Mobile Online Proficiency and Mobile Internet Use - Findings from Finland

Titiana Ertiö(✉) and Pekka Räsänen

Economic Sociology, Department of Social Research,
University of Turku, Turku, Finland
{titiana.ertio,pekka.rasanen}@utu.fi

Abstract. This paper investigates Finnish mobile Internet use and mobile payments, playing on the dual roles of citizens as users of a technology and consumers of services. The empirical section of the paper consists of an analysis of a nationally representative survey (n = 5,405) collected in 2012 and 2014. The data represent individuals aged 15 to 79. Our results indicate that Finns have become more active users of the mobile Internet and services such as mobile payment. The observed differences in user categories continue to be associated with age, education level and other socio-demographic factors. This also applies to expressing worries regarding information security, which continue to associate not only with use purposes, but also with age and other individual characteristics.

Keywords: Mobile Internet · Mobile payments · Mobile security proficiency

1 Introduction

Mobile phones have radically changed our patterns of communication, time use, consumption, and everyday life. There is no doubt that phones are very powerful and cost-effective communication tools for most people at the moment. Not so long ago, phones were widely thought of as offering the freedom to make and receive calls anywhere. Mobile phones established themselves as real timesavers for those who needed to be in touch with others at all times. Today, phones are 'standard accessories' for many consumers and their popularity rose dramatically. Indeed, phones are capable of so much more as their functionalities diversify. Due to technological convergence, smartphones equipped with calendars, cameras, GPS, voice recognition sensors and even health tracking sensors are just another step in the "mobile revolution". Access to new technical gadgets is likely to significantly influence people's social practices both directly and indirectly [1, 2].

Mobile phones break down the 'chains of time and space' [3, 4], offering users increased opportunities for information, entertainment or social interaction via applications (apps). On the other hand, the mobile phone also constitutes a private communication tool in that it is intended for one user only. The owner of the phone is expected to answer calls personally, use their own identity online and agree to the terms of use of third-party services personally. Naturally, the patterns of mobile phone use differ considerably from one person to another. The basic criterion for adopting any

T. Tryfonas (Ed.): HAS 2017, LNCS 10292, pp. 45–56, 2017.
DOI: 10.1007/978-3-319-58460-7_4

new product is that consumers use the product and its features, inevitably affected by personal preference. Broadly speaking, some products are cheaper, easier to use or provide other advantages over competing alternatives. Consumers feel that the basic functions of mobile phones are comfortable and easy to use. This helps to explain why mobile phones have diffused so quickly on a global scale.

As a response to the mass adoption of smartphones, firms of all types are integrating a mobile presence, or "mobile first", into their services. "Always online" consumers' demands for cross-platform services are met through mobile offerings. According to Eurostat [5], mobile Internet use has increased rapidly over recent years. In 2012, for instance, less than 40% of Europeans used a mobile device to connect to the Internet. By 2015, this share had already risen to 57% in Europe. Across the EU, only 25% of Internet users faced security concerns [5]. Notably, recent studies of the mobile Internet are country and area-specific, e.g. Indonesia [6], Thailand [7], Europe [8], India [9], Germany [10], African countries [11], Chile [12] or Denmark [13].

These studies focus on the plethora of tailored offerings for local customers in a hyper-connected, modern digital society. In Finland and other Nordic countries, mobile Internet use rose to 70% and beyond [5]. After only 8 months in the making, Denmark's "Mobile Pay" application has been adopted by 40% of Danes [13]. The striking availability of mobile Internet and mobile commerce opportunities, however, comes with a variety of security loopholes. There are common misconceptions tied to mobile usage, such as the fact that young people are less concerned about security and privacy and therefore more prone to adopt new services like mobile payments.

Recent studies found that socio-economic background variables do not influence mobile payments intentions or use [14, 15]. Such findings are puzzling in the light of technology adoption studies, which have consistently provided evidence of the importance of socio-economic variables. In this paper, we investigate Finnish mobile Internet use and mobile payments, playing on the dual roles of citizens as users of a technology and consumers of services. Mobile payments enable consumers to wave their phones over a terminal and secure a fast and seemingly secure transaction. But the adoption of such novel payment methods takes place at different speeds for consumers. We use demographic, social and economic data of repeated random-sampling, nationally representative surveys collected since 2006 by Statistics Finland. The 'ICT use by individuals and households' dataset represents individuals aged 15 to 74.

Our paper is structured as follows: first, we review literature on accessing the Internet from a mobile phone, a necessary but not sufficient condition of mobile payment usage. We single out mobile purchases as actions which mobile users can make. We then describe the data and methods used in the study. After the empirical analyses, we conclude with a short discussion on future developments of the mobile Internet revolution.

2 Mobile Internet and Mobile Purchases: Citizens as Users and Consumers?

Access to technology more broadly has been associated with a series of cumulative types of access [16, 17]. Much of the research has been focused on material access, namely devices, subscriptions and costs associated with accessing information. This is

both the case with owning a mobile device, and with having the resources to access the Internet – namely to pay the mobile operator's fees.

The industry standard for mobile Internet fees is based on data volume. In Finland, on the other hand, mobile operators offer flat-rate, unlimited access to the mobile Internet. Furthermore, subscriptions are also affordable which allows users to go about their daily business without worrying about costs. Such a bold move results in Finland having the highest data mobile usage in the world [18]. Particularly for mobile phone users, the Internet allows them to stay connected at all times [19]. An "activation effect" occurs when using a specific service (mobile Internet) by triggering the usage of other related services (mobile commerce applications and services [19]). Wei claims that mobile phone users spend "empty time periods" surfing the Internet. Being "always online" also comes with a high diversification of services used, which are highly context dependent. For instance, the mobile Internet is associated with free time and leisure activities, which are situated outside of the home and office in "other meaningful places" [20].

Figure 1 shows the rapid adoption of mobile Internet use in Finland. After a steady growth period between 2006 and 2008, the mobile Internet grew dramatically until 2014. In just eight years, adoption has grown from zero to 80% of the population. Outside wireless networks, Internet is accessed through 3G/4G connections. For instance, in 2015, 69% of Finns owned a smartphone and used it primarily to read emails and news, 61% [21].

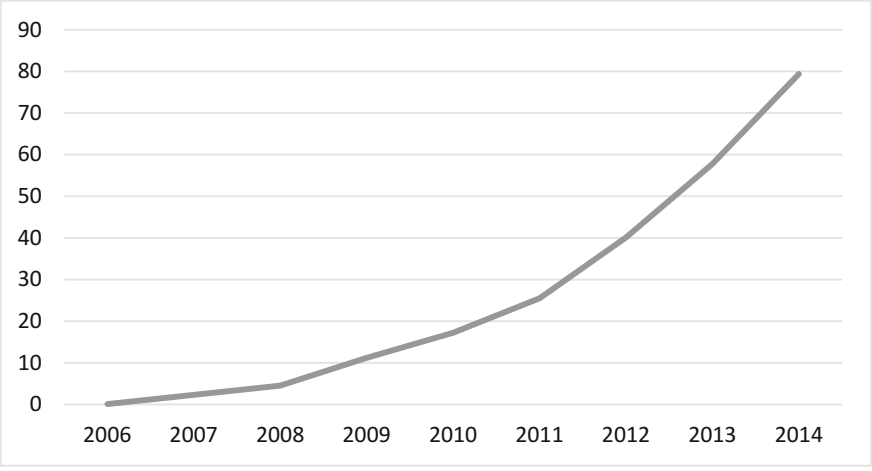

Fig. 1. Access to mobile Internet, 2006–2014 (%)

In general terms, one way of explaining the process of global technological diffusion and adaptation of the mobile Internet and mobile payments derives from the perspectives of diffusion theory. Rogers [22], for example, proposed that the characteristics of new products as perceived by consumers, determine their rate of adaptation. According to him, there are a total of five important attributes of an innovation.

These are: (1) relative advantage, (2) compatibility, (3) ease of use, (4) reliability, and (5) observability. Rogers also argued that any technological innovation (such as mobile Internet) is distributed along an S-curve over time [23]. Groups of early and late adopters of the technology perceive the benefits of the new products differently. Early adopters are immediately able to exploit or make use of the new offering, while late adopters are likely to use new products only after the general attitude toward adopting them has become positive. Mobile phones, in particular, present a variety of relative advantages, which explain their rapid diffusion; these include mobility, social status and opportunities to save time and money. Relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes [23: 229]. Adopting technological innovations is also a function of people's willingness to try new products [24: 704]. The five attributes, however, are not the ultimate factors driving the adoption of mobile phones but rather the extent to which they fit seamlessly into daily life [14, 25: 12–13, 26].

Personal, social, economic and demographic factors such as age, gender, education and income influence mobile Internet usage [27]. Massoud and Gupta [28] found that beyond ease of use, security and privacy are the most important factors in adopting mobile services. Age is also negatively correlated with phone ownership, mobile Internet access and mobile Internet usage [6]. In addition, the differences in skills and usage become a type of social inequality [29]. Puspitasari and Ishii [6] found that mobile Internet on smartphones correlates with information acquisition levels (search and handling capacity) while mobile Internet on earlier models of mobile phones was not. While the mobile Internet has been largely adopted, many users' skills are insufficient to use it for "sophisticated" purposes, such as mobile shopping or political participation [30]. These findings resonate with accounts that despite ownership, the mobile Internet is not necessarily used for "capital enhancing" activities [31]. Together, the cleavage between ownership and use has led to the emergence of a mobile Internet underclass [32]. Accessing the Internet is, however, just a first step to taking action online. Next, we turn to investigate specific instances of mobile purchases.

Mobile phones have a wide range of commerce-related affordances, including various location-based marketing applications, beacons, and SMS-based transport tickets, parking or banking services. Geo-fencing, which refers to targeted marketing campaigns that allow commercial providers to send push notifications to customers' phones who are moving around a radius of a point of interest (GPS-location), has also grown. Consumers benefit by receiving personalized advertisements which are based on their real-time location [33]. For marketing agencies, location-based services lower costs and allow them to approach clients just outside their doorstep. On the other hand, aggressive marketing prompts some customers to block ads should privacy concerns arise [34].

Technology-savvy individuals can control location-sharing information, what they share and with whom. Trust in mobile advertisers and a positive attitude towards m-commerce predicts mobile payment activity [33]. Chung's study [14] found that mobile users found advertising information to be up-to-date and relevant. Moreover, when permission is granted, personalized marketing messages to a phone are considered trustworthy as well [14, 35]. Yet, many users notoriously only accept the "Terms of service" without reviewing its content. In doing so, the information collected by the

services they subscribe to is no longer private because the user cannot control it. Simultaneously, information may be secure if accessed by authorized personnel only (for a distinction between security and privacy, see [36]). Privacy concerns of data collection, awareness of collection methods and location sharing with marketers do not predict mobile payments. On the other hand, perceived control over one's data and unauthorized access to personal information have significant negative influence on mobile payments [33].

Prior studies of the factors mitigating mobile purchases offer quite conflicting findings. Some studies find no influence of demographic or socio-economic variables [15, 33]. There seems to be some agreement that gender has no influence in mobile purchase behaviour [14, 37]. Yet, the effects of other variables are more diversified. The presence of children in the household and the time-constraints derived lead young parents to shop from their mobile phones [38]. Chong [37] found that age, education and income correlate with mobile purchases. Age has significant, negative effects on mobile purchases; education and income have significant, positive effects [37–39]. Younger users need fewer external impetuses to adopt mobile payments; moreover, trust and ease of use are also age dependent [39]. Younger users and users with higher levels of educational were also more likely to use mobile payments, location-based services, and entertainment than older users [37]. Older and younger adults have also been found to make mobile purchases at similar levels. More generally, many prefer to use their phones more for entertainment purposes than shopping [38].

Literature suggests that certain socio-demographic groups are characterized by high skills in mobile purchases as well as high purchasing power. However, on the other hand, they also face constraints of time, which makes the ubiquity of mobile payments particularly lucrative [38]. Next, we examine disparities that can be found when examining the use patterns of the mobile Internet in Finland during the past few years.

3 Research Questions, Data and Methods

In the empirical part of the paper, we examine mobile Internet access and online purchases in Finland in 2012 and 2014. Our main interest relates to the interconnections between these activities and online security proficiency, along with the basic sociodemographic background of different population segments. We refer to (1) mobile Internet access as whether the respondent has access to the Internet on his/her mobile phone, and (2) mobile purchase activities users perform to buy a product or service online with their mobile phone. We summarize the following two research questions:

RQ1: How do mobile Internet access and mobile purchases associate with online security proficiency in Finland in 2012 and 2014?
RQ2: Were there any associations after controlling for basic socio-demographic factors?

The data utilized covers the years 2012 and 2014, and were derived from the official Finnish statistics dataset 'ICT use by individuals and households' collected by Statistics Finland (n = 5,405). The data represents Finns aged 15 to 79 years. The data were primarily collected by phone interviews. However, data also include information

derived from population statistics, such as information on respondents' age, gender, education, residence and income [40].

As dependent measures, we use two variables: overall access to mobile Internet (3G or 4G connection) and mobile purchases during the past 12 months or earlier. Both of these variables were measured using the dichotomous options 'yes' and 'no'. Thus, these items only offer us a rough overview of information on mobile Internet uses. For instance, they do not reveal anything about the frequency of the given use purposes. At the same time, however, this measurement is the most straightforward way to make a distinction between mobile Internet users and non-users.

The primary explanatory factor for mobile Internet access and mobile purchases is online security proficiency. In our data, online security proficiency was measured using a question on whether respondents verified or modified an app or service other than the Internet browser. The response options were 'yes' and 'no'. In addition, our independent variables include age, education, and gender. Age was measured as age in years and is coded as a continuous variable. Education reflects the three educational levels of Statistics Finland's official education categorization, which are 'Bachelor/higher', 'secondary' and 'primary'. Finally, the variable 'gender' reports the sex of the respondents. Descriptive statistics for all independent and dependent variables are given in Table 1.

Table 1. Measurement, coding and descriptive statistics for dependent variable and independent variables by year

Variables	Coding	2012	2014
Dependent variables			
Do you have an Internet connection on your mobile phone (either 3G or 4G)	1 = Yes 0 = No	40.1%; 1,042 59.9%; 1,559	74.2%; 1,940 19.3%; 505
Have you made online purchases using a mobile phone during the past 12 months?	1 = Yes 0 = No	5.3%; 137 94.0%; 2,166	10.0%; 243 90.0%; 2,184
Independent variables			
Gender	1 = Female 0 = Male	51.2%; 1,332 48.8%; 1,269	49.7%; 1,299 50.3%; 1,313
Age (numerical variable)	Years of age (15–79)	47.23; 2,601 (16.60)	45.15; 2,613 (16.49)
Education	1 = Primary level 2 = Secondary 3 = BA or higher	24.9%; 648 42.7%; 1,111 58.3%, 1,414	21.6%; 564 41.5%; 1,085 36.9%; 964
Have you verified or modified an application or service other than the Internet browser?	1 = Yes 0 = No	58.3%; 1,414 41.7%; 1,009	60.3%; 1,500 39.7%; 986

Note: Percentages represented for categorical variables, means represented for numerical variables. Frequencies represented for both categorical and numerical variables (standard deviation in parenthesis).

Our starting point is that mobile Internet activities have become more common between 2012 and 2014. As already shown in Fig. 1, mobile Internet access increased from 40% to 80% during this two-year period. However, we may also assume that those citizens who are proficient in online security issues are more likely to access the mobile Internet and make mobile purchases (Hypothesis 1). We also assume that the use of the mobile Internet as well as making purchases is likely to decline according to age (Hypothesis 2). Similarly, less educated citizens are probably less likely to use the mobile Internet and make online purchases (Hypothesis 3). Gender, on the other hand, does not necessarily associate strongly with mobile Internet access or making purchases (Hypothesis 4). In order to examine the hypotheses listed above, we will use descriptive and explanatory techniques. First, the aim of the analysis is to describe the interconnections between mobile Internet use purposes and online security proficiency over time. Afterwards, logistic regression models will be applied in the explanatory analysis.

4 Results

The overall aim of the analysis is to examine whether online security proficiency connects with general mobile Internet access and mobile purchases. In addition, we were interested in how the possible associations with online security proficiency are affected by the general increase in mobile Internet access. We first examined these assumptions using simple cross tabulations. Tables 2 and 3 show findings from this descriptive analysis for 2012 and 2014.

Table 2. Mobile Internet by online security proficiency. Percentages

Year	Access to mobile Internet	Verified settings	
		Yes	No
2012	Yes	53.6	27.3
2014	Yes	87.4	67.5

Table 3. Mobile purchases by online security proficiency. Percentages

Year	Mobile purchases during the last 12 months	Verified settings	
		Yes	No
2012	Yes	8.3	2.2
2014	Yes	14.0	3.6

Tables 2 and 3 indicate that out of those who have accessed the mobile Internet, approximately 54% had verified online security settings on some other device or application than a web browser. In 2014 the share was already 87%. The shares were significantly lower for those who have not verified security settings (27% and 68%). Similarly, when we look at the consumption-related item, we can see that those who

have made purchases have checked online security settings more often than those who have not. The shares were 8% and 14% in 2012 and 2014, respectively. Despite the fact that very few had made online purchases through their mobile phone, it appears that this activity is clearly more common for those who have verified security settings in their devices. In this sense, it seems that mobile security proficiency is connected with the increased likelihood of both of the activities examined.

Tables 2 and 3 also capture the significance of online security proficiency's stability over time. In other words, this does not mean that the associations between online security proficiency, mobile Internet access and online purchases are going to disappear; the mobile environment is in a continual state of transformation as new technologies or innovations emerge. Next, we examine whether the associations with online security proficiency remain significant after controlling for basic socio-demographic factors.

Tables 4 and 5 show the results of logistic regression main-effect tests for mobile Internet access and mobile purchases in 2012 and 2014. In the tables, the effects of the independent variables in the models are presented with odds ratios (OR) and overall significance of the predictors with a chi square test (namely, Wald's χ^2). The pseudo-coefficients of the determination (Nagelkerke Pseudo R^2) of the models are also reported. The odds ratio is the increase or decrease if the ratio is less than one, in the odds of being in one outcome category when the value of the independent variable increases by one unit. Odds ratios are thus used to compare the relative strength of the independent variables.

Table 4. Access to mobile Internet by independent variables in 2012 and 2014. Logistic regression models

	2012			2014		
	OR	SE	CI 95%	OR	SE	CI 95%
Independent variables						
Age	0.965***	0.003	(0.959–0.971)	0.934***	0.004	(0.926–0.942)
Did not verify settings	1			1		
Verified settings	1.782***	0.100	(1.464–2.169)	1.555***	0.122	(1.225–1.975)
Female	1			1		
Male	1.312**	0.091	(1.098–1.567)	1.245 (ns)	0.116	(0.991–1.563)
BA or higher education	1			1		
Secondary education	0.556***	0.101	(0.456–0.678)	0.554*	0.130	(0.422–0.702)
Primary education	0.285***	0.134	(0.219–0.371)	0.406***	0.162	(0.296–0.558)
Pseudo R-Square (Nagelkerke) 0.185				Pseudo R-Square (Nagelkerke) 0.271		

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; (ns) = $p > 0.05$; OR = odds ratios; SE = standard errors; CI = confidence intervals.

Table 4 focuses on mobile Internet access. In both years, those who have verified online security settings are more likely than others to access the Internet with their mobile phones. The odds ratio is nearly 1.8 against 1 in 2012, and nearly 1.6 against 1 in 2014. In addition, it can be seen that age and education levels seem to have strong

Table 5. Mobile purchases by independent variables in 2012 and 2014. Logistic regression models

	2012			2014		
	OR	SE	95% CI	OR	SE	95% CI
Independent variables						
Age	0.968***	0.007	(0.954–0.982)	0.964***	0.006	(0.953–0.975)
Did not verify settings	1			1		
Verified settings	2.218***	0.262	(1.327–3.706)	2.779***	0.203	(1.867–4.136)
Female	1			1		
Male	2.451**	0.199	(1.660–3.620)	1.186 (ns)	0.143	(0.897–1.569)
BA or higher education	1			1		
Secondary education	0.807	0.208	(0.537–1.212)	0.569*	0.160	(0.416–0.779)
Primary education	0.515***	0.291	(0.291–0.912)	0.365***	0.233	(0.231–0.577)
Pseudo R-Square (Nagelkerke) 0.097				Pseudo R-Square (Nagelkerke) 0.109		

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; (ns) = $p > 0.05$; OR = odds ratios; SE = standard errors; CI = confidence intervals.

effects in both years, while gender is no longer significant in 2014. Highly educated and younger Finns are more likely than other demographic segments to access the mobile Internet. Overall, the pseudo-coefficients of the determinations indicate that mobile Internet access can be predicted rather efficiently by the selected independent variables in both years.

Table 5 shows the results for mobile purchases. Again, those who have verified online security settings are more active in making purchases than those who have not done so. In fact, the models indicate that the effects are relatively strong. The odds ratios indicate likelihoods of 2.2 and 2.8 against 1. This means that users proficient in online security are more than twice as likely to make mobile purchases as others. In addition, age and education are also significant in both years. Again, gender is significant only in 2012. The variances accounted for were smaller here compared to mobile Internet access. However, they indicate at least modest shares for both 2012 and 2014.

Together, the tables reveal that all background variables are statistically associated with Internet use activities, except for gender in the 2014 sample. As assumed, even in 2012, the effect of gender is weaker when compared to the effect of other independent variables. These findings by age are hardly surprising, since younger people are usually more interested in new ICTs than older segments of the population. However, it is notable that none of the observed differences by mobile phone proficiency have significantly diminished over time.

5 Discussion and Conclusion

This paper examined associations between online security proficiency and mobile Internet use in Finland. The Finnish case is particularly interesting because Finland has one of the highest adoption rates of the mobile Internet, which suggests that consumers

make use of this ubiquitous tool for many aspects of social life. We contribute to the growing literature on the mobile revolution in a consumer society by investigating not only the factors determining mobile commerce but also how it changes over time.

The mobile Internet plays a major role in terms of social participation by providing relatively easy access to information on various activities and events. In the near future, we expect to witness a remarkable extension of the software and application market aimed at private consumption and the use of public services. This extension is significant because the Finnish population is ageing rapidly. It may well be that older adults are less interested in mobile shopping due to lower levels of consumption after retirement [38]. Yet, a variety of future mobile well-being services might increase interest, which should be investigated in future research.

Our research shows that mobile Internet access is not associated with online purchases. While access to the Internet is as high as 80%, mobile purchases barely make the 10% cut. In light of the diffusion theory, our results suggest that even for a high-tech country like Finland, mobile purchases are only reaching a tipping point. By 2014, only innovators and early adopters used mobile purchases. There is a clear cleavage between the rate of adoption of the mobile Internet and task-based activities like mobile shopping.

We have posited and demonstrated that mobile online security proficiency is associated with mobile purchases (H1). As for age (H2) and education (H3), they also correlate significantly with mobile purchases. Interestingly, gender (H4) is significant for 2012 but not 2014. These findings expand our understanding of recent studies on mobile purchases [13–15, 26, 33, 35, 37–39]. We also posited that there would be a significant change in mobile purchase activities between the two years. Even though the numbers doubled, there is no evidence for mobile purchases becoming common for the general population.

Regarding our first research question, both mobile Internet access and mobile purchases correlate strongly with online security proficiency. Regarding our second research question, both mobile access and purchases correlate with the socio-demographic variables tested in 2014, excluding gender. Our results can be discussed in the light of consumer empowerment: when mobile users feel they can set security criteria themselves, they are more likely to use the mobile Internet and engage in mobile commerce. When access and shopping take place on terms that they can modify, consumers are more likely to engage in them.

Our study has its limitations as well. First of all, comparative research is required both from an international and a domestic perspective. Given the Finnish context, the results cannot be generalized beyond one Nordic country. At the general level, however, the results are strikingly similar to findings from different countries regarding mobile purchases. Secondly, we only assess the change over two years, which may not be sufficient to capture the overall phenomena.

Acknowledgements. This research was funded by the Strategic Research Council of the Academy of Finland (Digital Disruption of Industry research consortium, DDI).

References

1. Lievrouw, L.A.: Determination and contingency in new media development: diffusion of innovations and social shaping of technology perspectives. In: Lievrouw, L.A., Livingstone, S. (eds.) Handbook of New Media: Social Shaping and Consequences of ICTs, pp. 183–199. Sage, London (2001)
2. Wellman, B., Salaff, J., Dimitrova, D., Garton, L., Gulia, M., Haythornthwaite, C.: Computer networks as social networks: collaborative work, tele-work, and virtual community. Ann. Rev. Sociol. **22**, 213–238 (1996)
3. Kopomaa, T.: The City in Your Pocket: Birth of the Mobile Information Society. Gaudeamus, Helsinki (2000)
4. Mäenpää, P.: Mobile communication as a way of urban life. In: Gronow, J., Warde, A. (eds.) Ordinary Consumption, pp. 107–123. Routledge, London (2001)
5. Eurostat. http://ec.europa.eu/eurostat/statistics-explained/index.php/Digital_economy_and_society_statistics_-_households_and_individuals
6. Puspitasari, L., Ishii, K.: Digital divides and mobile internet in Indonesia: impact of smartphones. Telematics Inform. **33**(2), 472–483 (2016). http://dx.doi.org/10.1016/j.tele.2015.11.001
7. Srinuan, C., Srinuan, P., Bohlin, E.: An analysis of mobile Internet access in Thailand: implications for bridging the digital divide. Telematics Inform. **29**(3), 254–262 (2012)
8. Mascheroni, G., Olafsson, K.: The mobile internet: access, use, opportunities and divides among European children. New Media Soc. **15**, 1–23 (2015)
9. Rangaswamy, N., Arora, P.: The mobile internet in the wild and every day: digital leisure in the slums of urban India. Int. J. Cult. Stud. **19**(6), 611–626 (2015)
10. Gerpott, T.J.: SMS use intensity changes in the age of ubiquitous mobile internet access - a two-level investigation of residential mobile communications customers in Germany. Telematics Inform. **32**(4), 809–822 (2015)
11. Stork, C., Calandro, E., Gillwald, A.: Internet going mobile: internet access and use in 11 african countries. Info **15**(5), 34–51 (2013)
12. Ramirez-Correa, P.E., Rondan-Cataluña, F.J., Arenas-Gaitán, J.: Predicting behavioral intention of mobile internet usage. Telematics Inform. **32**(4), 834–841 (2015). http://dx.doi.org/10.1016/j.tele.2015.04.006
13. Hedman, J., Henningsson, S.: The new normal: market cooperation in the mobile payments ecosystem. Electron. Commer. Res. Appl. **14**(5), 305–318 (2015). http://dx.doi.org/10.1016/j.elerap.2015.03.005
14. Chung, K.: Gender, culture and determinants of behavioural intents to adopt mobile commerce among the Y Generation in transition economies: evidence from Kazakhstan. Behav. Inform. Technol. **33**(7), 743–756 (2014). doi:10.1080/0144929X.2013.805243
15. Cocosila, M., Trabelsi, H.: An integrated value-risk investigation of contactless mobile payments adoption. Electron. Commer. Res. Appl. **20**, 159–170 (2016). http://dx.doi.org/10.1016/j.elerap.2016.10.006
16. van Dijk, J.A.: The Deepening Divide: Inequality in the Information Society. SAGE Publications, Thousand Oaks (2005)
17. Räsänen, P.: The consumption disparities in information society: comparing the traditional and digital divides in Finland. Int. J. Sociol. Soc. Policy **25**(1–2), 48–62 (2006)
18. Tefficient. http://media.tefficient.com/2016/01/tefficient-industry-analysis-1-2016-mobile-data-usage-and-pricing-1H-2015.pdf
19. Wei, R.: Motivations for using the mobile phone for mass communications and entertainment. Telematics Inform. **25**, 36–46 (2008)

20. Karikoski, J., Soikkeli, T.: Contextual usage patterns in smartphone communication services. Pers. Ubiquit. Comput. **17**(3), 491–502 (2013). doi:10.1007/s00779-011-0503-0
21. Statistics Finland. Väestön tieto- ja viestintätekniikan käyttö, Internetin käyttö mobiililaitteilla (The population's use of ICT, use of Internet on mobile devices). http://www.stat.fi/til/sutivi/2015/sutivi_2015_2015-11-26_kat_002_fi.html
22. Rogers, E.M.: Communication Technology: The New Media in Society, 1st edn. The Free Press, New York (1986)
23. Rogers, E.M.: Diffusion of Innovation. The Free Press, New York (2003)
24. Hargittai, E.: Weaving the western web: explaining difference in internet connectivity among OECD countries. Telecommun. Policy **23**, 701–718 (1999)
25. Fidler, R.: Mediamorphosis: Understanding New Media. SAGE Publications Ltd., Thousand Oaks (1997). doi:10.4135/9781452233413
26. Bouwman, H., Carlsson, C., Molina-Castillo, F.J., Walden, P.: Barriers and drivers in the adoption of current and future mobile services in Finland. Telematics Inform. **24**(2), 145–160 (2007). http://dx.doi.org/10.1016/j.tele.2006.08.001
27. Potongsangarun, R., Worasesthaphong, T., Taveechat, O., Somkane, S.: Factors influencing decision to subscribe mobile phone services. Procedia-Soc. Behav. Sci. **40**, 473–477 (2012)
28. Massoud, S., Gupta, O.K.: Consumer perception and attitude toward mobile communication. Int. J. Mobile Commun. **1**(4), 390–408 (2003)
29. Zillien, N., Hargittai, E.: Digital distinctions: status-specific types of internet usage. Soc. Sci. Q. **90**(2), 274–291 (2009)
30. Lin, W.Y., Zhang, X., Jung, J.Y., Kim, Y.C.: From the wired to wireless generation? Investigating teens' internet use through the mobile phone. Telecommun. Policy **37**(8), 651–661 (2013). http://dx.doi.org/10.1016/j.telpol.2012.09.008
31. Pearce, K.E., Rice, R.E.: Digital divides from access to activities: comparing mobile and personal computer internet users. J. Commun. **63**(4), 721–744 (2013)
32. Napoli, P.M., Obar, J.A.: The emerging mobile internet underclass: a critique of mobile internet access. Inform. Soc. **30**(5), 323–334 (2014)
33. Eastin, M.S., Brinson, N.H., Doorey, A., Wilcox, G.: Living in a big data world: predicting mobile commerce activity through privacy concerns. Comput. Hum. Behav. **58**, 214–220 (2016). http://dx.doi.org/10.1016/j.chb.2015.12.050
34. PageFair The 2015 Ad blocking report. https://blog.pagefair.com/2015/ad-blocking-report/
35. Martín-Consuegra, D., Gómez, M., Molina, A.: Consumer sensitivity analysis in mobile commerce advertising. Soc. Behav. Pers.: Int. J. **43**(6), 883–897 (2015). doi:10.2224/sbp.2015.43.6.883
36. Chen, J.Q., Zhang, R., Lee, J.: A cross-culture empirical study of M-commerce privacy concerns. J. Int. Commer. **12**(4), 348–364 (2013). doi:10.1080/15332861.2013.865388
37. Chong, A.Y.L.: Mobile commerce usage activities: the roles of demographic and motivation variables. Technol. Forecast. Soc. Change **80**(7), 1350–1359 (2013). http://dx.doi.org/10.1016/j.techfore.2012.12.011
38. Kuoppamäki, S.M., Taipale, S., Wilska, T.A.: The use of mobile technology for online shopping and entertainment among older adults in Finland. Telematics Inform. **34**(4), 110–117 (2017). http://dx.doi.org/10.1016/j.tele.2017.01.005
39. Liébana-Cabanillas, F., Sánchez-Fernández, J., Muñoz-Leiva, F.: Antecedents of the adoption of the new mobile payment systems: the moderating effect of age. Comput. Hum. Behav. **35**, 464–478 (2014). http://dx.doi.org/10.1016/j.chb.2014.03.022
40. Statistics Finland. Väestön tieto- ja viestintätekniikan käyttö, Internetin käytön muutoksia 2015 (The population's use of ICTs, changes in the use of the Internet 2015). http://www.stat.fi/til/sutivi/2015/sutivi_2015_2015-11-26_kat_001_fi.html