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Article

Recovering Sustainable Mobility after COVID-19: The Case of Almeria (Spain)

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Abstract: The COVID-19 pandemic brought about a significant change in mobility habits within cities, with a significant decrease in the use of collective urban transport that has only been partially and unevenly reversed. To recover the previous rates of use, many cities are analyzing which characteristics of the urban transport network are hindering this recovery process in order to design actions to promote sustainable mobility. This article shows a study carried out in the city of Almería (Spain), where the operation variables of the municipal bus network have been analyzed (frequency, average vehicle occupancy, length of the lines, urban or suburban character, circularity, nodality or intermodality) to detect what aspects are more determinant on the number of users recovered. The results show that the lines that have recovered the most users in average are suburban lines, as well as the nodal lines that serve key centroids such as the university. Thus, the dependence of users on public transport would be the most important determinant in recovery, more than other variables representative of the service's intrinsic quality. This result shows that, without compromising the necessary quality of the service, the restrictions on less sustainable transportation alternatives will be those that, to a greater extent, allow for the prompt recovery of the space lost by urban public transportation.

Keywords: sustainable mobility; urban public transport; COVID-19; urban bus network

1. Introduction

Among other consequences, the COVID-19 pandemic has jeopardized the objective of a more sustainable urban transport, since most of the collective means have not recovered the number of users prior to the pandemic. In this context, public managers in charge of the operating and management of urban public transport (UPT) are promoting all kinds of measures to attract both the users who abandoned UPT during the pandemic, and those others who, not having been users at any time, may be susceptible of being incorporated into it. However, given the large number of socioeconomic, urban pattern, governance or service quality variables that influence the attractiveness of UPT, it is not easy to determine which measures might be most effective at this time. Within the broad spectrum of variables involved, this study has tried to analyze the correlation between both qualitative and quantitative representative variables of the service (frequency, average vehicle occupancy, length of the lines, urban or suburban route, circularity, nodality and intermodality), and the average of users recovered by UPT compared to the year prior to the COVID-19 pandemic.

The study has been carried out in Almeria, a city of 200,000 inhabitants located in the south of Spain, since its intrinsically complex territory is covered by a municipal bus service of 16 lines which provides a very broad range of values for all the variables analyzed. The results obtained are expected

to be of great interest to Public Administrations promoting sustainable urban mobility, since the study has only focused on variables intrinsic to the public transport, where the undertaking of short-term actions is feasible.

The study has been structured as follows. Firstly, a review of the existing literature has been carried out, from general aspects such as the impact of the COVID-19 pandemic on UPT to those studies that have analyzed the role of specific variables of the service in this topic. Next, the data collected to perform the study have been presented and the correlation obtained between the variables selected. Finally, the results have been discussed and the most relevant conclusions highlighted.

2. Literature review

Mobility restrictions during the COVID-19 pandemic led to a significant decrease in the number of daily trips both long distance [1] and in metropolitan areas [2,3]. This general pattern especially affected the means of collective UPT, such as the bus [4], the metropolitan train [5] or the subway [6], reaching falls of around 90% in Italy and France, 85% in Spain, 75% in the United Kingdom and 70% in Germany [7]. The number of users of urban taxis also had a very significant drop, by 94-96% [8]. Apart from these purely quantitative aspects, the impact of the pandemic on UPC was also qualitative, affecting modal choice [9]. Thus, within the general decline in mobility, a preference for means considered safer in that context, such as traveling on foot, by bicycle or by private vehicle, could be clearly observed among travelers [10,11]. For example, the decrease in passengers on the subway in New York reached 90% compared to 71% in the bike-sharing service, whose users increased their average travel time from 13 to 19 minutes, which shows the capture of new users [12]. Moreover, during the toughest phase of the pandemic, the private vehicle was the preferred option within motorized transportation [13], even competing with travelling on foot as the main way to move around in countries such as Germany or Italy [14].

The process of returning to normality is also highlighting some significant data, showing mobility patterns somewhat different from those previous to the pandemic [15,16]. The most significative could be that UPT has not recovered the number of daily users prior to the pandemic, with a similar behavior in all the collective means of transport [17]. Thus, although some of the infrastructure generated during the pandemic, for example the bike-lane network, could help return to the path marked before the COVID-19 outbreak [18], many of the advances reached in terms of sustainable urban mobility along the last decades are at risk nowadays [19]. As a whole, the share of trips that UPT has lost has translated in an increase for on foot, by bicycle as well as by private vehicle ones [20,21]. In addition, there are other aspects influencing this change as the appearance of new alternative means of transport as electric scooters and bicycles [22].

However, the percentage of UPT users' decline during the toughest phase of the pandemic, as well as that of recovering in the post-pandemic phase, are influenced by numerous variables affecting both the supply and demand of transport. Among those variables there are those of socioeconomic nature, the availability of transportation alternatives, urban patterns, and the quality of the public service [23]. Logically, the impact of the pandemic on public transportation was also strongly affected by governance and regulations emanating from public authorities [24].

Thus, from a socioeconomic perspective, studies have shown that the declines in mobility during the harshest phase of the COVID-19 lock-down were greater in areas with higher income levels [25], linked to a greater ease for telecommuting [26] despite the greater availability of private vehicles [27]. Actually, the biggest shift from UPT to the private vehicle has been associated with low-incomes areas [28], except in those with the highest percentages of captive travelers, who do not have alternative means of transportation. This was the case of some regions in India, where no decreases in the use of public transportation were observed during the pandemic [29]. For its part, the recovery of travelers after the first wave of COVID-19 was greater in areas mostly inhabited by blue-collar workers [30].

From the urban pattern point of view, changes in users' behavior depend on variables such as density or the size of urban settlements, which undoubtedly affect the viability of the shift from UPT

to non-motorized means of transport [14]. The urban zonification and the origin and destination of UPT lines have also been shown to be crucial factors in this field. For example, the study on the bus network of the city of A Coruña (Spain) [31] shows that the smallest drops in the number of users during the first phase of the pandemic were those linked to the hospital (79%), the CBD (85%) or the train station (83%), while those whose destination was the university or the main mall fell between 98%-100%. For its part, the recovery in the phase immediately after deconfinement (June 2020) was greater in the mall and the CBD, where around 70% of trips were recovered compared to year 2019.

Finally, some variables intrinsic to the design of the lines have also shown their impact on the change in UPC use. For example, in Lisbon it was observed that suburban lines suffered a slighter reduction in users during the first wave of COVID-19 compared to urban ones [32]. The management of the lines' frequency was also very important during the event. For example, while most of the European cities reduced the frequency of trips due to the drop in demand, Hong Kong maintained the frequency of the service, thus reducing the average occupancy of vehicles, although this led to a significant economic cost [33].

While studies on the impact of the COVID-19 pandemic on UPT are very abundant, those related to the measures to be taken by transport companies or public managers to recover the market share lost are not so frequent [34]. For example, the importance of increasing the frequency of the lines to avoid a feeling of crowding has been pointed out [35], in addition to improving the cleanliness of the vehicles [36,37]. Other variables to recover users would be to improve daily scheduling, as well as the intermodality with other means of transport [33]. Of course, all telematic systems associated with bus operation such as apps, average vehicle occupancy announcements, etc. favor the attraction of the lost users during the pandemic and are also useful to attract new users [38]. Finally, on-demand transportation has also been proposed in some studies as a viable solution to increase the share of UPT in less dense areas [39].

Thus, the present study's objective has been to delve into the latter issue, by analyzing individually the role of the main variables that define an urban bus line in the process to recover the users lost during the COVID-19 pandemic [40].

3. Materials and Methods

As indicated, the main objective of the present study has been to analyze the role of the basic design variables of an urban bus network in the recovery of users in the post-COVID-19 scenario. Thus, for each line of the urban bus network of the city of Almería, the correlation between its main service variables and the percentage of recovered passengers in 2022 compared to 2019 has been analyzed. In the analysis, only intrinsic variables to the urban bus network, both qualitative and quantitative, have been considered discarding other broad-spectrum external to the service variables where public managers have fewer possibilities to tackle in the short-term.

The city of Almería, located in the south of Spain, with a population of 199,237 inhabitants (2022), is especially appropriate to carry out this study, due to the diversity of characteristics in the urban bus lines that provide service within the municipality. Thus, the city has a municipal area of 295 km² where there are 17 small urban settlements apart from the main city, which concentrates 84% of the population. In addition, an international airport, a state-level port for goods and passengers, the main hospital of the region as well as a public university with approximately 12,000 students are located in the city. This diversity results in an intrinsically complex UPT network, which allows to analyze the role of very different variables, both qualitative and quantitative, with a wide internal range of values, which is crucial in an exploratory study of this nature. The main city is located at the western end of the municipality, which results in long bus lines towards the east. Thus, the urban bus network of Almería city consists of 16 lines with the configuration shown in Figure 1 (main city and surrounding lines) and Figure 2 (lines with service to the eastern municipal urban settlements):

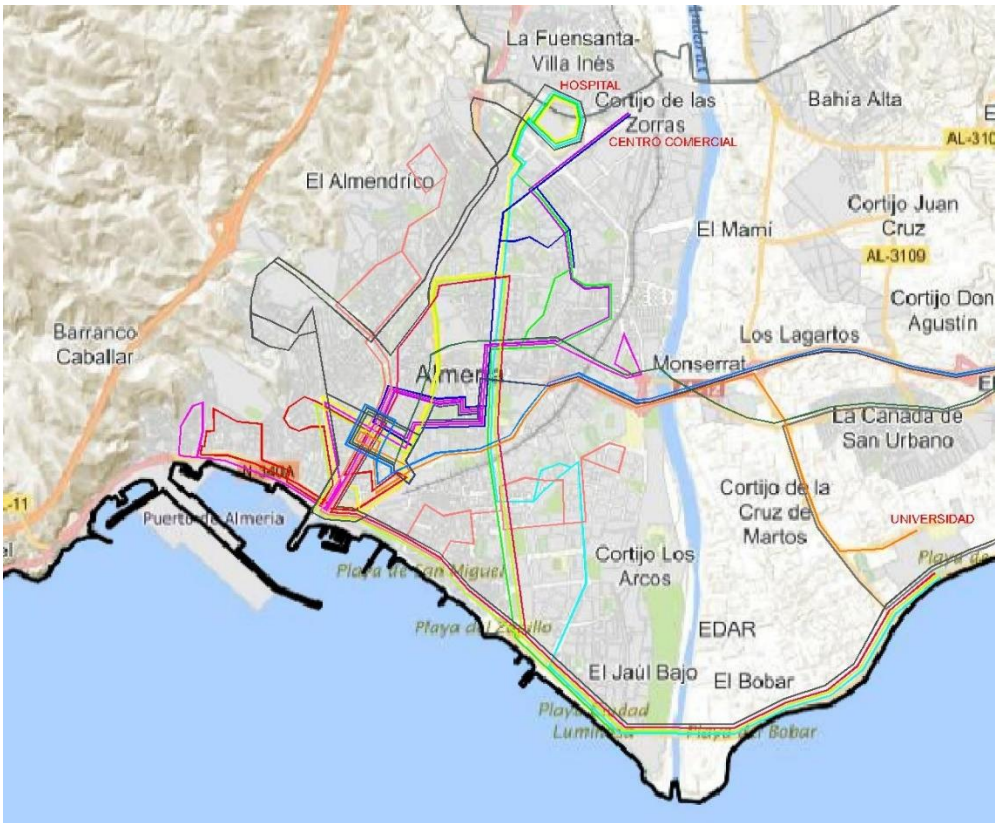


Figure 1. Municipal urban bus network. Main city and surrounding lines.



Figure 2. Municipal urban bus network. Lines to the eastern municipal urban settlements.

The evolution in the number of users of the UPT (bus) in the city of Almería from 2019 to 2022, according to the data provided by the City Council's Mobility Area, is indicated in Table 1. Only trips in labor days have been considered, since the particularities during weekends and holidays could bias the results:

Table 1. Evolution of urban public transport users in the city of Almeria (2019-2022).

	Year			
	2019	2020	2021	2022
Users	7.410.583	3.898.098	4.601.237	5.810.103
%	100%			
Com./2019		53%	62%	78%

As can be observed, during 2020 the COVID-19 pandemic caused that half of the users left the UPT. In 2022, the last year with partial restrictions on UPT (use of masks), the recovering of the number of users compared to 2019 amounted to 78%. The evolution in the number of users on each bus line during the 2019-2022 period is reflected in Figure 3:

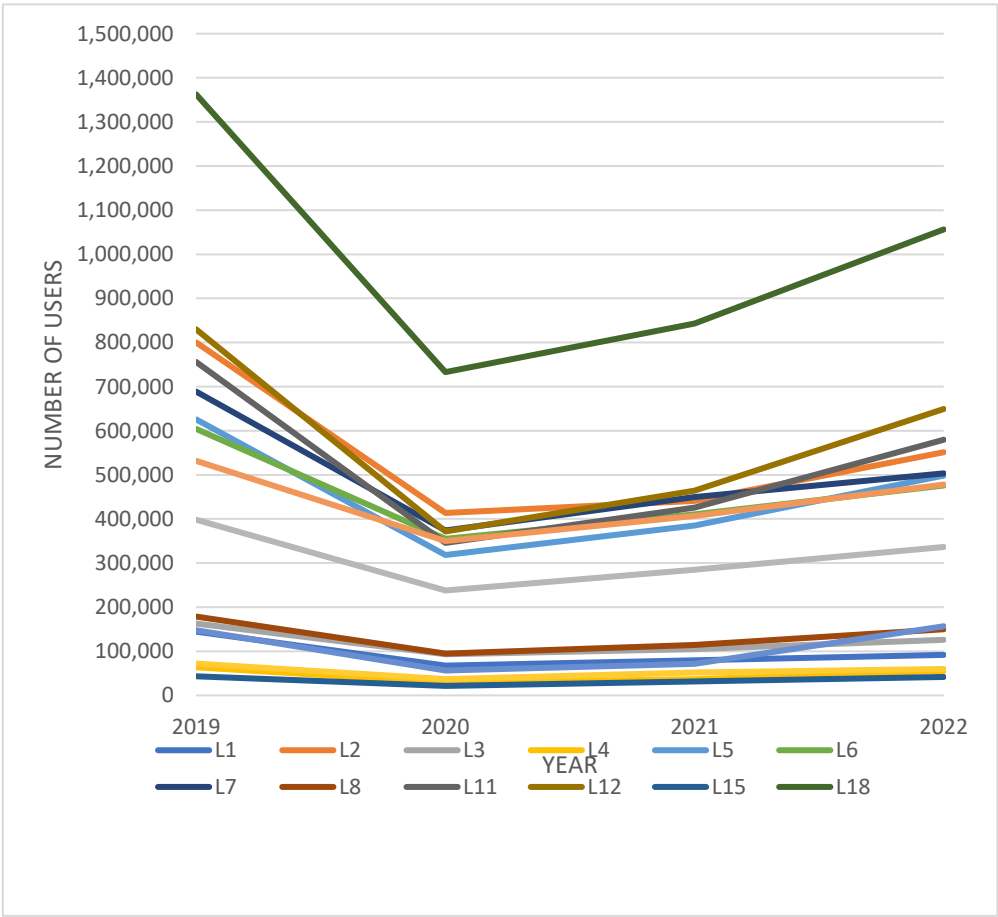


Figure 3. Evolution of users in urban bus lines in the city of Almeria. 2019-2022.

As indicated, for each bus line all those variables - intrinsic to the service that the literature has considered relevant -, were measured during 2022, the last complete year with data available. Apart from the dependent variable, the percentage of users recovered in 2022 compared to 2019 in each line, seven independent variables, four with a qualitative and three with a quantitative nature, have been identified. Thus, the qualitative variables considered have been the *urban or suburban* character of the lines, regarding as suburban those which leave the main urban center; *intermodality*, where it is analyzed whether the line connects with the airport or the intermodal station, (railway and interurban bus); *nodality*, considering nodal those lines that provide service to a strong transport centroid such as the hospital, the university or the main mall and, finally, the *circular* geometry or not of the line. The quantitative variables analyzed have been the *average vehicle occupancy*, understood as the relationship between the annual number of users and the service capacity, as well as the *frequency*

and *length* of the lines. Other variables such as the scheduling, the level of vehicle cleaning and technology support to operating (app's, etc.) have not been considered because they are almost identical in all the lines. The data collected for each of these variables is reflected in Table 2:

Table 2. Service variables of urban public transport in the city of Almería.

SERVICE VARIABLES										
LI NE	% Vehicle occupancy 2022	Freque ncy (min)	Subur ban	Intermoda lity	Nodality	Length (km)	Circu lar	Users 2019	Users 2022	%Users recovered 2022/2019
L1	34%	22	NO	YES (Bus/train)	NO	7,733	YES	144.54 3	92.072	64%
L2	43%	17	NO	YES (Bus/train)	YES (Hosp)	11,477	NO	800.20 5	551.172	69%
L3	40%	70	NO	NO	YES (Hosp)	14,169	NO	162.88 7	126.146	77%
L4	36%	70	YES	NO	YES (Hosp- Univ)	21,701	NO	63.707	55.832	88%
L5	47%	15	NO	NO	YES (Mall)	10,171	NO	625.74 4	498.187	80%
L6	48%	20	NO	NO	NO	13,914	NO	604.14 7	475.805	79%
L7	43%	20	NO	NO	NO	15,45	NO	688.76 8	503.525	73%
L8	42%	60	NO	NO	YES (Mall)	10,632	NO	178.71 1	149.747	84%
L11	54%	18	YES	NO	YES (Univ)	18,586	YES	755.88 9	579.444	77%
L12	60%	17	YES	NO	YES (Univ)	17,133	YES	829.89 5	648.966	78%
L15	19%	90	YES	NO	YES (Univ)	43,82	YES	43.278	41.935	97%
L18	98%	16	YES	NO	YES (Hosp- Univ)	34,155	NO	1.362. 526	1.056.2 54	78%
L19	25%	30	YES	YES (Bus/train)	YES (Univ)	14,497	NO	148.10 0	156.700	106%
L20	67%	30	YES	NO	NO	38,926	NO	531.70 9	478.027	90%
L30	48%	35	YES	YES (Bus/train)	NO	38,024	NO	398.30 4	336.617	85%
L31	33%	70	YES	YES (Bus/train)	NO	34,485	NO	72.170	59.674	83%
TOT AL								7.410. 583	5.810.1 03	78%

It should be noted that the variety of characteristics of the UPT lines in the city of Almería to cover its complex territory has allowed to obtain a reasonable sample for all the qualitative variables, since 9/16 lines are suburban, 5/16 are intermodal, 10/16 nodal and 4/16 circular, which is necessary for the consistency of the results obtained.

4. Results

The results obtained from the analysis on the correlation between the percentage of users recovery for each urban bus line in the city of Almería in 2022 compared to 2019 and the variables representative of the service are shown next.

4.1. Average vehicle occupancy

The correlation between the percentage of users recovered in 2022 compared to 2019 and the average vehicle occupancy, the latter estimated as the quotient between the number of users and service supply in each urban bus line is shown in Figure 4:

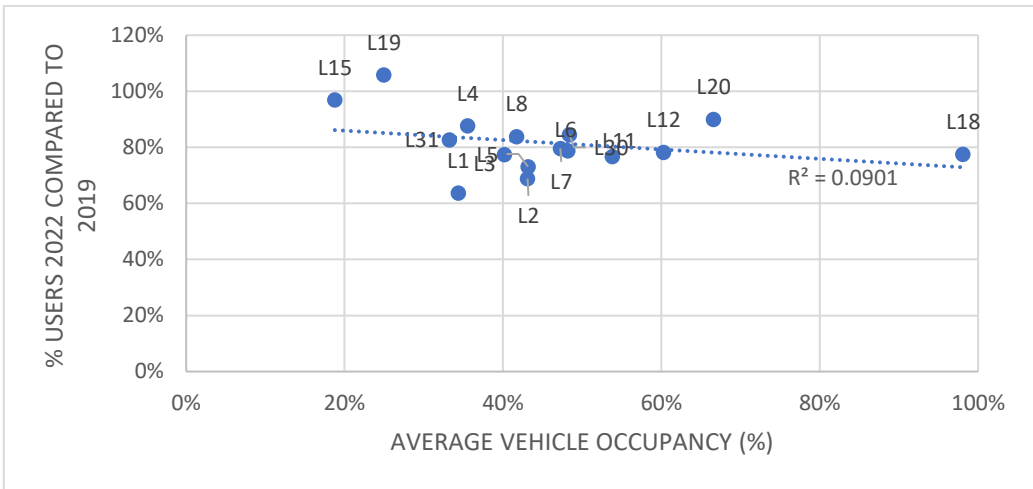


Figure 4. Correlation between the average of users recovered (2022 compared 2019) and the average vehicle occupancy.

As can be observed, there is a negative albeit weak correlation between both variables despite the wide occupancy average values of the lines, which ranges between 19% of L15, which covers the smaller urban centers of the east of the municipality, and 98% of L18, which connects Costacabana (a small urban center on the east of the main city) with the university and the hospital. Moreover, apart from these extreme values, average occupancy usually ranges between 30% and 70%. Despite the discreet overall correlation value, it is remarkable that the two lines with the least occupancy, L15 (19%) and L19 (25%), are both the ones with the highest percentage of users recovered, with 97% and 106% respectively. In any case, it should be noted that the effective occupancy level of the vehicles is always somewhat lower than represented, since, especially on longer lines, each seat offered can be occupied by different partial users along the same route.

4.2. Frequency

The correlation between the average of users recovered in 2022 compared to the pre-pandemic situation and the frequency of service in the urban bus lines can be observed in Figure 5:

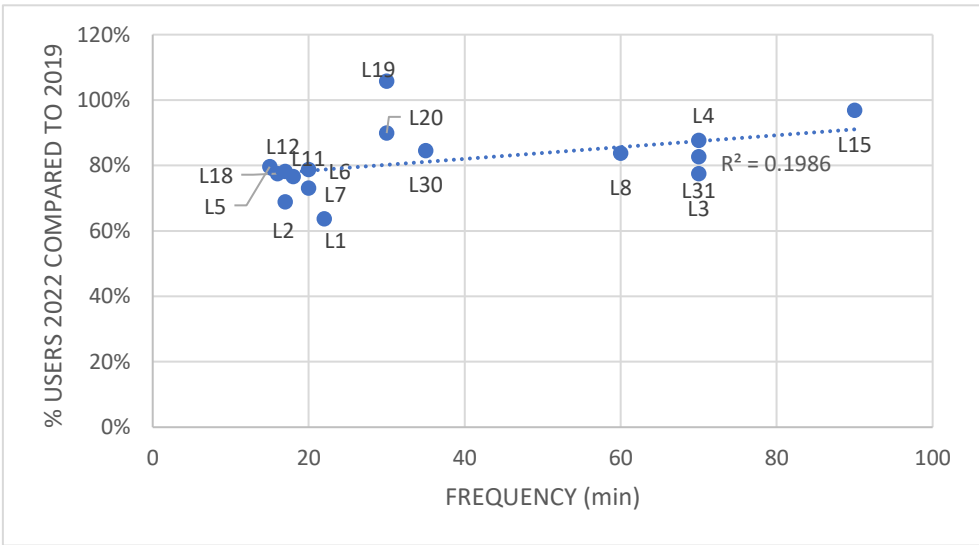


Figure 5. Correlation between the average of users recovered (2022 compared 2019) and the frequency of lines.

With moderate correlation values, it is observed that, in general, there is a positive relationship between the frequency in minutes of the line and the percentage of users recovered. It should be pointed out that none of the lines with a frequency of less than 25 minutes, which in theory provide a better service, has reached 80% of recovered users. Instead, with one exception, all the lines with a frequency over 30 minutes have recovered more than 80% of passengers. In fact, L15, which is the line that has by far the worst frequency (90 minutes), is the second one which has recovered the most users (97%), with demand levels similar to those prior to the pandemic. L19, which is the only one that in 2022 exceeded the number of users compared to 2019, has a frequency of 30 minutes. This can be described as intermediate in the context of UPT in the city of Almeria.

4.3. Length of bus line

The correlation between the average of users recovered in 2022 compared to 2019 and the length of urban bus lines can be observed in Figure 6:

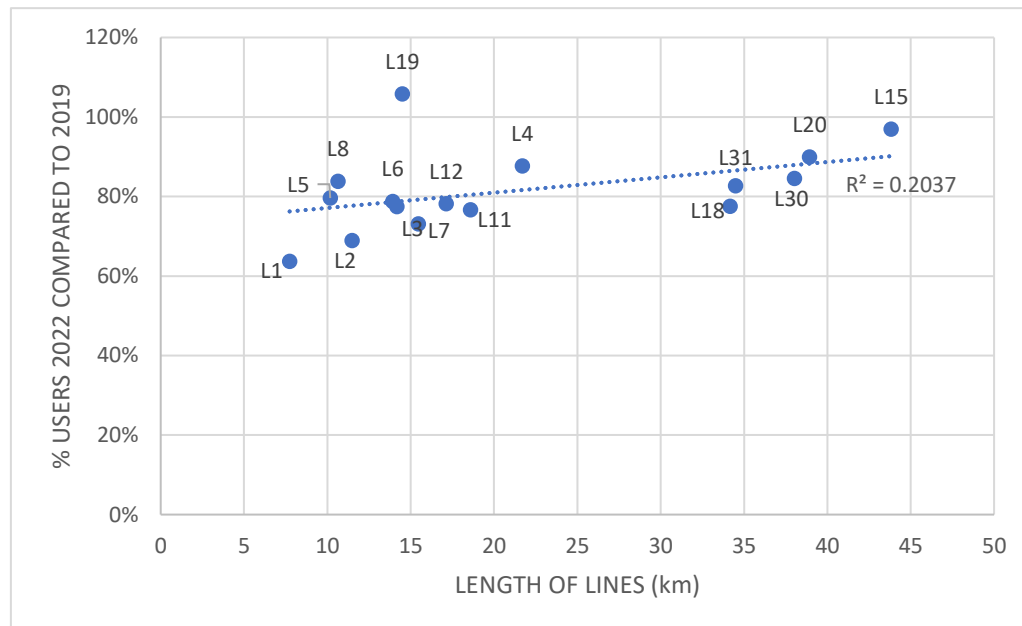


Figure 6. Correlation between the average of users recovered (2022 compared 2019) and the length of lines.

In this case, a positive correlation between the length of the bus lines and the recovery of demand can be observed, with a general good behavior of the longest lines. It is noteworthy that the two longest lines (L15 and L20) are the second and third with the highest percentage of users recovered with 97% and 90% demand recovery compared to 2019. It is also significant that the shortest line (L1), serving the Historic Center, is the one that has recovered the fewest travelers compared to the pre-pandemic situation.

However, there is a certain collinearity between the frequency and the length of lines that must be taken into account to analyze the results, as can be observed in Figure 7:

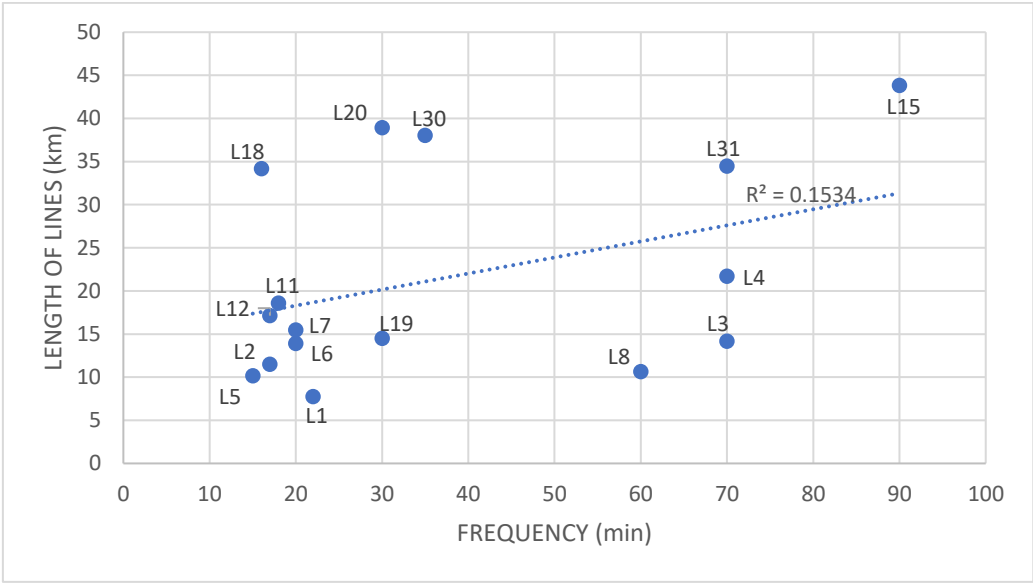


Figure 7. Correlation between frequency and line length.

Except for L18, which simultaneously serves the hospital and the university (Table 2), all lines with a frequency below 20 minutes do not exceed 20 km in length, which means that they transit within the main city. In contrast, L15 - which connects almost all the smaller urban centers located on the east of the municipality and is both the longest and the one with worst frequency line -, recovers almost 97% of travelers.

4.4. Qualitative variables

The qualitative variables analyzed for the urban bus service lines in the present study have been their urban or suburban nature (although all belong to the city's municipal service), their connection or not with other means of interurban transport as railway, airport, intercity bus (intermodality), their circular or lineal route and their service, or not, to the main urban transport centroids (university, hospital, main mall). The results obtained for the correlation between this set of variables and the average of users recovered in 2022 compared to 2019 have been summarized in Figure 8:

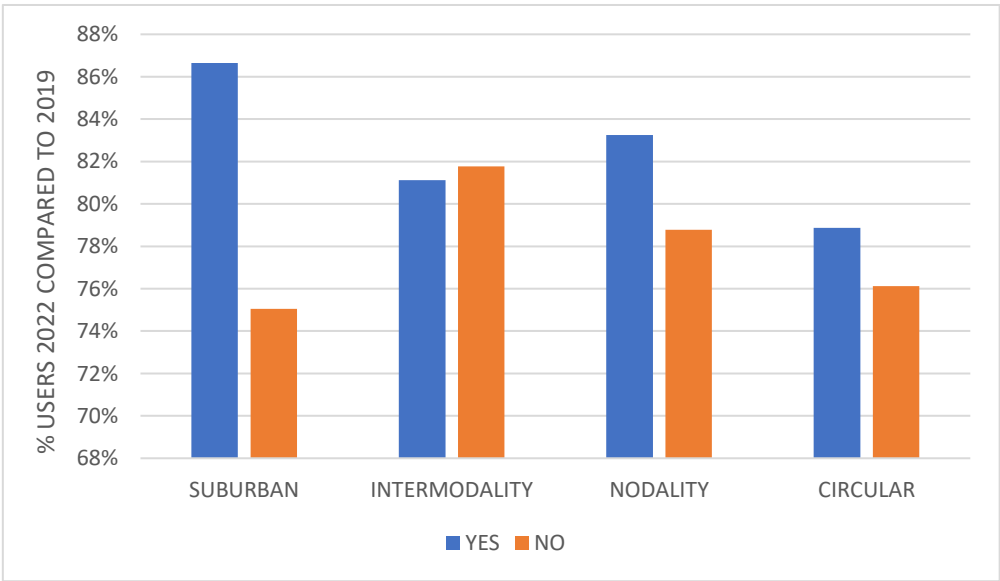


Figure 8. Correlation between the average of users recovered (2022 compared 2019) and the quantitative variables.

As shown, except for the urban or suburban character of the lines, in none of the other variables analyzed are there differences exceeding the 4% observed. For instance, the intermodal lines connecting with the airport and the intermodal train-intercity bus station do not recover more users than those that do not have that characteristic. In addition, the lines serving well identified transportation centroids (hospital, university, main mall) on average only recover 4% of users more than the rest. Finally, a more difficult variable to analyze as is the case of the linear or circular bus route of the bus barely affects the users' recovery process.

On the other hand, it is very significant that suburban lines have recovered 12% more users on average than those whose route transit entirely within the main city center. It should be noted that the suburban lines serve the smaller population centers of the municipality (up to 17 and scattered with a total population of around 35,000 people) as well as the university, an important transportation centroid located on the coast at about 3 km from the eastern edge of the city and about 6 km from its center. In fact, significant differences can be observed (Table 2) within the nodal lines. For example, discarding both L4 and L18, which simultaneously serve the university and hospital, the lines reaching the university have recovered on average 89% users (a percentage somewhat higher than the average for suburban lines as a whole), while those serving the main mall have done so by 82% and those serving the hospital only 73%.

5. Discussion

The overall analysis of the quantitative and qualitative data allows to extract some conclusions and make some reflections about the relationship between the recovery of the UPT demand in the current post-pandemic situation and some variables descriptive of a typical urban bus service. Possibly, the most remarkable result would be the better recovery of users on suburban lines, an aspect which had already been observed in other studies [32]. Thus, compared to an average recovery of users in the city of Almería bus service of 78% as a whole, the suburban lines have recovered 87% of the pre-pandemic occupancy level, the same average than the six lines serving the university (Table 2). Although at a first sight it could be thought that the lines to the University are the ones driving the average upwards, the results of other suburban lines such as L15 are also surprising, since, being the longest and the line with the worst frequency (90 minutes), it is the second in recovering users compared to 2019 (97%); and L31, the fourth in length and the second that offers the worst frequency (70 minutes) has recovered 83% of users. This seems to indicate that, regardless of whether they are urban or suburban lines, the more determinant factor could be the more or less captive nature of the users, both in the case of students, it is understood that for economic reasons [41], or for those citizens living in areas without other transportation alternatives as those needing to travel between the smaller centers of the municipality, even in the case of very low frequencies [42]. Thus, the captive passengers were more resilient both during the worst phase of the pandemic, when despite perceiving a higher level of risk, they were unable to change their behavior [29], and in the current recovery phase, due to the lack of alternatives [43].

Instead, despite the best frequency of the line serving the main city (32 minutes on average compared to 42 minutes for the suburban lines), these are the ones whose behavior is worst in the post-pandemic situation as a whole (Figure 8). Taking into account that the dimensions of the main city are approximately 5 km both from north-south and east-west directions, the factor that could be more determinant in this lack of recovering might be the shift of users to trips on foot or by bicycle/electric scooter. It is necessary to consider that the average on foot routes within the city would not exceed 30 minutes [44] and by bicycle 15 minutes [45], values which are very competitive taking into account the average frequency of the bus. In this context, it is not surprising that the line with the smallest geographical scope, L1 that serves the historic center, is the one with the worst recovery average. In this sense, other studies have shown that many UPT users do so by choice, even having the means to travel in their own vehicle or by other means of transport [41]. Although no specific measurements have been taken about the modal shift in the city of Almería, it is believed that this type of users have expanded their trips on foot or have been the protagonists of the modal change to the bicycle or electric scooter [46,47], thus being a percentage of the population difficult to attract back

to UPT. In fact, the number of bicycle trips is estimated to continue to rise in the future [48]. If those travelers who have maintained their preference for private vehicles on roads with fewer congestion problems [49] are added to the latter, it is explainable that almost three years after the start of the pandemic, and despite the efforts by Public Administrations in this field, the number of UPT users has not been recovered yet.

The previous results might be useful to establish public policies to recover part of the lost users. Assuming that those users who have shifted to other non-motorized means of transport will be difficult to recover (which is not negative in itself), efforts should focus on capturing those who chose (supposedly temporarily) to shift to private vehicles or, which could be more complicated, to those who have never been users of UPT. In this sense, it seems that the most effective measures could be to restrict internal mobility in private vehicles within the cities rather than the improvement of UPT service parameters such as frequency, especially in areas that already have a good service [50].

An unexpected result, although consistent with the previous ones, is the scarce impact that the average vehicle occupancy seems to have on the recovery of users in this time, since there is a negative but little significant correlation within this service variable and the percentage of users recovered in 2022 compared to 2019. Thus, although this factor was decisive for the risk perception during the hardest phase of the pandemic, especially in frequent UPT users [51], it does not seem that an increase in frequency service for the only purpose of decongesting vehicles has the effect of attracting new users [52].

Therefore, in general, the results of the study seem to indicate that, in areas with a mature UPT network, public transport users do so out of personal conviction or due to the lack of other viable alternatives. Thus, in these areas, the improvement of service parameters to increase the attractiveness of the UPT would not be a determining factor to attract new users, with which public policies to promote a more sustainable urban transport should mainly focus on reducing alternatives for private vehicle users. Of course, in the case of areas with less developed UPT services, Public Administrations should focus their policies on offering a more developed, sustainable, comfortable and reliable transport alternative to all those who currently lack it.

Any study of this nature, essentially exploratory, has many limitations that necessitate great caution when drawing conclusions. The most obvious limitation results from the impossibility to analyze different UPT network alternatives in the same territory. Thus, although the comparison of this study with others carried out in cities of similar or different characteristics has helped to interpret or even question the results obtained here, it will always be from the perspective of two different physical, social and governance realities, compromising the generalization of the results. Apart from that, even though the studies conducted during the COVID-19 pandemic have revealed the existence of abundant data for analysis, they have also detected numerous shortcomings. For example, as has happened in this study, the wide-scope data available can usually be disaggregated at the line level only, which does not allow to study singular patterns within them. This issue can be crucial to analyze long lines serving very heterogeneous territories. This type of more specific analysis can only be carried out nowadays through more selective and expensive field studies, which can be generalized in the future through the monitoring of the occupancy vehicle levels or the moment at which users leave them.

6. Conclusions

The present study shows how UPT continues its gradual recovery in the number of users as compared to the pre-pandemic situation. However, it is evident that the modal shift towards other means of transport is still persistent and that the recovery of users, necessary to return to the path of sustainable urban mobility, is uneven among the different user profiles. From the analysis carried out on the urban bus network of the city of Almeria, it seems that the more determinant factor in the recovery of the number of users on a given UPT line is the level of dependence of those users on public transport, since the lines which have recovered best are those linked to captive users, either for economic reasons, or due to the lack of viable transport alternatives, regardless of the intrinsic characteristics of the service such as the frequency or the average vehicle occupancy. In fact, these

two last variables, possibly the two most representative of the overall quality of the service, have not shown a significant correlation with the percentage of recovered users. The latter is especially striking when compared to the majority of studies carried out during the pandemic or the immediately following phase, when both the factors were shown to be decisive, especially combined, to keep the feeling of safety among users.

Given the above, it does not seem that an improvement in the offer, increasing the frequencies or using vehicles with a greater capacity, could have strong enough an appeal to significantly increase the number of users, especially in already well-served urban areas, where a positive shift to non-motorized means might have happened. In these urban areas, dissuasive measures against the use of private vehicles could be more effective to attract both new users and those who began using it during the pandemic. In the same way, public policies aimed to improve the spatial and social coverage of UPT to the maximum extent possible might significantly contribute to increasing the number of users, providing transport alternatives to those who still lack them.

The study conducted leaves new lines of research and open questions. For example, the analysis of the city of Almeria's bus service should be extended to other medium-sized cities to complete or even question the results obtained here, especially if they start with a different modal distribution of transport. It could also be revealing to perform a similar study in areas with a less mature UPT network, where, probably, the improvement in the characteristics of public transport themselves could be a sufficient tool to incorporate new users eager to have cheaper and more efficient transport alternatives. Finally, it would also be positive to compare the results obtained in this study regarding the average of users recovered for UPT with those reached in municipalities that have implemented significant restrictions to private vehicles during the last three years as those that this study seems to suggest. This could allow future research to delve into the effectiveness of the different public policies to promote a more sustainable urban mobility.

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