Mobile Ticketing Customers: How to Attract Them and Keep Them Loyal

Marta Campos Ferreira[1,2(✉)], Catarina Ferreira[1], and Teresa Galvão Dias[1,2]

[1] Faculty of Engineering, University of Porto, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal
{mferreira, tgalvao}@fe.up.pt, catarinassferr@gmail.com

[2] INESC-TEC, Faculty of Engineering, University of Porto, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal

Abstract. Technological advances and the use of mobile solutions to make smartphone users' daily life easier is a mindset that has revolutionized the society lifestyle in the past years. In the public transport sector, mobile ticketing is an example of the applicability of mobile solutions in a real context. Using one smartphone to purchase and validate tickets is a revolutionary idea that has acquired fans around the world. The convenience of use and time savings throughout the process are positive aspects, however, the success of the adoption of such services is limited.

Based on the case of Porto, Portugal and particularly of the mobile app And, this study intends to understand customer churn factors of mobile ticketing services by analysing data from customer complaints and from usage history. Thus, an analysis of the complaints, the complainers and the effects of complaints is presented. A strategy for capturing and retaining users is also proposed considering four stages of mobile ticketing apps lifecycle: user onboarding, user engagement, user retention and user reinstall.

Keywords: Mobile ticketing · Urban passenger transport · Customer loyalty · Customer churn

1 Introduction

As the world becomes increasingly interconnected, technology adoption is one of the most influential factors in human progress. Accessing internet right away or owning a smartphone is now assumed as granted in the many advanced economies. It permeates commerce, social interactions, politics, culture and daily life [1]. Furthermore, while high-income economies keep using more internet and owning more high-tech gadgets, in the past years, there has been a tendency for the emerging countries to follow and copy these behaviors. These patterns are now global, regardless of how fast they grow in each type of economy. In 2018, more than 3.5 billion people, 47% of the world population, was connected to mobile internet [2].

A. L. Martins et al. (Eds.): INTSYS 2020, LNICST 364, pp. 3–15, 2021.
https://doi.org/10.1007/978-3-030-71454-3_1

Internet access and innovative services facilitate the access to modern public health services, free education services and financial services, including mobile payments. Accordingly, mobile has become a fundamental gateway to the digital economy. The general adoption of mobile devices to pay for goods and services is a wide-spreading reality [3–5]. Mobile payments were designed to provide a secure, convenient, consistent, efficient and trusted payment experience to the users [6]. Although, security and privacy issues, as well as interaction and reliability of the service, might be sometimes concerns that users share [7].

Mobile payments can be applied to several sectors such as public transport. There, mobile payment comprises both pay-as-you-go options - in which the mobile phones serves as a wallet and actual ticketing - where passengers buy and authenticate tickets on their mobile phone. The last feature is only possible due to an emerging technology based service called mobile ticketing.

Similarly, to what happens in mobile payment services, mobile ticketing is a process whereby customers can order, pay for, obtain and validate tickets using only mobile devices and without needing the physical ticket. A mobile ticket contains a unique ticket verification varying according to the technology used. While some mobile ticketing systems require the validation through SMS text, a QR or barcode, others require Near Field Communication (NFC) [6]. Mobile ticketing service solutions take advantage of wireless communication and thus intend to free customers from difficult purchase decisions, allowing easier access to other services.

The convenience of this technology makes it totally suitable to address the problems of urban congestion and stress of metropolitan areas. As public transportation improves the mobility of passengers, by means that are safe of high-quality, it can be seen as the required solution to urban sustainability. Although, the complexity of the transport networks and the lack of seamless options reduce the attractiveness of the sector. Long waiting times in queues for purchasing and validating tickets make people drop this solution and choose to use their own vehicle instead. Mobile ticketing in the public transport sector can deliver an innovative, ubiquitous and engaging service [8].

Although some cities implemented mobile ticketing solutions on their public transport network, the adoption of such services seems to achieve limited success [9]. The causes that lead to such a low rate of utilization of the service are so far unknown. However, researchers affirm that the churn factors are somehow related to the acquisition phase or to the user experience [10]. Others claim that usage rates are still low because mobile payments require customers to change their behaviors towards tightly ingrained payment habits [11].

In an attempt to understand the phenomenon, the authors [11] studied the failure of three mobile payment cases in Switzerland: m-Maestro project, European initiative compliant with Visa, and mobile payments by PostFinance. PostFinance initiative, for instance, failed to provide additional value for customers and local merchants. They faced significant difficulties in finding a workable balance between interoperability and the ease of use for customers, resulting in a clumsy solution that did suit the physical environment and the behaviors associated with payments in local stores. At the end of the study, the authors recognize that further research is needed to formulate a more complete framework grounded in the richer process data of mobile payment diffusion trajectories.

On the other hand, despite recognizing that despite the growing number of mobile payment apps, very few solutions have turned to be successful, the authors [12] selected some of those few successful platforms to study the success factors. The authors conclude that the success of mobile payment platforms lies with the ability of the platform to balance the reach (number of participants) and the range (features and functionalities) of the platform.

In the city of Porto, Portugal, a mobile ticketing application, called Anda was deployed in June 2018 [13]. An analysis of the level of service utilization allowed to conclude that there are many customers who have never used the application, even though they have downloaded it, and others who, despite having already use it, preferred to give up the application and continue to use the traditional ticketing system. This reality happens with a number of similar mobile ticketing applications existent in the market and literature fails in explaining this phenomenon.

Therefore, this paper aims to identify and analyze the customer churn factors of mobile ticketing services and to propose strategies for customer acquisition and retention. This work is based on an in-depth analysis of the case of Porto, Portugal. Half a year of Anda complaints and usage data was analyzed. These, comprise data from interaction between the users and the customer support - made by phone, email and social networks - as well as data from the app usage history of those who complain. Thus, it is possible to establish the causal relationship between all the data extracted and then identify the reasons behind the churn factors. Based on that, a mobile ticketing customers' lifecycle can be defined from customer onboarding to customer acquisition, customer retention and customer re-engagement. For each of those stages, the critical success factors are identified and a set of useful strategies is set to attract and delight customers.

In the next sections the paper methodology is described, followed by the results of the analysis of complaints and user validation data. The discussion of the results is presented together with a proposal of service improvement in each of its stages. The final section presents the conclusions.

2 Methodology

In the city of Porto, Portugal, the public transport system is comprised of three subsystems: buses, light rail, and suburban trains. The three are all integrated into a multimodal public transport ticketing system, Andante. This system was originally designed for the use of a smartcard with RFID contactless technology. Users can purchase a monthly subscription pass, a metropolitan subscription, an Andante 24 pass – available for only 24 h, a tourist card or an occasional card - if they only need it for a limited number of travels.

In June 2018, a new mobile ticketing solution, called Anda, was deployed in Porto as a complement to the Andante system. By using the app the Andante card is dispensable because all action required to travel in Porto public transportation, from tickets purchasing to validation, can be done with a mobile device [14].

The launch of Anda was widely reported in the media, having been accompanied by a massive communication plan. The objective was not only to disseminate the new

service, but also to explain how it works. It involved news in TV channels, newspapers and social networks, placing outdoors and stands at stations, decorate vehicles, distribute flyers and informational leaflets, and having promoters presenting the service and helping customers.

To have a better understanding of how to capture and retain customers, it is crucial to first evaluate and then become entirely informed of current users' behavior. By identifying patterns of usage, as well as their tendency, it becomes easier to perceive the indicators of customers who are about to churn.

For instance, customer feedback might be a valuable tool to understand how the service has been communicated to current and potential users. Complaints analysis enables the understanding of how users perceive the app and what are their expectations and needs about it. By that, it is easier to recognize the vital areas for customer communication improvement and therefore the service improvement as well.

Since its full deployment, customers using the Anda application interact daily with the customer support service, through several channels, such as telephone, email, Facebook, Google play and physical stores. This interaction can have several purposes, such as asking questions, reporting errors, or making suggestions for improvement. The information from the various channels is collected in a single platform, to be further processed and analyzed.

The object of this study is the complaints received by the Intermodal Transports of Porto (TIP) over 6 months of use of Anda - from September 2019 to February 2020. The choice of this time interval is related to the fact that it is intended to study a normal period of use, with only regular updates to the app, but without major changes that would imply a greater influx of complaints.

The analysis included three main aspects: the complaints, the complainers, and the effects of the complaints on the usage of Anda. First, data on the complaints include the date when the statements were presented, the reasons which motivated them, the responsible transport operators, and the media through which they were submitted. Second, regarding the complainers, it is gathered information about their social profile – whether they belong to a specific age group or benefit from aids because of their social status – and about the type of ticket they most use. The information on the distribution of complainers over the different months was also collected. Finally, to assess the impact of the complaints on usage, data from app's validation history are considered.

To perform a descriptive analysis of the data gathered, MS Excel and Rapid Miner Software were required.

3 Results

This section includes the results of the analysis performed. In the first moment, the data of the complaints is presented. This is followed by the presentation of complainers' characterization and in the end, the results focus on the cross of data from the history of usage of Anda app and the complaints data.

3.1 The Complaints

During the period of time under analysis, the total of complaints Anda app received is at total 1223. Of those, only 68% (832 complaints) were submitted by different users, which means that 32% of the users complained at least more than once. To the date, the majority of those records (95,5%) are resolved and closed, but those which are still open require action by a third party – for example, external technical teams.

The problems that can arise in the use of Anda are several and can be categorized by the reasons that caused them. The main reasons are related to travel validation, login and register in the app, the correct completion of trips, the consultation of personal information, the associated tariff, and the disregarding of intermediate travel stops. Figure 1 shows the distribution of the main complaint reasons. Additionally, there are other reasons that can lead to a complaint - beacons, payment methods, questions, enroll, data change, improvement suggestions, inspection, and account deletion - but the total number of records with these reasons is not relevant to be considered in this study.

The Intermodal Transports of Porto (TIP) is constituted of 11 public transport operators and Anda can be used in all of them. Besides that, it is important to mention that 76,3% of the complaints is not related to travel itself and to the operators, but to issues related to the app or billing. The complaints to the transport operators are 23,7% of the total.

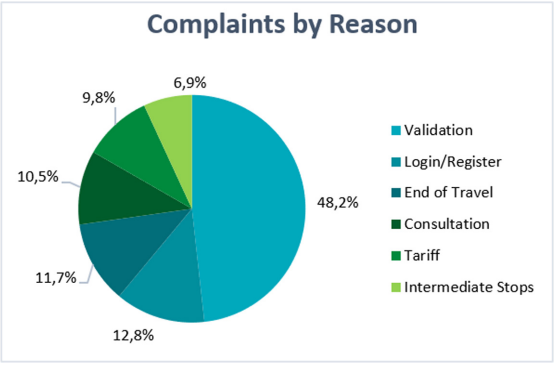

Fig. 1. Distribution of complaints by reason.

Anda's complaints can be submitted through the most varied means of communication, but two of them stand o-ut for their great use: the app's crash report (64%) and email (32,5%). Among the rest are phone calls (3%), the official Facebook page (0,4%) and the Google Play Store (0,2%).

3.2 The Complainers

The total number of Anda users from September 2019 to February 2020 is 5759 and 14% of them are complainers of the service. Usage data allows to know that, on average, about 3103 people use the app to travel on Porto's transport services per month. Likewise, it is also known that approximately 203 complaints are submitted per month. In Fig. 2, it is verified that, over the studied period, the relationship between the number of users and the total number of complaints received remained practically constant.

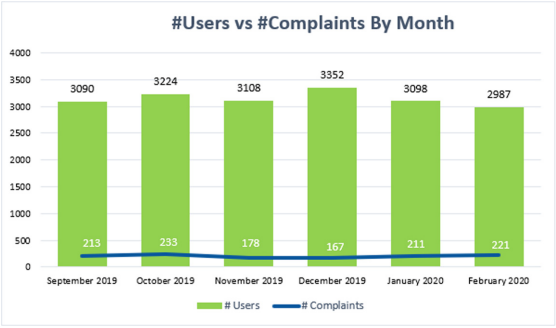

Fig. 2. Number of users vs number of complaints, per month.

Based on validation data, it is known what types of tickets were purchased by the complainers. The majority of people who complain buy single tickets (69.9%), ie for occasional trips. In Fig. 3a, it's seen the percentage distribution by different types of tickets. Additionally, TIP groups users by social profile according to their age group or social status. Through the analysis of these data, it can be seen in Fig. 3b that most of the complainers belong to the "Normal" social profile - which means they are adults who do not benefit from any type of discount. Among the remaining profiles are people who have lower rates (Social+), university students, students - under 18 - and seniors - over 65.

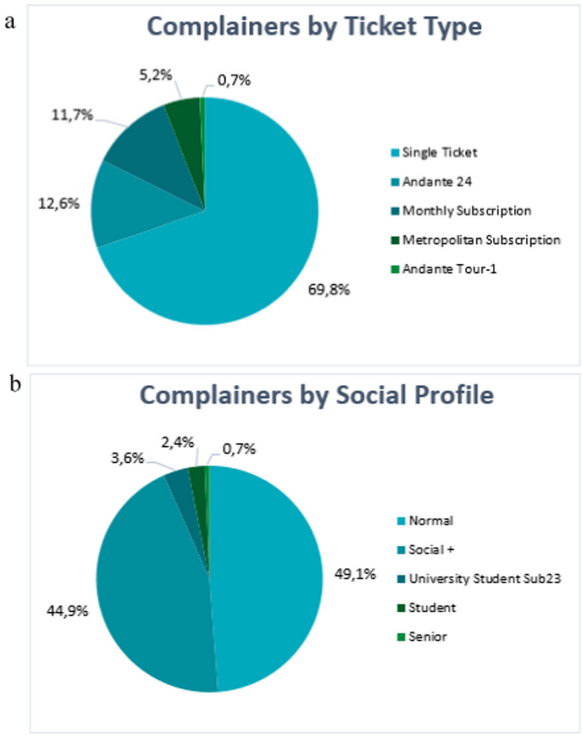

Fig. 3. a. Distribution of complainers by ticket type; b. Distribution of complaints by social profile.

The distribution of users by social profile also allows knowing that the users who most complain are the "Normal" and "Social+". Also, Fig. 4 shows that in all groups, the number of complaints is higher than the number of complainers, which, once again, reaffirms that there are users complaining more than once.

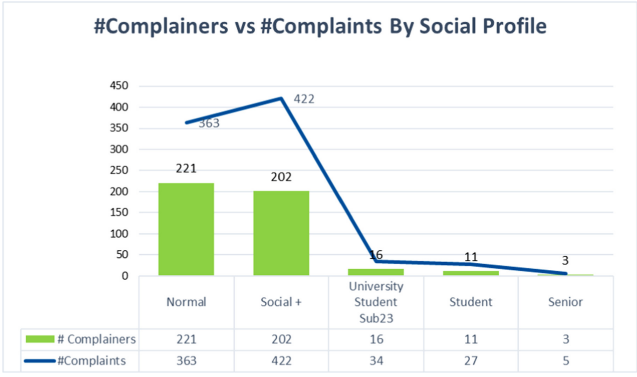

Fig. 4. Number of complainer vs number of complaints, by social profile.

3.3 The Effects of the Complaints

Finally, to understand the effect of complaints on the use of Anda, it is necessary to cross the data of both – complaints and validations. By knowing the complainers, it is noticeable their influence on the use of the application. Likewise, it is interesting to find out whether the use-complaint relationship is uni or bilateral.

When categorizing by type of users, as seen in Fig. 5a, it is possible to confirm that 78.7% of the complainers are people who use the app to make trips. However, 17.6% of app users complained without ever having used it - 9.9% complained before using it and 7.7% complained without ever having used it. In addition, 3.7% of complainers submit their statement at the time of their first trip. To deepen this connection, it was also assessed the use of the app on trips after the last complaint. In Fig. 5b, it can be seen that the majority (79%) have continued to use Anda, but 21% have not done so again.

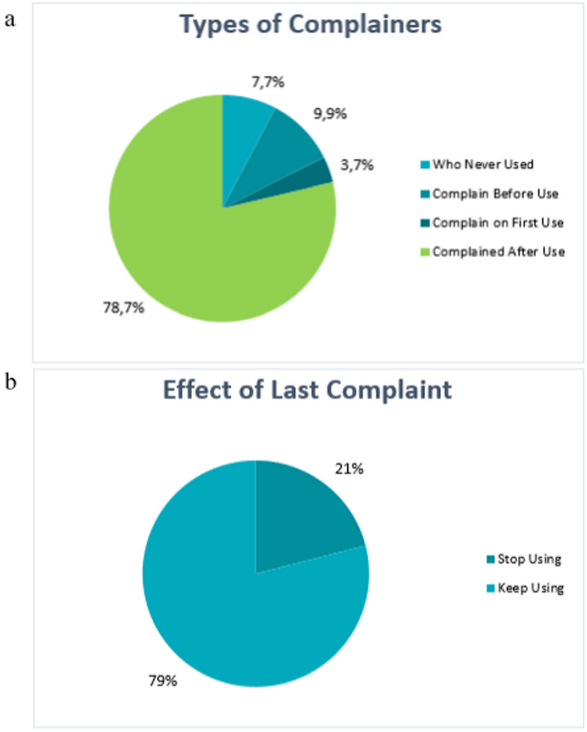

Fig. 5. a. Types of complainers; b. Effect of the last complaint.

4 Discussion

The analysis of the complaints and historical usage data opens the ground for several reflections and sets the path for the future development of the mobile ticketing services. In this sense, four fundamental stages were identified in the process of using this type of applications: user onboarding, user engagement, user retention and user reinstall. For each stage of the lifecycle, the main aspects to be taken into account - according to the results obtained - are identified and a series of tactics are established to increase the value of the service for the customers. The different user segments, as well as the appropriate channels to reach them, are also considered in the proposal presented.

4.1 User Onboarding

The data regarding to users who complain without having ever used the app are indicators that their first interactions with the service are not meeting their expectations. For technical or usability reasons, some users do not initially find the type of experience they were looking for and give up on the app before actually using it.

In order to counter this trend, Table 1 lists a series of tactics that can be put into practice. Regardless of the user segment, the application must present a welcoming message on first use, encourage users to register by emphasizing the benefits of the service and display a brief demonstration of the app and its main features.

Table 1. Strategy to improve user onboarding for different types of user segments.

User segment	Tactics	Channels
Installed but not registered	• Welcome users on the app and introduce the main features of the app • Encourage the register in the first 24 h • Incentivize registration with rewards on the app (cashback, ticket discount)	• In-app Notifications • Push Notifications
Registered but not activated	• Welcome app users after the register. Incentivize them to complete the payment information • Stimulate users to make their first travel using the app, with rewards (cashback, ticket discount)	• In-app Notifications • Push Notifications • SMS • Email • Reminders
Registered and activated	• Encourage greater use of the app with rewards (cashback, ticket discount)	• In-app Notifications • Push Notifications • SMS • Email • Reminders

4.2 User Engagement

Once familiar with the service, users need to be converted and start using it consistently and frequently. The data collected shows that 9.9% of the complainers are people who

complained before traveling with the app. Furthermore 3.7% are users who complained right after using the app for the first time. If these values aren't taken into account and if these users are not motivated to give the service a new chance, it is very likely that they will churn it.

At this stage of the cycle, the service should encourage consumers to complete the actions on the app – whether they are completing payment information or making a trip - stimulating the commitment already established. Notifications with special offers are also useful to promote constant use and encourage repeated interactions - for example, trips of the same type or with similar routes. Table 2 shows the different strategies to be targeted at the different users in the engagement stage.

Table 2. Strategy to improve user engagement for different types of user segments.

User segment	Tactics	Channels
Onboarded but non-converted	• Urge users to make their first travel using the app – push different use cases at different times • Create custom campaigns offering rewards for first users (cashback or travel discount)	• In-app Notifications • Push Notifications
First-time converted	• Confirm completion of first travel. Thank the choice of service, up to 5 min after it finishes • Encourage users to keep using the app	• Push Notifications • SMS • Email
Repeat converted	• Encourage continuous use through targeted personalized campaigns based on usage patterns • Promote different services with rewards (cashback or travel discount)	• In-app Notifications • Push Notifications • SMS • Email
Users not completing actions (abandonment)	• Notify users 1 h and 24 h after they abandon a task	• Push Notifications • SMS • Email • Reminders
No activity	• Remind users that have no activity in the app in the last 30 days	• Push Notifications • SMS • Email

4.3 User Retention

Mobile ticketing applications services tend to have difficulty retaining users. A consistent and constant customer base is the main foundation for the sustainable growth of any service.

At this stage, attention is drawn to data on the number of complaints and the number of complainers for each social profile. While in the "Normal" profile the number of complaints per complainer is approximately 3/2, in the rest the values increase by about two times. This information can become relevant in the sense that users dissatisfied with the service tend not only to abandon it but to negatively

influence potential new users. The more complaints a person has submitted, the greater their dissatisfaction with the service and the greater the likelihood of churning it.

In order to optimize retention, users can be motivated to repeat the same interactions with the application in exchange for discounts on regular trips or cashback of the amount to be paid at the end of each month. A careful and attentive analysis to control the retention rates of current and potential users must be carried out, as well as personalized promotional campaigns and reminder of available offers. In Table 3 are some tactics to be implemented.

Table 3. Strategy to improve user retention for different types of user segments.

User segment	Tactics	Channels
Engaged but not loyal (hibernating)	• Communicate with the user and understand what's their perception of the app. Send messages to obtain an assessment of the service • Send customized campaigns with "We miss you" messages	• In-app Notifications • Push Notifications • Email
Engaged and loyal	• Ensure app rating and reviews • Reward loyalty with travel discounts or cashback	• In-app Notifications • Push Notifications • Email

4.4 User Reinstall

The reasons for uninstalling a mobile application can be of the most varied types, from problems with interaction with the interface, inefficiency of features, poor performance or disastrous user experience.

At this stage it is important to consider the data regarding the effect of the last complaint. That is, 21% of complainers have stopped using Anda since they made their last complaint. This aspect means that the reasons that motivated the complaint or the resolution obtained in the complaint became a reason to stop using the app. Thus, the likelihood of uninstalling the app increases, the more time has passed since the last time it was used.

In order to recover inactive or discontinued customers, conducting an analysis of user behavior, as well as requesting feedback from former customers, can be useful in understanding the points of friction between them and the application and possibly eliminating them. For regain lost users targeted promotional offers can be put into action. Table 4 presents some strategies to be put into action.

Table 4. Strategy to improve user reinstall for different types of user segments.

User segment	Tactics	Channels
Converted but disengaged	• Run customized campaigns with the latest offers • Update users' preferences. Suggestion on discounts based on new preferred routes • Send reminding messages about the advantages of the service	• Email
Churned	• Run personalized email survey seeking feedback to understand the reasons for app uninstall • Run "We miss you" or "Check what your missing" campaigns, highlighting new promotions and cashback offers • Run "We're just a click away" campaigns, following the suspension policy between 43rd to 50th days after uninstalling the app	• Email
Re-acquired	• Run personalizes "Welcome back" campaigns, highlighting new promotions and cashback offers	• In-app Notifications • Email

5 Conclusions

Complaints are statements submitted by customers of service and result from their dissatisfaction when what is provided does not meet their expectations. Realizing the degree of customers' dissatisfaction and assessing the impact this may have on current and/or new potential customers is an advantage. Thus, a strategy can be preventively defined to optimize the quality of service of mobile ticketing applications in each of its four stages of use.

Through this study, it is clear that in the context of the Anda app, not only does the use of the app lead to complaints, but complaints negatively influence the use of the application. The bilateral connection between these two aspects is the basis for a series of reasons that lead customers to churn it.

In order to understand this causal relationship more deeply, future work in this area should include Anda usability tests with current, potential and lost users. Interviews and focus group sessions with these same stakeholders can also be useful to understand their perspectives.

References

1. Poushter, J.: Smartphone ownership and internet usage continues to climb in emerging economies. Pew Res. Cent. **22**, 1–44 (2016)
2. GSMA: The State of Mobile Internet Connectivity 2020. GSMA Reports (2020)
3. Garrett, J.L., Rodermund, R., Anderson, N., Berkowitz, S., Robb, C.A.: Adoption of mobile payment technology by consumers. Fam. Consum. Sci. Res. J. **42**, 358–368 (2014). https://doi.org/10.1111/fcsr.12069
4. de Sena Abrahão, R., Moriguchi, S.N., Andrade, D.F.: Intention of adoption of mobile payment: an analysis in the light of the Unified Theory of Acceptance and Use of Technology (UTAUT). RAI Rev. Adm. e Inovação (2016). https://doi.org/10.1016/j.rai.2016.06.003

5. Fontes, T., Costa, V., Ferreira, M.C., Shengxiao, L., Zhao, P., Dias, T.G.: Mobile payments adoption in public transport. Transp. Res. Procedia **24**, 410–417 (2017). https://doi.org/10.1016/j.trpro.2017.05.093
6. Ferreira, M.C., Dias, T.G., e Cunha, J.F.: An in-depth study of mobile ticketing services in urban passenger transport: state of the art and future perspectives. In: Smart Systems Design, Applications, and Challenges, pp. 145–165. IGI Global (2020). https://doi.org/10.4018/978-1-7998-2112-0.ch008
7. Rodrigues, H., et al.: MobiPag: integrated mobile payment, ticketing and couponing solution based on NFC. Sensors **14**, 13389–13415 (2014). https://doi.org/10.3390/s140813389
8. Ferreira, M.C., Nóvoa, H., Dias, T.G., e Cunha, J.F.: A proposal for a public transport ticketing solution based on customers' mobile devices. Procedia – Soc. Behav. Sci. **111**, 232–241 (2014)
9. Dahlberg, T., Guo, J., Ondrus, J.: A critical review of mobile payment research. Electron. Commer. Res. Appl. **14**, 265–284 (2015). https://doi.org/10.1016/j.elerap.2015.07.006
10. Cheng, S.K.: Exploring Mobile Ticketing in Public Transport An analysis of enablers for successful adoption in The Netherlands Expertise Centre for E-ticketing in Public Transport (2017)
11. Ondrus, J., Lyytinen, K., Pigneur, Y.: Why mobile payments fail? Towards a dynamic and multi-perspective explanation. In: Proceedings of the 42nd Annual Hawaii International Conference on System Science, HICSS (2009). https://doi.org/10.1109/HICSS.2009.510
12. Staykova, K.S., Damsgaard, J.: Adoption of mobile payment platforms: managing reach and range. J. Theor. Appl. Electron. Commer. Res. **11**, 65–84 (2016). https://doi.org/10.4067/S0718-18762016000300006
13. Ferreira, M.C., Dias, T.G., Falcão, J.: Is Bluetooth Low Energy feasible for mobile ticketing in urban passenger transport? Transp. Res. Interdiscip. Perspect. **5**, 100120 (2020). https://doi.org/10.1016/j.trip.2020.100120
14. Ferreira, M.C., Dias, T.G., e Cunha, J.F.: Codesign of a mobile ticketing service solution based on BLE. J. Traffic Logist. Eng. **7**, 10–17 (2019). https://doi.org/10.18178/jtle.7.1.10-17