Collaboration	86
Additional services	Ease of offering value added services Development of related sub-clusters	Value added services	59
Workers mobility	Ease with which entry level workers can get better positions within the company Educational opportunities for basic levels workers	Upward mobility	41
Economic development	Added transportation and warehousing jobs Added executive and managerial level jobs Jobs in value added operations Jobs in industrial clusters attracted to the logistics cluster	Job creation at different levels	55

**Table III.**  
Development of  
coding categories

## Results

### *Overall findings*

The grounded theory analysis of the interviews revealed that logistics clustering provides specific benefits to companies. These benefits derive mostly from opportunities for collaboration and for offering value added services. Logistics clusters also offer upward career mobility for employees in the cluster. Next, we discuss each category of benefits. Equally important, we offer a detailed description of the mechanisms that facilitate these outcomes.

### *Collaboration-related benefits*

Collaboration emerged as one of the key benefits of logistics clustering. Within a supply chain context, collaboration can be defined as a relationship between partners developed over a period of time to achieve lower cost, higher product or service quality, greater product innovation, reduced risks, or enhance market value (Gunasekaran *et al.*, 2015). The main driver of collaboration-related advantages is the similarity of transportation and logistics assets across firms in the cluster. Such assets are similar because the operations performed do not depend, by and large, on the content of the box but rather include standard activities (e.g. picking, sorting, loading, transporting, tracking, unloading and delivery). This quality facilitates transportation and logistics capacity sharing among companies. Our findings are consistent with the literature on industrial clustering. Grandori and Soda (1995) indicate that collaboration is likely to occur among firms operating within a cluster. Other authors within this domain also recognize this important outcome (Reuer and Lahiri, 2013; Rosenkopf and Padula, 2008). In addition, collaboration is facilitated by firms locating the points of origin and destination for their cargo within close proximity to those of other firms' in the cluster. There are several examples of this type of collaboration, as two managers mentioned:

A fashion retailer ships finished garment using a 747-cargo plane from Zaragoza Spain to Johannesburg South Africa. A neighboring operation in the same logistics park, a processed foods manufacturer and distributor, is bringing fish packed in ice from South Africa to Spain. We lease the plane together, creating a round trip to reduce costs. Furthermore, on the northbound trip we share the same trip. We put light raw material wool on top of their heavy pallets of ice-packed fish, thus utilizing both the volume and weight limits of the 747. The result is lower costs for both companies.

A multinational cleaning products manufacturer sends a weekly truckload shipment of 20,000 lbs. from their distribution center in Fairburn, Georgia to a retailer's distribution center in Florida. A manufacturer of batteries and personal care products operates a distribution center next door and sends a 9,000 lbs. less-than-truckload LTL shipment every week to the same retailer distribution center. The companies collaborated to create a single weekly truckload shipment, picking up every week at one distribution center and then the other, delivering to the same retailer distribution center in Florida. The retailer had to change its ordering pattern and delivery acceptance slots and both manufacturers had to change their processes and coordinate shipment schedules in order to enable the collaboration. As a result both manufactures reduced their transportation costs, and the retailer reduced dock congestion.

Firms within logistics clusters with similar operational requirements can collaborate through resource sharing such as warehousing space, employees, and equipment. One interviewee mentioned:

A specialized gifts retail company has a peak in demand just before Valentine's Day. Their distribution has been outsourced to a large supply chain service provider operating

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from a logistics campus in Kentucky. To accommodate the increased demand the supply chain service provider uses space, warehouse belts and employees from other park operations.

Logistics clusters also provide special opportunities for collaboration even among competitors. For example, in Memphis, a large logistics company facilitates and sets up forums for its partners and customers in the health care industry to talk about logistics issues. Companies claim to gain significant operational knowhow in these forums. Meetings usually involve around ten companies and they discuss common problems and proposed solutions. One manager mentioned “these forums represent a safe environment where we can talk even with competitors, of course without revealing the trade secrets.” Another manager added, “you can talk about general or specific topics together and have open discussions about it or how it could be improved.” All these advantages grow as the size of the cluster grows, more freight flows in and out, and more firms join the cluster, creating a positive feedback loop of growth.

RP1: Logistics clustering can lead to increased collaboration which is driven by the similarity of transportation and logistics assets across firms in the cluster; and by firms locating the points of origin and destination for their cargo within close proximity to those of other firms’ in the cluster.

#### *Value added services*

Value added services are linked to the process of servicisation which can be described as the offering of fuller market packages of customized combinations of goods, services, self-service, and knowledge in order to add value to core product offerings (Rada and Vandermerwe, 1988). The services that a firm provides in the process of servicisation can add value to the product and are therefore called value added services (Zhang *et al.*, 2015). Over time, a logistics cluster becomes more than just a location for warehousing and transportation activities. As products spend time in distribution centers, companies have an opportunity to add value to these products by tagging, packaging, preparing for retail display, and performing postponed operations before the products are moved into the retail channels. Being located within logistics clusters allows firms to postpone certain activities. As such, the execution of value added services within logistics clusters is facilitated by the opportunity to postpone performing certain value added services and still deliver products to customers within the expected time frame. In addition, the cluster allows firms to access a variety of vendors performing value added services, therefore offering the option to outsource certain functions and achieve lower total costs due to economies of scale generated by the pool of firms within the cluster.

In the Zaragoza facility, a sports articles manufacturer consolidated all its operations beyond production: packing, kitting, labeling, and others, including final delivery. The CEO commented: “the company can even postpone some of the sport products, shirts, balls, even promotional kits. The reason behind this strategy is the cost savings resulting from the efficiencies and economies of scale of performing all the activities in the same place.”

Building on the good transportation and distribution services in and out of logistics clusters, companies locate return and repair facilities there, leading to high-paying jobs for technicians and engineers in such clusters. Therefore, another factor that stimulates the location of value added services-related capabilities within logistics cluster is the opportunity to perform reverse-logistics activities. Consider the case of a large manufacturing company in Memphis which processes every night about 1,500 laptop

computers in need of repair. A faulty laptop can be dropped off by 20:00 at a FedEx station anywhere in the USA; by early next morning it will be in the company's repair facility where technicians diagnose the problem and attempt to fix it. Most laptops will be repaired and sent back by the end of the day to be delivered 36 hours after being dropped off by their owners.

A Miami-based forwarder with operations in Colon Free Trade Zone in Panama, saw an opportunity to provide value added services to the second hand equipment division of a large US-based machine manufacturer. In the past, the manufacturer used to store its used equipment in Panama for months. When an order was placed, its second hand equipment division would prompt the forwarder to ship the equipment to Miami for refurbishment and then to the customer. The forwarder proposed to the manufacturer to perform the refurbishment in Panama and then ship it directly to the customer. The new value added service required a significant investment from the forwarder, but it soon paid off. In 2011, the company refurbished 5,000 parts of equipment not only for that manufacturer but also for a competitor who moved its operations to Panama to take advantage of the value added service. The Panamanian government supported the operation by committing to train technicians, in addition to other inducements.

RP2: Logistics clustering can provide access to value added services which is driven by the opportunity to postpone certain activities and the opportunity to perform reverse-logistics activities.

#### *Career mobility*

One of the main facilitators of career mobility within logistics clusters is the emphasis and value that the industry places on "floor experience." The logistics industry recruits people with relatively low levels of education and gives them the opportunity to progress in the labor market. The logistics workforce has the opportunity for upward and horizontal movement within the same company and the option to shift among a portfolio of logistics-related positions within the logistics cluster. Our findings complement industrial clusters research arguing the important role of logistics clusters in the creation of employment opportunities in general (Kasarda, 2008; Lindsay and Kasarda, 2011). Consider the following interview excerpt:

The logistics industry is made up of a variety of sectors involved in receiving, processing, storing and moving goods, whose jobs require short, moderate or long term on-the-job learning, not degrees. This represents a pool of upwardly mobile opportunities to the large and growing number of marginally educated workers, which can later get promoted given their experience. Thus, logistics is one of those sectors that leads to access to middle class without college education.

Another main driver of career mobility within logistics clusters is the industry's extensive use of temporary workers. Since logistics companies have to deal with spikes in demand during holidays, new product launches, and changes of operations, companies hire many temporary employees. This represents an opportunity for companies to identify prospective candidates and offer them full-time positions in the future. Naturally, it also represents an opportunity for full-time employment seekers to prove themselves. As one manager said:

When the demand increases, we hire temp workers for the short-term. That is good for us. If we like a person we will offer financial aid to continue his education and a flexible type of contract that allows him to finish schooling and continue working with the company. That is how we can pick good workers and guarantee they are going to continue working with us, because of the dual advantage of gaining experience as well as improving their education level.

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UPS, the largest logistics company in the USA exemplifies this “promote from within” philosophy. Accenture (2006) reported that 54 percent of current full-time UPS managers rose from non-management positions, and 78 percent of its vice presidents started in non-management positions.

RP3: Logistics clustering can provide career mobility which is facilitated by the emphasis and value that the industry places on “floor experience” and the industry’s extensive use of temporary workers.

### *Job growth at multiple levels*

Our data analysis shows that logistics clustering is a source of job creations. This supports recent research indicating that logistics clustering is a phenomenon that is evolving and supporting regional economies and employment in developed countries that experience a reduction in traditional manufacturing (Chhetri *et al.*, 2014; Van den Heuvel *et al.*, 2014). The most striking feature of these clusters is their role as an engine of job growth at multiple levels. On the basic level, there are direct logistics jobs involving the storage and movement of cargo. However, logistics is not all manual labor because the industry is one of the heaviest users of sophisticated information and communications technologies. Logistics also requires complex cross-border accounting and financial acumen, in addition to operational, managerial, and executive functions. As such, this trend is supported by the wide range of logistics job functions required within logistics clusters. Consider the following interview excerpt:

Logistics jobs pay, on average, salaries commensurate with manufacturing. These include jobs in rail transportation, air transportation, support services for transportation, truck transportation, warehousing and the storage sectors, along with executive and managerial positions.

Job creation in logistics clusters goes significantly further. Another significant driver of job growth is the need for firms to locate support; and complementary job functions near logistics clusters. As mentioned before, logistics clusters require many value added jobs dealing with repair, returns, retail preparation, and related activities.

In the case of the forwarder and the machine manufacturer moving operations from Miami to Panama, the interviewee added:

[...] to provide the value added service, the forwarder had to get equipment to perform the refurbishment, hire more people, train the mechanics and get certified by the manufacturer.

In many cases, design-intensive consumer goods companies such as clothing, toys, and housewares choose to co-locate headquarters and design centers near their major global distribution clusters in order to be “close to action.” As one manager commented:

Our DC is here because of the cluster advantages, but because of our business we also have people in this facility working in designing, taking pictures, modeling, etc.

RP4: Logistics clustering can be a source of job growth at multiple levels for the geographic region where the cluster is located. The job growth is driven by the wide range of logistics job functions required within logistics clusters; and the need for firms to locate support and complementary job functions near logistics clusters.

Table IV presents additional key interview excerpts providing support for our interpretation of the data. Figure 1 presents the research model that emerged from the findings. Next, we discuss the study’s conclusions and suggest fruitful avenues for future research.

**Table IV.**  
Interview excerpts

Collaboration	Value added services	Upward mobility	Job creation
<p><i>Benefits</i></p> <p>“In Singapore’s chemistry industry, we share firefighting departments, we share maintenance complexes. Everything that can be shared, we share it”</p>	<p>“If a company has a regional distribution center in the cluster, it has a lot of spill-over effects, like value added services. There is an increasing trend for repair services, or packaging and labeling”</p>	<p>“I think all of our general managers in this area, with the exception of one, have 12 to 16 years of experience. And most of them have come up through the organization. I started 20 years ago as a 2nd shift supervisor in Allentown, PA, and there are many others like me”</p>	<p>“There is a positive effect on job creation, both directly and indirectly. The new jobs and the increasing efficiency attract people from other industries, because here they have a competitive advantage. Therefore, logistics jobs will create secondary jobs if it increases efficiency”</p>
<p>“In clusters you can have interstate proximity, labor, drayage savings, demurrage savings, foreign trade zone benefits. You’re just clustering everything. Cluster labor, cluster skills, cluster the forklift guys, cluster the palette guys. I know in this park, certain buildings don’t have rail spurs, and certain ones do. And I know from one customer, for instance, they bring in tomato paste, seasonally, from California, in rail cars, and so they said: “Well, we can either spend \$150,000 to put our own rail spur in, or we can just as easily pay another company down the street who has a spur. That company’s got the capacity.” And so you’re starting to see the companies use each other’s strengths. In my case, I have a lot of extra pallettes. Maybe I’ll barter those with you. We also share hardware as in combining cargo for shipments to the Far East”</p>	<p>“When you analyze the supply chain, you notice that it deals with a lot of the more advanced engineering and network design activities, as well as warehousing distribution, and more recently a pretty heavy push towards value added services – for example, customizing products further in order to allow our clients to postpone the final manufacturing. Actually, finished goods are done here, domestically”</p>	<p>“We are able to develop career paths for our associates. Here they gain the ability to transfer to another location. In this environment we have created many opportunities for people. They have been able to move into other operations and we have grown our customer base. We’ve shared people into other operations where they wouldn’t have had the opportunity to do that otherwise. As a result we have pretty high tenure in this area with our management team. They progress in their careers with us”</p>	<p>“For example, the health care industry is starting to develop vaccines and trial samples. These are very low in volume, but they still need very specialized handling capabilities, like humidity control, temperature control, even vibration. Everything is very specialized, which means we need specialized people”</p>

(continued)

Collaboration	Value added services	Upward mobility	Job creation
<p>“Locating at a high-tech campus is a gradual process. Here, companies like leading global health care manufacturing and distributors are located next to each other, but they do not make up a campus. I think the advantages of geographical proximity can be improved. That is why we try to stimulate those clusters through our work. For example, to have logistics companies work together on sharing freight containers, to try to share containers. So we try to push for the emergence of a more developed health industry cluster”</p> <p>“There is employee sharing. For example, a large truck and truck part company and a logistics company have different buildings around here, and they move their own people around. Also, the temporary agencies have the power to move [employees] from customer to customer”</p>	<p>“Companies locate in clusters because of the benefits. For instance, repair services for a large engineering and electronics multinational company in Asia are located in the logistics cluster in Singapore, because of all the advantages of the cluster”</p>	<p>“[...]The people within the company usually work much better for us, and we have a lot of them. People that started here from the very bottom and are now in managerial positions”</p>	<p>“There is job creation, because the jobs are not only moving boxes. There are executive jobs and IT jobs, among others”</p>
<p>“We have been great friends with a large logistics and supply chain services provider for years. They give us business for our warehouses. Much of the distribution that is done in this city is because of them. My theory is that companies that come here do it because of that large logistics and supply chain services provider. Once they get everything here they may use other logistics services providers. In fact, we manage the fulfillment center for a floral and gift retailer and distribution company. And you can take orders up here until midnight because of the presence of that large</p>	<p>“As an economist, logistics fascinates me because of its relation to social mobility for blue-collar workers. Workers start in an entry-level position and get promoted depending on more education and experience”</p>	<p>“The cluster has contributed to the economic development of Zaragoza. Even during the crisis, the level of unemployment inside the cluster is lower than in the rest of Spain. In Spain it is almost 20%, while in Aragon it is 11%. It is clear that the Plaza development generated jobs, not only entry-level jobs, but also managerial positions”</p>	

(continued)

## The benefits of logistics clustering

Table IV.



Collaboration	Value added services	Upward mobility	Job creation
<p>“Largely the advantage we get from having a cluster of businesses in one small area, that we call a campus, is that we share labor on a daily basis. So while an associate might have his primary responsibilities here at the operation of a toy manufacturer company, he is an associate of a large logistics company and he’ll work at any one of those operations based on the overall need of the business. So 260 days of the year they may work here, but on a weekend we have seen them run over and help out at the site of a multinational conglomerate because of a particular business need. So having that close proximity of the work force allows us to share labor without having a</p>	<p>logistics service provider. For example, we take orders over the internet on these flowers until midnight and then we still need to build the bouquets. We process the orders and every night we get shipments of flowers from hundreds of growers throughout Latin America. The flowers are then arranged into bouquets, as customers ordered on-line and by phone. Arrangements reach the customer, anywhere in the US, the next morning”</p>	<p>“We do some postponement activities for some of our companies, like a large manufacturer and a large processed foods company. We do customized pallet builds. A lot of display pallets and quarter pallets for specific customers. Half pallets of material rather than the standard pallet quantity. For the processed foods company we’re creating display pallets and the facings are selected by the buyer. Rather than the processed foods company having a prescribed product, the customer can pick and choose, they want facings of the pallet to provide information to the buyer. And then</p>	<p>“Workers at this toy manufacturing and distribution company are of two classes: the ones who start as entry-level and go up in positions in the company with its support like myself, and others who are hired from outside because of a specific ability like him, who has an MBA and experience in other companies”</p>
<p>“The impact has been huge, a total of 28,000 jobs were created in the park, in addition to the 1700 construction jobs. The development also led to the creation of 63,388 indirect jobs at different levels”</p>			

(continued)

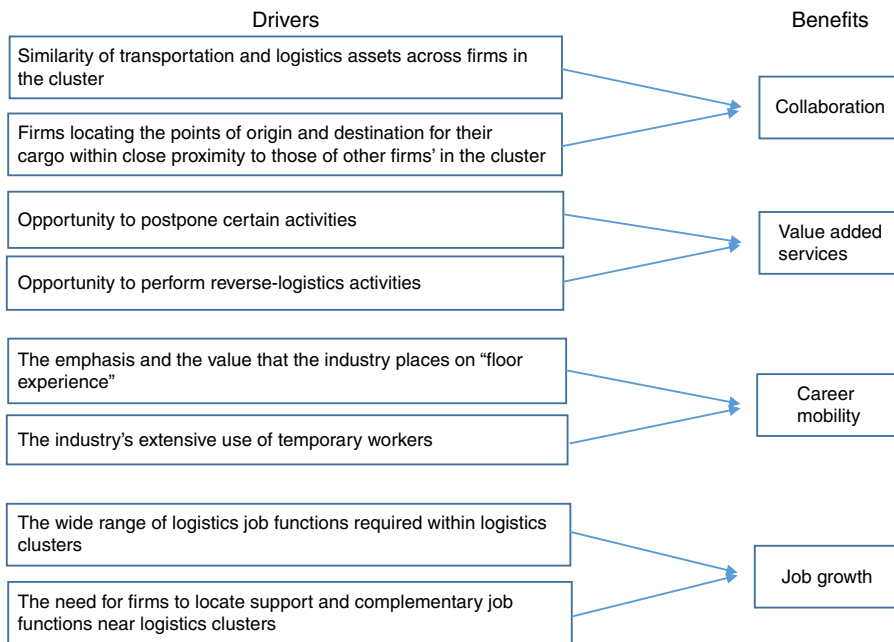
Collaboration	Value added services	Upward mobility	Job creation
<p>significant impact on people driving longer distances and incurring travel costs or commuting costs for that”</p> <p>“A packing company and a processed foods manufacturer and distributor were partners in the development of new packaging material. This was 10 years ago. Right now, there is a manufacturing operation of the packaging company inside the processed foods processing facility, which provides all the packing material. This is the first time that the packing company is operating like this. They are very close to us, they have the warehouse side by side with us; they located here because of us”</p> <p>“We share the facility with a number of other pharmaceutical companies, who have the same customers as ours. We share shipments or even partial shipments, which get full truckloads from the distribution center. They transport products of our company and of our competitors to the same customers, saving tremendous shipping costs. When we have heavy days they can pull resources from other accounts. When we have light days they can take our resources and apply them to other accounts. So we definitely have benefits from smoothing out the surges”</p>	<p>we build those to those customers’ specifications”</p> <p>“We’ll do quality testing, build a clean room train our technicians and refurbish chips. We also have a big project with defective chips here; we repair them. In addition, our customers have a training program in which our associates participate in and get certified. We also have kitting; the chip comes in raw, and we put together the kit”</p>	<p>“I am an example of social mobility. I started 22 years ago in a minor position and with training and good performance I have reached a manager position. The logistics industry incentivizes people’s mobility”</p>	<p>“The impact on the cluster is clear. Over 84,000 jobs in metro Atlanta in the sector with average pay over \$54k. Over 2,160 establishments across a wide range of services and modes”</p>
<p>“We produce, assemble, pack and label the product, all in the same facility. Any additional services like tagging, kitting, adding coupons for promotions are done here. That is how we can save some money while adding value”</p>	<p>“Workers, who enter in a minor position with little experience or requisites, progress whenever there are vacant positions to which they fill the requisites. Each job has new requisites that have to be filled. I became a manager after being in other jobs and gaining more experience”</p>	<p>“The impact of logistics clusters is huge. No surprise Detroit, Hamilton and Winnipeg are looking to build logistics clusters. Also, in Canada, Walton is trying to develop one with three parcels. All three parcels have the possibility to have rail service. Depending on the tenants, you could have a powerhouse of industries that could transform this entire region [...] the number of jobs at full build-out would be astronomical”</p>	

(continued)

## The benefits of logistics clustering

Table IV.

Collaboration	Value added services	Upward mobility	Job creation
<p>"For this company, a processed foods manufacturer and distributor, there is a clear example of collaboration with a fashion retailer. It is putting clothes on the plane leaving [...] and we put fish on it coming back. I think only the fashion retailer and this company actually have heavy air dependency in the park. We go by weight, and the fashion retailer goes by volume. So they can both go into the plane, and they balance"</p> <p>"This fall we were blowing out all our buildings, we needed extra short-term warehousing so we went to a pharmaceutical company and we secured some short-term warehousing from them. They had a building that had just been emptied and we did a three-month stint in there. We didn't spend a lot of money moving in or anything like that, but we were able to secure some warehouse capacity. There's always capacity and you can always find someone who's willing to help in the short term in the cluster"</p> <p>"We share warehouse space with other companies in the park, usually before the holidays when our demand increases"</p>	<p>"The laptops are repaired here. We get the laptops, they show up between 4:00 and 6:00 in the morning from the airport, and we inbound them, diagnose them, repair them, and pack them for shipment. At the end of the day they are picked up"</p> <p>"There are some operations that do some bundling, where you put two selling units together and over-wrap them. There are some where we do coupon inserts. Things where you're customizing the product for a particular customer"</p> <p>"For example, our unit also helps prepare toys for retailers by adding price tags, security tags, labels, and plastics before distributing products to the retail outlets"</p>	<p>"We could say that there is some of that mobility in workers, but it is not exclusive to this company. Some workers move between companies"</p> <p>"Social mobility occurs in my company. It is precisely the way we promote workers. Workers progress because they are good at what they do, they have experience and decide to get training to progress"</p> <p>"The Chicago Workforce Investment Council conducted a study last year on occupations within the freight/ logistics cluster, and found some evidence that people working in logistics progress, get better positions and salaries"</p>	<p>"We have the Aragón Cluster that quantifies the logistics impact on the economy and the data show the impact has been positive: more logistics jobs, both administrative and managerial"</p> <p>"The impact that the logistics park will have on economic development is significant. Furthermore, given the commercial agreement between Colombia and USA, the impact is going to be even greater. Job creation and new businesses are expected. Also, the relocation of companies in the Cartagena area will have a positive impact"</p> <p>"We are very interested in building a cluster similar to that in Guanajuato that has created jobs and had an impact on economic development"</p>



**Figure 1.** Benefits of logistics clustering and their key drivers

**Conclusions, future research, and limitations**

Logistics clusters have been the subject of a growing body of literature (Chhetri *et al.*, 2014; Zhou *et al.*, 2015; Qi and Liu, 2015). Despite anecdotal evidence that logistics clustering can yield important benefits (Alliance Texas, 2012), the logistics clusters research is still in its infancy and offers little understanding of the benefits associated with this phenomenon. Our main objective was to answer the following research question:

*RQ2.* What are the benefits of logistics clustering?

Our study contributes to extant literature by directly addressing the call by Rivera *et al.* (2014) for additional research to better explain the benefits associated with logistics clustering. We make several noteworthy contributions in this area. Specifically, our findings revealed four categories of benefits. Equally important, we make a key contribution to literature by providing a rich description of the mechanisms driving these benefits.

First, collaboration emerged as one of the key benefits of logistics clustering. The main driver of collaboration-related advantages is the similarity of transportation and logistics assets across industries; the operations performed do not depend, by and large, on the content of the box but rather include standard activities (e.g. picking, sorting, loading, transporting, tracking, unloading, and delivery). This allows firms serving different industries to collaborate on transportation and logistics-related activities. Our results also revealed that collaboration-related benefits are facilitated by firms locating the points of origin and destination for their cargo within close proximity to those of other firms' in the cluster. Our conclusions are supported by the industrial clustering literature which indicates that collaboration is likely to occur among firms operating within a cluster (Grandori and Soda, 1995).

Second, our data analysis indicates that logistics clustering creates the proper setting for firms to perform value added services. Thus, we make a contribution to the logistics clustering literature and the value added service literature (Rada and Vandermerwe, 1988; Zhang *et al.*, 2015). Our results indicate that the provision of value added services within logistics clusters is primarily driven by two factors: the opportunity to postpone certain activities and the opportunity to perform reverse-logistics activities. By locating to logistics clusters firms can more efficiently postpone performing certain value added services and still deliver products to customers within the requested time frame. Further, the study participants indicated that logistics clusters are prime locations for executing reverse-logistics activities.

Third, our study indicates that logistics clustering facilitates career mobility within the cluster's geographic region. Due to the variety of job functions within the logistics cluster, the logistics workforce has the opportunity for upward and horizontal movement. Our study also provides a detailed description of the mechanisms facilitating this benefit. Specifically, we found that career mobility is supported within logistics clusters by two factors: the value the industry places on "floor experience" and the industry's extensive use of temporary workers.

Fourth, our findings indicate that logistics clustering facilitates job growth at multiple levels. Our findings extend the literature addressing the impact of industrial clustering on regional employment (Chhetri *et al.*, 2014). We make an important contribution by describing the various ways that logistics clustering promotes job growth. We found that job growth at multiple levels within the logistics cluster is driven primarily by the wide range of logistics job functions required within logistics clusters and the need for firms to locate support and complementary job functions near logistics clusters.

For managers, we highlight that logistics clustering can facilitate collaboration between firms located within the cluster. In order to achieve such benefits managers can employ a couple of mechanisms. First, they should scan the logistics cluster for firms with similar transportation and logistics assets to collaborate and share the assets. Second, managers should attempt to locate the points of origin and/or destination for their cargo within close proximity to those of other firms in the cluster. By employing these two approaches, managers can take full advantage of the collaboration opportunities presented by logistics clustering. There are some barriers that could make it difficult for managers to take advantage of such collaboration opportunities. If one of the potential collaboration partners is already utilizing their transportation and logistics assets at full capacity, the prospective partner might not have the ability to share resources with other firms within the cluster. Also, if the customers and/or suppliers of firms located within the logistics cluster are not in close proximity to those of other firms within the cluster, the firms might not be able to collaborate. It might not always be possible, or it might not always pay off, to relocate supply chain members. For policy makers, we indicate that one way to attract firms to a specific region is by highlighting the potential collaborative opportunities presented by logistics clustering.

We also indicate to managers that logistics clustering can help create a setting for performing value added services. Managers can employ a couple of mechanisms to take advantage of such opportunities. First, firms should try to postpone certain activities that could be performed within logistics clusters. Once they identify activities that could be postponed, they should scan the logistics clusters and identify firms within the clusters that could perform those activities. Second, managers should evaluate the opportunity to perform reverse-logistics activities within logistics clusters. Firms could

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locate their own reverse-logistics operations within such clusters or scan the logistics clusters for other firms that might already have such operations and collaborate with them. Managers should be cautious of potential challenges associated with these mechanisms. Depending on the nature of the product and the customers' expectations, it might not always be a good idea to postpone activities and perform them within logistics clusters. The cost of performing value added activities might be higher within logistics clusters because of possible higher wages within the clusters.

In addition, our findings indicate to managers that logistics clustering offers career mobility opportunities. These opportunities are facilitated by the industry's emphasis on "floor experience" and the industry's extensive use of temporary workers. For managers, this indicates that a large pool of qualified individuals can be drawn to such clusters because of job advancement opportunities. On the other hand, because logistics clustering offers career mobility, managers should be cautious as employee turnover could become a problem as employees could be job-hopping within logistics clusters in search for quicker raise or promotion. One way to mitigate this risk would be through the use of longer-term contracts for key employees. Policy makers can also promote the career opportunities presented by logistics clustering as a means to attract qualified professionals to certain geographic areas and thus create a reinforcing loop of job opportunities and qualified candidates.

Finally, our findings highlight to managers the potential role of logistics clustering in job creation. Managers can play an important role in regional job creation by locating a wide range of logistics functions and complementary job functions within logistics clusters. However, certain barriers, such as local taxes or local policies, can prevent such initiatives. Firms would have to enlist the help of policymakers to overcome such barriers. One of our study's main implications for policy makers is that logistics clustering can be a source of job growth at multiple levels in regions where logistics clusters are located. Our findings complement and provide additional support for existing literature indicating that logistics clustering supports regional employment; this is particularly important in regions that experience a reduction in traditional manufacturing jobs (Chhetri *et al.*, 2014).

Inherent limitations associated with any single study provide avenues for future research. This paper used a qualitative approach. Therefore, one direction consists of empirically testing the generalizability of the proposed findings. A lingering question is whether the findings apply to some logistics clusters, but not all. Further research aimed at developing an estimate of the incremental benefits of locating in logistics clusters would be valuable. It would also be interesting to better understand what type of industries would benefit most from this phenomenon. The current study focussed on the positive outcomes of logistics clustering. Future research should specifically address the negative consequences associated with this phenomenon especially because some researchers raised concerns regarding the potential negative externalities of clustering (e.g. Henderson and Shalizi, 2001). For example, logistics clustering could hurt other industries outside the cluster by attracting qualified individuals from those industries through higher wages. Further, the career mobility and job growth associated with logistics clustering could lead to job-hopping within the logistics cluster which could increase employee turnover and artificially increase wages.

It would also be valuable for future research to investigate whether the benefits of logistics clustering are sustainable. If policymakers deploy resources to promote the development of logistics clusters, it is important to understand whether the potential benefits can be enjoyed by specific regions in the long-term. For example, especially as

compared to manufacturing jobs, do logistics-related jobs remain in area for a long time? In addition, future research could empirically assess job growth within logistics clusters. The current study identified several benefits of logistics clustering. This list is not exhaustive and future research should identify additional benefits and the inherent mechanisms that drive those benefits. Finally, it would be valuable for future research to employ other methods to examine the implications of logistics clustering, such as econometric modeling.

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### Appendix. Interview questions

#### First Stage

##### General information

- Tell me a little bit about yourself.
- What is your present position in this company?
- What are your major responsibilities?
- How long have you held this position?
- How long have you been working in this city?
- What other jobs have you had?

##### Cluster information

- How long have this company being located here?
- What are the advantages of being located here?
- What are the disadvantages of being located here?
- Why do companies decide to locate here?
- Do you think this logistics cluster is successful? Why?
- Do you know any other logistics cluster?
- Is there any additional benefit in logistics clusters compare to those of industrial clusters?
- Why are logistics clusters supported by public and private agents all over the world?

#### Second Stage

##### General information

- Tell me a little bit about yourself.
- What is your present position in this company?
- What are your major responsibilities?
- How long have you held this position?
- How long have you been working in this city?
- What other jobs have you had?

##### Cluster information

- How long have this company being located here?
- What are the advantages of being located here?

What are the disadvantages of being located here?  
Why do companies decide to locate here?  
Do you think this logistics cluster is successful? Why?  
Do you know any other logistics clusters?  
Is there any additional benefit in logistics clusters compare to those of industrial clusters?  
Why are logistics clusters supported by public and private agents all over the world?

#### Collaboration

Has your company ever collaborate with other company in the cluster?  
Could you mention some examples? How?  
How often does your company collaborate?  
How did the collaboration started? Who contact whom? Was there any facilitator?  
Did your company get any benefit/cost from collaborating?

#### Value added services

Does your company offer/demand logistics value added services?  
Could you mention some examples? How?  
Does your company offer/demand them to active clients?  
Is there any difference on offering/demanding value added services if you are inside or outside the logistics cluster?

#### Upward mobility

Does your company recruit entre level workers?  
Does your company offer education benefits to workers? How? What kind?  
How long do employees in your company stay in average?  
How do employees get promoted in your company?  
Do employees in your company experience upward mobility?

#### Job creation

Do logistics clusters create jobs? If so,  
What type of jobs?  
How are logistics industry salaries compared to those of other industries?

### About the authors

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