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An attitude-based latent class segmentation analysis of mobile phone users ☆

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ABSTRACT

We present a segmentation study utilizing latent class analysis with the object of segmenting consumers with regard to their usage of mobile technology. As bases for the segmentation we utilize attitudes reflecting consumers' perceptions on benefits to be found from using mobile technology, their personal innovativeness and self-efficacy, as well as social aspects of using mobile technology. In our results we find attitudes to be more significant determinants of mobile technology adoption and use than socio-demographic variables. The results are of consequence for researchers in the field of innovation adoption and diffusion, as well as practitioners developing mobile technology and services.

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1. Introduction and background

In this research we present a latent-class analysis of mobile phone users, utilizing users' attitudes towards usage of mobile technology as segmentation bases.

The research contribution we offer is twofold.

First, we apply latent class analysis to a novel problem; segmentation of mobile phone consumers. Latent class analysis is a less-used technique, which nevertheless holds many advantages in segmenting and has been shown to perform well for clustering applications (Magidson and Vermunt, 2002). Latent class analysis has previously been used to analyze e.g. e-shopping segments (Bhatnagar and Ghose, 2004) and footwear consumption (Baudisch, 2007). It holds numerous advantages over K-means clustering, for example probability-based classification and the possibility to work with datasets where the assumptions of equal variances and zero correlations are not met. Despite its advantages it has not been frequently used, mainly due to low availability and relative complexity in operationalizing the algorithms (Green et al., 1976).

Second, we use consumer attitudes as bases for the latent class analysis. There is a wide range of possible bases to use in segmentation analysis, ranging from demographic bases, simple to use but limited in utility, to lifestyle-related bases which are more complex but potentially more powerful (cf Wedel and Kamakura, 2000). It has been suggested in previous research that demographic and socio-demographic segmentation bases are of limited value in investigating consumer behaviour. We adhere to the idea of (Minhas and Jacobs, 1996) of first identifying behaviours we are interested in, and after that finding out who are the consumers in that segment; as opposed to a more traditional approach of grouping consumers according to observable general similarities – e.g. age, income level and type of residence – and then investigating the thus found groups to understand their behaviour. It is stated by Minhas and Jacobs that consumer attitudes, for example the benefits a consumer seeks are causally related to their future behaviour. Future behaviour is of extraordinary interest for device and service developers. We believe at the onset that consumer attitudes towards mobile technology are a more critical predictor of

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consumers' behaviour in the mobile device and services market, than their observable attributes, and thus we set out in this research to use and evaluate attitude-based segmentation to extend our understanding of consumer behaviour in the mobile field.

The more pragmatic interest lies simply within better understanding consumers' interests and needs in the field of mobile technology usage. Despite the wide proliferation of mobile phones, there is still limited understanding of users' motivations, especially concerning advanced usage of mobile phones, i.e. beyond voice and SMS. Smart phone penetration in the US as well as in the EU5 has reached 50% of mobile subscribers (Nielsen, 2012; comScore, 2012). Despite this relative ubiquity of the devices, there is research evidence of the slower penetration of value-adding features and applications of smartphones. Many studies conducted to describe smartphone usage are plagued by selective sample choice, where technologically savvy individuals are overrepresented in the sample and the gained understanding is thus not generalizable to the wider population (e.g. Tojib and Tsarenko, 2012). A number of recent, reliable studies do, however, indicate that adopting a smart device (such as smartphone or tablet) does not automatically lead to adopting smart features and applications. Gerpott et al. (2013b) found in a study on tablet and laptop usage, that for both types of devices, a disproportionate amount of mobile Internet traffic is generated by only a small number of users. In another study focusing especially on smartphones, Gerpott et al. (2013a) could conclude that also in this category, mobile Internet use intensity is highly skewed. Also, mobile Internet use in itself does not imply use of any especially advanced features or applications; e.g. using a relatively simple application such as mobile email generates mobile Internet traffic. In our own research (Sell et al., 2012) on a random sample representative of Finnish consumers between ages 16 and 64, we have found a surprisingly high percentage of smart phone owners making low use of services beyond voice and SMS (47%) and another sizeable group intending to discontinue smart phone use in the future (38%). Based on 2010 data, these findings are mirrored by unpublished research results also from late 2011. It is clear that the field of smart phone use and consumer habits is a field in flux.

In light of the above, there is a possible mismatch between the capabilities of the mobile hardware and software marketed towards consumers, and the nascent understanding we have of consumers' usage of these capabilities. We believe it is essential to strengthen the research evidence regarding consumers' usage of this special subgroup of consumer technology, and the road to understanding we have chosen in this research goes through segmenting and scrutinizing the found segments.

In general, we share many of the ideas presented by De Marez and Verleye (2004), for instance that traditional adoption and diffusion patterns can no longer be taken for granted, especially in the fast-moving ICT industry. Improved *preliminary* user insight is needed in order to understand which consumers are likely to adopt and use a certain technology. De Marez and Verleye present a simple screening scale, the three-question PSAP scale, for use in evaluating technological innovations with consumers before they are launched on market. Their goal in developing the instrument is to gain "preliminary insight in the adoption curve for a specific innovation, and the different adopter segments for that product", without focusing solely on technological innovators. These goals are similar to ours, as we wish to investigate consumers' interests in mobile technology innovations, in a situation where a majority of consumers has limited experience with said innovations, as proven by e.g. Gerpott et al. (2013a, 2013b), Sell et al. (2012).

Consumers are reported to be less predictable than they used to be previously. Previous assumptions have postulated for example, that traditional adopter segments such as early adopters and laggards could be profiled in a rather constant way, with regard to their socio-demographics, lifestyles and ICT usage and ownership. These traditional segmentation assumptions have been challenged in relation to ICT innovations today (see (De Marez and Verleye, 2004; De Marez et al., 2007). As described by Harrison and Kjellberg (2010) in discussing the emerging market of biosensors, the advanced mobile service market is a market 'in the making'. In such a situation, market segmentation has the potential to become less of a descriptive technique, more of an effort to emergently and interactively shape what is being described (i.e. the segments). Segmentation in new, emerging and in-the-making markets should not overemphasize identifying segments, but rather put effort into dealing with the complexity and ambiguity present in the emerging market (Sheth et al., 2000; Quinn et al., 2007). Also Lemmens et al. (2012) argue that the traditional assumption of stable segments over time is not suitable for segmenting new product markets, as these are inherently dynamic and evolving in nature.

De Marez and Verleye (2004) also challenge the applicability of the traditional adoption patterns as originally portrayed by Rogers (2003). When considering the adoption of a number of ICT innovations, the authors identify a gap in the diffusion of the innovations: the adopter segments, who traditionally should copy the behaviour of innovators and early adopters, are no longer exhibiting this copy-cat behaviour. Early adopters are no longer inspiring more laggard consumers to similar behaviour. (De Marez and Verleye, 2004) suggest the existence of a double-peaked adoption curve, instead of the traditional bell-shaped curve. In the double-peaked model, the first peak is formed by initial market-enthusiasm, where innovators and early adopters catch on to an innovation. This stage is followed by a backslide which not all innovations can recover from. If there is a recovery, this forms the second peak in the new adoption curve. For product and service designers to enable an innovation to overcome the backslide – which can be of variable depth – they will need to have an understanding of what adopter segments beyond the traditional innovators and early adopters expect from the innovation. We view attitude segmentation as one possibility to gauge different consumer segments with regard to their interests and motivations.

1.1. Consumer segmentation studies in the ICT field

Freeman and Lessiter (2003) present a study on attitude-based segmentation investigating consumers' usage of digital and interactive television. They utilize a two-step clustering approach based solely on consumer attitudes towards dTV

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