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Use of gamification mechanisms in shared mobility services for marketing purposes – literature review

Wykorzystanie mechanizmów grywalizacji w usługach mobilności współdzielonej w celach marketingowych – przegląd literatury przedmiotu

Abstract

The role of information technology in various areas of the economy and life has been growing rapidly in recent years. Mobile applications are used not only to support the use of products and services, but also, increasingly, for communication and customer relationship management. One of the marketing tools that are becoming ever more popular in mobile applications are gamification mechanisms, the purpose of which is to increase consumer involvement, strengthen their brand loyalty or increase the frequency of purchasing products or services. The aim of the article is to identify the current state of knowledge about the intersection of gamification and shared mobility from marketing perspective, and to identify which gamification mechanisms are applied by shared mobility service operators to manage their relationships with consumers. The authors carried out an analysis of the literature on the intersection of shared mobility and gamification. The results indicate that points, badges, quests and feedback are used most often; narration, visualized progression, levels and ratings are less popular, whereas leaderboards and gifts are the least popular. Analysis reveals that gamification mechanisms can be an effective marketing tool in various shared mobility systems, including public transport, but they must be appropriately selected for a specific mobility platform and coherently linked to the reward system.

Keywords

gamification, shared mobility, CRM, mobile applications, bike sharing

Streszczenie

W ostatnich latach rola technologii informatycznych w różnych obszarach gospodarki oraz życia gwałtownie rośnie. Aplikacje mobilne wykorzystywane są nie tylko do obsługi produktów oraz korzystania z usług, ale także, w coraz większym stopniu, do komunikacji oraz zarządzania relacjami z klientem. Jednym z narzędzi marketingowych wykorzystywanych coraz częściej w aplikacjach mobilnych są mechanizmy grywalizacji, których celem jest zwiększenie zaangażowania konsumentów, wzmocnienie ich przywiązania do marki lub zwiększenie częstotliwości zakupu produktów lub usług. Celem artykułu jest rozpoznanie obecnego stanu wiedzy na temat grywalizacji w usługach mobilności współdzielonej oraz identyfikacja mechanizmów grywalizacji, które wykorzystywane są przez operatorów usług mobilności współdzielonej do zarządzania relacjami z konsumentami. Autorzy przeprowadzili analizę literatury przedmiotu, dotyczącą skrzyżowania mobilności współdzielonej i grywalizacji. Wyniki wskazują, że najczęściej wykorzystywane są punkty, odznaki, questy oraz feedback, mniej popularne są narracja, zwizualizowana progresja, poziomy oraz ratingi, a rzadko stosowane są tabele wyników i prezenty. Analiza wskazuje, że mechanizmy grywalizacji mogą być skutecznym narzędziem marketingowym w różnych systemach mobilności współdzielonej, włącznie z transportem publicznym. Muszą być jednak odpowiednio dobrane do konkretnej platformy mobilności oraz spójnie powiązane z systemem nagradzania.

Słowa kluczowe

grywalizacja, mobilność współdzielona, CRM, aplikacje mobilne, bike sharing

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Introduction

In the 21st century many economic, social and business activities are evolving and transforming significantly, and there are several megatrends and rising global challenges having a big influence on the process. They include a very strong development of electronic and information technologies. The role of information technology in various areas of economy and life has been growing rapidly, and COVID-19 pandemic recently proved how useful and important this can be for everyday activities. Among all commonplace electronic devices, it is especially the role of smartphones that is expanding remarkably, together with their capabilities and reliability development. Mobile applications are currently used not only to support the use of products and services, but also, and increasingly so, for communication and customer relationship management. In effect, most companies representing almost all sectors are focusing on creating mobile applications whose goal is to increase customer's engagement and loyalty, using new methods and possibilities offered by modern technology. In this context, companies are keenly reaching for gamification mechanisms. While these are not a new marketing tool, they are significantly modified and extended by technical support from Internet, data collecting and location-sensitive devices, thus providing new possibilities (Seaborn & Fels, 2015). Another major trend in the global economy is sustainability aimed at reducing environmental risks and resolving challenges caused by climate change. Climate-related risks have become a problem that cannot be ignored. A variety of environmental issues pose an enormous threat to sustainability, including challenges related with deforestation, air pollution and global warming (Gupta & Vegelin, 2016). Transportation and mobility sectors are responsible for a substantial part of CO₂ emission and environmental problems which results in many solutions proposed for reducing their negative impact. One of them is shared mobility seen as an important dimension in Smart City concept and desirable element of innovative and sustainable mobility system. As a consequence, many new and innovative shared mobility companies have emerged over the last decade and they take on a challenge to promote their services and engage customers, from both competitive and socio-environmental perspective.

Shared mobility is a part of a broader phenomenon called sharing economy, which can have a positive influence on both economy and environment (Heinrichs, 2013). It aims at optimizing the usage of mobility resources by granting temporal access to a shared vehicle or a shared trip according to user's needs (Machado,

2018). There are many types of shared mobility systems, the most important being car sharing, on demand services called ride hailing or e-hailing, ride sharing also known as carpooling, bike sharing, scooter sharing, etc. Popularization of shared mobility is a response to environmental and logistical challenges that occur especially in large urban areas, such as growing congestion and smog (Katzev, 2003). Privately owned cars are used only for approximately 5% of their life cycle, for the remaining 95% staying immobile and occupying spaces, usually at home or at work (Bates & Leibling, 2012). This makes the current model of mobility, largely based on car usage, highly inefficient. The problem is especially significant in large agglomerations where the areas of parking lots are rather limited and traffic congestion is increasing. Moreover, this is expected to amplify since the global number of cars on the road is constantly growing, as well as urbanization rate which, according to United Nations forecast, will increase from 55% in 2018 to 68% in 2050 (United Nations, 2018). Another challenge in mobility from a resource allocation point of view is using a car in transportation, also over long distances and outside cities, mostly by one person, even if it has places for more passengers.

First shared mobility systems started operating in the twentieth century, but no real increase in their presence was seen until the previous decade. Their rapid growth in the last 10 years resulted, among others things, from growing environmental and consumer awareness which changes the preferences from ownership toward accessibility (Wang & Zhang, 2012; Hamari et al., 2016), but also from development and widespread use of communication technology and social media. The latter factor is particularly important, because shared mobility platforms and services are accessed via mobile applications. Therefore, a relevant application is not only responsible for the quality and effectiveness of a shared mobility system, but also plays a crucial role in customer engagement. As mentioned before, gamification has become a popular tool of increasing customer engagement through mobile applications (Hofacker et al., 2016; Van Berkel et al., 2017), and there is a serious potential for its implementation in shared mobility services.

According to Professor Hamari, "gamification broadly refers to technological, economic, cultural, and societal developments in which reality is becoming more gameful, and thus to a greater extent can afford the accruing of skills, motivational benefits, creativity, playfulness, engagement, and overall positive growth and happiness" (Hamari, 2019). Despite being a relatively new area of science, it has undeniably attracted interest of researchers worldwide. By

now, gamification is proven as a tool potentially suitable in many industries, including education (Huang & Soman, 2013), tourism (Xu et al., 2014) and marketing (Conaway et al., 2014), as well as new and rapidly growing industries such as streaming platforms (Miedziak & Wójcik, 2022). Even though gamification has been present in science for just over a decade (Deterding et al., 2011), it already has a relatively successful history of improving customer engagement, including solutions to challenges that require daily behavioral changes and increase consumer engagement behaviors – that is, customers' attitudes toward a company, beyond purchase, that contribute to the latter one's performance (Eisingerich et al., 2019). That means that if we want to change somebody's behavior, gamification can help, no matter if it is teeth hygiene for kids or changing the vehicles we use to move, or buying a particular product from specific stores. Depending on what is exactly understood by customer engagement, different gamification usages can be mentioned. For example, when assuming that customer engagement should lead to purchase, we can deal with such mechanisms as social interaction, sense of control, goals, progress tracking, rewards and prompts (Eisingerich, et al., 2019). When, however, brand loyalty is assumed as the ultimate goal, then mechanisms like effort expectancy, social influence and facilitating conditions are relevant (Abou-Shouk & Soliman, 2021). However, it needs emphasizing that there isn't a single impeccable way of choosing which gamification mechanisms to use, due to not enough research conducted yet and to complexity of gamification itself. As it comes to theories used in studies concerning gamification, the Self-Determination Theory is most often adopted (Krath et al., 2021). However, more detail-oriented theory-related gamification literature reviews have not been found, so this is an interesting area to explore, especially as it comes to prominent topics regarding sustainability, such as sharing mobility.

In terms of customer engagement, gamification can be introduced as a mechanism for both intrinsic and extrinsic motivation (Reiss, 2012). However, it is worth mentioning that when the objective is a long-term behavioral change in terms of customer engagement, reward-based gamification that stimulates extrinsic motivations might be less effective, as it would involve a risk of replacing intrinsic rewards for a behavior with an unsustainable need for extrinsic incentives (Hamari et al., 2014). In their study, Kim and Ahn (2017) argue that the reception of extrinsic rewards via a gamification process even weakens customers' intrinsic motivation to make further usage of a retail loyalty program. Therefore, gamification should favor mechanisms that trigger intrinsic motivation in terms of customer engagement (Hofacker et al. 2016).

Methodology

Before describing the methodology, it is crucial to point out that no similar reviews or metaanalyses were found. This literature review presents an overview of research presented at conferences and published in peer-reviewed journals to address the intersection of gamification and shared mobility (carpooling, car sharing, bike sharing, etc.). The overview was followed by an author-concept approach to categorize the literature (Watson & Webster, 2020) according to their relevance to the topics of the study. The review process was carried out in five phases:

1. Searching the literature in two databases in March 2023 (Web of Science and Scopus) according to relevant keywords.
2. Screening the selected literature.
3. Applying the inclusion and exclusion criteria.
4. Categorizing and analyzing the literature.
5. Communicating the findings.

The goal of the literature review was to identify the current state of knowledge about intersection of gamification and shared mobility from marketing perspective, and to identify which gamification mechanisms are used by shared mobility service operators to manage relationships with consumers.

For that reason, to be included in an in-depth analysis, articles had to fulfill the criteria of concentrating on both gamification mechanisms and shared mobility focusing on customers. To be more precise, to meet the inclusion criteria articles had to focus on the use of gamification mechanisms by shared mobility service operators as a marketing tool for managing relationships with consumers, that is, i.e., increasing customer motivation to use the service, increasing consumer involvement, building customer loyalty, increasing frequency of purchasing services, etc.

As it comes to exclusion criteria, it is important to highlight that the aim of the review was to find the intersection of gamification and shared mobility studies. Therefore, studies that only mentioned one criterion, without regarding the other, were excluded. Moreover, articles had to focus on gamification mechanisms as a marketing tool, so papers concerning the use of gamification mechanisms from the logistics or transportation management point of view were excluded too. Surprisingly, a majority of the research papers found were rejected after analyzing abstracts and full articles, because they focused on the use of gamification mechanisms in the applications of third party providers, whose aim was to promote healthy lifestyle, use of generally described sustainable mobility (public transport, shared mobility, biking and walking) instead of privately owned cars, and change of mobility habits from logistical and environmental point of view. For

example, where the authors stated that their application was gamified and the outcome was a more efficient bike stations algorithm, then this sort of study was excluded from the review. When it comes to research concerning, for example, an application which aims at changing behavior from driving a privately owned car to using generally more sustainable transportation, the same rules were applied.

As a result of thus established inclusion and exclusion criteria, in the end only six articles were analyzed in detail in the research process. The literature search in two databases was conducted in March 2023 and it included all research articles found, published before March 2023.

Other exclusion criteria the authors applied included following: (1) the articles had to be written in English, (2) authors needed to have access thereto.

The database of collected articles contained the information regarding:

- author;
- year;
- type of publication;
- theory basis of the study;
- methodology used;
- gamification mechanisms applied;
- form of transportation (cars/bikes etc.);
- sharing mobility solution (car sharing/ carpooling etc.);
- geographical area of the study.

It was crucial to establish the query used in searching, because too broad a scope could result in an excessive number of articles. The query was aiming at finding information regarding gamification and urban mobility in the title, abstract or among keywords (TITLE-ABS-KEY)

and was established as following: ("sharing mobility" OR "shared mobility" OR carsharing OR "car sharing" OR car-sharing OR "scooter sharing" OR scootersharing OR scooter-sharing OR "bike sharing" OR bikesharing OR bike-sharing OR "car pooling" OR "car club*" OR carpooling OR carpooling OR "ride sharing" OR ridesharing OR ride-sharing OR "ride hailing" OR ride-hailing OR ridehailing OR "urban mobility") AND ("serious game*" OR gamif*)).

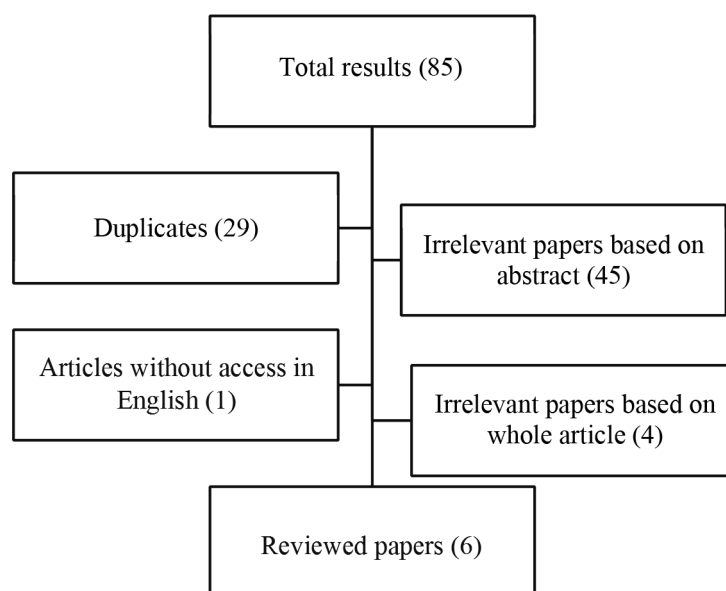
The database comprised 85 articles, 29 of these were repeated, leaving a database of 56 publications. 45 of these were deemed irrelevant, from which almost half was identified as articles in which gamification mechanisms are used to promote behavioral change towards more sustainable mobility habits, aimed at solving environmental and logistical challenges. Of the remaining 11 entries, one was available only in Portuguese, giving the 10 entries for further analysis. Finally, only six articles occurred relevant in terms of the study scope (Figure 1).

Results and discussion

Relevant articles are reviewed and analyzed in two parts: individual review and collective analysis of all six research papers, in which data about the theory, methodology, gamification mechanisms and models of shared mobility used are presented.

Pasca et al. (2021) in their research aimed at verifying the role of gamification mechanisms used

Figure 1. Literature review process



Source: authors' own elaboration.

in mobile applications of bike sharing services in Italy in improving service quality and user loyalty. Authors conducted in-depth interviews as well as a survey on Italian bike sharing users from different cities. In the article, gamification mechanisms used in mobile applications in services in question were described generally as "points, badges, feedback and so on" and characteristics of particular mechanisms were not a subject of the research. The results show that gamification has a crucial role in improving both service quality and user loyalty in the bike sharing system. Mobile application perception, understood as its ease of use, efficiency and security of personal information, has a strong influence on gamification. Gamification directly influences service quality, while loyalty is directly influenced by gamification with a weaker influence of service quality. Authors conclude that gamification can be a strategic tool to improve user engagement and develop customer loyalty in shared mobility as well as a mechanism for improving service efficiency and customer education (for example, while choosing parking places).

Politis et al. (2021) in their article present a holistic action plan aimed at optimization of functionality and promotion of usage of a bike sharing system operating in Thessaloniki, Greece. One of the most important actions of the plan was to implement gamification mechanisms in a mobile application that manages dockless bike sharing systems of 200 electric bikes to incentivize regular usage of the service. In the article authors included a case study describing the implementation and purpose of the use of gamification mechanisms in the platform and mobile application. No further research was conducted on the results and effects of gamification on customer engagement or loyalty. The mobile application included such mechanisms as levels, points, badges, and missions which are fully configurable by the system administrator.

- Badges (bronze, silver, gold) can be earned by users when they reach certain milestones while using the system, for example when completing a certain number of orders, covering a certain total distance, using the BSS for consecutive days, etc.
- When it comes to missions, there are three types integrated in the application. The first type is a parking mission – being asked to lock the bike near a city landmark. The second one is an exploration mission which asks users to take a specific route, through a historic or picturesque area of the city. The third type is commute missions, encouraging users to travel to a certain destination and back to the starting location.
- Points mechanism is used as a reward for completed missions and collected badges and for the time spent using the bike sharing system – number of journeys completed, kilometers and minutes traveled, etc.

- Levels mechanism is used in connection to the user's bike sharing profile. By collecting a certain number of points, users can level-up their personal profile. Authors point out that at the time of writing the article there were no direct advantages for achieving a higher level, but there were plans to add this.

Tan et al. (2017) created a case study of an Australian e-hailing and ride sharing platform goCatch, whose goal is to illustrate the role of technology in enabling consumer recognition, consumer engagement and consumer transposition. Research is based on qualitative methods – interviews and secondary data analysis. In the study, gamification is analyzed as means of stimulation of behavior change of e-hailing drivers, upgrading their technical skills and driving innovation, which plays a crucial role in digital disruption of mobility services. Gamification mechanisms in the application are mainly targeted at consumers of the app who perform the role of drivers, and the goal is to incentivize and recognize those who accept certain orders – as a response to a phenomenon where drivers prefer to cherry pick the best fares and ignore the short fares, resulting in logistical problem for the operator, especially during peak periods of demand. Therefore, gamification mechanisms implemented are used to keep drivers engaged in the application and motivated, as well as to influence specific behaviors. Application uses points as a reward for choosing certain orders, which later translates to a driver's status (levels – bronze, silver, gold). The most valuable orders in the application (better paid or on more comfortable or prestigious routes) are dispatched firstly to drivers with the gold status. In 2016 the operator partnered with Qantas, one of the world's major airlines, to encourage passengers to use the app by linking it to Qantas frequent flier membership. Desirable for drivers, airport runs are also firstly given to users with gold status. Research results suggest that gamification mechanisms are efficient as a motivational tool, that they improve user engagement and that they can change the motivation from mainly pecuniary to non-economic, as users' motivation change toward "points driven" in order to be able to get better orders and regular clients. Additionally, the authors conclude that in order to successfully implement gamification, the operator company needs skills in managing innovation and selecting gaming elements that best suit their intended purpose.

Prabowo et al. (2019) analyzed the influence of gamification mechanisms in ride sharing application on drivers' motivation and satisfaction. The authors have surveyed 103 participants in Indonesia. The research model was based on Self-Determination Theory (SDT) and Motivational Affordance Perspective (MAP). Gamification in the

ride sharing system was described by authors as driver ratings and points obtained as a reward for completing a certain number of transactions. In the research model, gamification was an example of external regulation, which could have an influence on playfulness and self-efficacy. The findings show that gamification used in the ride sharing system under research achieves no positive effect on playfulness, described as a system that aims to make users feel more comfortable and happier. Gamification has no positive effect on self-efficacy either, understood as confidence about being competent enough to accomplish the work. On the other hand, positive relation between gamification (external regulation) and extrinsic motivation was confirmed, in line with SDT. Authors conclude that such findings may result from a gamified system in which drivers (users) cannot reach the target number of points to get bonuses. Therefore, additional features should be implemented to support gamification mechanisms, such as financial bonuses and leaderboards, as well as ensuring gamification relevance from drivers' point of view. Potential solutions also include adding personalization-based gamification mechanisms.

Huber and Röpke (2015) in their research focus on exploring how gamification framework can provide a structured and guided way of gamifying any system successfully. To consider the issue, an example of ride sharing is used, as well as gamification mechanisms aimed at motivating and triggering permanent behavior change of customers toward the use of corporate ride sharing as a mobility system more sustainable compared to using privately owned cars. The research may seem to be oriented towards the aspect of behavioral change to more sustainable, however it focuses on the topic of motivation and long-term customer engagement to use a specific ride sharing system (authors refer on many occasions to the ride sharing solution of their company – SAP TwoGo), therefore the article meets the inclusion criteria and so is included in the literature review. The proposed framework of gamifying the ride sharing application consists of several steps. Firstly, business objectives and target behaviors are defined. Secondly, types of players (users) who will use the application are described, in order to better understand and target motivations or reservations of each subgroup to use the ride sharing services. Thirdly, activity cycles for each type of players are specified, in which users' actions, triggered by motivation and resulting in a meaningful feedback, might translate into new motivation. For long-term customer engagement, the authors suggest that evolution of a gamified experience and increasing its complexity, together with ever new challenges, might improve stickiness of the service. With respect to different player types, it is necessary to

consider different ways of approaching levels and challenges. Authors also point out that the game can be enhanced by surprises, so it is worth considering some kind of randomness and chance to be added to the system, such as special events, the narration, dedicated game days, and extra bonuses levels. After joining the service, new customers could choose a personal way of progressing towards mystery and fitting personal needs which gives users perceived autonomy to upgrade their avatars to the next level. Fourthly, a gamified system needs to contain elements which create fun for customers. Authors propose four different types of fun activities and possible ways of their implementation to mobile application. As the fifth step, once the former stages are established, specific mechanisms have to be selected for a particular application. The proposed structure consists of dynamics (big picture elements), mechanisms (basic processes), components (specific instantiations of dynamics and mechanisms) and the context. The analyzed concept is based on two high-level elements – the narrative and relationships. The former can be based on challenges, quests and progress bars. The latter is the second central dynamic of the system because ride sharing itself is a social behavior. It can be built by implementing individual actions of the player or group action in cooperation with other users, by challenges, points and progress bars. In the sixth step, feedback, skill unlocking and gifts are added as obligatory elements of the application, as a reward system enabling users to experience their progress. In the seventh one, mechanisms should be provided for matching the users for a joint ride. Authors recommend making the setup and selection of the ride a playful activity, allowing customers to participate in the matchmaking process, in line with the need for user's autonomy. In conclusion, authors underline that their research was aimed at testing the framework for creating gamified mobile application, and that further research is necessary in order to be able to contribute to the existing ride sharing application SAP TwoGo. Nevertheless, the article describes in detail the process of gamifying a ride sharing system for stimulating the user's motivation and building long term engagement.

Qiao (2019) created a case study of Tokyo Metro campaigns in which a mobility provider (a subway system in Japan's capital city) is influencing customer behaviors by commodification and gamification of urban mobility. The author describes that, since privatization in 2004, one of Tokyo's major public transportation providers incentivizes innovation in marketing through campaigns as a means to increase revenue. Mechanisms applied include gamification, understood in the study as a company's strategy of transforming its existing services into location-

based games for commercial rather than entertainment purposes. Unlike gamification mechanisms used in previously described research, Tokyo's Metro attempts to use gamification not in the mobile application, but instead via non-IT methods. One type of such campaigns are occasional "stamp-rallies" (sutampurarii) in which Tokyo's Metro challenge the travelers to collect imprints from rubber stamps placed at selected subway stations within a specified timeframe (usually 30 days). Completing the challenge gives a chance to win prizes (reward mechanisms). Most of the campaigns are connected to popular culture to attract participation from a big fan base. In such events, operator influences users to follow designed routes, often travelling to stations outside of their daily routines. Travelers interested in taking up the challenge need to travel more by subway, often buying additional tickets. Another type of gamified campaign is called "Underground Mysteries". It is a puzzle-solving game that consumers pay to play while using the Tokyo subway (utilizing gamification mechanisms described as quests). In the first edition, conducted in 2014, more than 20,000 people participated, and by 2018 the total number of participants reached 250,000. In 2018 edition, in six selected stations customers could buy a special kit for 2200 Japanese yen, which included a 24-hour pass for Tokyo Metro and a booklet of questions and materials that assist in puzzle-solving (quest). Finding the answers required travelling by subway and moving around station premises. In this event there was no reward for completing the quest, other than satisfaction from playing. Underground Mysteries change the usage of Tokyo Metro services from simple mobility to a form of leisure and entertainment. The campaign

is also designed to offer an innovative way to explore and enjoy the city. Author concludes that Tokyo Metro employs various strategies that commodify and gamify their services to stimulate additional travel by public transportation.

Collective analysis of the articles

The articles were examined in terms of their theoretical basis, methodology used, gamification mechanisms applied, shared mobility solution and geographical area of the study. Concerning the first aspect, it may come as surprise that a third of the articles were not based upon any known theory – there was no scientific theory at all, underpinning the presented processes of preparing case studies. As shown in Table 1, Self-Determination Theory was the most mentioned one. Only one article (Prabowo et al., 2019) was based on more than one theory – Motivational Affordance Perspective (MAP) along with Self-Determination Theory (SDT).

One aspect often analyzed in literature reviews is what kind of methodologies were used in the studies. It can be seen that qualitative research is used much more often than quantitative alone. Admittedly, two studies (Huber & Röpke, 2015; Pasca et al., 2021) were both qualitative and quantitative.

A very important part of the review was to check which mechanisms appear in which articles and which mechanism (or a group of them) was used most often in shared mobility solutions. A similar review was done during collecting articles regarding gamification and sustainable consumption (Guillen, 2021). However, it is relevant to mention that collecting information concerning gamification

Table 1. Theory basis used for designing the research methodology

Theory used	Articles
Self-Determination Theory (SDT)	Pasca et al., 2021; Prabowo, et al., 2019; Huber & Röpke, 2015 Prabowo et al., 2019 Tan et al., 2017 Politis et al., 2021; Qiao, 2019
Motivational Affordance Perspective (MAP)	
Theory for understanding	
Lack of theory basis in designing the research methodology	

Source: authors' own elaboration.

Table 2. Methodology of research

Research	Articles
Quantitative	Prabowo et al., 2019 Politis et al., 2021; Tan et al., 2017; Qiao, 2019 Pasca et al., 2021; Huber & Röpke, 2015
Qualitative	
Qualitative and quantitative	

Source: authors' own elaboration.

mechanisms was purely based on the article itself – its text and (where applicable) figures. That could mean that some mechanisms could have been used, but unless a respective information appeared in the article, this review could not detect that. Moreover, in three articles feedback was mentioned as a mechanism, with no further description. It should be pointed out that, for example, points also give us feedback, so we need to believe authors that it was additional feedback for example shown as "good job", thumbs-up icon or similar.

As shown in Table 3, points were the only mechanism present in almost all the articles examined. The second most popular one were badges, quests and feedback, followed by levels, visualized progression, ratings and narration.

Another important aspect to investigate was the shared mobility solution. It could be surprising that in the analyzed literature car sharing and scooter sharing services were not a research subject of any article, despite their recent commercial growth. The reason for that could be their relatively smaller perceived potential to bring benefits from environmental perspective, compared to bike sharing or ride sharing services, understood as environmental gain from replacing privately owned cars with a particular service (Table 4).

The geographical areas of the conducted studies were diversified across the globe. The research

concerned in Indonesia (Prabowo et al., 2019), Germany (Huber & Röpke, 2015), Italy (Pasca et al., 2021), Greece (Politis et al., 2021), Japan (Qiao, 2019) and Australia (Tan et al., 2017). Even though European domination is evident, two other continents have been covered. The interesting point is that no study regarding the intersection of gamification and shared mobility from marketing perspective has emerged in America. However, considering the rapid growth of both topics, it seems it's only a matter of time.

Conclusions and further research

The goal of the literature review was to identify the current state of knowledge about intersection of gamification and shared mobility from a marketing perspective, and to identify which gamification mechanisms are used by shared mobility service operators to manage relationships with consumers. The literature review conducted led to the following conclusions.

Firstly, gamification mechanisms can be an effective marketing tool in various shared mobility systems, including public transport. Gamification mechanism proved to have a strong influence on the perceived quality of services and user loyalty in bike sharing (Pasca et al., 2020). Gamification also has positive effect on the extrinsic motivation

Table 3. Gamification mechanisms

Gamification mechanism used	Articles
Points	Prabowo et al., 2019; Politis et al., 2021; Tan et al., 2017; Pasca et al., 2021; Huber & Röpke, 2015
Badges	Politis et al., 2021; Pasca et al., 2021; Tan et al., 2017
Quests	Politis et al., 2021; Qiao, 2019; Huber & Röpke, 2015
Feedback	Pasca et al., 2021; Prabowo et al., 2019; Huber & Röpke, 2015
Narration	Qiao, 2019; Huber & Röpke, 2015
Visualized progression	Huber & Röpke, 2015; Tan et al., 2017
Levels	Politis et al., 2021; Tan et al., 2017
Ratings	Prabowo et al., 2019; Tan et al., 2017
Leaderboards	Huber & Röpke, 2015
Gifts for other players	Huber & Röpke, 2015

Source: authors' own elaboration.

Table 4. Shared mobility solution

Shared mobility solution	Articles
Bike sharing	Pasca, et al., 2021; Politis et al., 2021
Ride sharing or carpooling	Prabowo et al., 2019; Huber and Röpke, 2015
Ride hailing or e-hailing	Tan et al., 2017
Public transport	Qiao, 2019

Source: authors' own elaboration.

of consumers in ride sharing services (Prabowo et al., 2019), but applied mechanisms must be appropriately selected for a specific mobility platform and coherently linked to the reward system in order to have a strong and long term positive influence on customers' motivation (Prabowo et al., 2019 ; Huber & Röpke, 2015). Gamification can be also used for improving service efficiency and customer education based on example of ride hailing services (Tan et al., 2017). Different mechanisms can be used to stimulate customer behavior to use shared mobility services in different ways and satisfy different customer's needs in bike sharing and ride sharing (Poltic et al. 2021, Huber & Röpke, 2015). Even though gamification mechanisms seem to be better suited for mobile applications of shared mobility providers, it is possible to use gamification in more traditional ways for service promotion and customer engagement, as seen on the example of Tokyo Metro (Qiao, 2019). Finally, the research showed that gamification framework can provide a structured guided way to gamify any shared mobility system (Huber & Röpke, 2015).

Secondly, based on six analyzed articles, research results indicate that in shared mobility services points, badges, quests and feedback are used most often; narration, visualized progression, levels and ratings are less popular, while leaderboards are the least popular.

Thirdly, the topic of gamification implementation in shared mobility from marketing perspective is not developed yet. The number of articles found and reviewed is relatively small. It means that, despite both topics being very popular nowadays, their connection possibilities are still unexplored. Literature searching process showed that some research areas regarding the use of gamification mechanisms to stimulate customer's motivation in mobility are already much better examined, as evidenced by the example of applications whose aim is to change customer behavior and mobility habits toward more sustainable. This indicates a big potential for further research in the area of gamification use in shared mobility services as a marketing tool.

Fourthly, literature on usage of particular mechanisms in shared mobility is relatively scarce. Almost all the studies found used points, half of them applied badges, quests and feedback (for more information regarding this topic – see Table 3), but there is no comparison between particular

mechanisms. Gamification has been proved to be a suitable tool in engaging shared mobility applications' participants, but there is lack of research concerning which mechanisms helped the most in that area, and describing good and bad practices of gamification mechanisms usage. As it comes to ideas for further research, it would be interesting to compare effects of using different gamification mechanisms in a shared mobility system, or to compare effects of implementation of the same mechanisms in two different shared mobility services.

To sum up, some gamification mechanisms are used in shared mobility services for marketing purpose, but it seems that they are used rather intuitively. There is a research gap regarding the aspect of measuring and understanding how different mechanisms stimulate users' engagement in shared mobility. In further research it would be very valuable to investigate in detail how the most popular gamification mechanisms can be applied in different shared mobility systems and which mechanism gives the best results for customer satisfaction and customer engagement in particular conditions. Moreover, literature review of the gamification and shared mobility intersection confirmed that this research area is not developed yet but it is probably going to become an important research subject in the future.

Limitations

Among the study's limitations, modest number of results is the most important. Six articles cannot provide basis for firm conclusions, however, albeit with caution, some trends in gamification and shared mobility research can be observed. Moreover, such a small number of results clearly shows how underdeveloped this field of study is. Despite intersecting two rapidly growing areas, the authors have received a surprisingly narrow pool of articles. Another limitation can be seen in the research exclusion criteria, as the analysis only covers articles written in English. While the reason is understandable, lack of analysis of articles written in different languages narrows the number of potentially valuable literature. Last but not least, authors used only two databases – Web of Science and SCOPUS. If more databases were explored, it is quite likely that more relevant results would be found.

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