How Uncertainty Avoidance Affects Innovation Resistance in Mobile Banking? The Moderating Role of Age and Gender

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Abstract
While internet banking has received the attention of the masses in many developed countries, mobile banking adoption is still in its infancy. This paper explores the role of uncertainty avoidance on innovation resistance in the context of mobile banking. Hypotheses of the effect of uncertainty avoidance on five adoption barriers, namely usage, value, risk, tradition and image, were tested using a large data set consisting of 1556 effective responses from online bank customers. The results show that uncertainty avoidance has a highly significant effect on innovation resistance, the strongest influence related to image and risk barriers. Moreover, age appear not to moderate the effects while gender is found to be a highly significant moderator. The results contribute to the earlier literature by evincing that uncertainty avoidance indeed increases resistance to innovations despite the age of a consumer. However, this influence varies between genders, which partly contradicts with the earlier debate.

1. Introduction
Value-adding mobile services are becoming increasingly important in gaining a competitive edge in the marketplace [1] and service providers are putting increasing efforts to take advantage of the business opportunities offered by wireless technology. Consequently mobile services and mobile service consumption have become a hot topic among information systems and marketing scholars [1]. In the financial services sector mobile banking represents an additional service for certain occasions adding the element of true mobility to Internet banking used over fixed networks. Some bank customers, for example, find mobile banking valuable when being out of home on a country house, on the road or in case of acute need for money transfer [2]. However, it appears that mobile banking, defined as “an interaction in which a customer is connected to a bank via a mobile device such as cell phone, smartphone or personal digital assistant (PDA)” [3] is yet to receive the attention of the masses. This is problematic since from the perspective of banks that develop mobile banking, a great number of customers should use these services in order to produce a return on investment [4]. Therefore, it has been argued that whereas today internet banking services provide massive economic benefits for the banks, mobile services serve rather as a way to offer customers value added [5]. Thus more research is needed in order to better understand the reasons that hamper or postpone innovation diffusion in this context.

However, innovation resistance represents “the less developed concept in diffusion research” [6] as the diffusion perspective, including the motivating factors of adoption and characteristics of innovation adopters has up until now represented the mainstream of the literature on innovations [7,8,9] and research into customer resistance to innovations is scarce [10]. The objective of this study is to develop insight into this less developed area in the innovation research.

This paper takes the perspective of culture on innovation resistance. Earlier literature has discussed innovation resistance noting that resistance varies across cultures [11]. However, up till now actual empirical results on how culture influences on innovation resistance are scant. Thus, this paper takes one of the Hofstede’s cultural dimensions, namely uncertainty avoidance, and aims to empirically test if and how cultural uncertainty avoidance influences on five theory driven adoption barriers in mobile banking context. Cultural perspective is needed at least from two reasons. First, in a globalized world today cultural boundaries are mixed with national boarders. This means that cultures vary between nations but also increasingly within nations making cultural variables gradually important within country settings. Second, the knowledge whether cultural variables influence consumers’ attitudes and behavior towards innovations is useful for the firms planning international marketing strategies for their innovations.

The remainder of the paper is structured as follows. First, by reviewing the earlier literature on online banking adoption and uncertainty avoidance as a
cultural dimension the reasons that may cause resistance to mobile banking adoption are discussed. This is followed by a discussion of the moderating role of age and gender in the phenomenon. Thereafter, the data and methods used are presented. Finally, the results of the study are presented, conclusions drawn, and some avenues for further research suggested.

2. Literature review and hypotheses development

2.1. Innovation resistance

Earlier literature has explained resistance to innovations through two constructs, habit or satisfaction with an existing behaviour and perceived risks associated with innovation adoption [6]. Consequently Ellen et al. [12] note that satisfaction with current performance increases resistance to alternatives and reduces the likelihood of adoption. Perceived risks, for their part, derive from physical, social or economic consequences, performance uncertainty and perceived side effects of the innovation [6]. As a part of the risk barrier, Ellen et al. [12] emphasize the role of perceived self-efficacy, being the perceived ability or skill to successfully perform a given task, in consumer resistance to technological innovations. These views assume that resistance derives from two constructs: perceived benefits over existing methods and perceived risks associated with innovation adoption. Ram and Sheth [13] explain consumer resistance though five distinct barriers namely usage, value, risk, tradition and image, providing a more comprehensive view to the phenomenon.

2.1.1. Usage barrier. In their seminal paper Ram and Sheth [13] propose that the usage barrier comes into operation when an innovation is not well-suited with existing practices, workflows or habits. It is later suggested that in technology intensive services the usage barrier could be associated to the usability of the service and the changes it requires from the individuals [5]. This parallels with the definition of ease-of-use in the Technology Acceptance Model (TAM) as the degree to which an individual considers an innovation to be free of effort [14]. Furthermore, perceived ease-of-use closely peers with the concept of complexity [15,16], defined as the degree to which an innovation is perceived as difficult to understand and use [17]. In the mobile banking context the small size of mobile devices including small screens and tiny multifunction keypads may be troublesome to use and impair the usability of the service. For example, some bank customers consider bill payment via mobile phone to be difficult and time consuming as the device enables only a limited amount of information processing and hence, the whole bill is not visible on the display inhibiting the progress in the service process [2,18]. Indeed, it has been argued that system limitations, such as tiny screens and keypads and slower transaction speeds, compared to PC based internet banking may slow diffusion of mobile banking [4]. Moreover, Kuisma et al. [19] draw attention to simple authorization mechanisms in online banking and report inconvenience due to changing PIN codes among some bank customers as the codes need to be carried along.

2.1.2. Value barrier. The value barrier comes from the performance and monetary value of an innovation relative to its substitutes [13]. It closely relates to the concept of perceived usefulness in the TAM model and to the concept of relative advantage in the Rogers’ [17] innovation decision process. Brown et al. [20] proved that the greater the perceived advantage that mobile banking offers over other ways of banking, the more likely mobile banking is to be adopted. One such advantage is the option to check the transactions of an account anytime anywhere, increasing customers’ feeling of control over their financial affairs [2]. However, if an innovation does not offer enhanced performance to existing alternatives, it is not sensible for consumers to change their behaviour [13].

2.1.3. Risk barrier. Risk barrier indicates the degree of perceived risks of an innovation [13]. Perceived risk was initially related to fraud or product quality, but nowadays as people have engaged in online environment, perceived risk is largely related to financial, psychological, physical, or social risks in online transactions [21,22]. In the mobile banking context some early studies have reported privacy and security concerns among certain consumers [23]. In addition, the data input and output mechanisms have been found to hinder the individual’s confidence [2,18]. Moreover, mobile phones may be limited in computational power, memory capacity and battery life, limiting the use of mobile services [24]. Finally, in a system in which a portable list of PIN codes is used, as in Finland, risk perceptions among consumers may arise as the list may be lost [19]. Consequently, Poon [25] argues that some bank customers fear that the hackers may get access to their bank account via PIN numbers. Thus it can be argued that safety measures of personal details and financial information are one of the vital factors for the success of mobile banking [20].
2.1.4. Tradition barrier. It is argued that some satisfaction/dissatisfaction with electronic financial services is not necessarily tied to the technology itself, but rather to the type of personality [26]. Thus, the tradition barrier takes place when an innovation is incompatible with an individual's existing values, norms and past experience [13]. The tradition barrier appears to be conceptually linked with the concept of compatibility referring to the degree to which using an innovation is perceived as consistent with the existing values and beliefs, past and present experiences, and needs of potential adopters [17]. In the banking context the tradition barrier may arise if an individual perceives online banking to be very different from the way he/she has been accustomed to paying bills [27]. It may also derive from a strong desire to deal with human tellers and thus prevent an individual from adopting self-service technologies [28]. Indeed, a customer may need social interaction and take pleasure in talking to bank personnel, and complain that internet banking lacks a social dimension in terms of human interaction [29,30]. In this vein earlier studies show that lack of human contact may cause dissatisfaction in internet financial services [26,31]. It may be that in this context the tradition barrier takes place if consumers simply prefer to deal directly with the bank personnel instead of using new banking technologies.

2.1.5. Image barrier. Lastly, innovations gain an identity from their origins, for example the product category to which they belong, the country of origin or brand. In case an individual dislikes these associations he/she develops a negative image of the innovation [13]. This may be associated with different types of anxiety towards computers [32] or technology itself, referring to consumers’ negative attitude toward technology tools [33]. In their qualitative study on online banking resistance Kuisma et al. [19] identified that online banking non-users usually bear markedly negative image regarding new technology and they are against the trend of moving services onto the internet. Moreover, in the late 90’s Fain and Roberts [27] stated that the image barrier in online banking emerges from a negative hard-to-use image of computers and the internet. This may also be the case in mobile banking today as some consumers may perceive the mobile technology to be too complicated to use and therefore instantly form a negative image of the service related to the technology.

2.2. Uncertainty avoidance and innovations

“Existing cultural conditions determine whether, when, how, and in what form a new innovation will be adopted” [34]. Indeed, the earlier literature has shown that national culture, especially in terms of Hofstede’s [35,36] cultural dimensions, have a significant effect on innovation adoption and innovativeness [37,38,39]. The original cultural dimensions [35] can be briefly described as follows: power distance is the societal acceptance of organizational hierarchy; uncertainty avoidance is the cultural tolerance of ambiguity; individualism is the societal preference for interdependence; and masculinity is the cultural tendency towards dominant sex role patterns. Steenkamp et al. [37] argues that three out of the four original dimensions of national culture can be related to consumer innovativeness. Given the fact that the original dimensions were extracted from a mammoth data in one global organization and were mainly based on work-related behaviors, only one dimension seem irrelevant in consumer behavior, that is power distance. In addition to the four dimensions, a newly defined dimension in the Hofstede’s scheme is the long-term orientation that is also applicable to consumer context.

Out of the four cultural dimensions applicable to consumer context uncertainty avoidance appears to be the most self-evident when perceptions to innovations are discussed. This is e.g. due to the fact that higher level of uncertainty avoidance corresponds with greater resistance to change [35]. In an organizational context high uncertainty avoidance is often related to resistance to innovations, highly formalized management and the constraining of innovations [36]. This means that organizations with high uncertainty avoidance are less likely to adopt innovations [38,39] and adopt innovations only if their value has already been proven in the market. This relates to the discussion of innovativeness and to the adoption categorization of decision makers to late adopters and laggards [17]. Indeed, in the consumer context high level of uncertainty avoidance refers to resistance to change from established routines and risk avoidance. In their work Steenkamp et al. [37] study national culture as an antecedent to consumer innovativeness. They found that cultural uncertainty avoidance has a negative effect on consumer innovativeness. Thus, we hypothesize the following:

\[ H_1: \text{Uncertainty avoidance is positively associated with usage barrier} \]
\[ H_2: \text{Uncertainty avoidance is positively associated with value barrier} \]
\[ H_3: \text{Uncertainty avoidance is positively associated with risk barrier} \]
\[ H_4: \text{Uncertainty avoidance is positively associated with tradition barrier} \]
\[ H_5: \text{Uncertainty avoidance is positively associated with image barrier} \]
2.3. Age in online banking

The impact of demographics on electronic services adoption has been extensively studied in the past [5,40,41,42,43,44,45,46,47,48]. Studies focusing on new technologies adoption refer to a predominance of male, younger, more educated and having a higher income, when compared to those who do not adopt innovations [49,50,51,52,53].

Previous findings show that older individuals have lower inclination to adopt new technology-based services [54,55]. Accordingly, earlier studies [5,30,56] have shown that mature customers have more resistance to internet and mobile banking services than other bank customers. Laukkanen and Pasanen [48] argue that a typical Finnish mobile banking user is more likely to be middle-aged (30-49 years old) and same pattern could be found for China [57], Japan [58] and Brazil [43]. Moreover, in his studies Hofstede [35] found that age has a strong relationship with uncertainty avoidance. Thus it is hypothesized:

\[ H_6: \text{Age moderates the effect of uncertainty avoidance on innovation resistance} \]

2.4. Gender in online banking

Gender is among the most studied demographic characteristics in the context of electronic services. When compared to women, male perceive less risk in online business activities [45,46,59,60]. Males are inclined to evaluate mobile commerce more positively than women [61] and this attitude might be related to a greater valuation of non-store shopping in general [62,63]. Some studies prove that males dominate among users of mobile banking services [48,56,59,64]. Consequently it is hypothesized:

\[ H_7: \text{Gender moderates the effect of uncertainty avoidance on innovation resistance} \]

Figure 1 illustrates the theoretical model of the study.

![Conceptual model and hypotheses](image)

Figure 1. Conceptual model and hypotheses

3. Data and methods

Based on the earlier literature discussed above an online questionnaire was designed (Table 1). There are only very few empirical studies on innovation resistance and validated scales of the barriers are scarce. The measure items of the five adoption barriers follow Laukkanen and Kiviniemi [3] and the measures for uncertainty avoidance were adapted from Yoo and Donthu [65].

The questionnaire was placed in a log-out page of a large bank’s online service in Finland, thus the respondents represented bank customers already familiar with online banking services. After removing cases with missing values a total number of 1556 effective responses were received.

Age and gender served as moderators in the study. Following some earlier studies [5] respondents above the age of 55 were defined as a mature segment while the rest of the respondents represented the younger segment. Out of the 1556 respondents 300 (19.3%) represented the mature segment and 1256 (80.7%) were categorized as the younger counterpart. As for the gender, the data is slightly female dominated with 956 (61.6%) and 597 (38.4%) female and male respondents respectively (Table 2).
Table 1. Measure items

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measure item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usage barrier</td>
<td>In my opinion, mobile banking services are easy to use (-)</td>
</tr>
<tr>
<td></td>
<td>In my opinion, the use of mobile banking services is convenient (-)</td>
</tr>
<tr>
<td></td>
<td>In my opinion, mobile banking services are fast to use (-)</td>
</tr>
<tr>
<td></td>
<td>In my opinion, progress in mobile banking services is clear (-)</td>
</tr>
<tr>
<td></td>
<td>The use of changing PIN codes in mobile banking services is convenient (-)</td>
</tr>
<tr>
<td>Value barrier</td>
<td>The use of mobile banking services is economical (+)</td>
</tr>
<tr>
<td></td>
<td>In my opinion, mobile banking does not offer any advantage compared to handling my financial matters in other ways</td>
</tr>
<tr>
<td></td>
<td>In my opinion, the use of mobile banking services increases my ability to control my financial matters by myself (-)</td>
</tr>
<tr>
<td>Risk barrier</td>
<td>I fear that while I am paying a bill by mobile phone, I might make mistakes since the correctness of the inputted information is difficult to check from the screen</td>
</tr>
<tr>
<td></td>
<td>I fear that while I am using mobile banking services, the battery of the mobile phone will run out or the connection will otherwise be lost</td>
</tr>
<tr>
<td></td>
<td>I fear that while I am using a mobile banking service, I might tap out the information of the bill wrongly</td>
</tr>
<tr>
<td></td>
<td>I fear that the list of PIN codes may be lost and end up in the wrong hands</td>
</tr>
<tr>
<td>Tradition barrier</td>
<td>Patronizing in the banking office and chatting with the teller is a nice occasion on a weekday</td>
</tr>
<tr>
<td>Image barrier</td>
<td>I find self-service alternatives more pleasant than personal customer service (-)</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>I have such an image that mobile banking services are difficult to use</td>
</tr>
<tr>
<td>avoidance</td>
<td>I find it important to have instructions spelled out in detail so that I always know what I am expected to do</td>
</tr>
<tr>
<td></td>
<td>In my opinion, it is important to closely follow existing instructions and procedures</td>
</tr>
</tbody>
</table>

Source: [3,65]
Note: (-) = Reversed scale

Table 2. Sample distribution

<table>
<thead>
<tr>
<th>Item</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Younger segment (≤ 55 years)</td>
<td>1256</td>
<td>80.7</td>
</tr>
<tr>
<td>Mature segment (&gt; 55 years)</td>
<td>300</td>
<td>19.3</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>956</td>
<td>61.6</td>
</tr>
<tr>
<td>Male</td>
<td>597</td>
<td>38.4</td>
</tr>
<tr>
<td>Total</td>
<td>1556</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Confirmatory factor analysis was used to validate the theory driven constructs. In order to ensure that the measurement model yielded equal representation among the moderation groups, multigroup invariance analysis [66] was conducted. Thereafter, structural model was built and hypotheses tested with the overall sample of 1556 responses. Finally, the moderation effects of age and gender were tested using multigroup moderation analysis with pairwise tests of path coefficients.

4. Construct validation

After removing one measure item cross-loading with another construct, a final 17-item measurement model with six constructs was set. The model indicates a good fit to the data with $\chi^2$/df=7.079, CFI=0.956, RMSEA=0.063. To assess discriminant validity the square root of average variance extracted (AVE) for each of the construct was compared to between-construct correlations. Discriminant validity is supported as the square root of AVE is greater than the correlation with other constructs [67].

Thereafter a series of multigroup invariance tests was conducted using AMOS 19 program. At the first stage, configural invariance was tested. This means testing that the same basic factor structure exists in all the moderation groups studied [68]. Thus, a model was created in which the tests for the validity of factorial structure were conducted across the moderation groups simultaneously. This simultaneously estimated model provides the value against which all the subsequently specified models of the invariance test are compared [69]. Byrne [69] suggests that prior to testing for the equality of sets of measure items, it is always advisable to test for the possibility that a fully constrained model is invariant across the groups examined. This means specifying a model in which all factor loadings, all factor variances and all factor covariances are equally constrained across the groups. If fully constrained model is not supported, as often is the case, metric invariance and factor variance invariance are sequentially tested.

As for the age moderator Goodness-of-fit statistics showed a chi-square value of 880.77 ($df = 214;
p<0.001) and fit indices CFI=0.955, RMSEA=0.045 indicating a good fit across the two groups. All factor loadings for all measure items were highly significant at the p<0.001 level in both younger and mature segment, and only two standardized factor loadings were below 0.60 (the minimum loading being 0.557). Thus, the model showed configural invariance across the two age segments. The fully constrained model was not significantly poorer than the fit of the configural invariance model ($\Delta\chi^2(29) = 40.50; p>0.05$) showing complete model invariance between younger and mature consumer segments (Table 3).

<table>
<thead>
<tr>
<th>Model tested</th>
<th>Model fit measures</th>
<th>Model differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\chi^2$</td>
<td>df</td>
</tr>
<tr>
<td>1 Configural invariance</td>
<td>880.77</td>
<td>214</td>
</tr>
<tr>
<td>2 Factor loadings, variances and covariances</td>
<td>921.27</td>
<td>243</td>
</tr>
<tr>
<td>constrained equal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the gender moderator invariance analysis supported configural invariance as goodness-of-fit statistics of the two-group unconstrained model showed excellent fit with a chi-square value of 874.31 ($df = 214; p<0.001$) and fit indices CFI=0.956 and RMSEA=0.045. In addition, all factor loadings for all measure items were highly significant at the p<0.001 level among both female and male, and only three standardized factor loadings were below 0.60 (the minimum loading being 0.562). The fully constrained model was rejected ($\Delta\chi^2(29) = 48.85; p<0.05$). Thus the authors tested full metric invariance by constraining all the factor loadings, but remaining factor variances and factor covariances unconstrained. As full metric invariance was achieved ($\Delta\chi^2(8) = 9.71; p>0.05$) the factor variances were also constrained in order to test factor variance invariance. The data supported full factor variance invariance ($\Delta\chi^2(14) = 17.28; p>0.05$) with CFI=0.956 and RMSEA=0.043 (Table 4).

<table>
<thead>
<tr>
<th>Model tested</th>
<th>Model fit measures</th>
<th>Model differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\chi^2$</td>
<td>df</td>
</tr>
<tr>
<td>1 Configural invariance</td>
<td>874.31</td>
<td>214</td>
</tr>
<tr>
<td>2 Factor loadings, variances and covariances</td>
<td>923.16</td>
<td>243</td>
</tr>
<tr>
<td>constrained equal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Full metric invariance</td>
<td>884.02</td>
<td>222</td>
</tr>
<tr>
<td>4 Full factor variance invariance</td>
<td>891.59</td>
<td>228</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>$\Delta\chi^2$</th>
<th>$\Delta$df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17.28</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

5. Results

5.1. Overall model

The results of the path analysis of the overall model show that uncertainty avoidance has a highly significant positive effect on innovation resistance. The results confirm hypotheses H1,5 as uncertainty avoidance has statistically significant effect on all the five adoption barriers. It appears that it has the greatest effect on image barrier, followed by risk barrier. Value, usage and tradition barriers follow respectively. The results suggest that greater uncertainty avoidance reinforces in particular negative image and risk perceptions towards innovations among consumers (Figure 2).

5.2. Moderating role of age

According to the earlier literature, consumer adoption behavior, attitudes towards innovations, and innovation resistance is influenced by age. The results of the present study indicate that among the younger consumer segment the influence of uncertainty avoidance is statistically significant ($p<0.001$) on all the adoption barriers while among the mature segment only risk and image barriers are influenced by uncertainty avoidance, the effects on usage, value and tradition barriers being non-significant. However, the multigroup comparison tests show that the difference between the effects of uncertainty avoidance on adoption barriers is not statistically different between the age groups. Thus it is suggested that the effect of uncertainty avoidance on innovation resistance is not dependent on age of a consumer and consequently H6 is rejected.
5.3. Moderating role of gender

Earlier literature suggests that gender has a role in consumer attitudes towards innovations. The results of this study show that cultural uncertainty avoidance has influence on the magnitude of resistance to innovations among males especially. However, it seems that among females uncertainty avoidance has much lesser effect on innovation resistance overall. Moreover, among females the effect of uncertainty avoidance is statistically non-significant on usage and value barriers and the effect is weak in case of the tradition barrier. The results clearly demonstrate a great difference between females and males in the effect of uncertainty avoidance on innovation resistance as all the five path estimates differ between genders on a 99.9% (p<0.001) confidence level. Therefore, it is argued that the effect of uncertainty avoidance on innovation resistance is highly gender dependent, and consequently H7 is supported (Table 5).

![Figure 2. Path estimates of the overall model](image)

### Table 5. Results of the multigroup analysis: standardized loadings and statistical differences

<table>
<thead>
<tr>
<th>Paths</th>
<th>Younger</th>
<th>Mature</th>
<th>$\chi^2$</th>
<th>$\Delta \chi^2$</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncertainty avoidance $\rightarrow$ Usage barrier</td>
<td>0.19***</td>
<td>0.12ns</td>
<td>2235.33</td>
<td>0.43</td>
<td>ns.</td>
</tr>
<tr>
<td>Uncertainty avoidance $\rightarrow$ Value barrier</td>
<td>0.21***</td>
<td>0.08ns</td>
<td>2236.93</td>
<td>2.03</td>
<td>ns.</td>
</tr>
<tr>
<td>Uncertainty avoidance $\rightarrow$ Risk barrier</td>
<td>0.35***</td>
<td>0.17**</td>
<td>2237.70</td>
<td>2.80</td>
<td>ns.</td>
</tr>
<tr>
<td>Uncertainty avoidance $\rightarrow$ Tradition barrier</td>
<td>0.17***</td>
<td>0.04ns</td>
<td>2236.62</td>
<td>1.72</td>
<td>ns.</td>
</tr>
<tr>
<td>Uncertainty avoidance $\rightarrow$ Image barrier</td>
<td>0.36***</td>
<td>0.20**</td>
<td>2237.21</td>
<td>2.31</td>
<td>ns.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\chi^2_{(234)} = 2030.86$</td>
<td>$\chi^2_{(234)} = 2234.90$</td>
</tr>
<tr>
<td>Uncertainty avoidance $\rightarrow$ Usage barrier</td>
<td>0.07ns</td>
</tr>
<tr>
<td>Uncertainty avoidance $\rightarrow$ Value barrier</td>
<td>0.08ns</td>
</tr>
<tr>
<td>Uncertainty avoidance $\rightarrow$ Risk barrier</td>
<td>0.21***</td>
</tr>
<tr>
<td>Uncertainty avoidance $\rightarrow$ Tradition barrier</td>
<td>0.11***</td>
</tr>
<tr>
<td>Uncertainty avoidance $\rightarrow$ Image barrier</td>
<td>0.23***</td>
</tr>
</tbody>
</table>

Note: Significant at: * = 0.05; ** = 0.01; *** = 0.001; ns = not significant

6. Conclusions

This paper tested the effect of uncertainty avoidance on five theory-driven adoption barriers namely usage, value, risk, tradition, and image on mobile banking adoption. The hypotheses were based on the earlier literature on the relationship between innovation adoption behavior and national cultural dimensions. Moreover, the moderating effects of age and gender were tested as the earlier literature suggests that they have a great influence on consumers’ adoption behavior. Thus hypotheses on the moderating effect of age and gender were developed based on the earlier electronic banking literature. Hypotheses were tested with a large data (N=1556) from Finland, that represents globally one of the leading countries in terms of internet banking adoption.

The results evince statistically significant positive relationship between uncertainty avoidance and all the five barriers. The results show that uncertainty avoidance has the greatest effect on image and risk barriers. This suggests that cultures with higher level of uncertainty avoidance are more sensitive to negative
image of an innovation and new technology in general. Moreover, individuals and cultures with higher level of uncertainty avoidance are more risk averse. Indeed, earlier literature supports the negative relationship between uncertainty avoidance and risk taking as e.g. Hofstede [35] argues that low uncertainty avoidance means a greater willingness to take risks. In general, future research on culture-specific barriers causing a slower adoption of certain innovations is welcome [70].

Already in his seminal work Hofstede [35] found that the level of uncertainty avoidance varies between different age groups. However, the results of the present study suggest that age does not have an effect on the relationship between uncertainty avoidance and innovation resistance. This means that the effect of uncertainty avoidance on innovation resistance is not significantly different between younger and mature consumer segments. Thus further research is needed to explore the effect of age on consumer adoption of and resistance to innovations, and further if this effect is context dependent.

Probably the most interesting result of the present study relates to the role of gender in the relationship between uncertainty avoidance and innovation resistance. Even though there are arguments in the literature that the connection between gender and uncertainty avoidance appears unlikely, and that also Hofstede [35] in his early study did not find any gender differences in uncertainty avoidance, the results of this study show a statistically highly significant difference between females and males in the effect of uncertainty avoidance on innovation resistance. Thus the results of the present study suggest that the role of gender in uncertainty avoidance, especially in a context of innovations, is not that self-evident and deserves further investigation and academic research.

This study benefits the earlier literature in that among very few earlier studies [3,5] it attempts to empirically validate the five adoption barriers suggested by Ram and Sheth (1989) over 20 years ago. Moreover, it shows a highly significant positive relationship between cultural uncertainty avoidance and a less researched phenomenon of innovation resistance. It further suggests that this relationship is independent of age of a consumer but rather varies between genders.

However, the study holds some possible limitations that are worth to address. First, the data were collected using an online questionnaire being open for 72 hours in an online service of a bank. As different people may bank online on weekdays than at weekends, placing the survey on the banking site only for this limited time period exposed the study to a potential bias. Also, the respondents were all already using internet banking services meaning that their attitudes to mobile banking may differ significantly from online banking non-users. In addition, the data was collected only among customers of a single bank in Finland. This may cause a bias as customers of one bank may exhibit different behavioral patterns from customers of other banks and, furthermore, Finns may show different attitudes to technological innovations than people in other countries. However, to conclude, understanding consumer resistance to innovations and the role of culture in this phenomenon deserves more academic attention in the future.

10. References


