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**Article**

## Growth trap of public freight villages in Europe

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## MANAGEMENT | RESEARCH ARTICLE

# Growth trap of public freight villages in Europe

Yilmaz Uygun<sup>1\*</sup> and Mohammad Niyayesh<sup>1</sup>

**Abstract:** Freight Villages (FV) are important nodes in supply chains and can be seen as industrial and trade zones with good connections to transport networks, such as road, rail and air, offering basic logistics services, such as warehousing and transshipment, as well as further complimentary services especially for transport-intensive companies, such as logistics service providers. As such, FVs are promoters of inter-modal transport. They are successfully introduced and run throughout the world and are well accepted by companies. Therefore, FVs can be found in almost every country. Accordingly, many papers were published on how best to set up those centers but less is known about their growth and the challenges they face here. Our research shows that there is an interesting counter-intuitive effect in growth and expansion of FVs. We conducted empirical analyses and developed a System Dynamics model to reveal a so-called “growth trap”. Public and public-private FVs interested in the expansion of their terminal infrastructure will attract private competitors offering warehouse capacities in the near vicinity which will impede the growth of the FV. This effect is also validated by means of a case study. To avoid such development, we propose policy recommendations for a proper and healthy growth of such FVs.

**Subjects:** Manufacturing Engineering; Logistics; Reverse Logistics; Warehousing

**Keywords:** logistics center; system dynamics

### ABOUT THE AUTHORS

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Mohammad Niyayesh studied Supply Chain Engineering and Management at Jacobs University Bremen (Germany) and graduated with a Master of Science degree in 2018. He is currently a PhD student under the supervision of Prof. Yilmaz Uygun. His research deals with intelligent scheduling methods in steel industry.

### PUBLIC INTEREST STATEMENT

Freight Villages (FV) are important nodes in supply chains and offer warehouse related services. Freight villages are industrial and trade zones with good connections to transport networks, such as road, rail and air, offering basic logistics services, such as warehousing and transshipment, as well as further complimentary services especially for transport-intensive companies, such as logistics service providers. Freight Villages are promoters of intermodal transport. They are successfully introduced and run throughout the world. They are well accepted by companies that see lots of advantages in operating within FVs. Nowadays, those FVs intend to grow. But currently the effects of such growth are not studied yet. Our research shows that there is an interesting counter-intuitive effect in growth and expansion of FVs. We revealed a so-called “growth trap”. Public and public-private FVs investing in the expansion of their terminal infrastructure will attract private competitors offering warehouse capacities in the near vicinity which will impede the growth of the FV.

## 1. Introduction

Globalization and increased trade relations with the European Union (EU) have created a challenge to distribute cargo flows not only more efficiently but also more environmentally friendly. In response to this constantly growing challenge, Freight Villages (FVs) provide necessary intermodal transport infrastructure to ensure the highest utilization rate of transportation. Throughout the years, FVs in Germany—as a pioneer—have been developed to improve the efficiency of the goods distribution network. According to the latest report of the World Bank (2019), the performance of the German logistics network has been constantly ranked #1 in the world since 2014. It shows the significance of logistics in Germany that it is the world's 3<sup>rd</sup> largest exporter and importer nation with an annual revenue of about 260 billion Euros which is higher than many other developed countries, like the UK and France (GATI, 2018)

Based on the world container traffic data the overall throughput of international trade reached 800 million TEU at the end of 2018 (UNCTAD, 2019). FVs are nodes where a significant portion of this cargo traffic is handled and forwarded. The capability of freight forwarding depends on the efficiency of the FV. Hence, it is no surprise that the FV concept is so popular because it makes distribution networks flexible by providing companies warehouses and related services.

In this paper we are providing a clear understanding of FV and their further development in terms of expansion, i.e., investment in their logistical infrastructure for storing, transportation and transshipment. Here, especially investments in transshipment facilities such as multimodal terminals are of importance. To understand the dynamics of growth, we conducted a series of interviews and developed a System Dynamic model that is not only replicating the growth behavior but also builds a framework showing how different policies will affect the prosperity of FVs.

## 2. Freight villages

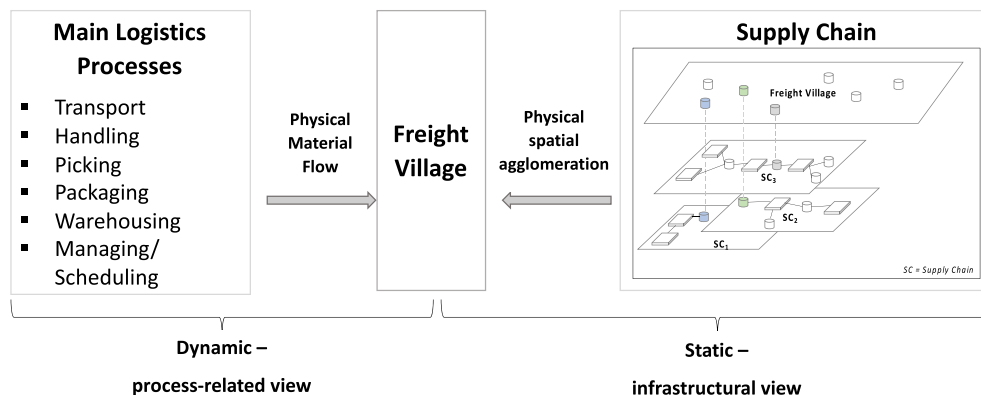
Various terms and explanations for Freight Villages can be found in literature. Most of them are rather descriptive. Some of them offer only an explanation for types of the FVs and some others just introduce a standardized and/or hierarchical typology.

In literature, we find various terms and explanations for Freight Villages (FVs), such as Logistics Parks, Logistics Centers, Distribution Points, Transport Centers, GVZ (Güterverkehrszentrum) in Germany, Interporto in Italy, Freight Villages in the US and North America, or Plateforme Multimodal in France. (Wagener, 2017). The variety of names and definitions originates in their functional role, complexity of operations, governance model, etc. (Dong et al., 2018). Frequently used, the term “center” (or its equivalent in other languages as well) indicates that this is a complex system to facilitate freight transportations (Baydar et al., 2017). Additionally, names of such a system are different from one geographic region to another which refers to levels of logistics capabilities and logistics performance indices (Grundey & Rimiené, 2007).

In this paper, we use the term “Freight Villages” as a substitution of all names used in literature. Our definition of FV is as follow: “*Freight Villages are industrial and trade zones with good connections to transport networks, such as road, rail, water and air, offering basic logistics services, such as warehousing and transshipment, as well as further complimentary services especially for transport-intensive companies*”.

FVs are important nodes in supply chains. As can be seen in Figure 1, FVs are the intersection or spatial concentration of nodes, i.e., warehouses, distribution centers, etc., in different steps of predominantly multi-echelon supply chains (Güller et al., 2015) of different companies. Here, geographically clustered but independent companies' needs for warehousing and related services are met. In general, main logistics processes are applied in FVs and thus physical

**Figure 1. Role of FVs in supply chains.**



material flow is realized. Here, conventional and novel transport and conveyor technologies, e.g., presented in Güller et al. (2013) and Güller et al. (2018), are applied.

The governance structure in FV is unique as to their characteristics of operation and development. Rodrigue et al. (2016) categorized governance of FV based on ownership and operation factors. Since there are always two main parties involved in the FV (public body and private company), usually the management and operation tasks are separated. Especially in the EU operational tasks are privatized (EUROPLATFORMS, 2000). The scope of this study includes fully publicly owned and public-privately owned ones, which is the case with the vast majority of FVs within the EU zone. Fully privately owned FVs are not considered.

The second attribute of FVs focused in this paper will be the level of integration, i.e. the ability to integrate different modes to enable efficient and cost-reduced use of the transportation system with uninterrupted and customer-oriented door-to-door services. The main focus of this paper is on FVs with a high level of integration.

The last attribute we focused in this paper is its centralization level. Here, a central Freight Village is characterized by a special concentration of all functional areas, i.e. all FV service offerings (warehousing, transshipment, etc.) are located within one commercial area. A decentralized Freight Village is characterized by spatial separation of those FV components by using spatially separated commercial areas. The focus of this paper is both on centralized and decentralized FVs. A comprehensive overview of the differences is given in Table 1.

Freight villages are accustomed to providing a variety of services. EUROPLATFORMS (2000) emphasizes the essential elements as access control, service areas, business centers, transport and logistics warehouses, intermodal warehouses, intermodal terminals and some other areas like inner roads, green areas, and customs areas (EU Transport, 2015). Providing shared access to facilities, equipment, and services are considered mainly as advantages of FVs. Other scholars, such as Higgins and Ferguson (2011) and Boile et al. (2011) categorizes services offered at FVs into three main categories, based on the requirements of the operators and services:

- (1) **Basic services:** storage & warehousing, loading, and unloading primary modes of transportation, freight forwarding, transfer to secondary modes, hazardous goods services, cross-docking, merging in transit, freight consolidation and deconsolidation, cold storage areas, distribution, and final delivery

**Table 1. Comparison of different terminal types**

	<b>Access to Resources</b>	<b># of Modes</b>	<b>Integ-ration</b>	<b>Centralization</b>	<b>Owner-ship</b>	<b>Cargo Turn-over</b>	<b>Value Added Service</b>	<b>Location</b>	<b>Land Ownership</b>
Warehouse or Container Yard	Private Access	One or two	Non-Integ-rated	Centralized	Private or Public	Small	Basic needs	Rural and Urban Area	Private or Public
Distribution Center, Inland Container Depot, Intermodal Terminals, Inland Port	Shared Access	Three or Four	Integ-rated or Non-Integ-rated	Centralized or Decentralized	Private or Public	Medium	Medium	Rural and approximate to Urban are	Private or Public
Freight village, Main port terminal	Shared Access	Three or Four	Integ-rated or Non-Integ-rated	Centralized or Decentralized	Private or Public	Large	Biggest coverage	Rural and approximate to Urban are	Private or Public

- (2) **On-site complimentary services:** customs clearance, banking, office space for rent, insurance offices, post offices, security, maintenance and repair, logistics training and education, and research labs
- (3) **Community-integrated services:** hospitals, residential development, schools, restaurants, daycares, and supermarkets.

### 3. Literature review

Despite the fact that there is a variety of names associated with Freight Villages, what is commonly agreed among scholars is the fact that establishing or developing a FV is considered as one of the main drivers of regional development and business sustainability (Altuntaş & Tuna, 2013). Moreover, recent studies show FVs have different functionality in developed and less developed nations. In middle-income countries, a FV is a key to achieving social equity while in high-income countries it is considered as a mechanism for competitiveness and efficient business processes (Bodaubayeva, 2015). Nevertheless, the definition or the application of FV is very variant, and it is clear that FV is the key element in the efficiency of supply chains and prosperity of a region.

Systematic literature reviews done for example, by Gligor et al. (2012), Kilubi (2016), Baydar et al. (2017) show that the majority of recent publication (as of 2008) in the context of developing FVs are narrowly focused on one dimension only, such as financial aspect, environmental impact, efficiency, or regional development. However, in the previous period of 1990–2008 there are publications that deal with more factors. Relevant studies with the topic of evolution of FVs are mainly case studies and feasibility studies which investigate the chance of prosperity on a country level or in certain regions by taking into account business environment, infrastructure availability to forecast the implication of development. Higgins and Ferguson (2011) and Belzer (2019) examine the applicability of FVs in Ontario and Michigan respectively. Uysal (2014) suggests using the ELECTRE method to evaluate the alternatives of locating FVs. Awasthi et al. (2011) use fuzzy TOPSIS, a multi-criteria decision method, to choose the location of urban distribution centers under uncertainty. Özceylan et al. (2016) came up with a combined methodology of the GIS and TOPSIS methods of multi-criteria decision making for site selection. Some others focused on mathematical solutions to improve flow of goods with the current infrastructure of FVs. Ross and Droge (2004) used Data Envelopment Analysis (DEA) methodology to model how the size of cargos may lead to efficient use of distribution networks.

There are important factors identified by scholars that have to do with the development of FVs such as land availability and prices, public policies, social and economic structure. Giuliano and Kang (2018) investigated FVs in California and categorized factors based on economic development, metropolitan size, structure, and physical geography of the state. Aljohani and Thompson (2016) analyzed two geographic characteristics of FVs, sprawl and polarization logistics activities. Logistics sprawl is the change in the location of FVs from inner urban areas to suburban areas which will lead to a change in the number of labor. Therefore, logistics sprawl phenomena is responsible for the increase in commute of logistics employment and increase in truck traveling distance. Several other scholars such as Allen et al. (2012) and Heitz and Dablanc (2015) in the EU, Dablanc et al. (2014) and Woudsma et al. (2016) in North America, and Sakai et al. (2015) in Japan also pointed out the risk and side effects of this phenomena on a robust operational environment.

The research done by Sakai et al. (2015) in the Tokyo region shows that concentration of logistics facilities and companies in the FVs will lead to efficient utilization of infrastructure and improve throughput of cargos. Rivera et al. (2016) state that cooperation among logistics service providers promotes the improvement of value-added services. Rodrigue (2008) concludes that the quality of services offered within the freight villages are considered as key factors that may lead to reorientation of FVs in a region, but Lan et al. (2017) state that repositioning of these FVs will lead to geographically dispersion of supply chain partners which increases the distance between suppliers to end customers.

Although there are many other studies dedicated to FV,<sup>1</sup> the literature review shows that this topic still needs more attention from scholars because many influencing factors have not been quantitatively evaluated. In this paper, based on the factors derived from empirical studies and our assessment, we model the dynamics of growth behavior of FVs. Thus far, this has not been addressed and, let alone, modeled by scholars.

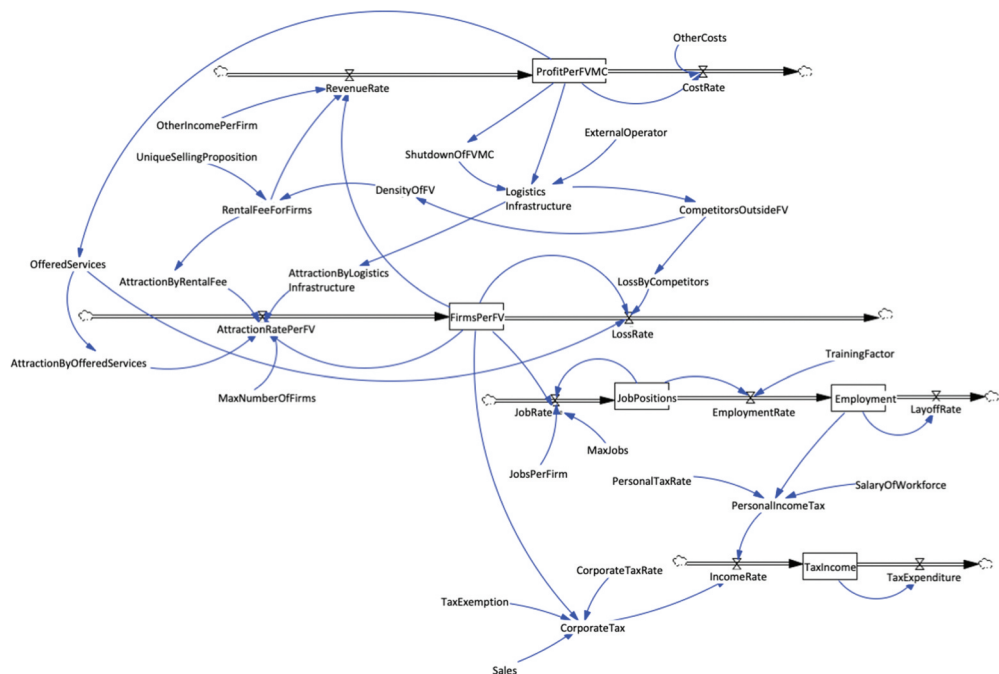
#### 4. Methodology

In this paper, we use a combination of qualitative and quantitative methods. First, interviews with representatives of 43 FVs and 2 FV associations (Deutsche GVZ Gesellschaft in Germany and Europlatforms in Brussels) were conducted, mainly over the phone. Additionally, site visits to 9 of them that are located in the EU zone, namely in Germany, Italy, and Spain, were realized. Here, approaches, problems and challenges in the development of FVs could be seen in action. Information derived from these empirical studies were used to develop a dynamic model to understand the underlying dynamics of growth of FVs.

For this purpose, a System Dynamics (SD) model was created. The method was developed and firstly applied by Forrester (1970). Since then, numerous studies in different fields were conducted by using this method. Moldavska (2016) suggests that SD is a suitable methodology for understanding the complex and interactive behavior of systems. It is a methodology to study complex systems by focusing on the holistic view and evaluating the contribution of interactions to the system behavior. The interaction is defined by three important mechanisms, that are delays (i.e., the time difference between the action and its effect), non-linearity (i.e., any action could have more than one effect and any effect could be caused by more than one action), and feedback loops that either reinforce or balance the system (Sterman, 2000).

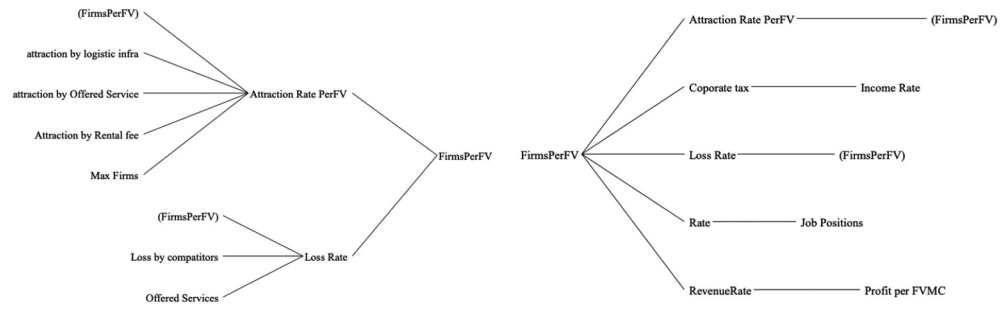
Scholars have successfully applied SD for modeling urban logistic issues. Qiu et al. (2015) show that escalating the capacity of shipping vehicles directly diminishes CO2 emission in Beijing Xu and Coors (2012) accessed sustainability of urban development with the use of SD in a combination of GIS and 3D visualization. In the area of logistics and supply chain management scholars adopted SD in policy design and strategy making specifically in the sustainability context. Walther et al.

**Figure 2. The developed SD model for FVs.**





**Figure 3. Cause and effect factors of the stock “Firm Per FV”.**



(2010) applied the SD method for assessing car manufacturing strategies to tackle regulations regarding low CO<sub>2</sub> emission in California. Thies et al. (2016) propose the SD model to evaluate different policies as an alternative of powertrains in long-range passenger cars.

In this paper, insights from macro-economic models in combination with several interview outcomes with the experts who are operating or managing FVs in the EU as well as the social-economic aspect of developing FVs in a region will be integrated within our SD model.

**4.1. System description**

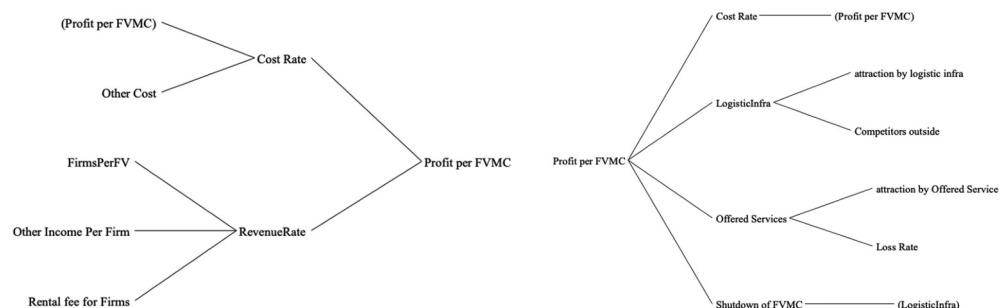
We developed an SD model for FVs and tested several scenarios which will be discussed in the following. As shown in Figure 2, we defined five streams of stocks and flows where stocks are “Profit of FVMC (Freight Village Management Company)”, “Firm Per FV”, “Job Positions”, “Employment”, “Tax Income”. The detailed description of all variables alongside their equations can be found in the supplements.

To describe this model in more detail, we start with the formation procedures of an FV in the first place. Therefore, we assume that there are several factors which encourage companies to settle in the FV. These factors are increasing the numbers of “Firms per FV” (Figure 3). As these numbers are increased, it affects other variables in the model, like “Job positions”, “Corporate tax” and “RevenueRate” (that leads to more Profit per FVMC). We also identified that an increase in the number of firms might have negative effects which will be discussed in more detail in one of the scenarios.

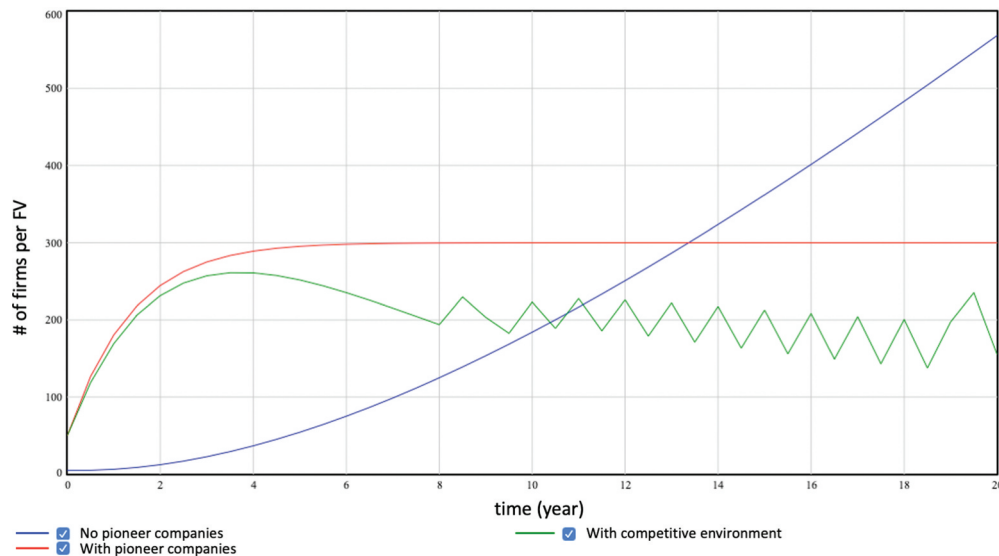
The second important part of the model in the profit generation process, which encompasses all investments and operational costs within the FV. In Figure 4, the cause and effects factors are shown.

Based on our findings in academic literature as well as through various interviews with experts, we defined three scenarios to investigate the effects of changes with different policies on the behavioral structure associated with the growth of FVs. The scenarios are based on the assumptions that there should be an upper limit of firms doing business in an FV and that companies

**Figure 4. Cause and effect factors of the stock “Profit per FVMC”.**



**Figure 5. Change in the number of firms in the FV over time for the three scenarios.**



move out from the FV if the quality of services which were promised are not met (anymore) and the management of the FV cannot meet the expectation of the companies (anymore).

After several calibrations of the model, we simulate the model with both actual numbers and some literature-based numbers for the period of 10 years. The total number of companies reached after the 10th year corresponds to the actual number, we see in most of the modern FVs around the globe.

In the first scenario, as can be seen in Figure 5 as the blue line, there is no extra support, i.e., no preliminary settlement of pioneer companies, etc., and the growth of the FV happens self-regulatory and without limits. The general behavior of the model shows that the number of companies settling down in the FV slowly but gradually increases. As a result, without any support, it takes a very long time for an FV to work at full capacity. This creates difficulties in terms of capturing operational efficiency and economies of scale.

In the second scenario, we assume that we already have pioneer companies settled in the FV and the FV has a capacity limit of 300 companies. The results in Figure 5 (red line) show that the number of companies increases significantly in the first years. The difference here would be our focus on the number of firms which leave the FV. As mentioned above, firms will leave the FV if the management of the FV is not able to provide a certain level of quality of services.

The third scenario is based on the second one, i.e., we have pioneers and a capacity limit. We measure the effect of investments in service and logistics structures to attract more companies to the FV on the number of companies given the fact that the FV is in a certain competitive environment. In our empirical studies, we found that a higher level of services offered, e.g., intermodal terminals for transshipment, will not only help companies within the FV, but will also attract third-party companies to start offering warehousing services around the FV to take advantage of those high-level services. This is especially true for the Interporto Quadrante Europa in Verona (see below), which is known as the best FV in Europe (DGG, 2015). Based on a certain level of existing services and existing competitive environment (competing warehouses, etc.), we see that in the case the FV operator fails to provide or maintain the promised service quality, companies will leave that FV. In other words, we see that if the quality of offered services decreases, the number of firms in the FV will be adversely affected by a certain delay and fluctuation. When it falls below a certain level (in our model in the 8th year), the competition is reduced due to the halt of investments in logistics properties (terminals,

etc.). Thus, companies gradually start leaving the FV. After this time, interestingly there is a continuous fluctuation, i.e. a back and forth in terms of settling and leaving, as the investments in services and logistics properties are effective in both directions, i.e., on the one hand attracting companies and attracting competitors on the other.

In particular, the behavior of the third model is supported by our empirical work and interviews.

#### **4.2. Case study: Interporto quadrante Europa Verona (Italy)**

For validation purposes, we visited and interviewed the management board of the Italian FV located in Verona that is called Interporto Quadrante Europa Verona. This is considered as the best FV in Europe (DGG, 2015).

Since its establishment in 1948, the Consorzio ZAI has been working towards the development of the Veronese economy. The Consorzio ZAI is an institutional body on a territorial basis whose tasks are town planning and propulsion towards the overall development of the area and its economy. The jurisdiction is divided into four areas of the Veronese district: the industrial area known as ZAI Storica, the second industrial area ZAI Due-Bassona, the Innovation area “Marangona”, and the FV “Quadrante Europa”. As a whole, the place is a true infrastructure system covering 10 million m<sup>2</sup> and representing a natural economic strong point with its 1,000 companies and 46,000 workers.

The Interporto Quadrante Europa covers 2,500,000 m<sup>2</sup> with further expansion to 4,200,000 m<sup>2</sup> planned. It is the most important in Italy in terms of combined traffic volume and has been recognized as the best Interporto in Europe. Six million tons of goods are moved by rail and more than 20 million tons are moved by road every year.

Located at the crossroads of the Brenner (north-south axis) and the Serenissima motorways (west-east axis) as well as the Trans-European TEN-T1 (Berlin-Palermo) and TEN-T6 (Lisbon-Kiev) Network, the Interporto Quadrante Europa is directly connected to the Verona-Villafranca Airport and the Brenner railway line. The Interporto interconnects different shipping modes (rail, road, air), concentrates traffic flows, and gives access to European transport corridors.

Although there are other big FVs, such as Bologna and Padua in relatively close proximity, the Interporto Quadrante has been operating successfully. One of the most important reasons for this is its unique selling point. The companies operating in Verona are generally those having business with Germany and since Verona is the most northern FV in Italy and close to the Brenner tunnel, it is convenient for trade with Germany. So, it is not surprising that 75% of Interporto Quadrante’s trade volume is associated with Germany.

Fully equipped with a telemetric network, Interporto Quadrante Europa offers services such as data, audio, and video transmission and access to an international database. It also provides high-quality logistics services.

Interporto Quadrante Europa’s revenue sources come equally from warehouse leasing (50%) and infrastructure sales (50%).

Verona has a special agreement with the German Rostock port. A daily train connection is established.

Verona has created a rapid customs corridor with the Ports of Venice and La Spezia. The corridors are formed by using the railway with Venice and the highway with La Spezia. In accordance with a special agreement with these ports, the customs procedures of the containers to be delivered to Verona are not performed at the port but are sealed and put on trains and sent to Interporto Quadrante Europa to have customs clearance there.

As to the main idea of this paper, Verona has experienced challenges in terms of growth. Since it is a public FV, access to the intermodal terminal is also available to everyone, i.e. even for companies outside the FV. This has led to the establishment of private companies, i.e. warehouse service providers, outside and around the FV. So, those warehouses offer storage and related services to transport-intensive companies that will use the intermodal terminal as well. These are seen by the board of directors as competitors for Interporto Quadrante Europa Verona.

#### **4.3. Policy recommendation**

So, the following suggestions and policy recommendations can be made after the SD analysis, which is also in accordance with our empirical findings.

##### **(1) Pioneer companies in the FV establishment phase**

We have seen in some examples, such as Zaragoza (Spain), pioneer or locomotive companies will give huge momentum for growth. We modeled this in the second scenario. This has both economic and psychological reasons. The presence of more companies enables more efficient use of terminals in terms of economies of scale. On the other hand, the transition of large companies to such FVs will lead to serious references and imitations by other companies.

##### **(2) Keeping the FV service level high**

Enterprises come to FVs for economic reasons. That is why the quality of logistics services should be continuously increased. In this case, it is important that the profit needs to be reinvested in the FV. Otherwise, the effects seen in the third scenario will kick in.

##### **(3) Applying positive discrimination to tenants in the FV**

When services in a Freight Village are provided to everyone, such as terminal-related services, this may lead to the establishment of warehouses around the FV in the sense of creating competition for the Freight Villages, as seen in the third scenario. For this reason, privileges should be offered to companies operating within the FV. These privileges may be terminal fee cuts, discounts, or direct rail connections.

#### **5. Conclusion**

In this paper we present the concept of Freight Villages as a promoter of intermodal transportation, since they have been well adopted globally and developed incrementally. We showed, that it is the growth of FVs that comes with challenges. We discovered that the management of public and public-private FVs investing in the logistics infrastructure, especially in the intermodal terminals, attract not only new tenants but also competitors in terms of storage facilities in the vicinity of such FVs. Thus, we modeled the behavior of such a development by using System Dynamics based on empirical analyses and a case study to demonstrate the implications of development decisions in the FV. We identified attributes, such as poor service quality levels and uncontrolled investment in logistics facilities, which limit further growth of an FV. Taking into consideration these variables three suggestions, such as having pioneer companies, high service levels, and positive discrimination, are proposed to avoid unwanted implications.

In terms of further research, it is helpful to understand the role of FVs in supply chains (see e.g., Besenfelder et al., 2011) or in networks (see e.g., Liesebach et al., 2012) as well as in an advanced manufacturing innovation ecosystem (see e.g., Reynolds & Uygun, 2018), i.e., how they can support the realization of Industry 4.0, similar to Yavas and Ozkan-Ozen (2020). Possibilities of technological applications, such as sensors, RFID (Auerbach & Uygun, 2007), data analytics, self-driving vehicles, etc., may also be investigated. Another important topic to be addressed is the application and further improvement of lean management practices in warehousing that are predominantly discussed in the manufacturing environment (see e.g., Droste et al., 2008; Kortmann & Uygun, 2007; Straub et al., 2013; Uygun et al., 2011; Uygun & Straub, 2013). Anticipating demand changes and alleviating the resulting implications, as discussed in (Uygun & Wötzel, 2009; Kuhn et al., 2009), are also an important field to be investigated. Furthermore, algorithmic approaches to better manage processes in facilities in a FV (warehouses, etc.) but also in the FV management company are an emerging

research area. Here, material planning strategies (see e.g., Uygun & Cheruthottunkal, 2010) and customer requirements management by means of classifier algorithms, such as discussed in Lyutov et al. (2019) & Lyutov et al. (2021), or multi-agent based cooperation support mechanisms, such as in Besenfelder et al. (2011) or Besenfelder et al. (2013), are a promising research field. Additionally, research on which and how further industries, such as steel (see e.g., Özgür et al., 2021) or food & beverages (e.g., cocoa, as discussed in Uygun et al., 2020), to be included in freight villages seems very interesting. The analysis of importance of FV in the new silk road from China to Europe, see for e.g., (Uygun et al., 2021), are also an important research area.

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#### Note

1. For further readings, please refer to e.g., Amjadian & Gharaei, (2021), Awasthi and Omrani (2019), Duan et al. (2018), Dubey et al. (2015), Gharaei et al. (2020), Gharaei et al. (2019), Giri and Bardhan (2014), Giri and Masanta (2020), Hao et al. (2018), Hoseini Shekarabi et al. (2019), Kazemi et al. (2018), Rabbani et al. (2019), and Rabbani et al. (2020), Sarkar and Giri (2020), Sayyadi and Awasthi (2018), Sayyadi and Awasthi (2020), Shah et al. (2020), Tsao (2015) and Yin et al. (2016).

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