COVID-19 and Low-Cost Bus Companies in Europe: before and during pandemic crisis strategies and customer perceptions

COVID-19 and Low-Cost Bus Companies in Europe: before and during pandemic crisis strategies and customer perceptions

Authors:

Cristina Pronello[a*], Marcos Henrique Dos Santos Fornari[a,b], Pinky Kumawat[a]

[a]Politecnico di Torino, Interuniversity Department of Regional and Urban Studies and Planning
Viale Mattioli, 39. 10125 Torino, Italy
Tel: +39-011-0905613; Fax: +39-011-0906450; Email: cristina.pronello@polito.it

[b]Flixbus GmbH, Karl-Liebknecht-Str. 29, Berlin, Germany (*present address*)

* Corresponding author

COVID-19 and Low-Cost Bus Companies in Europe: before and during pandemic crisis strategies and customer perceptions

Abstract: This paper assesses the operational strategy of FlixBus in response to the COVID-19 pandemic in Europe, in relation to the strategies of its main competitors. We were seeking to determine whether the actions taken by FlixBus during this period were consistent with its strategy and corresponded to its customers' expectations, and to this end we adopted a multifaceted approach. We first analysed FlixBus's strategy based on supply data. Second, we used data from a quantitative online survey administered to European residents (a sample of 437 respondents obtained via a snowball sampling plan) in order to better understand people's travel preferences during the pandemic. This analysis comprised an Exploratory Factor Analysis (EFA) followed by a clustering on the survey data to segment customer perceptions, as well as a cross-analysis with socioeconomic and attitudinal variables to determine the profiles of the different clusters. Results suggest that brand and occupancy, and also hygiene and safety, are the most significant factors in determining the four clusters identified among those who actually travelled during the pandemic. Willingness to travel in the pandemic, change in modal choice, and change in destination choice are the most significant factors in determining the seven clusters identified with regard to the impact of pandemic on leisure travel preferences. An analysis of the changes in supply on the different routes offered by FlixBus shows an overall dynamic demand-response strategy and a flexible approach closely related to its competitors' operations at the same time. Our study also shows that FlixBus saw the pandemic as a period of new opportunities, such as in entering new markets, and in launching *FlixDeal*, and that these initiatives were welcomed by customers.

Keywords: Low-Cost Bus; European Bus Market; COVID-19; Operational Strategies; Customer Perceptions; Market Segmentation.

1. Introduction

The European long-haul bus market has experienced many changes since the liberalisation of some of its main markets, especially with the entry of low-cost transport providers like FlixBus. FlixBus started its operations in Europe in 2013 as an intercity bus provider in Germany and since then has been evolving into a global mobility company, FlixMobility, which in addition to long-distance bus/train travel also offers charter bus rental and carpooling. The company has the vision of "offering affordable and environmental friendly mobility for all people" (FlixBus, 2021). This market, however, has been experiencing increased competition from newcomers like BlaBlaBus, and recently faced major disruption caused by the COVID-19 pandemic. The beginning of 2020 saw a series of travel restrictions and lockdowns designed to contain the spread of the virus and protect public health. These restrictions were put in place in many parts of the world, including within the Schengen area, and affected purely domestic travel in some countries. FlixBus and FlixTrain combined transported around 30 million passengers in 2020, around half of the number they transported in 2019 (FlixBus, 2021). The pandemic brought numerous challenges, and plans for further internationalization of the brand were postponed.

The impacts were also seen in other transport modes: for Deutsche Bahn, the number of long-distance passengers in 2020 fell by 46% compared to 2019 (Bahn, 2021) and for Swiss Federal Railways there was a fall of 50% (Deloitte, 2021). Trenitalia registered a 66.4% fall in demand for long-haul, and a 56.3% reduction in saleable passenger-kilometres. As regards Trenitalia's regional services, passenger-kilometres were down 57.5%, with a fall in train-kilometre production of 26% compared to the first six months of 2019 (Press Release, FS ITALIANE, 2020). Much of this might have been a temporary shock due to travel restrictions and the health situation, but there might also be some permanent behavioural changes, with people travelling less and using different travel modes. Strategic planning in times of high uncertainty may lead to strategic shifts or at least some adjustments in the plans of low-cost bus companies. Van de Velde (2009) reported that Europe-wide comparisons of modal share in interurban passenger travel are difficult, because of differences in definitions and statistics (Beria et al., 2014). One of the problems is that local and regional bus services are sometimes grouped together with coach services in a single category, as the definition of "interurban" may vary from country to country. As reported by Van de Velde (2009) and Eurostat (2017), the share represented by the *bus* category has fallen in most of the countries analysed, including in those countries where deregulation has occurred, such as in Germany (2013) and Italy (2014). However, this does not necessarily mean that the long-distance bus market has contracted in those countries. The literature on the expected benefits of deregulation is, however, scant (van de Velde, 2014), especially in Germany, Italy and France (Beria et al., 2018; Bertolin and Tolentino, 2019).

Demand for medium- and long-distance bus travel is characterised by a high price elasticity and a low opportunity cost for customers with respect to the time spent travelling (ART, 2017; Schiefelbusch, 2013). Most of the customers concerned are in low-income brackets and have a high sensitivity to price, and this impacts projections for market growth (ART, 2017) and potential shifts between modes. It is a factor which may limit an expansion of the market for intercity bus trips (Burgdorf et al., 2018). In Italy, however, Beria et al., (2020) suggest that between 2018 and 2019 there was an increase in interest among the 25-44 age group, accompanied by a willingness to pay more for bus travel. They believe that the coach sector is losing its "low-cost" stigma and becoming increasingly competitive with rail. Another important factor to be considered concerns the externalities of different transport modes; according to Knorr and Lueg-Arndt (2016), intercity bus services are not a natural monopoly and have fewer negative environmental externalities (i.e., greenhouse gas emission and noise) than other modes.

FlixBus's strategy focuses on offering cheap tickets and comfortable coaches with Wi-Fi and power outlets (Belyh, 2016; Guihéry, 2019). The digitalization of services, and in particular booking, is an important component of FlixBus' strategy, especially given that many of its customers are young people (Flixbus, 2018). Another important component, highlighted by André Schwämmlein, one of the founders of FlixMobility, is the rapid development of a network of coach connections in order to achieve a more competitive position in the market for intercity bus travel (Gorgs, 2017). In France, in 2018, FlixBus had 45% of market share and served 69% of all destinations in the country (Crozet and Guihéry, 2018).

National and international travel is significantly affected by external events such as terrorist threats, global economic turmoil, and epidemics or pandemic outbreaks (Liu et al., 2011; Wilder-Smith, 2006). The characteristic features and the impact of earlier crises can still serve as a reference for current challenges (Wen et al., 2005). The virus outbreak in the past that most closely resembled the COVID-19 pandemic was the SARS outbreak in Asia in 2002 and 2003 (Beria et al., 2020). In the case of SARS, however, the impact on travel was not limited to areas directly hit by the virus, because travel restrictions imposed by authorities, together with the psychological impacts of the crisis, contributed to a reduction in international travel in 2003 (Wilder-Smith, 2006).

Concerning the future impacts of the pandemic, specifically on the transport sector, the World Conference on Transport Research Society's COVID-19 Task Force carried out a survey among experts that identified some likely long-term changes (Zhang and Hayashi, 2020). A great deal of intercity business will be replaced by online meetings (especially in Europe, and to a lesser extent in the USA, Canada, China, Japan, India, and South Korea); online booking will become standard, and there will be a shift in the cost structure of transport and logistics companies to anticipate future public health threats.

During pandemics, and even more so in transition periods when workplaces and schools reopen and an inelastic demand for travel demand is ramped up, public transport needs a series of specific, unconventional prevention strategies (Zhou et al., 2020). One of the problems faced by public transport and highlighted by Zhou and his team is the "mismatch between potentially high travel demand and bus capacity in case of pandemics". To overcome this problem, they propose a "demand-response operating strategy", ensuring that the bus system promptly responds to a ramp-up in demand by "treating different areas differently".

A study published by Statista (2020) has already looked at the impacts that COVID-19 might have in the long-distance bus market around the world. The study found that the increase in internet use that predated the pandemic was already leading to growth in the market for online bus tickets, favouring digital players such as FlixBus, and that this trend was being accelerated by the pandemic, given that it was causing a major shift towards e-commerce and online purchasing generally. The study also mentions autonomous vehicles as an important innovation that might have a significant effect in the bus market; however, given the uncertainty in the autonomous vehicle sector, and the current level of development and tests, this aspect was not included in their 5-year forecast.

The present research focuses on the long-distance bus market. We assess FlixBus's operational strategy in response to the pandemic in Europe and compare this strategy to the strategies of some of its main competitors. We use a multifaceted approach to examine the company's positioning and strategy before the pandemic occurred, and to evaluate how far the company's culture and digital mindset influenced its approach during the crisis and whether this translated into a competitive advantage.

The paper is structured as follows. The following section (*Methodology*) presents the methodology for data collection and analysis. The *Results* section is a detailed report of what we observed: FlixMobility's positioning before the pandemic; the supply of services by FlixBus and its competitors during the pandemic; traveller perceptions and behaviour during

the pandemic, and their willingness to travel in the future. Finally, in the *Discussion and conclusions* section we seek to position our results in the context of the literature. We state the main findings and conclusions of the study, and suggest future research with a view to obtaining a better understanding of the legacy of the pandemic.

2. Methodology

We used a three-step methodology to analyse market strategies before and during the COVID-19 crisis:

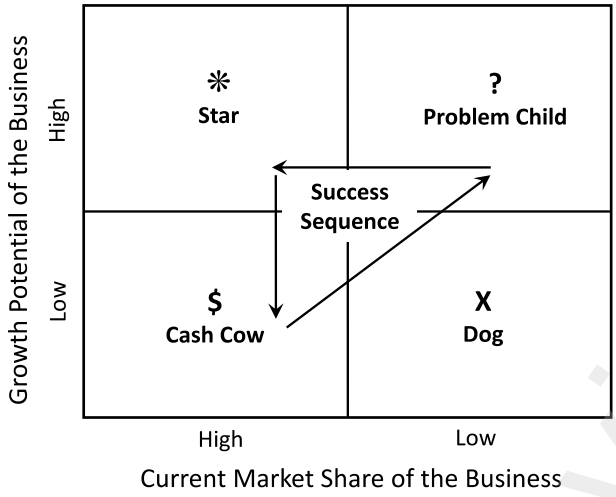
- an analysis of the long-haul market before 2020 in order to understand the initial positioning of FlixBus and its main competitors;
- an in-depth analysis of supply during the pandemic, to identify how Flixbus's strategy changed in relation to its pre-pandemic strategy;
- an analysis of the perceptions and attitudes of customers following the pandemic outbreak.

2.1 Flixbus's operational strategy and positioning

The main challenges faced by FlixBus in the European market before COVID-19, and FlixBus's current strategic pillars were analysed using Porter's five forces method and the Boston Consulting Group growth-share matrix. Porter's five forces is a commonly used technique for strategic planning and assessment, centering around a competition analysis of a firm's environment (Mintzberg et al., 1998). The five forces in question are: (1) the threat of new entrants; (2) the bargaining power of the firm's suppliers; (3) the bargaining power of the firm's customers; (4) the threat of substitute products; (5) the intensity of rivalry among competing firms (Porter, 1996). To evaluate these five forces in the case of FlixBus we drew on a variety of sources: an analysis of the literature on the subject; public interviews with founders and directors; data made public by Eurostat, the German Federal Statistical Office (Destatis, 2021) and by Statista (Statista, 2020); and information on companies from Bureau van Dijk's Orbis Database.[1]

Determining a firm's optimal position in the marketplace calls for detailed analysis and calculations, and to this end we used Boston Consulting Group growth-share matrix (BCG matrix) (Mintzberg et al., 1998). BCG matrix is a tool aimed at diversified companies that seeks to show how funds should be allocated between their businesses. It classifies the company's various businesses as either *Stars*, *Cash Cows*, *Problem Children*, or *Dogs*, depending on their growth rate and their current market share. The main assumptions are that high market share means high margins and that the higher the growth rate, the greater the cash input required. As illustrated in Fig. 1, *Cash Cows* are businesses with high market share but low growth, generating a lot of cash that needs to be invested in *Problem Children*, that is to say cash-starved businesses with a higher growth rate, with a view to enlarging their market share and turning them into *Stars*. The final category, *Dogs*, may have an accounting profit, but this needs to be reinvested to maintain their position, and so these businesses are not able to contribute further to the company overall.

[1] bvdinfo.com/en-gb/.



Source: (Mintzberg et al., 1998)

Figure 1: Boston Consulting Group growth-share matrix (BCG matrix)

2.2 Flixbus supply assessment during the pandemic

We did an in-depth analysis of market supply to observe how Flixbus changed its strategy during the pandemic, by collecting data on weekly frequencies of FlixBus and its competitors. Our data came from several sources: public news, announcements by companies during the crisis, and informal interviews with their managers. We based our figures on the weekly frequency of services, as suggested by de Haas et al., (2017), which decreases distortions and allows an assessment of market strength. FlixBus's operations in Europe were shut down from the middle of March 2020, with a reopening planned for when restrictions were lifted. To understand how FlixBus started to ramp up its operations across Europe, we analysed scheduled trips in 2020 from June to the beginning of August (weeks 22-32), a period preceding the historic high demand of the European summer. Four cross-border and seven domestic routes were chosen for the collection of data, since we were seeking to shed some light on the effects of restrictions on FlixBus operations that were specific to different countries. The same assessment was made for at least one direct bus competitor on each of the routes analysed. Data were collected between 25/05/2020 and 12/07/2020, with this period containing two separate stages. The first stage lasted four weeks (up to 19/06/2020), since we wished to assess if there were relevant changes in supply during the week regarding the ramp-up of FlixBus operations in Europe. The second stage lasted three weeks (weekly data recorded on 28/06/2020, 05/07202, and 12/07/2020).

2.3 Survey to assess the demand during the pandemic

The perceptions and attitudes of the customers after the pandemic outbreak were evaluated using a web questionnaire focusing on two main topics: a) the mode choice of customers who had to return to their usual place of residence in the middle of the pandemic; and b) what different types of customers thought about travelling for leisure during and after the pandemic: their attitudes and preferences in this regard.

The survey, entitled "Has your mobility changed in the pandemic period (COVID-19) and how?", was made available in English, Portuguese, Spanish, and Italian. It was divided into six sections:

1. *Residential information:* this section contains questions regarding the residential location and filter questions addressing to the following sections. Respondents who were in their country and city of residence before the beginning of the COVID-19 pandemic were addressed to the fourth section. Respondents who were away from their home country/city when the pandemic begun but returned to it afterwards were addressed to the second section. The respondents who were away from their home country/city since the beginning of the pandemic were addressed to the third section;
2. *Travelling during the pandemic:* this section was designed to understand motivations and priorities during the return trip made during the pandemic period;
3. *Possibility of travelling home during the pandemic:* this section was designed to analyse if the respondents had plans to return home in the near future and possible motivations to do that during the pandemic;
4. *Travel Plans*: all the respondents answered to this section related to their plans and motivations to travel for leisure during and after the pandemic. Differences among main European long-distance transport modes (bus, train, plane, and car-pooling) were evaluated;
5. *Business Trips:* all respondents answered to this section related to their plans and motivations to travel for business during and after the pandemic;
6. *Socio-economic information:* gender: disability status; birth year; educational level; household size; number of children in the household; driving license ownership; number of cars, motorbikes, and bikes in the household; monthly net household income.

In each of the sections, information relating to perceptions and attitudes was obtained via 6-point Likert scale questions. 35 attitudinal variables were selected for the Exploratory Factor Analysis (EFA) and cluster analysis to assess the demand during the pandemic (see Table 1). The survey was programmed using Lime Survey and disseminated using mailing lists, social networks and news portals linked to mobility/transport, using a snowball sampling plan. The survey was made available to customers with a fixed residence in Europe, but our focus was on the markets specifically targeted in this research: Italy, Germany, Spain, Portugal, and France. The launch of the survey was preceded by a small pilot test, with ten transport experts and researchers as respondents.

The data analysis included a descriptive analysis of data, followed by an Exploratory Factor Analysis carried out using IBM SPSS Statistics. Bartlett's test of sphericity was used to analyse the correlation between the variables, and the Kaiser-Meyer-Olkin (KMO) test was used to establish the validity and accuracy of the sample (Hair et al., 2006). To ensure significance, we computed the percentage of total variance that could be explained by the factors (Maskey et al., 2018; Zikmund et al., 2010; Hair et al., 2006). A new score was computed by adding up the scores of all the variables within each factor, and the cluster analysis then used normalised factors. First, a hierarchical clustering was performed using Ward's method and squared Euclidean distance to identify an optimal number of clusters. Second, k-means clustering was performed followed by ANOVA (Analysis of Variance) to identify the significant factors in determining the clusters. Finally, a cross-analysis was performed using socio-economical and attitudinal variables to better understand the profile of each cluster.

Table 1. The analysed variables

	Travelling during the pandemic	
No.	**Variables and descriptions**	**Range of values**
	Variables regarding the specific preferences towards choosing the travel mode to return home	
1	Cost	Judgement on the statement, expressed by a score from 1 (Not important at all) to 6 (Extremely Important)
2	Travel time	
3	Interconnections	
4	Comfort	
5	Safety	
6	Hygiene Standards	
7	Company Brand	
8	Date	
9	Day of the Week	
10	Departure Time	
11	Number of Seats on Sale	
12	Number of Tickets Already Booked	
	Impact of the pandemic on leisure travel preferences	
No.	**Variables and descriptions**	**Range of values**
	Variables regarding the impact of the pandemic on leisure travel preferences	
13	It is safe to travel with my private car during the pandemic	Judgement on the statement, expressed by a score from 1 (Totally disagree) to 6 (Absolutely agree)
14	It is safe to travel by plane during the pandemic	
15	It is safe to travel by bus during the pandemic	
16	It is safe to travel by train during the pandemic	
17	It is safe to travel using car-pooling (e.g., BlaBlaCar) during the pandemic	
18	I went on a holiday trip on July/August 2020	
19	As soon as governments authorized, I started going on weekend getaways	
20	As soon as governments authorize, I intend to do long leisure trips (if it is already authorized in your country, refer to your plans when it wasn't)	
21	I feel now is a good moment to plan my future leisure trips because of lower prices/promotions	
22	I do not intend to do international leisure trips this year	
23	When travelling for leisure after the pandemic I feel safer going to places I already know	
24	I will begin travelling for leisure to less crowded/known destinations	
25	I feel it is safe to do leisure trips now, but I wouldn't do it because it is not socially acceptable	
26	When the pandemic is over, I will use more private modes for leisure trips because of fear of being infected	
27	After the pandemic is over, I prefer to go on domestic leisure trips	
28	Due to COVID-19 I changed the mode of transport to go on holidays	
29	Due to COVID-19 I changed the mode of transport to go on weekend getaways	
30	I intend to change my weekend getaway destination due to COVID-19	
31	I intend to change my holiday's destination due to COVID-19	
32	I will only go on weekend getaways again after the pandemic is over	
33	I will only do long leisure trips again after the pandemic is over	
34	I will read more carefully the cancellation/rebooking policy when booking a leisure trip from now on	
35	I feel eager to pay more for a more flexible cancellation/rebooking policy from now on	

3. Results

We first present the results relating to the long-haul bus market in Europe before COVID-19, focusing on FlixBus's positioning and strategy. We then present an assessment of the supply by FlixBus and its competitors in the period preceding the European summer, followed by an assessment of demand and customer preferences during the pandemic.

3.1 The European long-haul bus market

The analysis of competitors was done to evaluate FlixBus's positioning and assess its power before the crisis, which was a determinant of its survival during 2020. The first step was an examination of Porter's five forces.

(1) Threat of new entrants. Liberalisation removed a number of entry barriers to some of the major markets in Europe. In Germany, after liberalisation, there was a lack of terminal capacity that acted as a barrier to newcomers, and in France many terminals were operated by SNCF (Société Nationale des Chemins de fer Français), which meant that this state-owned company had the potential to block access to competitors in 2016 (DG MOVE, 2016). Other important barriers are the client base of a given operator and the sales channel used, even though switching costs are not very significant. Also, profit margins in a low-cost service that relies on partnering with the bus owners are small, and to be profitable an operation must rely on having a varied supply and a wide network. Thus, newcomers might need high capital infusion to enable them to attain a network and customer base comparable to FlixBus's. Faced with this new competition (digital and innovative), FlixBus chose a strategy of internationalisation, network expansion and multimodality, launching three new products: FlixTrain in Germany (2018), FlixCar in France (2019) and FlixBus Charter, now discontinued.

(2) Bargaining power of the firm's suppliers. The power of suppliers may subtract value from the market, driving down its profitability and limiting quality. FlixBus is considerably bigger than its main suppliers, who consequently lack bargaining power and are in a weak position in relation to revenue sharing agreements; the bigger FlixBus becomes, the more standardised those agreements tend to be. What might change this scenario is the entry of other significant competitors, such as BlaBlaBus, who could tempt FlixBus's suppliers away and force FlixBus into offering better agreements. Recently, however, German operators have been turning down contracts with FlixBus because of low profitability, and instead FlixBus has been concluding contracts with non-German bus companies (Guihéry, 2020).

(3) Bargaining power of the firm's customers. With customers seeking lower prices and better service quality, their power is growing. This is heavily influenced by the price sensitivity of bus passengers, the availability of substitutes, and the availability of information. For low-cost bus customers, price is central to their purchasing decisions, and today, with more alternatives on offer, including of low-cost trains, low-cost flights and car-pooling, customers have greater power, enhanced by an easier access to information. The low-cost bus market relies heavily on online booking, which also facilitates price comparison by customers. This can drag prices down and make competition fiercer, even though customers do not engage in any kind of "negotiation" as such.

(4) Threat of substitute products. This includes the ease with which customers can replace a given service with an alternative, the costs of switching, and customers' price sensitivity. In

the bus market customers have high price sensitivity and will often choose bus travel rather than a travel mode with higher perceived quality/comfort. The growth of low-cost business models in the train sector, together with the growing popularity of car-pooling, means a greater incursion by substitute products into FlixBus's main market. In the face of threats to its main market, FlixBus has sought to expand into the markets from which these threats emanate, adopting a multi-modal Mobility as a Service (MaaS) approach, taking advantage of synergies, and expanding its customer base. A major difficulty for FlixBus, which became more acute with the pandemic, is where state-owned rail companies receive subsidies and tax allowances that create a situation of unfair competition. FlixBus has protested about fiscal inequalities with both air transport (not taxed for its pollutant emissions) and rail transport, lodging a formal complaint with the European Commission. It has argued that buses are a greener alternative to air travel, and it has claimed that some rail companies, in particular Deutsche Bahn (Bahn, 2021), have an unfair market advantage.

(5) Intensity of rivalry among competing firms. This is influenced by the way the industry is growing, the number of competitors, exit barriers, the degree of differentiation, and innovation. In the case of FlixBus's market, competition becomes especially fierce whenever there is a new entrant, whose approach is normally to offer extremely low-priced tickets in an attempt to establish a customer base, given that purchasing decisions are price-sensitive, and given the low degree of product differentiation. What can significantly differentiate is the availability of trips and their frequency; here, as a market leader, FlixBus is able to offer more connections than new entrants and can scale faster given its already existing network.

The changes mentioned in relation to forces (1) to (4) bring into question the profitability of long-haul bus services in the medium term, which has the effect of making rivalry even more intense. Recent developments include the arrival of BlaBlaBus and Pinkbus in the market, the reduction in VAT (Value Added Tax) on train travel in Germany, and the launch of FlixCar, not to mention the potential impacts of the COVID-19 crisis. Guihéry (2020) voices a growing concern that excessive competition is negatively impacting safety measures, maintenance costs and drivers' pay. This is especially due to the high degree of rivalry between FlixBus and BlaBlaCar, given that each has entered the other's main markets and has engaged in a price war. Moreover, BlaBlaBus entered into a major European partnership with ALSA (Spain and Portugal), National Express (UK) and MarinoBus (Italy), creating the second largest coach network in Europe. However, these companies differ considerably in their strategy, and only BlaBlaBus has a business model similar to that of FlixBus. FlixBus's multi-vector strategy aims at a continued growth characterised by different mobility approaches, and has three main components (Engert, 2019): 1) core market leverage; 2) expansion of adjacent markets; and 3) internationalisation.

In the light of our discussion of the five forces, and given FlixBus's strategy in expanding its services into other mobility markets as part of a MaaS approach, let us now examine the situation from the perspective of a BCG growth-share matrix. Here, the *Cash Cows* are the company's stable bus operations that have already reached profitability and which, together with additional investments by venture capitalists, help fund further expansion (Table 2). These Cash Cows correspond to the German and French markets, which experienced significant growth shortly after the deregulation period. Although FlixBus has remained the market leader

in Germany and France, both of them went through a "Problem Child" phase shortly followed by a "Star" phase. The Italian market for FlixBus can be considered a *Star*; there is still room for expansion, especially given the existence of local monopolies and the power that traditional providers still have. Nevertheless, FlixBus's market share in all the above markets is high and they have higher profitability, generating cash to be used in expanding into other markets and providing other services.

Table 2: BCG matrix for FlixMobility's portfolio

		Current Market Share of the Business	
		HIGH	**LOW**
Growth Potential of the Business	**HIGH**	**Stars** FlixBus (Italy)	**Problem Child** FlixBus (Portugal and Spain) FlixBus Charter FlixTrain (Germany and Sweden)
	LOW	**Cash Cow** FlixBus (Germany and France)	**Dog** FlixCar (France)

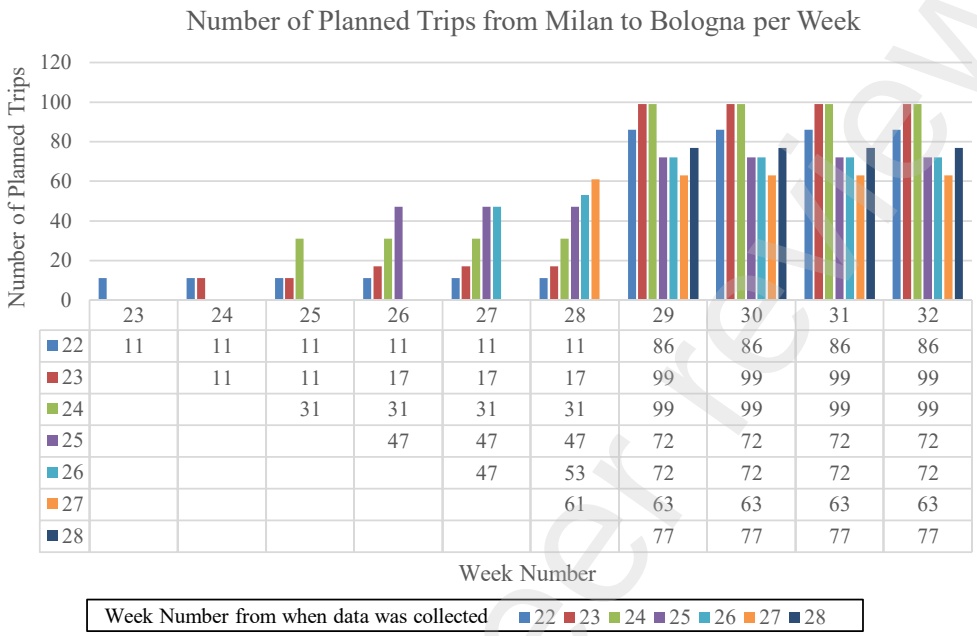
The case is different for other European markets analysed in this research, which have to be classified as *Problem Children*. In Portugal, FlixBus entered the domestic market in 2020 following changes in regulations, and it now challenges the market leader, Rede Expressos. In Spain, FlixBus offers only international connections, as the internal market is organised according to concessions, which does not correspond to FlixBus's business model. However, the Spanish market is a large, highly consolidated market, with 8.3 million users predicted for 2025, making it even bigger than that of Germany, and if it were to be de-regulated at some point in the future, that would be a great opportunity for FlixBus. Currently the market leader in Spain is ALSA, which also offers international connections, competing directly with FlixBus in that market. In the *Dog* quadrant there is the FlixCar operation in France, a market with little growth potential and dominated by BlaBlaCar. This intermodal strategy and expansion pose a new challenge to FlixBus to offer new services of a high quality and to ensure that it does not cannibalize its cash cow, the coach market.

3.2 An assessment of Flixbus's supply during the pandemic, before the European summer

Our examination of weekly frequencies allowed us to identify two main strategies: a *baseline projection strategy* (week 22) reflecting FlixBus's initial plan for its operations, and a *ramp-up strategy* (weeks 23-28) corresponding to the strategy the company adopted in practice for ramping up operations with respect to the baseline. The period between weeks 23 and 28 (*try-out*) shows an initial modest supply following the end of lockdown and the lifting of travel restrictions preceding the summer; the period between weeks 29 and 32 (*peak-season*) shows an increased supply designed to satisfy the traditionally higher holiday demand in July and August.

On the three ***short-haul routes*** (two in Italy, one in Portugal), the baseline for Milan-Bologna had a lower "try-out" supply of 11 trips/week and rising to 86 trips in the 29th week (Fig. 2). The ramp-up strategy consisted in increasing the supply after the "try-out" period, but supply then varied during the peak-season, with an overall decrease of 10% in weekly trips if

we compare the last observed data to the baseline. For the Napoli-Bari route, in the try-out period there were 14 trips/week planned, with double this number (28 trips) planned for the peak-season; the "try-out" period did not register any variation from the baseline and, in the "peak-season" there was also a more stable supply, with an overall decrease of only 14% from the baseline to the last collected data.

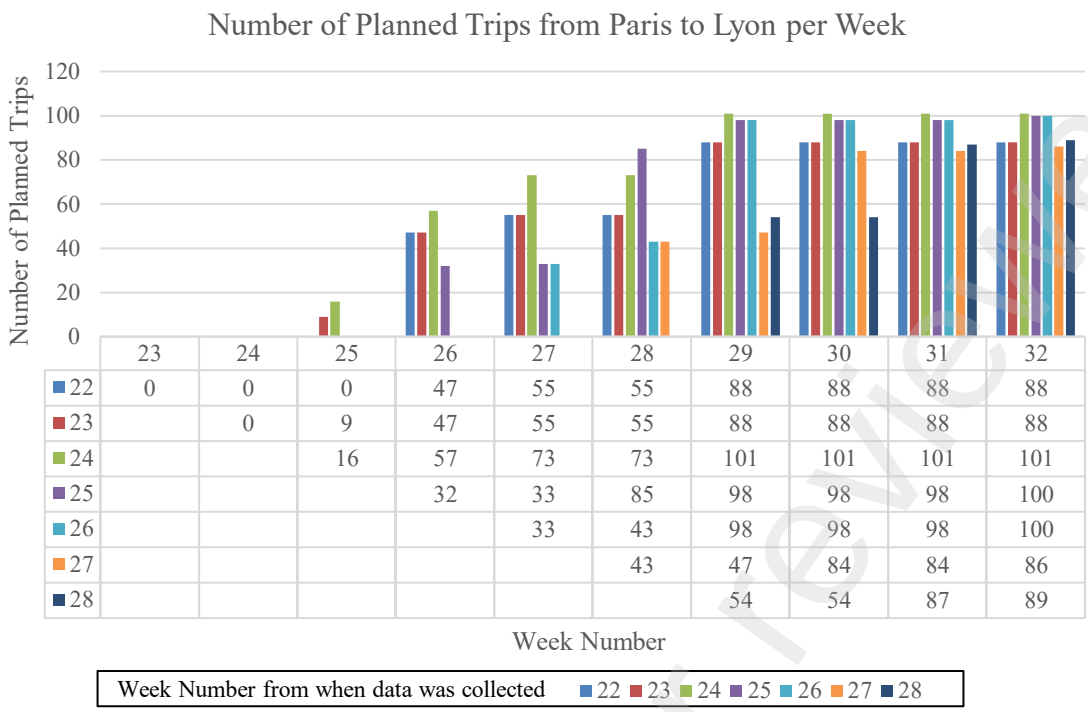


	23	24	25	26	27	28	29	30	31	32
22	11	11	11	11	11	11	86	86	86	86
23		11	11	17	17	17	99	99	99	99
24			31	31	31	31	99	99	99	99
25				47	47	47	72	72	72	72
26					47	53	72	72	72	72
27						61	63	63	63	63
28							77	77	77	77

Figure 2: FlixBus supply on the Milan-Bologna route

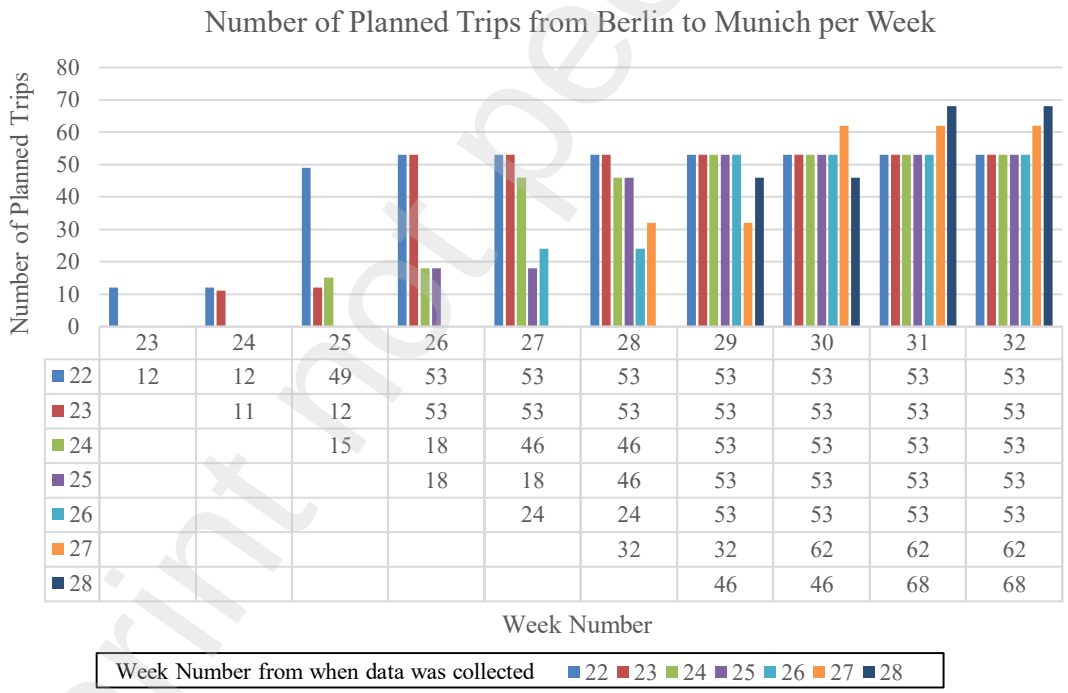
On the Lisbon-Porto route supply was maintained at 14 trips/week without any changes over the analysed period.

On ***medium-haul routes,*** the French market offered bookable trips in the baseline scenario only from week 26 onwards. Travel on one international route, Paris-London, was further complicated by European travel restrictions (Brexit already in force and 14-day quarantine required for all arrivals in England). The baseline strategy consisted of a flat 84 trips/week supply from week 26. As for the ramp-up strategy, FlixBus trips were gradually cancelled with 2 weeks' notice from weeks 23 to 28. The domestic Paris-Lyon route was opened in week 26 with 47 trips/week, and this was increased to 88 trips/week for the "peak-season" (+87%) (Fig. 3). Concerning the ramp-up strategy, trips were continuously and dynamically reduced starting in week 25. In the case of the Berlin–Munich route (Fig. 4), baseline supply started at 12 trips/week, but with an increase already initially scheduled for week 25, reaching a maximum of 53 trips/week. In terms of the ramp-up strategy, the Berlin–Munich route registered gradual reduction in supply from week 22 to week 25. Even though the supply was reduced in relation to the baseline, it nevertheless increased throughout the period, from 12 trips/week in week 23 to 68 trips/week in week 31. For Rome-Milan, the baseline strategy consisted of a 41.7% increase in supply from the "try-out" to the "peak-season" period. The ramp-up strategy was similar to that for the two Italian short-haul routes described above.



	23	24	25	26	27	28	29	30	31	32
22	0	0	0	47	55	55	88	88	88	88
23		0	9	47	55	55	88	88	88	88
24			16	57	73	73	101	101	101	101
25				32	33	85	98	98	98	100
26					33	43	98	98	98	100
27						43	47	84	84	86
28							54	54	87	89

Figure 3: FlixBus supply on the Paris-Lyon route

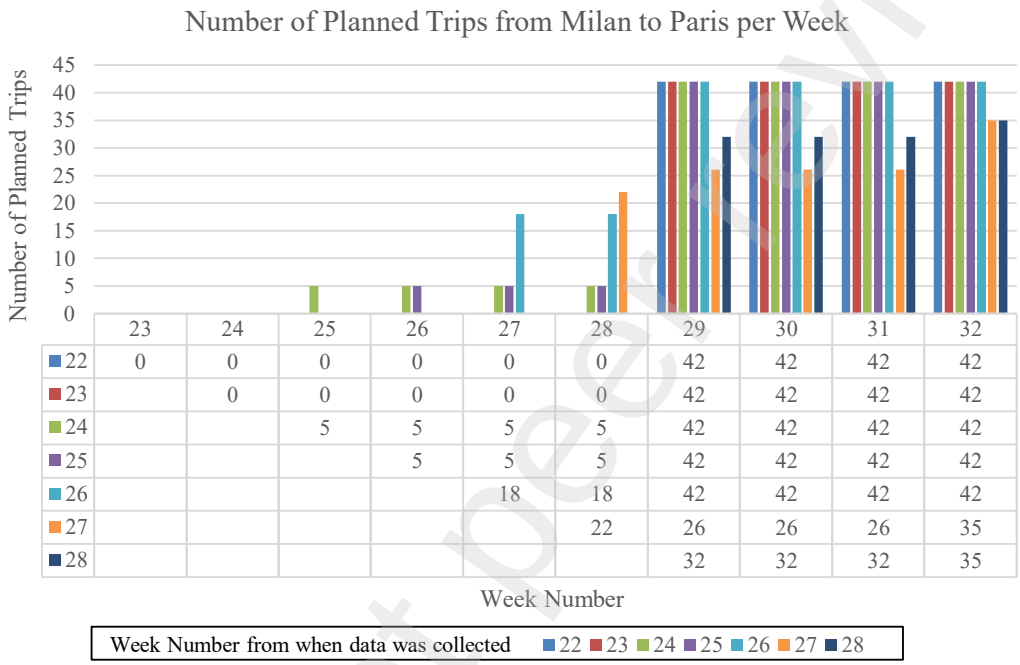


	23	24	25	26	27	28	29	30	31	32
22	12	12	49	53	53	53	53	53	53	53
23		11	12	53	53	53	53	53	53	53
24			15	18	46	46	53	53	53	53
25				18	18	46	53	53	53	53
26					24	24	53	53	53	53
27						32	32	62	62	62
28							46	46	68	68

Figure 4: FlixBus supply on the Berlin–Munich route

On ***long-haul routes***, for the Milan-Bari line, the baseline strategy was for a "peak-season" supply (14 trips/week) double that of the "try-out" supply. The ramp-up strategy showed a stable supply during the "try-out" period followed by supply reductions in the "peak-season" (7 trips/week in week 25). For the Milan-Paris line, the baseline consisted of a supply during the "peak-season" only (42 trips/week). The "ramp-up" strategy consisted of anticipating the re-launch of the line for week 25 (5 trips/week). The "try-out" supply was gradually increased

up to a frequency of 22 trips/week in week 28. For the "peak-season", the ramp-up strategy consisted of an overall 76% reduction in weekly trips (Fig. 5). For Madrid-Lisbon line, there was a constant high baseline supply (32 trips/week) without any distinction between the "try-out" and "peak-season" periods. Concerning the ramp-up strategy, there was a continuous supply reduction within a two-week window to only 2 trips/week during the "try-out" period. The supply in the first weeks of the "peak-season" was reduced to daily trips and to a maximum of 14 trips/week (44% of the baseline). FlixBus's baseline strategy for the Barcelona–Geneva route was 7 trips/week over the whole period. For the "ramp-up strategy", supply was reduced often with two weeks' notice, varying between 2 and 5 trips/week.



	23	24	25	26	27	28	29	30	31	32
22	0	0	0	0	0	0	42	42	42	42
23		0	0	0	0	0	42	42	42	42
24			5	5	5	5	42	42	42	42
25				5	5	5	42	42	42	42
26					18	18	42	42	42	42
27						22	26	26	26	35
28							32	32	32	35

Figure 5: FlixBus supply on the Milan-Paris route

From an analysis of the weekly frequencies it may be concluded that FlixBus's strategy during the pandemic did not correspond to a well-structured, well-defined plan, but it was rather what Mintzberg (1987) would call an "emergent" strategy. FlixBus remained flexible in responding to demand and to external circumstances, determining local approaches to the ramp-up. The matrix framework in figure 6 presents a summary of the approaches observed in relation to the baseline strategy and the ramp-up strategy for the different routes. We have separated the baseline strategy into two different headings: "Increasing" and "Constant". "Increasing" corresponds to routes where baseline supply can be divided into two periods with different weekly frequencies: an initial period with a low frequency, followed by second period with a higher frequency. "Constant" corresponds to routes with a constant supply throughout the whole period, without any significant changes in their baseline. All routes characterized by an "increasing" baseline strategy were domestic routes, while those characterized as "constant" were either new markets or international connections.

The ramp-up strategy is separated into three headings, in increasing order of dynamicity: "Stable", "Gradual cancellations with two weeks' notice" and "Increase of try-out offer and decrease of peak-season offer".

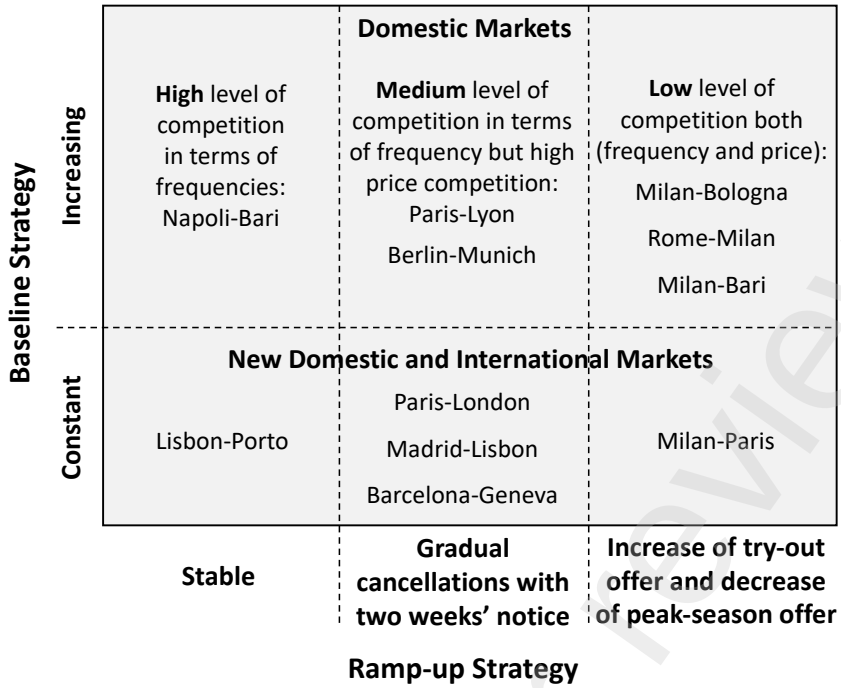


Figure 6. Supply strategy matrix for FlixBus during the COVID-19 pandemic

In the case of domestic routes, the dynamicity observed on a route appears to be inversely proportional to the degree of competition on that route. That is to say, on domestic routes where competition was less fierce, FlixBus was better able to adopt a more flexible approach to its ramp-up, altering the supply for the whole period, even where this meant cancelling trips so that supply more closely matched the current demand. The company was thus able to reduce costs in relation to revenue, serving only strategic connections with a higher occupancy.

On more competitive routes, especially those where BlaBlaBus had a larger presence and affordable prices, FlixBus used a strategy of modifying supply with a smaller time window (usually two weeks). An example is Berlin-Munich, whose baseline supply for week 25 was 53 trips/week, but only 15 of those were actually bookable the week before, suggesting a pressure to maintain market share focused on cash generation in the light of the entry of BlaBlaBus with a constant supply. On the Milan-Bari route, MarinoBus had high weekly frequencies, while FlixBus maintained its supply approximately constant for the whole period, with a "stable" ramp-up strategy. On the Lisbon-Porto route, a new market for FlixBus, a stable and constant supply was put in place with lower frequencies over the whole period. This strategy allowed the company to maintain a good level of customer satisfaction while registering lower losses in a critical period where customers were beginning to try out their service. This was important, given the intense competition on the route from Rede Expressos with its high-frequency service, although Rede Expressos tickets remained more expensive.

3.3 Demand assessment during the pandemic

The responses analysed fall into two groups: first, respondents who had to travel during the pandemic to return to their permanent place of residence (whether or not the trip had already taken place when they responded to the survey); and second, other respondents who were expressing general views on leisure travel during and after the pandemic.

There were 437 responses to our survey. Among the 360 responses from Europe, 237 were from Germany and Italy. Most of the respondents were under 50 years old.[2] Figure 7 shows the respondents' age and country of residence (only European respondents). 71% of respondents were already in their permanent place of residence at the outbreak of the pandemic and thus did not need to travel "home". As a consequence, these respondents were expressing opinions that concerned only their current and future leisure and business travel plans. The remaining 29% were responding in regard to a trip back to their permanent place of residence either already undertaken during the pandemic (18%) or that they were intending to undertake (11%). This separation into two distinct groups is important in understanding the differences in the needs and preferences expressed, with respondents in the second group focusing on what could be considered an "emergency" trip, given lockdowns and travel restrictions.

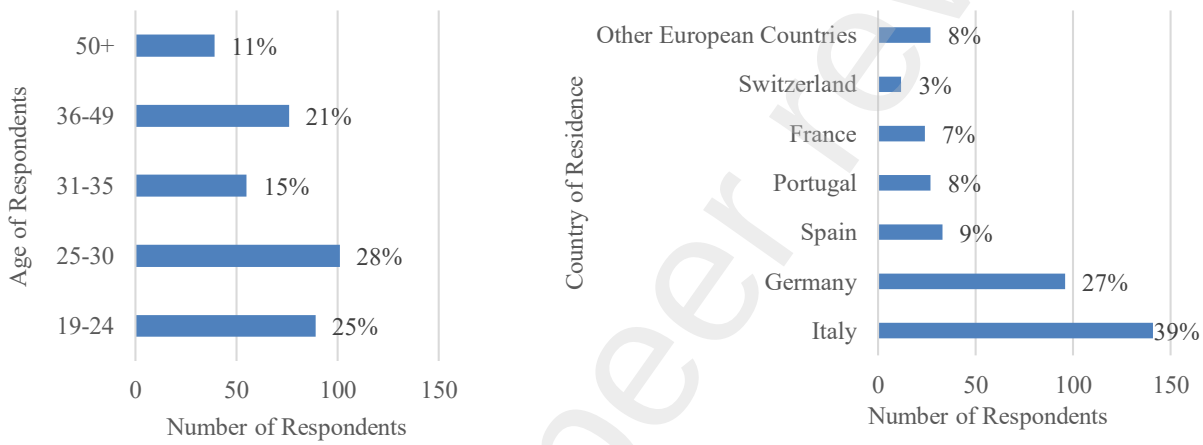


Figure 7. Respondents' age and country of residents (only Europe)

3.3.1 Travelling during the pandemic

For the respondents who had already travelled during the pandemic or were intending to, the main reasons given for returning to the permanent place of residence related to national lockdowns and a desire to be closer to family during this period. Table A1 in appendix shows the descriptive statistics of the reasons why respondents travelled during the pandemic. 59% of the respondents had not been planning a return trip before the COVID-19 outbreak.

The descriptive statistics of the reasons of mode choice during the pandemic is reported in table A2 in appendix. The most important variables in the choice of transport mode for this trip were hygiene standards, safety, and cost. However, for the respondents who used long-distance buses, hygiene standards, the number of seats on sale, and the number of seats already booked were not among the principal reasons for choosing bus travel. During the pandemic many transport companies declared that selling only 50% of their capacity was not enough to cover all the costs, preferring instead to suspend services completely. This was the case for FlixBus, which re-started operations in May 2020 with full bus capacity.

Results of Exploratory Factor Analysis (EFA) are given below, with a sample adequacy of 0.663 for KMO test results, a chi-square value of 316.449 for Bartlett test results, a degree of

[2] The preponderance of younger travellers is a characteristic feature of long-distance travel. In Germany, for example, only 17% of long-haul bus travellers are over 50 years old.

freedom (df) of 66, and *p* value of 0.000. Varimax rotation was applied and generated 4 factors (Table 3), explaining approximately 67.5% of total variance, which is a satisfactory result.

Table 3: EFA: modal choice during the pandemic

	Factors			
	Brand and occupancy	**Travel convenience**	**Safety and hygiene**	**Departure specifics**
Comfort	0.474			
Company brand	0.507			
Number of seats on sale	0.921			
Number of tickets already booked	0.842			
Cost		0.728		
Travel time		0.754		
Interconnections		0.613		
Date		0.627		
Safety			0.816	
Hygiene standards			0.848	
Day of the week				0.837
Departure time				0.845

The "*Brand and occupancy*" factor includes variables relating to the comfort of the trip made, as well as to familiarity with the company brand. It includes an evaluation of occupancy, especially where there is an official recommendation to avoid crowded places. "*Travel convenience*" refers to the travel cost and time, interconnections and date of the trip (which influences how far in advance the trip is planned), all of these elements impacting the price. The "*Safety and hygiene*" factor includes the health measures and protocols in operation during the pandemic. The final factor, "*Departure specifics*", groups variables regarding the day of the week and the time of the day the departure is made. These factors were then used as new variables for clustering. Three clusters were obtained using k-means clustering, hierarchical methods having first been used to determine the appropriate number of clusters. Table 4 reports the size of clusters. It can be seen from the F-ratio that "*Brand and occupancy*" and "*Safety and hygiene*" are the most significant factors in determining the clusters using Analysis of Variance (ANOVA).

Table 4: Clustering: modal choice during the pandemic

	Factors mean			
Cluster (size)	**Brand and occupancy**	**Travel convenience**	**Safety and hygiene**	**Departure specifics**
1: Emergency travellers (15)	4.93	8.67	3.67	1.47
2: Focus on essentials (48)	4.92	12.02	8.15	3.00
3: Conscientious travellers (17)	13.41	15.59	8.88	6.00
Grand mean	6.72	12.15	7.46	3.35
Between mean squares	482.62	191.88	136.41	89.23
Within mean squares	9.52	19.67	2.53	5.50
F-ratio (*p* value)	50.72 (0.00)	9.76 (0.00)	53.84 (0.00)	16.22 (0.00)

We labelled the first cluster (15 users) "*Emergency travellers*", since all the factors had low scores, suggesting the urgency of travel caused by the pandemic. The second cluster (60% users) had a higher score on *Safety and hygiene* and a medium score on *Travel convenience,* with low scores on *Brand and occupancy* and *Departure specifics*. The cluster is labelled

"*Focus on essentials*", because in a pandemic period these travellers valued *Safety and hygiene* the most and gave less importance to any other aspects of their choice. The third cluster (17 individuals) has the highest scores on all the factors, suggesting that these travellers continued to value convenience and comfort even during the pandemic, and we therefore labelled this cluster "*Conscientious travellers*".

The clusters were analysed with reference to the socio-demographic and mobility information obtained in the survey (Table 5). "*Emergency travellers*" included the highest percentage of residents in Italy and Spain, the highest percentage without a driving license and the highest percentage using a long-distance bus to return home. This is also the cluster with the highest percentage of respondents booking their trip home less than one week before departure, reinforcing the "emergency" aspect of the cluster. The "*Conscientious travellers*" included the highest percentage of residents in Germany and Portugal, the highest percentage returning home by plane, and the highest percentage booking their ticket one month or more in advance.

Table 5: Socio-demographics and preferences across clusters: travelling home during the pandemic

		Clusters (%)		
		Emergency travellers	**Focus on essentials**	**Conscientious travellers**
Gender	Male	40	31	35
	Female	60	69	65
	Non-binary	0	0	0
Age	0-24	29	42	44
	25-30	43	40	31
	31-35	21	4	13
	36-49	7	7	6
	50+	0	7	6
Country of Residence	Italy	53	48	29
	France	0	13	6
	Portugal	0	8	12
	Germany	0	15	35
	Switzerland	7	2	0
	Spain	20	8	0
	Other	20	6	18
Driving License	Yes	73	85	88
	No	27	15	12
Time in advance on booking the return trip	Less than 1 week	53	37	13
	1 week	13	17	13
	2 weeks	13	5	31
	3 weeks	13	10	6
	1 month	0	12	19
	More than 1 month	7	20	19
Transport mode of the return trip	Long-distance bus	21	2	6
	Plane	43	54	65
	Private car	0	21	6
	Train	21	23	24
	Other	7	0	0

3.3.2 Impact of the pandemic on leisure travel preferences

The items relating to plans made in a situation of high uncertainty followed by months of lockdown and travel restrictions were analysed to identify potential factors for clustering respondents according to their reaction towards leisure travel. EFA revealed seven factors, explaining 61.8% of total variance (Table 6). A KMO test result of 0.785 and a Bartlett test chi-square value of 2448.99 (degree of freedom of 253 and *p* value of 0.000) validated the factor analysis. The seven factors were then used as new variables for clustering respondents. Five clusters were obtained using k-means clustering, after using a hierarchical method to determine the appropriate number of clusters. Table 7 reports the size of the various clusters and the mean for each factor (using unstandardised data). From the F-ratio it can be seen that "*Willingness to travel in the pandemic*", "*Change in modal choice*", and "*Change in destination choice*" are the most significant factors in determining clusters using ANOVA.

Respondents in the first cluster (73 individuals), "*Travel enthusiasts and risk takers*", perceived the different modes as safe, and were thus willing to travel during the pandemic. They were inclined to start travelling again as soon as governments allowed, or were already making plans for the near future, showing flexibility as regards travel habits, destinations and cancellation policies. The second cluster (69 individuals), "*Adaptable travel enthusiasts*", had a fairly high willingness to travel even during the pandemic, but were more open to changes in their travel plans, including in regard to durations of trips and destinations. The third cluster (74 individuals), "*Flexible travellers*", exhibited a more flexible approach towards leisure travel, and although they considered the different modes to be safe, they were less willing to travel during the pandemic period. This cluster had the highest values for most of the factors involving a behavioural change (travel mode, destination, etc.). The fourth cluster (90 individuals), "*Adaptable cautious travellers*", preferred to start travelling again only after the pandemic. They were, however, open to changes in their habits and destination choices and gave more importance to cancellation/rebooking policies. The fifth cluster (54 individuals), "*Cautious and conservative travellers"*, had the lowest scores for willingness to travel during the pandemic, changes in mode and destination choices, and in relation to cancellation/rebooking policies.

The different clusters were cross-analysed with the socio-demographic and behavioural data (Table 8). The "*Adaptable travel enthusiasts*" have the highest percentage of males under 35 years old (75%), which seems consistent with the flexibility to change generally attributed to youth. This cluster showed a reluctance to give up travel during the COVID-19 period, and a willingness to adapt habits and destinations if needed. The two "*Travel enthusiasts*" clusters (whether "*risk takers*" or "*adaptable*") have the highest percentage of respondents not owning a car (>40%). The "*risk takers*" are those who were mostly already in their permanent place of residence before the pandemic began (77%), while the "*Cautious and conservative travellers*" included the highest percentage returning home during the pandemic. This suggests that the effort made in returning home and their experience of this journey might have made them more cautious and less willing to travel again during the pandemic. The first cluster ("*risk takers*") has the highest percentage of those preferring to book the trip home less than a week in advance, which seems consistent with the risk-taking tendency. The "*Adaptable*" clusters (whether "*travel enthusiasts*" or "*cautious travellers*"), have the highest percentage of German

Table 6: EFA: attitude towards leisure trips during and after pandemic

	Factors						
	Modal safety	**Willingness to travel in the pandemic**	**Change in travel habits**	**Change in modal choice**	**Change in destination choice**	**Travel after pandemic**	**Cancellation/rebooking policy**
It is safe to travel with my private car during the pandemic	0.37						
It is safe to travel by plane during the pandemic	0.79						
It is safe to travel by bus during the pandemic	0.85						
It is safe to travel by train during the pandemic	0.86						
It is safe to travel using car-pooling (e.g., BlaBlaCar) during the pandemic	0.73						
I went on a holiday trip on July/August 2020		0.59					
As soon as governments authorized, I started going on weekend getaways		0.75					
As soon as governments authorize, I intend to do long leisure trips (if it is already authorized in your country, refer to your plans when it wasn't)		0.76					
I feel now is a good moment to plan my future leisure trips because of lower prices/promotions		0.44					
I do not intend to do international leisure trips this year		-0.55					
When travelling for leisure after the pandemic I feel safer going to places I already know			0.74				
I will begin travelling for leisure to less crowded/known destinations			0.59				
I feel it is safe to do leisure trips now, but I wouldn't do it because it is not socially acceptable			0.49				
When the pandemic is over, I will use more private modes for leisure trips because of fear of being infected			0.51				
After the pandemic is over, I prefer to go on domestic leisure trips			0.62				
Due to COVID-19 I changed the mode of transport to go on holidays				0.85			
Due to COVID-19 I changed the mode of transport to go on weekend getaways				0.87			
I intend to change my weekend getaway destination due to COVID-19					0.75		
I intend to change my holiday's destination due to COVID-19					0.84		
I will only go on weekend getaways again after the pandemic is over						0.84	
I will only do long leisure trips again after the pandemic is over						0.83	
I will read more carefully the cancellation/rebooking policy when booking a leisure trip from now on							0.81
I would be ready to pay more for a more flexible cancellation/rebooking policy from now on							0.75

Table 7: Clustering: attitudes towards leisure trips during and after the pandemic

Cluster (size)	Factor Mean						
	Modal safety	**Willingness to travel in the pandemic**	**Change in travel habits**	**Change in modal choice**	**Change in destination choice**	**Travel after pandemic**	**Cancellation/ rebooking policy**
1: Travel enthusiasts and risk takers (73)	14.86	12.09	5.47	1.42	1.66	2.86	5.95
2: Adaptable travel enthusiasts (69)	9.42	9.69	9.19	4.14	6.72	2.58	6.09
3: Flexible travellers (74)	10.09	5.61	14.69	7.39	6.77	6.96	7.95
4: Adaptable cautious travellers (90)	7.54	2.09	9.34	2.13	5.72	6.96	6.97
5: Cautious and conservative travellers (54)	7.72	1.52	6.94	1.89	1.11	5.79	3.48
Grand mean	9.94	6.21	9.27	3.42	4.61	5.11	6.27
Between mean squares	26.52	38.47	34.42	41.57	44.98	34.90	27.03
Within mean squares	0.71	0.58	0.62	0.54	0.50	0.62	0.71
F-ratio (*p* value)	37.22 (0.00)	66.57 (0.00)	55.22 (0.00)	76.56 (0.00)	89.18 (0.00)	56.48 (0.00)	38.24 (0.00)

Table 8: Cross-analysis between leisure trips' preferences and socio-demographics

		Clusters (%)				
		Travel enthusiasts and risk takers	**Adaptable travel enthusiasts**	**Flexible travellers**	**Adaptable cautious travellers**	**Cautious and conservative travellers**
Gender	**Male**	44	36	41	31	31
	Female	55	64	59	69	67
	Non-binary	1	0	0	0	2
Age	**0-24**	30	29	19	29	22
	25-30	25	26	29	22	35
	31-35	9	20	19	10	12
	36-49	26	18	20	27	16
	50+	10	6	14	12	16
Country of Residence	**Italy**	38	25	39	43	52
	France	8	14	3	4	4
	Portugal	11	4	8	4	11

	Germany	21	33	24	33	19
	Switzerland	5	4	3	1	4
	Spain	12	9	8	8	9
	Other	4	10	15	6	2
Number of cars	**0**	41	43	32	36	30
	1	30	35	28	31	33
	2	22	14	28	20	28
	3+	7	7	11	13	9
Status of the respondent	**In the place of residence (before COVID-19)**	77	71	66	71	67
	Not in the place of residence	11	14	15	16	13
	Returned home during COVID-19	12	14	19	13	20
Time in advance on booking the return trip	**Less than 1 week**	58	23	41	22	33
	1 week	0	8	29	17	17
	2 weeks	8	23	0	17	17
	3 weeks	8	23	6	0	17
	1 month	8	8	12	17	8
	More than 1 month	17	15	12	28	8
Transport mode of the return trip	**Long-distance bus**	0	14	15	0	8
	Plane	62	71	35	63	46
	Private car	15	7	20	5	23
	Train	23	7	25	32	23
	Other	0	0	5	0	0

residents and have high scores for adaptability regarding destination choice. The "*Adaptable travel enthusiasts*" also have a high score for willingness to travel even during the pandemic. This aspect, together with the fact that Germany, Italy, and France were the countries whose residents were most likely to go on holiday during the summer of 2020, significantly influenced the destinations chosen.

4. Discussion and conclusions

This research was done to assess the operational strategy of FlixBus during the pandemic in Europe and to determine whether this strategy reflected its business model and perceptions by its customers.

Considering the results of the survey and referring to the respondents who had returned home or were planning to, the *Emergency travellers* cluster contained the highest percentage of travellers using a long-haul bus service. This cluster exhibited the lowest score for almost all factors relating to mode choice; these individuals did not much care how they travelled. This suggests that FlixBus's strategy in the pandemic period, providing a gradual and flexible increase in supply and focusing less on amenities and extra safety measures than their traditional competitors, was appropriate for this group of travellers, especially in markets like Italy and Spain. Flixbus's strategy was also appropriate for the cluster whose modal preference was for long-haul bus and that was inclined to book a shorter time in advance. The company was also able to continue providing a low-cost solution while still maintaining a reasonable supply, higher than its competitors, which meant that these customers had no need to turn to competitors during this period, thus making it less likely that they would switch suppliers on future trips.

In addition to its flexible ramp-up strategy and substantial increase in supply during the summer on the main lines, FlixBus implemented a rigorous hygiene protocol, including mandatory mask use, regular disinfection of its fleet and the provision of hand sanitizers. It also introduced "*FlixDeal*", a system of vouchers for future trips. The prepaid vouchers were valid for three years and were redeemable against any one-way FlixBus or FlixTrain ticket on a direct route. The vouchers were sold for a €14 flat rate at the beginning of the pandemic. This strategy, which generated revenue at a time when lockdowns were forcing the company to suspend operations, was consistent with the preferences of both *Travel enthusiasts and risk takers* and *Adaptable travel enthusiasts*. Respondents in these two clusters, as well as being willing to travel even during a pandemic, saw this period as an opportunity to plan future leisure trips making the most of favourable deals. The *Adaptable travel enthusiasts* cluster has the highest percentage of under 35s, an age bracket that market analysis has shown to represent an important part of FlixBus's market.

A health crisis may potentially be followed by a recovery in demand that is slow and accompanied by a higher level of fear and risk aversion. In this survey, *Adaptable travel enthusiasts*, *Flexible travellers*, and *Adaptable cautious travellers* had the highest scores for the factors *change in travel habits* and *change in destination choice*. *Change in travel habits* includes a preference for domestic trips even after the pandemic, along with a preference for the higher level safety that respondents believe is to be found in less crowded, more familiar

places, while *change in destination choice* refers to a change in travel destination due to COVID-19 for weekend gateways and longer holidays. The three clusters mentioned had the highest percentage of German residents, which corresponds to a trend observed in experimental data by Destatis (2021). That study made use of mobile phone data to investigate mobility inside Germany between 2019 and 2020. Overall, there was a substantial reduction in mobility in March 2020, followed by an increase from April to July. In some cases, it took little time to return to and then to exceed pre-pandemic levels. Mobility recorded on 30th May in the state of Mecklenburg-Western Pomerania was 79.33% higher than a year previously, and in July and August there were also several days where mobility was over 70% higher than the previous year. Mecklenburg-Western Pomerania is on northern Germany's Baltic Sea coast, with its beaches, resorts and lakes making it a popular summer destination. This increase in mobility towards a domestic destination matches the changes in summer destinations and the preferences for closer places that we also observed in our analysis.

FlixBus's operations and strategy in the pandemic, its flexibility, the stronger comeback on essential routes and nearby holiday options is entirely consistent with its business model, that is to say a model focused on essentials, offering affordable mobility and a tech-focused approach. In this respect, the company was different from its competitors during the pandemic period, being better able to provide flexible supply on its various routes and quickly react to changes in demand. The flexible ramp-up of operations implemented by FlixBus was also appropriate in the face of high dynamicity and uncertainty in the market. This is a case of "strategy as plot" (Mintzberg, 1987), which is an alternative way of demonstrating market power and influencing the behaviour of competitors in order to obtain a larger market share. In a scenario of uncertainty and unprecedented demand, this strategy can work like a threat of investment, discouraging competitors from expanding their own operations. Such flexibility, however, is not easy to achieve for any type of company, and represents a competitive advantage for FlixBus. For FlixBus, it includes the company's focus on internationalisation and expansion, affordability, and sustainability, without clearly stating the "how" in a structured and explicit plan that could limit its strategy. This explains much of FlixBus strategy in the pandemic: a flexible and dynamic approach to the ramp-up of operations, closely following changes in demand as well as changes in supply by FlixBus's competitors, without giving up on expansion even at such a difficult time. For example, FlixBus's national operations in Portugal started in May 2020, and later that year they started in the UK. In the first semester of 2021 FlixTrain started operations in Sweden, the first market outside Germany, and considerably expanded its German network. It is also worth highlighting a recent new round of investments for FlixMobility, a series G round of funding of more than US$ 650 million, raising its valuation to over US$ 3 billion. The only other company that could have had the same advantage is BlaBlaCar; however, BlaBlaCar's lower market power in the bus sector limited its response to the crisis, offering a smaller supply than FlixBus and a later re-launch.

New insights about Flixbus strategy versus its competitors come looking at the supply assessment and the main findings of the survey through the PASS (Zhang et al., 2021) framework (P: Prepare, Protect and Provide; A: Avoid and Adjust; S: Shift and Share; and S: Substitute and Stop) that highlights links between the company's strategy, the supply during

COVID-19, and the preferences of customers. We can conclude from our analysis of the weekly frequencies that the strategy followed by FlixBus during the pandemic did not correspond to a well-structured, clearly defined plan, but relied rather on what Mintzberg (1987) terms an "emergent" strategy. Apart from drawing up an initial plan for dealing with the COVID-19 crisis and for organizing the ramp-up of operations following lockdowns in the countries where it operates, FlixBus remained flexible in responding to demand behaviour and the external situation in order to determine local approaches to the ramp-up. This is consistent with Mintzberg's (1987) definition of "realized" strategy as a culmination of "intended" and "emergent" strategies; in a period of high uncertainty and unpredictability, like that experienced in 2020, it is essential to react in a flexible and quick way.

Considering the *P (Prepare, Protect and Provide)*, the central aspect was preparing guidelines and contingency plans to be activated during the pandemic. With reference to Porter's Five Forces Model (Porter, 1996), FlixBus's business model relies on partnering with existing bus companies. Although the bargaining power of these companies has traditionally been low, an increased presence of eastern European providers has created a more challenging situation, with the entry of new competitors and changes in opportunity costs for bus owners, especially after a pandemic period during which companies incurred significant losses. Dynamicity and flexibility formed an essential part of FlixBus's strategy, in pricing, in network planning, and in frequency of service in a time of crisis, enabling FlixBus to react quicker than its competitors to shifts in demand. To better exploit this advantage, FlixBus also needs to define a series of guidelines for managing the relationship with bus partners during a pandemic period, especially as regards service cancellations and modifications in its network.

The experience of the COVID-19 pandemic could help FlixBus deal with similar travel disruptions in the future, possibly designing "emergency networks" to be put in place in similar situations, even locally. To protect users and drivers, a detailed health protocol must be defined now, based on existing coronavirus data and on new studies, to enable a quick response to future waves. All of this must be carefully studied not to impact greatly on price and convenience; as the survey reveals, travellers during the pandemic tended to value "*Travel convenience*" including factors like cost and travel time more highly than "*Safety and hygiene*". Other important factors observed are rebooking and cancellation policies, which became a more important consideration when purchasing tickets, especially for the "*Flexible travellers*" and "*Adaptable cautious travellers*" clusters. FlixBus should revisit its policy, making it clearer to the public, providing timely information, and possibly proposing faster and more flexible cancellation/rebooking options for customers wishing to pay extra for them.

Going to *A (Avoid and Adjust)*, the cluster of "*conscientious travellers*" who had travelled during the pandemic was the cluster with the largest percentage of German residents, and also the cluster with the highest scores for all factors related to the choice of transport mode. Given that Germany is FlixBus's biggest market, special attention must be paid in terms of customer service, service quality and bus occupancy. This cluster was alone in having a high score for the "*Brand and occupancy*" factor, which includes numbers of seats put on sale. This might be an argument for studying the feasibility of offering 50% bus capacity on pre-determined routes in future pandemic waves or health emergencies, using data obtained for different routes during

the pandemic period. With travellers' concerns in mind, FlixBus might also offer more connections between big cities and destinations that are closer and/or perceived as less crowded. The survey identified this as a customer need in the "*adaptable/flexible*" clusters immediately following the crisis. As a consequence, FlixBus must also adjust its own operations, planning an emergency network and taking advantage of the flexible demand-response strategy already put in place during the COVID-19 pandemic, as observed in the "ramp-up strategy" from most of the analysed routes.

Analysing *S (Shift and Share)*, as a pandemic situation develops, FlixBus must shift its network to a pre-determined alternative network, and apply a demand-response strategy to shift operations according to the pandemic situation locally, according to customer demand, and according to the reaction of competitors. An opportunity that could arise from the pandemic period but has not yet been harnessed by FlixBus is shared mobility, using the idle capacity of buses to transport goods and expand revenues in times of low demand.

Finally, considering the second *S (Substitute and Stop)*, during critical periods of health emergencies transport operations might need to be suspended, according to pre-determined protocols referenced in the first step of the PASS framework. However, in times of lockdown FlixBus could opt to replace its core earnings by revenue generated through online know-how, exploiting its technological capabilities. This is an opportunity that appeared during the COVID-19 pandemic but that might also be relevant in a post-pandemic situation. As a tech company, FlixBus could offer its own software to other mobility companies that are not direct competitors, in a Software as a Service (SaaS) approach. This could have been a differential at a time when COVID-19 was forcing a lot of companies to accelerate their digital transformation. SaaS could also provide FlixBus with an additional way of entering new, less appealing markets, expanding its internationalisation even to markets where traditional operations might not yet be profitable. It could also facilitate future entry into other markets, by establishing beforehand a network of partners already familiar with FlixBus's services and software. However, an analysis needs to be done to assess whether that software is an essential component of FlixBus's competitive advantage, and whether sharing it might negatively impact the company's competitive positioning.

This accelerated digital transformation in the transport sector was also highlighted in the literature review, with online booking becoming a standard service (Zhang and Hayashi, 2020) and no longer a FlixBus differential. The company might benefit from a review of its competitive advantages, based on its core capabilities, one of them being the development of mobility software. More generally, the rapid advance of Artificial Intelligence and Machine Learning, Autonomous Driving and Electric Vehicles is likely to disrupt the market. Given FlixBus's entrepreneurial vision and technological expertise, these disruptions may bring new competitive advantages in FlixBus's operations and guide the company's internationalisation and its growth in already well-established markets.

The main difference observed between domestic and international lines was a more conservative approach in relation to international connections, given that these were riskier connections in a pandemic period. This conservative approach was characterised by a constant baseline supply and a ramp-up strategy more oriented towards reducing frequencies from the

baseline. The inverse relation observed on domestic routes between dynamicity in the ramp-up and intensity of competition was not observed on international routes.

The survey showed that FlixBus's approach was also pertinent to important market segments, enabling it to maintain its competitive positioning especially in relation to traditional players like MarinoBus, ALSA and Rede Expressos. Even though BlaBlaBus offered higher frequencies than those traditional players, and tickets with prices similar to those of FlixBus, FlixBus was still able to take advantage of its position and already greater market power in Germany and France. This, combined with a more careful approach to its ramp-up, guaranteeing sufficient supply to prevent loss of market share to its main competitors, ensured a strong comeback even on routes with more intense competition. The data used for this study, however, focused only on weekly frequencies and companies' policies. There is therefore a need for future research to assess bus occupation and revenue, which are not publicly available data.

Alongside weekly frequencies, an analysis of supply in a pandemic period also needs to look the *days of the week* and the *times* where services operated; neither of these parameters featured in our research. In this regard, however, the German mobility data (and the results of the survey more generally) demonstrate that when normal demand profiles are disrupted by external circumstances, dynamicity and flexibility are key. When a situation is unprecedented, historic data on the level of demand and seasonality of a given route have far less relevance than assessments of present demand.

Data from 2020 and correlations between the various COVID-19 waves in Europe must be analysed to provide insights for future waves and possible future mobility disruptions. This might be a moment to work out specific routes for pandemic periods, for example, reinforcing connections between Germany's main cities and its northern coast, and between other urban centres and nearby holiday destinations, in line with the change in demand that occurred during the first waves of the COVID-19 pandemic. This was a trend clearly observed in the survey.

The PASS framework employed in the analysis of supply and customer responses was useful for summarising some important aspects, and could potentially prove useful for other analyses in the future. What emerged from the PASS framework is reflected in the recent network expansion and new partnerships launched by FlixBus. FlixBus UK has expanded its daily routes to include the city of Dundee (midway between Glasgow and Aberdeen) from August 2022, serving more customers and locations than ever before. Ticket price starts at 99p, providing an affordable and reliable travel option for the city.[3] Recently Flixbus UK launched a partnership with Welsh operator Cymru Coaches[4] in May 2022, and with Nottingham-based operator Tiger European[5] as of 15 August 2022.

CRediT authorship contribution statement

Cristina Pronello: Conceptualization, Methodology, Data curation, Supervision, Writing-Reviewing and Editing, Project administration, Validation. **Marcos Henrique Dos Santos**

[3] https://www.intelligenttransport.com/transport-news/139024/flixbus-uk-new-city-scottish-coach-network/.
[4] https://www.intelligenttransport.com/transport-news/137155/flixbus-uk-cymru-coaches/.
[5] https://www.intelligenttransport.com/transport-news/138641/flixbus-nottingham-operator-tiger-european/.

Fornari: Data curation, Methodology, Software, Visualization, Investigation, Validation. **Pinky Kumawat**: Writing-Original draft preparation, Validation.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

ART, 2017. Indagine conoscitiva sul mercato dei servizi di trasporto via autobus a media e a lunga distanza in regime di libera concorrenza.

Bahn, D., 2021. Deutsche Bahn Facts & Figures 2020.

Belyh, A., 2016. Flixbus, Interview with its co-founder Jochen Engert. Cleverism.

Beria, P., 2020. La pandemia della mobilità. EyesReg 10.

Beria, P., Grimaldi, R., Debernardi, A., Ferrara, E., Laurino, A., 2014. Spatial and scenario analyses of long distance coach transport in Italy.

Beria, P., Nistri, D., Laurino, A., 2018. Intercity coach liberalisation in Italy: Fares determinants in an evolving market. Res. Transp. Econ. 69, 260–269. https://doi.org/10.1016/j.retrec.2018.07.029

Beria, P., Tolentino, S., Vardhman, L., 2020. Rapporto sul Mercato delle Autolinee a Lunga Percorrenza in Italia.

Bertolin, A., Tolentino, S., 2019. Le autolinee di media e lunga percorrenza in Italia: evoluzione del settore da prima della liberalizzazione ad oggi. Le autolinee di media e lunga percorrenza in Italia: evoluzione del settore da prima della liberalizzazione ad oggi. Riv. di Econ. e Polit. dei Trasp.

Burgdorf, C., Eisenkopf, A., Knorr, A., 2018. User acceptance of long distance bus services in Germany. Res. Transp. Econ. 69, 270–283. https://doi.org/10.1016/j.retrec.2018.07.023

Crozet, Y., Guihéry, L., 2018. Deregulation of long distance coach services in France. Res. Transp. Econ. 69, 284–289. https://doi.org/10.1016/j.retrec.2018.07.021

de Haas, S., Herold, D., Schäfer, J.T., 2017. Entry deterrence due to brand proliferation: Empirical evidence from the German interurban bus industry. MAGKS Pap. Econ. 201731.

Deloitte, 2021. Mobility after COVID-19: the lure of travelling versus "flight-shaming."

DG MOVE, 2016. Comprehensive Study on Passenger Transport by Coach in Europe.

Engert, J., 2019. Flixbus & Omio - NOAH19 Berlin.

Eurostat, 2017. Modal split of passenger transport.

Flixbus, 2018. Reinventing Travel: FlixBus Celebrates Five Years of Booming Business.

FlixBus, 2021. Vision 2021 remains in place: FlixMobility as an important part of green mobility revolution.

Gorgs, C., 2017. Wie Flixbus den Reisemarkt aufmischt. Manag. Mag.

Guihéry, L., 2020. Autocars interurbains en Allemagne: pour FlixBus, le temps des interrogations. Transp. Infrastructures Mobilité.

Guihéry, L., 2019. Long Distance Coach Services in France and Germany: the new European competition between Flixbus and BlaBlaBus. Riv. di Econ. e Polit. dei Trasp.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., Tatham, R.L., 2006. Multivariant Data Analysis. Pearson International.

Knorr, A., Lueg-Arndt, A., 2016. Intercity bus deregulation in Germany – Intramodal and intermodal effects after two years. Res. Transp. Econ. 59, 323–329. https://doi.org/10.1016/j.retrec.2016.06.005

Maskey, R., Fei, J., Nguyen, H.-O., 2018. Use of exploratory factor analysis in maritime

research. Asian J. Shipp. Logist. 34, 91–111. https://doi.org/10.1016/j.ajsl.2018.06.006
Mintzberg, H., 1987. The Strategy Concept I: Five Ps for Strategy. Calif. Manage. Rev. 30, 11–24. https://doi.org/10.2307/41165263
Mintzberg, H., Lampel, J., Ahlstrand, B., 1998. Strategy Safari: A Guided Tour Through The Wilds of Strategic Management. Free Press.
Porter, M.E., 1996. What is Strategy? Harv. Bus. Rev. 74, 61–78.
Press Release Stampa FS ITALIANE, 2020. 1–3.
Schiefelbusch, M., 2013. Developments in Transport Policy Past and Future Regulation of Interurban Coach Services in Germany. J. Transp. Econ. Policy.
van de Velde, D., 2014. Market initiative regimes in public transport in Europe: Recent developments. Res. Transp. Econ. 48, 33–40. https://doi.org/10.1016/j.retrec.2014.09.029
Van de Velde, D., 2009. Long-Distance Bus Services in Europe: Concessions or Free Market? OECD/ITF Jt. Transp. Res. Cent. Discuss. Pap. https://doi.org/10.1787/9789282102688-en
Wen, Z., Huimin, G., Kavanaugh, R.R., 2005. The Impacts of SARS on the Consumer Behaviour of Chinese Domestic Tourists. Curr. Issues Tour. 8, 22–38. https://doi.org/10.1080/13683500508668203
Wilder-Smith, A., 2006. The severe acute respiratory syndrome: Impact on travel and tourism. Travel Med. Infect. Dis. 4, 53–60. https://doi.org/10.1016/j.tmaid.2005.04.004
Zhang, J., Hayashi, Y., 2020. Impacts of COVID-19 on the transport sector and measures as well as recommendations of policies and future research: Analyses based on a world-wide expert survey. SSRN.
Zhang, J., Zhang, R., Ding, H., Li, S., Liu, R., Ma, S., Zhai, B., Kashima, S., Hayashi, Y., 2021. Effects of transport-related COVID-19 policy measures: A case study of six developed countries. Transp. Policy 110, 37–57. https://doi.org/10.1016/j.tranpol.2021.05.013
Zhou, J., Ma, C., Dong, S., Zhang, M., 2020. Unconventional Prevention Strategies for Urban Public Transport in the COVID-19 Epidemic: Taking Ningbo City as a Case Study. China J. Highw. Transp. https://doi.org/10.13140/RG.2.2.20856.06405
Zikmund, W.G., Babin, B.J., Carr, J.C., Griffin, M., 2010. Business Research Methods. CENGAGE Learning.

Appendix A

Table A1: Descriptive statistics: reasons why respondents travelled during the pandemic

	N		Median	Mode	Range	Percentiles		
	Valid	Missing				25	50	75
I was afraid of being infected with COVID-19	80	0	2	1	5	1	2	4
I was afraid of not getting proper health care	80	0	1	0	5	0	1	3
I was afraid that countries would start to lockdown	80	0	3	5	5	2	3	5
I got anxious during quarantine period	80	0	3	2	5	1	3	4
I was feeling alone outside my hometown	80	0	1	0	5	0	1	3
I lost my job	80	0	0	0	5	0	0	0
I wanted to reduce my expenditures	80	0	2	0	5	0	2	4
I wished to be closer to family during the pandemic	80	0	4	5	5	2	4	5

Table A2: Descriptive statistics: reasons of mode choice during the pandemic

	N		Median	Mode	Range	Percentiles		
	Valid	Missing				25	50	75
Cost	80	0	5.0	6	5	3	5	6.0
Travel time	80	0	4.0	4	5	2	4	5.0
Interconnections	80	0	4.0	6	5	3	4	6.0
Comfort	80	0	3.0	4	5	2	3	4.0
Safety	80	0	5.0	6	5	4	5	6.0
Hygiene Standards	80	0	5.0	6	5	4	5	6.0
Company Brand	80	0	2.0	1	5	1	2	3.6
Date	80	0	4.5	6	5	3	5	6.0
Day of the Week	80	0	2.0	1	5	1	2	4.0
Departure Time	80	0	3.0	1	5	1	3	4.0
Number of Seats on Sale	80	0	2.0	1	5	1	2	3.7
Number of Tickets Already Booked	80	0	2.0	1	5	1	2	4.0