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Additional Information

1 **Connecting passenger loyalty to preferences in the urban passenger transport:**  
2 **trends from an empirical study of taxi vs. VTC services in Spain**

3  
4  
5  
6 **Abstract**

7 Taxi service and private-hire driver companies (VTCs) offer their services through online  
8 platforms to cater for passenger demand yet there is a lack of studies as to who these  
9 passengers are, what their demands are and how to gain their loyalty over the next years.  
10 Based on a survey of taxi and VTC passengers in Spain, we have performed different  
11 qualitative and quantitative analyses to explore connections between loyalty and  
12 passengers' profiles, experience and values. The main result in terms of profile is that  
13 VTC passengers are more price-sensitive and less loyal than taxi passengers, who are less  
14 price-sensitive and more loyal. Regarding experience, loyalty to a taxi service centres on  
15 transparency and safety (trust), while in VTCs it revolves around quality and comfort.  
16 Finally, values are related to loyalty in the sense that passengers support the service they  
17 use most, but Corporate Social Responsibility does not influence a first choice. In terms  
18 of age, we observed that younger passengers are less loyal, more price-sensitive and more  
19 concerned with sustainability. This implies that these factors are worth to explore in other  
20 countries as they could drive the future of urban passenger transport. The results of this  
21 study show trends that could be of interest to researchers, companies and policymakers.  
22

23 **Keywords** urban passenger transport, loyalty, preferences, business models, licences.  
24

25 **Introduction**

26  
27 Over the last few years, some traditional business models have had to reinvent and  
28 reorganise their services. This is the case of the urban passenger transport sector which,  
29 especially in Spain, has been regulated for many years via licences. Although taxi services  
30 and luxury urban driver services, known in Spain as VTCs (private-hire driver licences),  
31 have coexisted since the 1990s (Doménech, 2015), the latter have grown dramatically  
32 with the arrival of online platforms and transportation network companies (TNCs) due to  
33 the increase of immediacy (Uber & AFI, 2017). Up until this time, VTC licences had  
34 operated as an exclusive service, mostly for companies and events. The role of the Court  
35 of Justice of the European Union (CJEU, 2017), excluding TNCs from intermediary and  
36 free delivery services and confirming them as a transport service, put a halt to a period of  
37 uncertainty during which companies such as Cabify and Uber operated via VTC licences  
38 (cheaper than taxi), and sometimes even without them, in the same conditions as the taxi  
39 sector (Table 1).  
40

41 In 1998, Spain established the ratio 1/30 to prevent VTCs from being assimilated with  
42 the public taxi service. This meant that one VTC licence could be authorized for every 30  
43 taxi licences. However, the deregulation of urban passenger transport gained momentum  
44 with Directive 2006/123/EC of the European Parliament and of the Council, of 12  
45 December 2006, on services in the internal market (Services Directive or Bolkestein  
46 Directive), which gave a transposition period of three years (Official Journal of the  
47 European Union, 2006). In Spain, this transposition was carried out with the Omnibus  
48 Law (BOE, 2009) modifying various laws to adapt them to this Law on free access to  
49 service activities and their operation.  
50

51 Based on the Omnibus Law, the 1/30 ratio was eliminated and this led to a conflict  
 52 between the taxi sector and TNCs, which was resolved by the Court of Justice of the  
 53 European Union in 2017. Thus, pressure from the taxi sector pushed the Government to  
 54 reintroduce the 1/30 ratio in 2015 and it was ratified in 2018. However, this period  
 55 produced a “legal vacuum” in the licences that had been requested from 2009 to 2015,  
 56 which left many VTC licences pending. The Supreme Court accepted several of these  
 57 licences. On the other hand, the National Commission of Markets and Competition  
 58 (CNMC) appealed to the Supreme Court to eliminate the ratios and the limitation to  
 59 operate between regions, claiming that the entry of new operators was being vetoed and  
 60 that this could lead to an oligopoly. However, the ratio ruling has been confirmed.

61  
 62 Therefore, the latest national, regional and local regulations in Spain, as has occurred in  
 63 other countries, have curtailed TNC activities (De Miguel et al., 2020) and, in some cases,  
 64 these organisations have decided to stop operating in large cities. This is the case of  
 65 Barcelona and Madrid. Even if they are also transportation providers, the reality is that  
 66 they have few employed drivers. In fact, Cabify has more employed drivers than Uber,  
 67 which mainly works with freelance drivers although they are acquiring some VTC  
 68 companies in order to obtain licences. Therefore, until now VTC licences had mainly  
 69 been owned by Cabify or by other small companies, and even by some taxi drivers  
 70 (Doncel, 2019; Moratalla, 2021).

71  
 72 Table 1. Positioning matrix of transport providers with drivers in Spain included in the analysis.

		Using TNCs	
		General	Exclusive
With licence	Taxis	Free Now, Cabify, Uber	PideTaxi, NTaxi
	VTC*		
Without licence	Natural person (sharing)	Blablacar	

73 Source: compiled by authors.

74 \* VTC (private-hire driver licence)

75  
 76 TNC business models are based on having a critical mass of drivers to guarantee  
 77 immediate availability. Without this, TNCs will find it difficult to survive (Andersson et  
 78 al., 2013). However, according to Standing et al. (2018), over-regulation has been an  
 79 important barrier. Government has not provided a homogeneous framework for all the  
 80 stakeholders concerned, and has protected the taxi service, generating considerable  
 81 uncertainty and ambiguity and leading to considerable conflict in Spain (De Miguel et al.,  
 82 2020). Moreover, regulation depends mainly on local governments which means that  
 83 models can differ within the same region or country. We can say that, in the most  
 84 restricted cases, these companies are now not a part of the collaborative economy  
 85 (European Commission, 2016) if they ever were, though perhaps this was true in the early  
 86 years. The only type of companies that could come under this heading are Blablacar-type  
 87 services, although even these are evolving to a licence-type model in order to increase the  
 88 number of clients.

89  
 90 Anyway, these platforms have developed a two-sided business model for both taxi and  
 91 VTC drivers, and their long-term sustainability will depend on passenger satisfaction and  
 92 loyalty. As Button (2020) pointed out, TNC competition leads to a lack of profitability

93 which results in fare-discounting wars and efforts to create consumer loyalty using their  
94 micro data. Conversely, users are enjoying significant benefits.

95  
96 To our knowledge, there is a scarcity of studies at different levels of government, and in  
97 the taxi, VTC and TNC sectors, on how passenger transport deregulation affects different  
98 stakeholder groups, especially passengers, which is quite unusual, given that the taxi  
99 sector is essentially a public service. There is a need to obtain a greater insight into what  
100 motivates the different sides of the TNC market, including passengers and drivers  
101 (Button, 2020). Accordingly, our goal is to explore passenger profiles, experience and  
102 values in this sector, comparing the different services, and their connections to loyalty.

### 103 **Literature review**

104  
105  
106 Until about ten years ago, the majority of passenger transport in cities was based on the  
107 public taxi service. But certain factors such as traffic congestion, conditions in access to  
108 the service, or the need to offer affordable safe and clean private vehicles, have prompted  
109 private companies to develop new digital business models in recent years (Cohen and  
110 Kietzmann, 2014:281) that have thrived due to their low maintenance and personnel costs.

111  
112 These platforms need to attract users on both sides of the equation (passengers and  
113 drivers) to increase value and utility (Cusumano et al., 2019), which has been named as  
114 “Ubernomics”. Faced with this scenario, the traditional taxi service has been forced to  
115 modernize communication channels with its users. In this way, platforms such as NTaxi  
116 and PideTaxi have been developed because the taxi sector requested them (Madrid  
117 Council & Vectio, 2017). They allow passengers to easily search for and order available  
118 vehicle services, thereby increasing the value delivered to the passengers themselves but  
119 also to the drivers. (Apte and Davis, 2019).

120  
121 TNCs connect drivers to passengers, so both passengers and drivers use the platform and  
122 obtain a valuable service from it. In this sense, it can be understood that both sides are  
123 customers (Osterwalder and Pigneur, 2010; Täuscher & Kietzmann, 2017; Kumar et al.,  
124 2018). The difference between them is that drivers pay for the services offered by the  
125 platform, while passengers benefit from the platform's services and pay the driver through  
126 it but without additional charges (De Miguel et al., 2020). That is, the platform collects a  
127 percentage of the income of each driver. That percentage can reach up, for example, to  
128 30% in the case of Uber (Button, 2020). As suggested by Ritter & Schanz (2019), the  
129 flow and origin of the income allows the different groups of clients to be specifically  
130 defined. But on the other hand, some platforms segment their clients depending on  
131 whether they are corporate clients or not (Skok & Baker, 2018). In fact, platforms such  
132 as Cabify focus above all on clients with a business profile.

133  
134 Another criterion through which platforms segment their customers is their technological  
135 skills. There are groups of clients whose predisposition to use collaborative platforms,  
136 reserving services and paying for them through these tools, is greater than for others  
137 (Watanabe et al., 2016; Skok & Baker, 2018). That's the case, for example, of the  
138 Millennials and other younger generations, who are more familiar with the use of certain  
139 technologies (Kumar et al., 2018; Apte & Davis, 2019; Young & Farber, 2019).

140  
141 In terms of a value proposition for passengers, these platforms state that they offer safety,  
142 transparency, affordability, convenience, flexibility and quality (Table 2).

Table 2. Main definitions and concepts regarding passenger profiles, experience and values.

Keywords	Definition and Concept
Affordability	The state of being cheap enough for people to be able to buy (Cambridge Dictionary, 2020). In transportation means that all households, including those with low incomes, can afford to access basic services and activities. This typically means devoting less than 20% of household budgets to transport (Litman, 2013).
Safety	A state in which or a place where you are safe and not in danger or at risk (Cambridge Dictionary, 2020). TNCs relate safety to licenced drivers (taxi or VTC) and the option to track the ride.
Transparency	A situation in which business and financial activities are done in an open way without secrets, so that people can trust that they are fair and honest (Cambridge Dictionary, 2020). The level of availability and accessibility of market information to its participants (Zhu, 2004).
Convenience	A judgement made by consumers according to their sense of control over the management, utilization and conversion of their time and effort in achieving their goals associated with access to and use of the service (Farquhar & Rowley, 2009).
Quality	The extent to which the service delivered meets the customer's expectations (Ghobadian et al., 1994).
Flexibility	The firm's intent and capabilities to generate firm-specific real options for the configuration and reconfiguration of appreciably superior customer value propositions (Johnson et al., 2003).
Comfort	Comfort relates to aesthetics, a sense of relaxation and well-being (Zhang et al., 1996).
Loyalty	It is a deeply held commitment to rebuy or repatronise a preferred product/service consistently in the future, thereby causing repetitive same - brand or same brand - set purchasing, despite situational influences and marketing efforts having the potential to cause switching behaviour (Oliver, 1999).
Corporate Social Responsibility	It is the notion that corporations have an obligation to constituent groups in society other than stockholders and beyond that prescribed by law and union contract. Two facets of this definition are critical. First, the obligation must be voluntarily adopted; behaviour influenced by the coercive forces of law or union contract is not voluntary. Second, the obligation is a broad one, extending beyond the traditional duty to shareholders to other societal groups such as customers, employees, suppliers, and neighbouring communities (Jones, 1980).

Source: own source compiled from different authors.

**Customer satisfaction** is a holistic concept that is shaped by customer experiences with a particular service, which are reflected by the extent to which customers are happy with the service (Dimitriadis & Zilakaki, 2019). It is important to jointly consider elements of the service concept and characteristics of customers as co-creators (Anderson et al., 2008). According to Khuong and Dai (2016), there are two variables that directly affect taxi customer satisfaction, namely **comfort** and price. Passengers that use taxis and VTC services are **price-sensitive**, although some studies indicate that passengers would be prepared to pay more for them (Kumar et al., 2018; Clauss et al., 2019). To attract passengers, platforms like Free Now offer promotions and price reductions (Kumar et al., 2018). However, Clauss et al. (2019) state that loyalty depends on customer satisfaction rather than on prices.

Platforms such as FreeNow, Uber and Cabify, pay special attention to **safety** in their services, because as indicated on their respective websites, all routes are geolocated and drivers are duly identified in each case (De Miguel et al., 2020), which could also be understood as trust. **Transparency** in the service also concerns all platforms. But the concept is applied in a different sense in the case of VTC platforms and taxi service. The former link transparency to the fact that customers know the price of the service in

165 advance (thus being able to accept or reject it), while the second associates transparency  
166 to the possibility of checking the route in real time while traveling (Vassallo et al., 2018).

167  
168 An essential factor for both VTC platforms and taxi service apps, is **convenience**. The  
169 convenience refers, above all, to the simplicity, speed and accessibility in handling the  
170 application; to the possibility of requesting the service at any location; to the existence of  
171 different payment options; and to the response time (Kumar et al., 2018). Since the type  
172 of vehicles offered by the VTC platforms has always been their distinctive feature, taxi  
173 solutions such as Pidetaxi or Free Now, based on the demands of their passengers, offer  
174 different types of vehicles (even ecological cars) that they can book in advance.

175  
176 The **quality** of the service is controlled by some platforms through a rating system for  
177 drivers and passengers included at the application itself (Watanabe et al., 2016; Vassallo  
178 et al., 2018; Apte and Davis, 2019). Although certain studies warn that service users  
179 generally tend to overestimate these services when they rate them online (Kumar et al.,  
180 2018), this system offers interesting indicators for quality control. This is an important  
181 aspect because if drivers do not know the routes well and their service is not perceived as  
182 a quality service, it becomes difficult to retain customers (Kumar et al., 2018).

183  
184 The possibility of sharing routes between several passengers is one of the main  
185 characteristics of some applications in terms of **flexibility** (Vassallo et al., 2018). In this  
186 way, it is also possible to attract environmentally sensitive users or price sensitive users  
187 (Ertz et al., 2018).

188  
189 **Loyalty** is a deeply held commitment to rebuy or repatronise a preferred product/service  
190 consistently in the future, thereby causing repetitive same - brand or same brand - set  
191 purchasing, despite situational influences and marketing efforts having the potential to  
192 cause switching behaviour (Oliver, 1999). Loyalty is also reflected in the share of the  
193 total purchases a customer buys from a particular supplier (given a particular product and  
194 a particular period of time) (Helgesen, 2006).

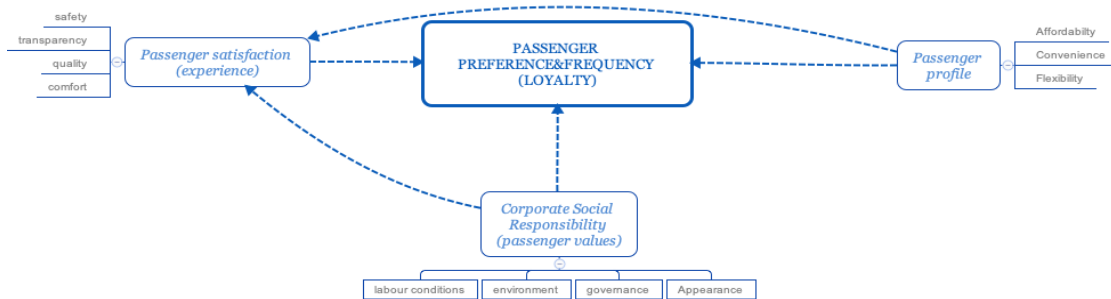
195  
196 Furthermore, some studies have related consumer satisfaction to **Corporate Social**  
197 **Responsibility (CSR)**. Corporate social responsibility encompasses the economic, legal,  
198 ethical, and discretionary (philanthropic) expectations that society has of organizations at  
199 a given point in time (Carroll, 1979). For example, in the mobile phone sector and  
200 according to Dimitriadis and Zilakaki (2019), CSR does not have a significant direct  
201 effect on customer loyalty, while corporate image and customer satisfaction do have a  
202 significant positive effect on customer loyalty. These results coincide with the results of  
203 a similar survey conducted in the transport sector (Chang and Yeh, 2017). However, some  
204 of the two-sided passenger transport businesses (for example, Uber) are seen as the  
205 capitalist part of the sector because they do not behave ethically regarding drivers' labour  
206 rights (Täuscherand and Kietzmann, 2017). In recent years, cities in different parts of the  
207 world have ruled that TNC drivers are technically employees of their TNCs and are thus  
208 entitled to employee benefits (Button, 2020). Moreover, Rosenblat and Stark (2016)  
209 highlighted that,  
210 "power and information asymmetries emerge via Uber's software-based platform through  
211 algorithmic labor logistics shaping driver behavior, electronic surveillance, and policies  
212 for performance targets" (p. 3777).

213

214 After the literature review, some questions arose regarding the loyalty of passengers who  
 215 use these services (taxi and VTC) in Spain. The model we propose explores different  
 216 connections for passenger loyalty based on profiles, experience and values, in the case of  
 217 two-sided urban passenger transport platforms (Figure 1).

218  
 219

Figure 1. Model proposed.



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Source: authors' own.

223 As we understand the model, passenger loyalty is related to a passenger's preference and  
 224 frequency of use of a service, which is influenced by a passenger's profile, experience  
 225 and values. Moreover, profile and values can influence the passenger experience.

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Therefore, we propose different research questions:

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- RQ1. Is there a relationship between passenger profiles and loyalty?
- RQ2. Is there a relationship between passenger values and loyalty?
- RQ3. Is there a relationship between passenger experiences and loyalty?
- RQ4. Is there a relationship between passenger values and experiences?
- RQ5. Is there a relationship between passenger profiles and experiences?

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## Methodology

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This section presents the method used to obtain data, the variables defined and the techniques employed for data analysis.

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## Data

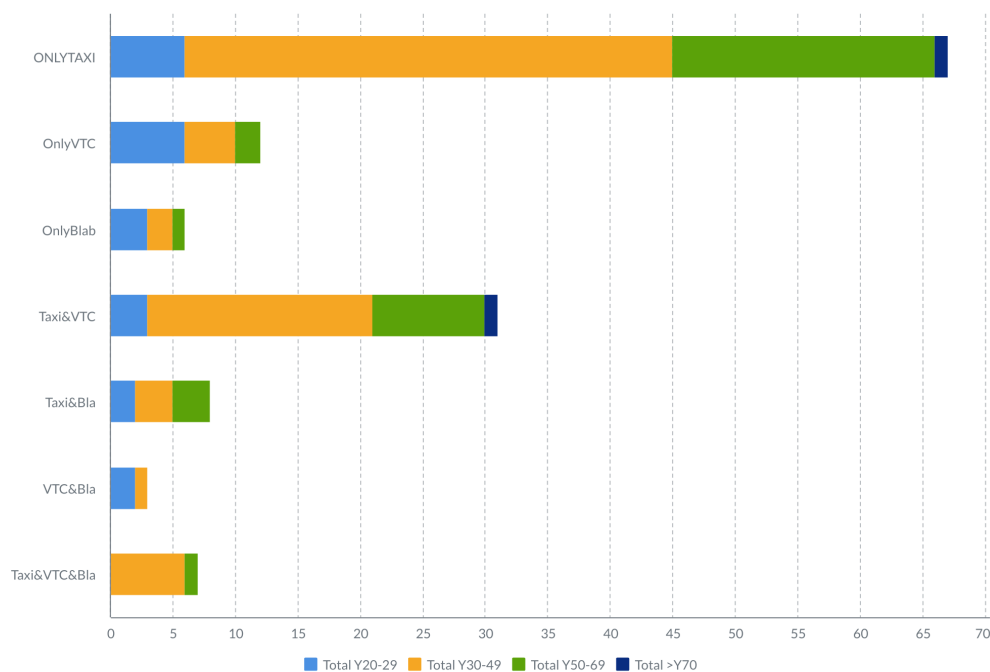
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Data for the analysis were obtained through a survey answered by 134 passengers that used taxi, VTC and Blablacar services in Spain. We included Blablacar in order to check the trend amongst young people to using more collaborative transport models because, by now, this option is not available in Spain with Uber or Cabify. A pre-test of the survey was answered by three experts. The questionnaire was delivered from 6/3/2020 to 17/3/2020 through social networks (mainly Twitter and Whatsapp) and included 25 items (Annex A). As we cannot determine the whole population, we adopted a snowball sampling approach using personal contacts (Tsafarakis et al., 2019). This type of sampling is frequently used in social science research when the aim of the study is exploratory and results cannot be generalised to a population (Collin et al., 2017). In this paper, the main objective was to explore differences in preferences between users. The snowball sample method enabled us to capture answers from different age groups. The main urban area covered was Valencia. However, as the service evaluated was based on mobility apps, users also answered about other cities, such as Madrid and Barcelona.

255 Figure 2 shows the options identified through the survey, separated by the four user  
 256 groups based on age and family situation:

- 257 – Group 1 (20-29 years), Millennials without family obligations (16.4%
- 258 respondents),
- 259 – Group 2 (30-49 years), almost all Millennials with children of school age (54.5%
- 260 respondents),
- 261 – Group 3 (50-69 years), Generation X or Babyboomers with adult children (27.6%
- 262 respondents), and
- 263 – Group 4 (>70 years) who are retired (1.5% respondents). However, for the data
- 264 analysis we did not compare group 4 as it was underrepresented.

265 Data in Figure 2 indicate that 50% of users only chose taxi services, 34% chose taxis and  
 266 other services and 16% did not use a taxi service. Data also indicated that 9% of users  
 267 only selected VTCs, 4.5% only Blablacar and 2.2% a combination of VTC and Blablacar.  
 268 In total, 62% of users were loyal to one service or company, while 38% were  
 269 multiplatform users. Figure 2 also indicates differences according to the age of users,  
 270 especially between the youngest and the other segments. Loyalty only to taxis was the  
 271 lowest in this user segment, with seemingly greater loyalty to only Cabify and Blablacar  
 272 services than the rest of segments.



273  
 274 Figure 2. User segments by service preference (frequencies).  
 275 Source: authors' own compilation based on survey data  
 276

### 277 *Variables*

278  
 279 The variables employed in the analyses were defined from questions included in the  
 280 survey. Table 3 shows these variables and their values, which are the answers given in  
 281 the survey. These variables identified loyalty to taxi and/or VTC services, whether users  
 282 were price-sensitive, and their principles about transparency, responsibility, sustainability  
 283 and governance. There were also items which expressed users' opinions about quality,  
 284 comfort and safety in the services. Flexibility was not included because in Spain there are



285 no real options for VTCs to offer route-sharing for multiple passengers, although this  
 286 could change in the future.

287  
 288

Table 3. Variables and values

Concept	Variables	Item	Values	Type of variable	Obs
Loyalty	Preference: OnlyTX TX&Other NoTX	User preference for transport service	1 = No Taxi 2 = Taxi with others 3 = Only Taxi	Nominal	134
	Frequency in use: HighTX HighVC	Higher frequency in the use of taxis. Higher frequency in the use of VTCs.	1 = Yes 0 = No	Nominal	134 134
Age	AGE	User age	1 = 20-29 2 = 30-49 3 = 50-69 4 = ≥ 70	Nominal	134
Convenience	APP	Use of a taxi app	1 = Yes 0 = No	Nominal	134
Price-sensitive user	CheapVC CheapBLA	VTCs and Blablacar are cheaper than taxis	1 = Disagree 2 = Slightly disagree 3 = Slightly agree 4 = Strongly agree 5 = Totally agree	Ordinal	123 89
Quality	BetservVC KdrivVC	VTCs are better value for money and drivers are more pleasant		Ordinal	122 118
Comfort	CleanVC NewVC	VTC cars are cleaner and newer		Ordinal	121 134
Appearance	OstentVC	VTC cars are ostentatious		Ordinal	134
Transparency	RoutTX	Taxi drivers know the routes better		Ordinal	115
Safety	ConfTX	I trust taxi drivers more		Ordinal	134
Social responsibility	LabTX	Labour conditions are better for taxi drivers		Ordinal	123
Sustainability	Elect PolutBLA PolutTX	Taxi and VTC cars should be hybrid or electric. I would use Blablacar to pollute less. Taxis pollute less than VTC cars.		Ordinal	134 120 134
Governance	GovTX NRegVC	Government should protect taxis against VTCs. New regulations damage VTC companies.	Ordinal	134 127	

289 Source: authors' own compilation

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### 292 **Data analysis**

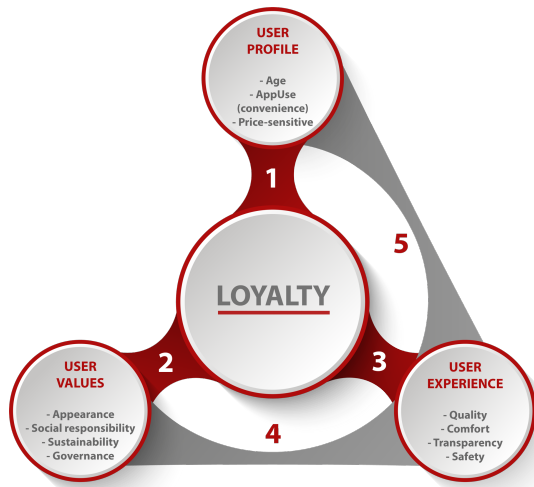
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294 Different exploratory analyses were carried out using the SPSS 26 and fsQCA software  
 295 (Ragin and Davey, 2016) to test the connections between the different concepts<sup>1</sup>. In total,  
 296 five connections were defined and are shown in Figure 3:

<sup>1</sup> Prior to these analyses, information about missing values was obtained with the EM option in SPSS 26. Little's test for MCAR (missing completely at random), applied to the fifteen ordinal variables in the database, was not significant (Chi2= 246.584; DF = 221; Sig. = 0.114). This implies that missing values were MCAR and more options could be used to manage missing data (Hair et al., 2010), including pairwise and listwise deletion (Garson, 2015), although with caution, depending on the method to be used

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Figure 3. Connections between user profiles, values, experience and loyalty to taxi and VTC.



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Source: authors' own compilation

- Connection 1 explored whether passenger profiles were related to loyalty (RQ1).
- Connection 2 explored whether passenger values were related to loyalty (RQ2).
- Connection 3 explored whether passenger experiences were related to loyalty (RQ3).
- Connection 4 explored whether passenger values were related to their experience (RQ4).
- Connection 5 explored whether passenger profiles were related to their experience (RQ5).

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Table 4 provides a summary of the non-parametric tests and correlations used in the analysis of the five connections in Figure 3. All of them were based on the type of data involved in the analyses. The sample was divided into Valencia (84) and non-Valencia (50) and some analyses were carried out separately to detect similarities and differences.

Table 4. Methods used in the five connections

Independent variable		Dependent variable	
		Loyalty (nominal)	User experience (ordinal variable)
User profile	Nominal variable (app use, age, price-sensitive)	<b>RQ1. Connection 1:</b> Cramer's V	<b>RQ5. Connection 5:</b> Kruskal-Wallis
	Ordinal (price-sensitive)		<b>RQ5. Connection 5:</b> Kendall's Tau b
User values	Ordinal		<b>RQ4. Connection 4:</b> Kendall's Tau b
	Dichotomous transformation (values 1 and 0)	<b>RQ2. Connection 2:</b> Cramer's V	
User experience	Dichotomous transformation (values 1 and 0)	<b>RQ3. Connection 3:</b> QCA	

317  
318

Source: authors' own compilation

(Allison, 2002). These two deletions are available in the test conducted by the SPSS software, so the option selected was the one that enabled us to work with more cases.

319 The tests used measured the association between variables, that is, whether variables were  
320 independent. *Cramer's V* is an association measure based on Ch2, *Kruskal-Wallis* tests  
321 the null hypothesis that samples in a population have the same distribution and *Kendall's*  
322 *Tau* is a correlation coefficient (Upton and Cook, 2014). Pairwise comparison was  
323 conducted when the result for a test was significant and SPSS performed the post-hoc  
324 Bonferroni adjustment to significant values.

325

326 In Connection 3, a Qualitative Comparative Analysis (QCA) was conducted to obtain  
327 necessary and sufficient causal conditions and whether the output was loyalty to taxi or  
328 VTC services (HighTX and HighVC). Four models were defined, one for the entire  
329 dataset and three that analysed all the age segments:

330

331 *Model 1* analysed lower loyalty in the use of VTCs (entire dataset, 134 users):

332

$$\sim\text{HighVC} = f(\text{QualityVC}, \text{ComfortVC}, \text{TransparencyTX}, \text{SafetyTX})$$

333

334

335 *Model 2* analysed lower loyalty in the use of taxis by the youngest user segment (Age 1,  
336 20-29 years old):

337

$$\sim\text{HighTX} = f(\text{PriceSensitive}, \text{TransparencyTX}, \text{SafetyTX})$$

338

339

340 *Model 3* analysed lower loyalty in the use of VTCs by the Age 2 dataset (30-49 years  
341 old):

342

$$\sim\text{HighVC} = f(\text{QualityVC}, \text{ComfortVC}, \text{AppearanceVC}, \text{TransparencyTX}, \text{SafetyTX})$$

343

344

345 *Model 4* analysed higher loyalty in the use of taxis by the Age 3 dataset (50-69 years old):

346

$$\text{HighTX} = f(\text{QualityVC}, \text{ComfortVC}, \text{TransparencyTX}, \text{SafetyTX})$$

347

348

349 The conditions in the four models were the user experience concepts in Table 3. As the  
350 analysis conducted was a crisp set QCA, the ordinal data were first dichotomised,  
351 transforming values 1 and 2 into 0, while the remaining values were transformed into 1.  
352 Moreover, when a concept was made up of two variables, logical "OR" was used to create  
353 the condition (for example, the price-sensitive condition was obtained with the logical  
354 formula "CheapVT OR CheapBLA").

355

## 356 **Results**

357

358 This section presents the results for the five connections. They are divided into loyalty (1  
359 to 3) and user experience (4 and 5) connections.

360

### 361 ***Results for loyalty (RQ1, RQ2, RQ3)***

362

363 Cramer's V was used to analyse the association between loyalty and user profile  
364 (Connection 1) and between loyalty and user values (Connection 2). Table 5 shows the  
365 results for the two connections and differentiates between the results for Valencia and for  
366 the rest of the sample. Loyalty was measured by the variable preference.

367

368

369 Table 5. Results for loyalty: connections 1 and 2

Concepts	Variables (dichotomic)	Cramer's V: <i>preference</i>			
		Valencia	<i>p</i> -value	Non-Valencia	<i>p</i> -value
<i>Connection 1 (RQ1)</i>					
Price-sensitive user	CheapVC or CheapBLA	0.318	<b>0.013</b>	0.538	<b>0.001</b>
Age	AGE	0.439	<b>0.002</b>	0.245	0.241
Convenience	APP	0.332	<b>0.008</b>	0.425	<b>0.012</b>
<i>Connection 2 (RQ2)</i>					
Appearance	OstentVC	0.084	0.773	0.246	0.277
Social responsibility	LabTX	0.119	0.550	0.293	0.121
Sustainability	Elect	0.124	0.704	0.296	0.097
	PolutBLA	0.064	0.867	0.100	0.907
	PolutTX	0.135	0.508	0.352	0.067
Governance	GovTX	0.310	<b>0.018</b>	0.156	0.590
	NRegVC	0.117	0.600	0.277	0.172

370 Source: authors' own compilation

371  
 372 Results for *connection 1* show that there is a link between user profile and loyalty to  
 373 service. There was an association between sensitivity to price and preference for a service  
 374 as the *p*-value is lower than 0.05. Cramer's V value indicates that the level of association  
 375 was moderate with the value coming in at between 0.30 and 0.60 (Humble, 2020). The  
 376 association is explained by a higher percentage of price-sensitive users who selected  
 377 options different to only-taxi (38.8% vs. 27.1% in Valencia, 48.9 % vs. 23.4% in the non-  
 378 Valencia subsample).

379  
 380 Table 5 shows a moderate association between age and preference of transport service in  
 381 the Valencia subsample, with a Cramer's V of between 0.30 and 0.60. Differences were  
 382 observed for Age 1 (20-29 years) in relation to the other two age segments. The youngest  
 383 users preferred the NoTX option (VTC&Blablacar), while the other two segments  
 384 preferred the OnlyTX option. Therefore, loyalty to taxis is lower among younger users.

385  
 386 There was a moderate association between the use of a service and the use of a taxi app  
 387 (convenience concept) in the two subsamples, with a Cramer's V of between 0.30 and  
 388 0.60. That means that the use of different apps is widespread among all kinds of users.

389  
 390 Results for *connection 2* in Table 5 indicate that there was no significant link between  
 391 user values and loyalty (measured by preference). The association analysis shows no  
 392 relation between appearance, social responsibility, sustainability and governance  
 393 variables. Therefore, there was no difference in the selection of a transport service based  
 394 on whether users considered VTC cars to be ostentatious. Moreover, there was no  
 395 difference in the selection of a transport service based on user concerns about drivers'  
 396 labour conditions. However, we can observe that, in the Valencia subsample, taxi users  
 397 were more concerned about taxi drivers' labour problems. The selection of a transport  
 398 service was not impacted by users' values about sustainability.

399  
 400 Table 6 presents the QCA results for *connection 3*, which explored whether passenger  
 401 experiences indicated the necessary or sufficient conditions for loyalty. User experience  
 402 was measured through the concepts of quality, comfort, transparency, and safety.

403  
 404 The QCA analysis was performed in two main steps in the four models, the analysis of  
 405 necessary conditions and the analysis of sufficient conditions (Annex B). They all

406 revealed that there were no necessary conditions. Ragin (2014) stated that necessary  
407 conditions can be identified because they are present in every solution in a model. In this  
408 paper, we established that necessary conditions had to have consistency values  $\geq 0.9$   
409 (Schneider and Wagemann, 2012).

410  
411 The second step in the QCA analysis was to obtain the sufficient conditions, that is, to  
412 find those conditions which had the value 1 and, consequently, the output would also  
413 have the value 1 (Schneider and Wagemann, 2012). Table 6 shows the results for the four  
414 models. The configuration of the table follows the one defined by Ragin and Fiss (2008).

415  
416 *Model 1* explored the reasons for the lower use of VTCs compared to taxis. The model  
417 yielded two sufficient solutions, the absence of quality associated with VTC services and  
418 the presence of safety (trust) related to taxis. Since the solution coverage was 0.6, there  
419 might be other conditions which also explain the frequency of use of VTCs.

420  
421 *Model 2* explored the reasons for the lower use of taxis compared to VTCs by users  
422 between 20 and 29 years of age. The three conditions evaluated refer to a price-sensitive  
423 user and the two characteristics associated with taxis, transparency and safety (trust). The  
424 model gave a sufficient solution which means that young adult users do not use taxis more  
425 often because they do not perceive the transparency and safety when they travel by taxi,  
426 coupled with the fact that they are price-sensitive users. Moreover, given that the solution  
427 coverage was 0.467, there might be other conditions which would also explain why there  
428 is not higher frequency in the use of taxis.

429  
430 *Model 3* explored the reasons for the lower use of VTCs compared to taxis by users  
431 between 30 and 49 years. The five conditions included in the analysis refer to the  
432 characteristics associated with good service in taxis and VTCs, besides the feel that VTC  
433 cars are ostentatious. The model gave three sufficient solutions: a lack of quality in the  
434 VTC service, the feel that VTC cars are ostentatious, and a combination of safety (trust)  
435 and lack of transparency in taxi services. The result reveals to firms offering these  
436 services that it is important for this user segment to feel safe while they use these transport  
437 services. In addition, some users rated the ostentatious type of cars available in VTC  
438 services negatively.

439  
440 *Model 4* explored the reasons for the higher use of taxis compared to VTCs by users  
441 between 50 and 69 years of age. The four conditions evaluated refer to the characteristics  
442 associated with good service in taxis and VTCs. The model yielded three combinations  
443 of sufficient conditions:

- 444
- 445 - The first was a combination of lack of quality in the VTC service and lack of  
446 feeling safe when travelling by taxi. This combination indicates that this segment  
447 of users is more loyal to taxis because they do not perceive the quality of VTC  
448 services, though they do not perceive safety (trust) as a characteristic of taxi  
449 services either.
  - 450 - The second solution was a combination of transparency in taxi services, though  
451 there was also an absence of the perception of safety (trust), as in the first  
452 combination.
  - 453 - The third combination included lack of quality in the VTC service, though in this  
454 case, there was the presence of transparency in the taxi service.



















455 It is important to highlight the differences obtained in segments 2 and 3 in relation to how  
 456 they rated taxi services. Users between 30 to 49 years rated safety (trust) positively while  
 457 users between 50 and 69 years rated transparency positively. Given that the solution  
 458 coverage was 0.56, there could be other conditions which would also explain why there  
 459 is higher frequency in the use of the taxi by this segment of users.

460

461 The results of *connection 3* can be summarised as follows:

- 462 – Absence of quality in the VTC service is a sufficient condition which explains  
 463 both lower loyalty to VTCs and higher loyalty to taxis.
- 464 – Comfort in the VTC service is not a sufficient condition in loyalty. This means  
 465 that users do not pay major attention to the car.
- 466 – Transparency in the taxi service is a sufficient condition which explains higher  
 467 loyalty to taxis among older users. Conversely, the absence of transparency is a  
 468 sufficient condition which explains lower loyalty to taxis among younger users.
- 469 – Safety (trust) in taxi services is a sufficient condition which explains lower loyalty  
 470 to VTCs.

471 Table 6. Sufficient conditions for the entire dataset (RQ3)

Model	Model 1		Model 2	Model 3			Model 4		
Output	~HighVTC		~HighTaxi	~HighVTC			HighTaxi		
Dataset	Complete dataset		Age 1 (20-29)	Age 2 (30-49)			Age 3 (50-69)		
Conditions	S1	S2	S3	S4	S5	S6	S7	S8	S9
Price-sensitive									
Quality-VTC									
Comfort-VTC									
Appearance									
Transparency-Taxi									
Safety-Taxi									
No. Cases	20	20	8	20	20	8	7	2	8
Raw coverage	0.409	0.445	0.4667	0.375	0.406	0.125	0.2	0.08	0.28
Unique coverage	0.155	0.191	0.467	0.25	0.281	0.063	0.2	0.08	0.28
Consistency	0.957	0.925	0.875	1	0.963	1	0.714	1	0.875
Frequency cutoff	2		1	2			2		
Consistency cutoff	0.8		0.875	1			0.833		
Solution consistency	0.9296		0.875	0.979			0.824		
Solution coverage	0.6		0.467	0.734			0.56		
	Core condition present in parsimonious and intermediate solutions								
	Core condition absent in parsimonious and intermediate solutions								
	Contributory condition present in the intermediate solution								

472 Source: authors' own compilation

473

474

475

476 **Results for user experience (RQ4 and RQ5)**

477

478 The results for *connection 4* are presented in Table 7, which correlates experience and  
 479 values. They indicate that taxi-less-polluting (sustainability) correlated positively with  
 480 transparency and safety (trust), which refer to the taxi service. Conversely, taxi-less-  
 481 polluting correlated negatively with quality and comfort in the VTC service. Moreover,  
 482 when passengers prefer transparency and safety (trust), they support the social benefits  
 483 of the taxi, while this is not important for those who prefer quality and comfort (VTC)  
 484 and support the social benefits of VTCs. Therefore, it can be stated that values are related  
 485 to the taxi-passenger or VTC-passenger experience.

486

487 Table 7. Kendall's Tau b between values and experience (RQ4)

Variables	Concept analysed	Quality		Comfort		Transparen cy	Safety
		BetservVC	KdrivVC	CleanVC	NewVC	RoutTX	ConfTX
<b>Valencia</b>							
OstentVC	Appearance	-0.164	-0.145	-0.237*	-0.042	0.148	0.334**
LabTX	Social responsibility	-0.074	-0.086	-0.092	-0.041	0.178	0.212*
Elect	Sustainability	0.030	0.199*	0.297**	0.212*	0.137	-0.006
PolutBLA		-0.020	0.089	0.086	0.081	-0.098	-0.113
PolutTX		-0.249**	-0.358**	-0.227*	-0.221*	0.277**	0.376**
GovTX	Governance	-0.357**	-0.335**	-0.393**	-	0.450**	0.507**
NRegVC		0.369**	0.456**	0.551**	0.325**	-0.269**	-0.333**
<b>Non-Valencia</b>							
OstentVC	Appearance	-0.188	-0.256	-0.284*	-0.112	0.023	0.311*
LabTX	Social responsibility	-0.289*	-0.221	-0.124	-0.052	0.175	0.280*
Elect	Sustainability	-0.029	0.023	-0.065	-0.030	-0.057	-0.165
PolutBLA		-0.038	0.000	-0.114	-0.023	0.019	-0.021
PolutTX		-0.585**	-0.568**	-0.492**	-	0.413**	0.537**
GovTX	Governance	-0.541**	-0.410**	-0.383**	-	0.297*	0.528**
NRegVC		0.560**	0.449**	0.500**	0.326**	-0.350**	-0.469**

488

\*p-value < 0.05; \*\*p-value < 0.01

489

Source: authors' own compilation

490

491 Table 8 shows the results for *connection 5*, which explored whether user profile (price  
 492 and age) was related to user experience. The results for the Kruskal-Wallis test indicated  
 493 significant differences between age groups and experience with VTC services (quality  
 494 and comfort). The pairwise comparison indicated a significant difference between Age 3  
 495 and Age 1 (based on the Bonferroni adjustment, p-value=0.043 in quality and p-  
 496 value=0.022 in comfort). As these results were not found in the rest of the sample, more  
 497 analyses for these relationships should be performed.

498

499 Results for Kendall's Tau b in Table 8 indicate the existence of a relationship between  
 500 price-sensitive users and their experience with taxi and VTC services. These users, who  
 501 stated that VTCs and Blablacar are cheaper, rated the VTC service positively whereas  
 502 they rated taxi services negatively. There were few differences between the two  
 503 subsamples.

504  
505

Table 8. Connection between user profiles and user experience (RQ5)

Variables	Concept analysed	Groups: Age	Price-sensitive	
			CheapVC	CheapBLA
			Kendall's Tau b	Kendall's Tau b
<b>Valencia</b>				
BetservVC	Quality	4.040	0.623**	0.296**
KdrivVC		6.175*	0.360**	0.236*
CleanVC	Comfort	5.062	0.313**	0.292**
NewVC		7.973*	0.289**	0.138
RoutTX	Transparency	0.009	-0.300**	-0.062
ConfTX	Safety	2.649	-0.379**	-0.184
<b>Non-Valencia</b>				
BetservVC	Quality	0.801	0.643**	0.429**
KdrivVC		2.069	0.575**	0.384**
CleanVC	Comfort	0.245	0.451**	0.208
NewVC		1.343	0.536**	0.442**
RoutTX	Transparency	0.460	-0.219	-0.207
ConfTX	Safety	0.071	-0.307*	-0.369*

506 <sup>a</sup>Degree of freedom = 2 or 3; \**p*-value < 0.05; \*\**p*-value < 0.01  
507 Source: authors' own compilation

508  
509  
510

4.6. Final results

511 Table 9 shows a summary of the descriptive results for urban mobility in the sample  
512 analysed in Spain, and of the responses to our research questions-

513  
514

Table 9. Summary of results

Independent variable		Dependent variable	
		Loyalty (nominal)	User experience (ordinal)
User profile	Nominal (app use, age, price-sensitive)	<b>RQ1. Connection 1:</b> Association for price-sensitivity and convenience	<b>RQ5. Connection 5:</b> Difference in comfort experience by age group
	Ordinal (price-sensitive)		<b>RQ5. Connection 5:</b> Relationship between price-sensitivity and experience (positive for VTC and negative for taxi)
User values	Ordinal		<b>RQ4. Connection 4:</b> Relationship between values and experience
	Transformed to dichotomic	<b>RQ2. Connection 2:</b> There is no association, except for governance supporting taxi service	
User experience	Transformed to dichotomic	<b>RQ3. Connection 3:</b> QCA shows that age matters in determining sufficient causal conditions. Quality, safety and transparency appear as sufficient solutions explaining loyalty	

515 Source: authors' own compilation

516



517 **Discussion**

518

519 At present, the use of platforms for taxi and VTC services in Spain is influenced by age  
520 (Kumar et al., 2018; Apte & Davis, 2019; Young & Farber, 2019; Watanabe et al., 2016;  
521 Skok & Baker, 2018). However, we disagree with Khuong and Dai (2016) in terms of  
522 passenger satisfaction. They gave more importance to comfort and price instead of safety  
523 and transparency, which is not the case for taxi passengers. Comfort only seems to be  
524 valued by VTC passengers and price depends on age. The results show that the customers  
525 of these platforms are not always price-sensitive. This is especially applicable in the case  
526 of taxi services.

527

528 Price-sensitivity was observed in the case of VTC passengers, especially in the 20-29 age  
529 group. For the youngest group, loyalty depending on customer satisfaction rather than on  
530 price was not applicable. This is in keeping with Kumar et al. (2018) and Clauss et al.  
531 (2019) who stated that passengers were prepared to pay more and that loyalty depended  
532 on customer satisfaction rather than on prices.

533

534 Taxi passengers especially value safety (trust), which is in line with Madrid Council &  
535 Vectio (2017). In fact, this variable is emphasised by VTC companies in order to increase  
536 trust among their potential customers (De Miguel et al., 2020; Vassallo et al., 2018). For  
537 Kumar et al. (2018), this is a key point because if drivers do not know the routes well and  
538 their service is not perceived as being a quality one, it becomes difficult to retain  
539 customers.

540

541 We agree with Dimitriadis and Zilakaki (2019) and Chang and Yeh (2017) in the sense  
542 that values do not have a significant direct effect on customer loyalty, though we can say  
543 that drivers' labour rights are a concern (Täuscherand and Kietzmann, 2017; Rosenblat  
544 and Stark, 2016), depending on their transport preference (De Miguel et al., 2020). When  
545 passengers prefer transparency and safety, they support the social benefits of taxis, while  
546 this is not important for those who prefer quality and comfort (VTC) and support the  
547 social benefits of VTCs. This result is in line with Sigmados (2019). Surprisingly, and  
548 taking into account the conflict between taxis and VTCs in Spain (De Miguel et al., 2020),  
549 we found fewer negative attitudes from passengers than we expected, both for taxis and  
550 for VTCs.

551

552 Environmental benefits (Ertz et al., 2018) are not a priority at present. By contrast,  
553 Spanish citizens prefer the public management of public services (AEVAL, 2016:75) as  
554 this is supposed to encourage more social values.

555

556 Finally, we agree that the passenger comments and review tools in these apps are barely  
557 used (Watanabe et al., 2016; Vassallo et al., 2018; Apte and Davis, 2019). Other  
558 experiences have shown that, no matter what the type of service, passengers value the  
559 perception of availability and quality (Heikkilä & Heikkilä, 2019). Accordingly, greater  
560 insights into what drives the various stakeholders is still required (Button, 2020).

561

562 **Conclusions**

563

564 TNCs offer a wider range of services in some cities with relatively more TNC competitors  
565 and public transport providers (Button, 2020). Therefore, taxis need to focus heavily on  
566 loyalty if they wish to survive over the next few years, and especially with the younger

567 customer segment. They also need to increase comfort and quality. On the other hand,  
568 VTCs need to increase transparency and safety, with a view to catering for and gaining  
569 the trust of older groups. Users need to be targeted by age and attention needs to be paid  
570 to the groups that are less satisfied in each case.

571  
572 Three important conclusions can be inferred from our analysis, in the case of urban  
573 mobility in Spain:

- 574 1) There is a relationship between user profiles and user experiences, and between  
575 user profiles and loyalty to services. Younger users consider their experience to  
576 be better in VTCs, while older users think their experience is better with a taxi  
577 service. Price-sensitive users are more loyal to VTCs while non price-sensitive  
578 customers are more loyal to taxi services. The preference of younger users  
579 towards using VTC services might change the market share structure in the future,  
580 with VTCs becoming the main urban passenger transport option offered in Spain.
- 581 2) There is also a relationship between user values and user experiences, but a weak  
582 relationship between user values and loyalty to services. The analysis indicates  
583 that passenger values tend to favour either taxis or VTCs when they evaluate their  
584 experience. This could infer that companies are already increasing their loyalty  
585 and passengers identify with the service they have chosen.
- 586 3) There are sufficient conditions in user experiences which result in the presence  
587 or absence of loyalty to services, and age clarifies these conditions. An absence  
588 of quality in VTC leads to lower frequency in the use of VTC services.  
589 Transparency in the taxi service results in higher frequency of taxi use by  
590 customers in the Age 3 segment (50-69 years old). Conversely, the type of cars  
591 used by VTC services is a barrier for some customers in the Age 2 segment (30-  
592 49 years old).

593  
594 These results may prove to be relevant for academia, as there is a lack of studies on urban  
595 transport passenger loyalty. We have focused on the case of Spain, but the study could be  
596 extended to other countries. Furthermore, the results are relevant for taxi and VTC  
597 services, as it gives them information about the need to work on loyalty depending on  
598 passenger age groups, and focusing on the experience variables that require further  
599 development in both services.

600  
601 Finally, future research could centre on how passengers, and especially young users, feel  
602 about taxis as a public service.

### 603 **Limitations**

604  
605 On the one hand, although our study was exploratory and the sample is not representative  
606 of the whole country (Tsafarakis et al., 2019; Collin et al., 2017), the results show trends  
607 and differences that could be analysed again in a few years' time to evaluate the changes  
608 that occur as passengers get older. Moreover, in the specific case of Spain, we should  
609 review how deregulation has evolved and impacted user perceptions (De Miguel, 2010).

610  
611 We have to take into account that the questionnaire was delivered just before the first  
612 COVID-19 lockdown in Spain. Therefore, the results could be different in a post-  
613 pandemic scenario. On the other hand, it would be of interest to have the opinion of taxi  
614 and VTC drivers to compare their answers (De Miguel et al., 2020). This is especially  
615 relevant in the case of VTC drivers, as not all of them are TNC employees.  
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850 **Annexes**

851 **A. Questionnaire (own compilation)**

Questions	Response alternatives
Age range	20-29; 30-49; 50-69; 70-79
Kind of urban passenger service used	Taxi; VTC-Cabify; VTC-Uber; Blablacar or similar
App used when ordering a taxi service	FreeNow-Mytaxi; PideTaxi; None; Other
Looking at consumer reviews before purchasing a taxi or VTC service through an app	Yes/No
Frequency of using a taxi service	Never; Almost never/1-2 timesxmonth; Seldom/3-4 timesxmonth; Almost always/1-2 timesxweek; Always/3-4 timesxweek
Frequently of using a VTC (Uber, Cabify...)	Never; Almost never/1-2 timesxmonth; Seldom/3-4 timesxmonth; Almost always/1-2 timesxweek; Always/3-4 timesxweek

VTCs are cheaper than taxis	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
VTCs give a better service than taxis at a lower price	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
Taxis should give a fixed price before they start their route	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
I use Blablacar because it is cheaper	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
VTC drivers are more pleasant than taxi drivers	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
Taxi drivers know the routes better than VTC drivers	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
I trust a taxi driver more than a VTC driver	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
VTC cars are cleaner than taxis	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
VTC cars are newer than taxis	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
VTC cars are too ostentatious	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
The Government needs to protect taxi services from VTCs	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
Labour conditions are better for taxi drivers than for VTC drivers	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
The labour conditions of VTC drivers are deficient	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
Taxis pollute less than VTC cars	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
All cars, taxis and VTCs should be hybrid or electric vehicles	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
I would use services such as Blablacar to pollute less	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
The VTC-taxi conflict has had a negative effect on the image of taxi service	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
During the conflict, all the stakeholders took an equal stance	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree
The new regulation harms VTC companies excessively	Strongly disagree; Disagree; Slightly agree; Agree; Strongly agree

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## B. Analysis of necessary conditions and cases in sufficient conditions (own compilation)

Table B1. Necessary conditions for Models 1 to 4

<b>Model 1</b>				
Output: ~HighVTC	HighVTC		~ HighVTC	
Condition	Consistency	Coverage	Consistency	Coverage
QualityVTC	0.916667	0.252874	0.590909	0.747126
ComfortVTC	0.833333	0.185185	0.800000	0.814815
TransparencyTaxi	0.416667	0.163934	0.463636	0.836066
SafetyTaxi	0.166667	0.075472	0.445455	0.924528
~QualityVTC	0.083333	0.042553	0.409091	0.957447
~ComfortVTC	0.166667	0.153846	0.200000	0.846154
~TransparencyTaxi	0.583333	0.191781	0.536364	0.808219
~SafetyTaxi	0.833333	0.246914	0.554545	0.753086
<b>Model 2</b>				
Output : ~HighTaxi	HighTaxi		~HighTaxi	
Condition	Consistency	Coverage	Consistency	Coverage



Pricesensit	0.857143	0.285714	1.000000	0.714286
TransparencyTaxi	0.571429	0.333333	0.533333	0.666667
SafetyTaxi	0.571429	0.571429	0.200000	0.428571
~ Pricesensit	0.142857	1.000000	0.000000	0.000000
~ TransparencyTaxi	0.428571	0.300000	0.466667	0.700000
~ SafetyTaxi	0.428571	0.200000	0.800000	0.800000
<b>Model 3</b>				
Output: ~HighVTC	HighVTC		~ HighVTC	
Condition	Consistency	Coverage	Consistency	Coverage
QualityVTC	1.000000	0.183673	0.625000	0.816327
ComfortVTC	0.777778	0.118644	0.812500	0.881356
Appearance	0.111111	0.037037	0.406250	0.962963
TransparencyTaxi	0.444444	0.111111	0.500000	0.888889
SafetyTaxi	0.111111	0.034483	0.437500	0.965517
~QualityVTC	0.000000	0.000000	0.375000	1.000000
~ComfortVTC	0.222222	0.142857	0.187500	0.857143
~Appearance	0.888889	0.173913	0.593750	0.826087
~TransparencyTaxi	0.555556	0.135135	0.500000	0.864865
~SafetyTaxi	0.888889	0.181818	0.562500	0.818182
<b>Model 4</b>				
Output: HighTaxi	HighTaxi		~HighTaxi	
Condition	Consistency	Coverage	Consistency	Coverage
QualityVTC	0.400000	0.555556	0.666667	0.444444
ComfortVTC	0.720000	0.642857	0.833333	0.357143
TransparencyTaxi	0.400000	0.833333	0.166667	0.166667
SafetyTaxi	0.520000	0.812500	0.250000	0.187500
~QualityVTC	0.600000	0.789474	0.333333	0.210526
~ComfortVTC	0.280000	0.777778	0.166667	0.222222
~TransparencyTaxi	0.600000	0.600000	0.833333	0.400000
~SafetyTaxi	0.480000	0.571429	0.750000	0.428571

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Table B2. Cases<sup>1</sup> in model solutions

<b>Model 1:</b> ~HighVTC = f(QualityVTC, ComfortVTC, TransparencyTAXI, SafetyTAXI)
<b>S1:</b> US10 (1,1), US100 (1,1), US102 (1,1), US103 (1,1), US107 (1,1), US108 (1,1), US109 (1,1), US111 (1,1), US112 (1,0), US113 (1,0), US117 (1,1), US119 (1,1), US123 (1,1), US125 (1,1), US126 (1,1), US127 (1,1), US129 (1,1), US13 (1,1), US131 (1,1), US134 (1,1)
<b>S2:</b> US10 (1,1), US103 (1,1), US107 (1,1), US108 (1,1), US111 (1,1), US113 (1,0), US114 (1,1), US116 (1,1), US117 (1,1), US119 (1,1), US120 (1,1), US125 (1,1), US129 (1,1), US130 (1,1), US131 (1,1), US132 (1,1), US134 (1,1), US14 (1,1), US19 (1,1), US23 (1,1)
<b>Model 2 (age 1):</b> ~HighTaxi = f(Pricesensit, TransparencyTaxi, SafetyTaxi)
<b>S3:</b> US121 (1,1), US44 (1,0), US50 (1,1), US51 (1,1), US52 (1,1), US53 (1,1), US55 (1,1), US62 (1,1)
<b>Model 3 (age 2):</b> ~HighVTC = f(QualityVTC, ComfortVTC, AppearanceVTC, TransparencyTAXI, SafetyTAXI)
<b>S4:</b> US10 (1,1), US123 (1,1), US125 (1,1), US13 (1,1), US134 (1,1), US19 (1,1), US22 (1,1), US23 (1,1), US24 (1,1), US26 (1,1), US27 (1,1), US30 (1,1), US36 (1,1), US5 (1,1), US6 (1,1), US69 (1,1), US72 (1,1), US79 (1,1), US82 (1,1), US85 (1,1)
<b>S5:</b> US124 (1,1), US125 (1,1), US132 (1,1), US14 (1,1), US2 (1,0), US23 (1,1), US6 (1,1), US63 (1,1), US64 (1,1), US65 (1,1), US67 (1,1), US68 (1,1), US70 (1,1), US72 (1,1), US74 (1,1), US75 (1,1), US76 (1,1), US79 (1,1), US80 (1,1), US81 (1,1)
<b>S6:</b> US125 (1,1), US25 (1,1), US43 (1,1), US45 (1,1), US46 (1,1), US6 (1,1), US65 (1,1), US90 (1,1)
<b>Model 4 (age 3):</b> HighTaxi = f(QualityVTC, ComfortVTC, TransparencyTAXI, SafetyTAXI)
<b>S7:</b> US100 (1,1), US102 (1,1), US109 (1,1), US112 (1,0), US126 (1,1), US127 (1,1), US7 (1,0)
<b>S8:</b> US11 (1,1), US39 (1,1)
<b>S9:</b> US107 (1,1), US108 (1,1), US113 (1,0), US129 (1,1), US131 (1,1), US37 (1,1), US8 (1,1), US99 (1,1)

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<sup>1</sup> Cases in intermediate solutions