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Article

How to Improve the Continuous Usage of Mobility Apps - The Effects of Personalisation and Privacy on the Use of Mobility Applications in German Urban Areas

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Smart Mobility Marketing



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How to Improve the Continuous Usage of Mobility Apps

The Effects of Personalisation and Privacy on the Use of Mobility Applications in German Urban Areas

Even though mobile apps are becoming more important in the marketing mix, not much research has been done on what makes people decide to use an app or not. This paper presents a new value-based technology adoption model and investigates whether the perceived value of a mobility app influences the user's intention to continue using the service.

Arjan Vlaskamp

The way people move from A to B is changing, causing an increase in demand for more individual and sustainable mobility solutions. Digitization is changing society rapidly, and the role new technology plays in the consumer's everyday life is increasing. Technological advancements and the change from private to shared and public mobility create many opportunities for cities and mobility companies to address the challenges of congestion, climate change, and increasing density in urban areas.

Smartphones and mobile apps are getting a lot of attention from users who rely on them every day for getting around the city and using mobility services. On the one hand, apps are therefore a relevant asset in an organisation's marketing mix and, on the other hand, a crucial service as well as a revenue channel for mobility companies.

Even though mobility apps are becoming more important, low reviews in the Apple App Store and Google Play Store indicate that very few of the ones run by public transportation companies actually satisfy customers. However, from a company's perspective, customer expectations should be met and app users must value the provided services, as this fosters continuous app usage and, thus, retention and success.

The success of new technologies depends more on how often they are used than on how quickly they are adopted by the customer. Since the app market is very competitive, customers often stop using a service and uninstall the app, ending their relationship with the service provider. Losing a customer is disadvantageous, as gaining a new one is more challenging than retaining an existing one. Thus, mobility companies should particularly focus on the continuous usage of their digital services by their customers.

This research paper analyses the significant drivers for the continuous usage of

mobile applications for urban mobility. Overall, the challenges and impacts of digitization on urban mobility services have rarely been investigated in academic marketing literature. By crafting and verifying a quantitative model, this research tries to fill this gap. The empirical results enable the development of recommendations for practice and professionals, as well as directions for further research.

Theoretical Background

In academic research, mobile applications are regarded as digital services and information systems (IS). Ye et al. (2019) found that customers decide to continue using an app depending on their prior expectations as well as their actual experiences when using these apps. Studies conducted across a range of industries argue that retaining an existing customer is much less expensive than finding a new one. According to Bhattacharjee (2001), acquiring new customers can cost up to five times as much as keeping existing ones. Research shows that apps with higher continuous usage generate increased customer satisfaction and loyalty and provide a higher return

on investment (Albashrawi & Motiwalla, 2019). It can therefore be argued that continuous usage is critical to a technology's long-term viability and the economic success of a service or product.

In recent marketing research, customer value has become a key strategic variable that helps explain brand loyalty, commitment to a relationship, and making multiple purchases. Therefore, increasing the value as perceived by the customer should be the aim of every new technology and part of its development.

Perceived value is partially influenced by the perceived net benefit of performing a behaviour, such as using the app. This follows the Prospect Theory's underlying logic, which is conceptualized as the consumer's assessment of the balance of perceived quality and perceived sacrifice (Kahneman & Tversky, 1979; Zeithaml, 1988).

Today, marketers look at personalising marketing as a way to improve how customers perceive the quality of their products, how well they like them, and how long they stay customers. Personalisation creates benefits for the customer, such as better products, services, communication, and user experience, thereby positively impacting customer satisfaction



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and presumably perceived value (Tam & Ho, 2006; Vesänen, 2007).

Ceder and Jiang (2020) state that users of mobility applications not only seek a route from A to B but also expect to receive a connection that considers the user's preferences provided beforehand. Mobility apps personalise their services based on location-based services, which use the user's location to, for example, show routes based on the user's preferences (Wang & Lin, 2017). This can include direct routes, but also more sustainable routes, or factoring in other modes of transportation. Moreover, data entered by the customer like payment details can be used by the service provider to issue tickets or calculate trip-based prices and discounts.

Personalisation and the rise in demand for personal data go hand in hand. To give users a personalised app experience, data collection is necessary. To receive such a unique and personalised service, users must "sacrifice" data, such as personal information, which might intrude on their information privacy (Zhang et al., 2013). According to Zeithaml (1988), consumers sacrifice not only money but also other resources to obtain products and services. As data collection happens in the technical background of a mobil-

Management Summary

Mobile apps have become trusted daily companions for the user in navigating a city, as well as relevant assets in an organisation's marketing mix and a vital revenue channel for mobility companies. This research looks at the privacy-personalisation paradox and develops a value-based technology adoption model (VTAM) to analyse the reasons why users decide to continue or quit using a mobility app. App managers are advised to incorporate personalisation components in the app to increase the service's value to the user, while equally taking into account consumers' privacy concerns.

ity app, personalisation silently creates non-monetary costs or investments for the customer. These sacrifices include, among others, increased privacy risks (Vesänen, 2007) and, consequently, lower perceived value.

Consumers have named privacy concerns and risks as fundamental reasons for not using mobile commerce systems

(Zhang et al., 2013). Even though there is evidence that more personalisation makes customers more engaged, this could also make customers feel uncomfortable, which could make them less engaged and use the service less (Aguirre et al., 2015). This phenomenon describes the contradictory wish for more personalisation without sharing private information. This so-called "personalisation-privacy paradox" can be prominently observed in the context of smartphone apps (Sutanto et al., 2013).

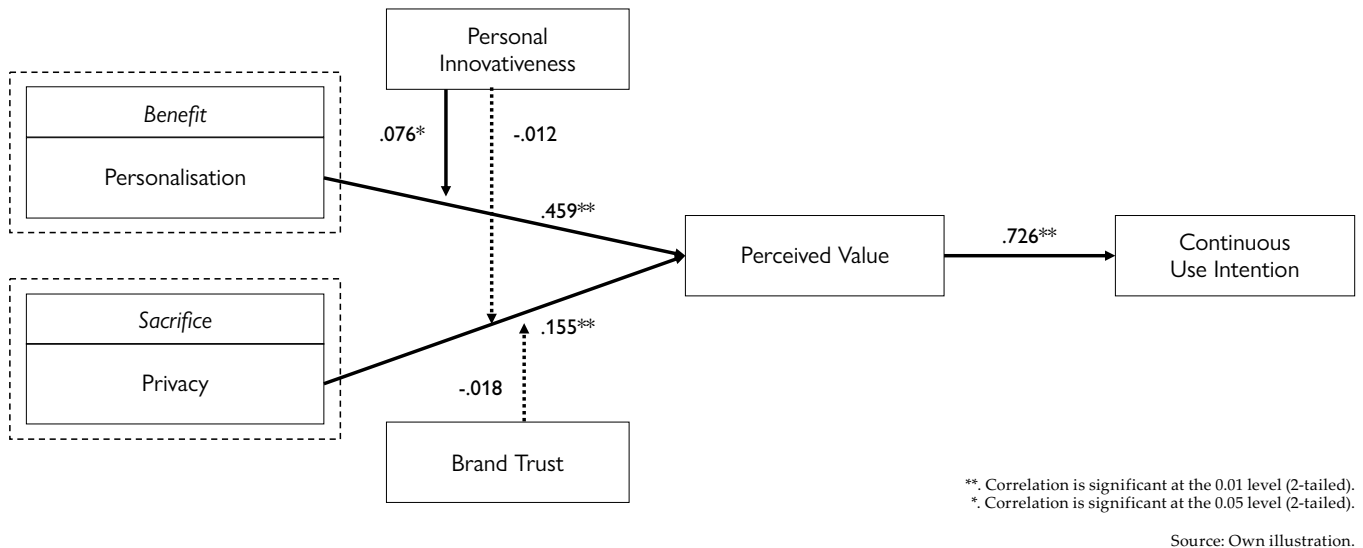
However, there is a clear distinction between desirable and undesirable personalisation in academic literature. Aguirre et al. (2015) conclude that the credibility of personalised advertising when it appears on a trusted website can mitigate the negative effect of data collection. Research has revealed that trust and perceived risk are essential variables in explaining users' acceptance of information systems and are impacting brand loyalty and continued use in the context of mobility (Briliana & Sari, 2020; Featherman & Pavlou, 2003; Lee & Song, 2013).

In the case of information systems and apps, the user's trust means trust in the application's provider (Molla & Licker, 2001). Regarding mobility apps, the market is competitive, and many app providers are offering digital services to users. Traditional public transport companies are nowadays facing competition from emerging new mobility companies, such as TIER, Lime and Uber. Even though these companies are operating very physical services, such as electric scooters or taxis, customers can only access their services through an app on their smartphones. Public transportation firms, however, provide a wide range of additional, established services, a greater physical presence, as well as a long history, in addition to digital services. As a result, customers are more familiar with public transportation providers, as they might interact with them on a daily basis due to the

Main Propositions

- 1 The perceived value of using a mobility application has a significant impact on the continuous use intention.
- 2 To get the perceived value of a mobility app, users have to weigh the benefits and sacrifices, such as personalisation and privacy risk.
- 3 A higher degree of brand trust in the mobility provider can mitigate the perceived sacrifice brought on by potential privacy issues.
- 4 Innovative customers are more likely to appreciate the advantages of personalised services and are more willing to make compromises when it comes to privacy concerns.

Figure 1: VTAM Research Design and Findings



everyday usage of the bus or train for transportation. Therefore, customers may perceive public transportation apps' privacy and data collection practices differently than those of private companies. Thus, brand trust will likely moderate the perceived privacy risk.

The success of an information system depends on both technology and individual differences (Lu et al., 2003). People's interest in new technology and how they react to more personalisation may depend on a number of personal factors and traits. In marketing literature, it is argued that innovation, by its nature, is often linked to more significant risks. Agarwal and Prasad (1998) argue that individuals with higher personal innovativeness are more open to taking risks and making sacrifices. Therefore, highly innovative individuals tend to be more able to cope with a higher level of uncertainty, especially with regard to technology (Lu et al., 2003), and are more likely to cope with higher risks (Xu et al., 2011). They are more optimistic about using innovation and the latest technology. Therefore,

the individual's inherent innovativeness will likely moderate the acceptance of new technology, personalisation, and privacy risks.

Research Design

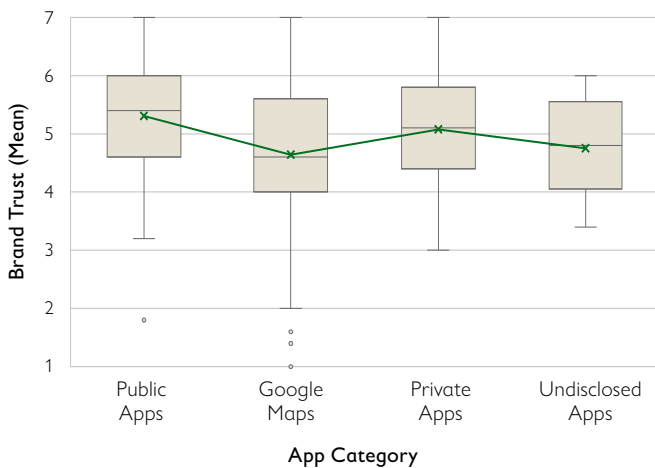
Present academic research mainly focuses on the initial adoption of mobile applications, primarily through utilising and extending the Technology Acceptance Model (TAM) or the Unified Theory of Technology Acceptance (UTAUT) (Lai, 2017; McLean et al., 2020; Venkatesh et al., 2003). Kim et al. (2007) argue that adopters of new technology are people who use and adopt digital services, such as apps, for personal reasons. Therefore, adopters of new technology must be looked at from a more consumer-oriented and less technical point of view, with consumer choice and decision-making processes as the main drivers of technology adoption and maximising value. Kahneman and Tversky's (1979) Prospect Theory states that people always weigh how much

they will gain and how much they will lose when deciding what to do.

All of this existing research has now been translated into a new value-based technology adoption model (VTAM) (see figure 1), where the constructs of gain are transformed into benefits, and losses into sacrifices. The analysed "perceived value" of using an app is mostly based on these two constructs. The research design has factored in the discussed constructs and questions. It therefore involves the two dependent variables continuous use intention and perceived value; the two independent variables personalisation and privacy; and the two moderating variables personal innovativeness and brand trust (for a complete overview see table 1 in the [online Appendix](#)). This research has either adopted or adapted existing validated constructs where possible.

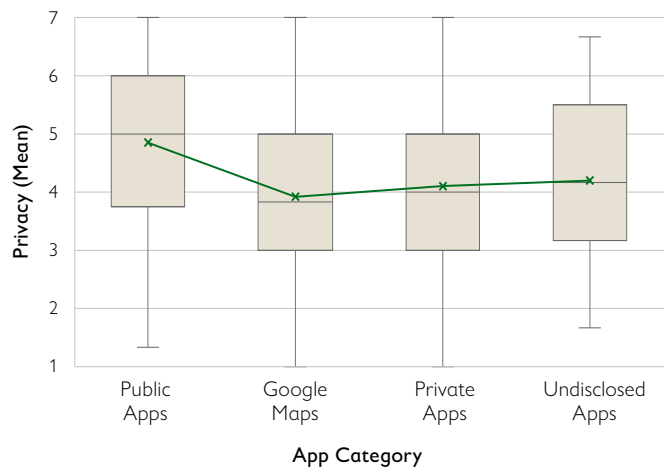
A survey with closed-ended questions was distributed to test the research design and hypotheses (for descriptive statistics on the participants see table 2 in

Figure 2: Brand Trust (Means) by App Category



Source: Own illustration.

Figure 3: Privacy (Means) by App Category



Source: Own illustration.

the [online Appendix](#)). First, participants were asked to indicate their most-used mobility app and their usage of this app. Participants were required to choose their most-used mobility app from a list of 32 apps (see table 3 in the [online Appendix](#)) for the purpose of evaluating the app category. These apps were then grouped into three categories: publicly owned, privately owned, and Google Maps. Second, demographic questions about gender and age were asked. Third, participants were asked to answer 25 research items concerning the selected constructs. A seven-point Likert scale, ranging from “strongly disagree” (1) to “strongly agree” (7), was used to measure the items.

Since it may be assumed that people in urban areas are more likely to use mobility apps than people in rural areas, this research focused on cities. Germany was chosen as the area of research, so participants had to live in one of Germany’s four largest cities: Berlin, Cologne, Hamburg, or Munich.

The online questionnaire was provided in German and English. The data was

collected from mid-November to mid-December 2021, and participants received a small monetary compensation for completing the survey. In total, 424 responses were collected, of which 332 were considered for this study.

Findings

The purpose of this research is to investigate the significant drivers for the continuous usage of a mobility app. Its central hypothesis is that the perceived value of using an application motivates continued use.

First, personalisation and privacy were found to be significantly related to perceived value. Therefore, most importantly, the research confirms that perceived value from using an application is a significant factor in determining the continuous usage of an app. On the one hand, these findings are in line with the established theories by Bhattacharjee (2001) and Zeithaml (1988). On the other hand, they extend their validity into a digital context by adding new con-

structs, providing a baseline for further research based on the research design. Based on the personalisation–privacy paradox, this research supports the hypothesis that personalisation is regarded as a benefit and reduced privacy as a sacrifice. The research data provides evidence that both variables significantly impact an application’s perceived value. Furthermore, the mediating role of the perceived value in the relationship between personalisation and privacy with regard to continuous usage intention is confirmed.

Second, the moderating roles of personal innovativeness and brand trust were analysed. The moderating role of personal innovativeness is supported regarding personalisation but not regarding privacy. In addition, the moderating role and thus mitigating effect of brand trust on the relationship between privacy and perceived value of a mobility app could not be supported.

A third finding of this research is derived from the analysis of frequencies and correlations of the control variable

app category with privacy and brand trust. Brand trust correlates significantly with the constructs of perceived value, personalisation, and the app category. The subsequent ANOVA analysis confirmed one of the assumptions made in this research. Data shows that the mean for brand trust is lowest in the case of Google Maps ($M = 4.64$). Slightly higher are privately operated apps ($M = 5.08$) and highest regarding brand trust are apps owned or provided by public organisations ($M = 5.31$) (see figure 2). In addition, the level of privacy is ranked significantly higher in publicly operated apps ($M = 4.85$) than in privately operated apps ($M = 4.10$) or in Google Maps ($M = 3.92$) (see figure 3).

Theoretical Contributions and Managerial Recommendations

Marketing experts agree that retention rates are becoming more important in digital and mobile commerce. Since there are fewer and fewer physical interactions with users, the value of offerings must be transferred through product experiences and services.

This research is among the first to shed light on the role of personalisation and privacy in mobility apps and how these factors impact an app's perceived value and continuous usage intention. Through qualitative analysis and research on existing models in the domain of information systems, three variables were identified as applicable to investigating continuous usage intention in this context: (1) personalisation, (2) privacy, and (3) perceived value. The new research framework provides an "ex-post perspective" on the usage of an application, compensating for the shortcomings of existing research frameworks in analysing the continuous usage behaviour of

customers with regard to mobile apps beyond their current use.

This study goes beyond previous research in the domain of app marketing and contributes to understanding the user's app usage and behaviour motivations. Its findings provide three practical managerial recommendations for mobile marketers and app developers in the public and private sectors when designing new mobility apps:

First, the goal of app development should be to give the customer more value, and personalisation is one of the best ways to do this. Personalisation can make the users' experience better and keep them using the app longer by adapting it to their preferences and needs. Because of this, it's important to find a good balance between personalisation and privacy concerns and to avoid putting user data at risk in the name of personalisation.

Second, privacy should be a requirement for app developers, and public institutions should be more aware of what users want and make apps that meet those needs. To make sure that

user data is safe, app developers should make privacy a top priority and a key criterion in how they build apps. When designing mobility apps, public institutions should also keep in mind what users want and make apps that meet their needs and provide both privacy and personalisation.

Third, publicly owned mobility apps may have a competitive advantage in the mobile app market if they make use of their well-known brand. Using existing trust to build brand loyalty can lead to higher adoption rates and more usage in the long run. So, extending an existing brand when making a new app is the smart thing to do from an economic point of view for developers of publicly owned mobility apps.

Fourth, the value-based technology adoption model (VTAM) has proven to be a solid framework for evaluating criteria that impact mobile app adoption and continuous usage. The model shows that app developers need to evaluate the benefits and losses induced by new product features, taking into account the evaluation criteria of personalisation and privacy, among others.

Lessons Learned

- 1 The main goal of app development should be to provide customer value, and personalisation is a key factor why users continue using mobility apps.
- 2 Privacy should be a requirement for app developers, and public institutions should be more aware of what customers want and make apps that meet those needs.
- 3 Publicly owned apps can achieve an advantage in the market for mobility apps by using existing brand trust and making sure their digital offerings are privacy-compliant.
- 4 App developers can use the value-based technology adoption model (VTAM) as a guide for evaluating criteria when creating a new digital product.

Further Research

In the past, academic research has emphasised that marketers need to be aware of cultural differences and possible value conflicts when it comes to how people adopt and use technology. A framework designed by Hofstede (1980) has become an established model to measure the impact of culture. Research has shown that users from cultures with high individualism value personalisation and personalised features, while those from cultures with high uncertainty avoidance

are more risk-averse. Social and environmental factors, such as the reason for using a particular app, have not been in the scope of this research but might be included in future studies.

Furthermore, the importance of the uses and gratification theory in the context of

media consumption analysis has been demonstrated in academic literature (Sutanto et al., 2013). Therefore, further research on the gratifications and benefits users derive from using an application, including their impact on enjoyment and perceived value, is strongly recommended. ■

Getting personalisation and privacy just right, adds value to the mobility app and keeps customers using it.

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How to Improve the Continuous Usage of Mobility Apps

The Effects of Personalisation and Privacy on the Use of Mobility Applications in German Urban Areas

Table 1: Overview of Research Constructs

Construct	Definition	Item	Citation
Continuous use intention (CUI)	It describes to what extent there is an intention to continue using a certain mobility app after the initial adoption phase.	CUI1: I intend to continue using this mobility app in the future CUI2: I intend to continue using the mobility app rather than seek an alternative means CUI3: I intend to continue using this mobility app as regularly as I do now CUI4: I intend to decrease my use of the mobility app during the next months. (Reverse) CUI5: I would like to discontinue using this mobility app and switch to another app (Reverse)	Albashrawi & Motiwalla (2019), Bhattacharjee (2001)
Perceived Value (PV)	It describes the consumer's overall assessment of the utility of a mobility app based on its benefits and the sacrifices related to using it	PV1: Compared to the effort I need to put in, the use of the mobility app is still beneficial to me PV2: This mobility app is worth the time I have to put into it PV3: Overall, I am satisfied with the app	Zeithaml (1988), Kim et al. (2007)
Personalisation (PS)	It describes to what extent tailored services are provided to the mobility app's users based on their behaviours and preferences	PS1: This mobility app provides me with personalised services PS2: This mobility app provides me with relevant information tailored to my preferences or personal interests PS3: This mobility app provides me with valuable information that I like PS4: This mobility app knows what I want PS5: This mobility app gives me personal attention	Albashrawi & Motiwalla (2019)
Privacy (PY)	It describes the individual's ability to control the terms under which personal information is acquired and used while interacting with a mobility app.	PY1: I am concerned that the provider of this mobility app could use my personal information for other purposes PY2: I am concerned that my privacy could be breached when using the mobility app PY3: I am concerned that my personal information could be shared or sold when using the mobility app	Xu et al. (2011)
Personal Innovativeness (PI)	It describes the willingness of an individual to try out any new information technology	PI1: I like to experiment with new mobility applications PI2: If I heard of a new mobility application, I would look for ways to try it PI3: Among my peers, I am usually the first to try out new mobility applications PI4: In general, I am hesitant to try out new mobility applications (Reverse)	Agrawal & Prasad (1998)
Brand Trust (BT)	It describes the willingness of an individual to rely on the ability and integrity of a brand to perform its stated function	BT1: The provider of the mobility app is trustworthy BT2: The provider of this mobility app always does what is right BT3: The provider of this mobility app has high integrity BT4: The provider of this mobility app is honest BT5: The provider of this mobility app is safe	Morgan & Hunt (1994), Chaudhuri & Hoibrook (2001)

Table 2: Descriptive Statistics of the Respondents' Characteristics

Measure	Items	Subjects	
		Frequency	Percentage
Gender	Female	188	56.6
	Male	143	43.1
	Other	1	0.3
Age	< 29	47	14.2
	30–39	80	24.1
	40–49	62	18.7
	50–59	69	20.8
	60 <	74	22.3
Education	No schooling completed	2	0.6
	High school graduate or the equivalent	94	28.3
	Professional degree	42	12.7
	Bachelor's degree	74	22.3
	Master's degree	111	33.4
	Doctorate degree	9	2.7
Location	Berlin	141	42.5
	Hamburg	84	25.3
	Munich	61	18.4
	Cologne	46	13.9
Usage	Less than once a month	21	6.3
	Once a month	60	18.1
	Once a week	148	44.6
	Once a day	56	16.9
	More than once a day	47	14.2

Source: Own illustration.

Table 3: Overview of Mobility Apps Included in the Study

App	Location	App Category	German App Store Ratings	
			iOS	Android
BVG Fahrinfo	Berlin	Public-Owned	3.9	3.7
BVG Tickets: Bus & Bahn	Berlin	Public-Owned	4.5	3.8
VBB Bus & Bahn	Berlin	Public-Owned	2.3	4.0
S-Bahn Berlin	Berlin	Public-Owned	4.5	4.1
BVG Jelbi	Berlin	Public-Owned	4.7	4.7
HVV – Navigation für Hamburg	Hamburg	Public-Owned	3.4	3.9
HVV switch	Hamburg	Public-Owned	4.4	3.7
StadtRAD Hamburg	Hamburg	Public-Owned	2.5	2.6
MVG Fahrinfo	Munich	Public-Owned	4.3	4.0
München Navigator	Munich	Public-Owned	3.1	3.6
MVV	Munich	Public-Owned	1.6	1.9
MVG more	Munich	Public-Owned		3.6
MVGO	Munich	Public-Owned	3.0	2.8
KVB	Cologne	Public-Owned	1.8	2.1
VRS Auskunft	Cologne	Public-Owned	2.5	2.9
KVBike	Cologne	Public-Owned	3.7	3.1
DB Navigator	All	Public-Owned	3.6	3.4
Citymapper	All	Private-Owned	4.7	4.6
Moovit	All	Private-Owned	4.4	4.1
Öffi Fahrplanauskunft	All	Private-Owned	–	4.2
Google Maps	All	Google Maps	4.6	4.0
Apple Maps	All	Private-Owned	3.0	–
TIER	All	Private-Owned	4.7	4.0
Lime	All	Private-Owned	4.9	4.6
Bird	All	Private-Owned	4.8	4.3
VOI.	All	Private-Owned	4.8	4.6
Call a Bike	Berlin, Munich	Public-Owned	1.9	1.8
Bond	Hamburg	Private-Owned	3.7	2.7
Emmy	All	Private-Owned	4	4.0
NextBike	All	Private-Owned	4.4	4.4
UBER	All	Private-Owned	4.3	4.5
Free NOW (myTaxi)	All	Private-Owned	4.8	4.0

Source: Own illustration.