Improving the global competitiveness of retailers using a cultural analysis of in-store digital innovations

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Abstract: Global retailers are expanding their business to countries with diverse cultures and consumer preferences. Competitive and sustainable retail chains require advanced e-services linked to in-store digital innovations. This research focuses on cultural dimensions and the implications of implementing global and internet-linked e-service innovations. The research studies how cultural dimensions influence consumers’ attitudes toward five types of retail innovations. The cultural dimensions include uncertainty avoidance and collectivistic cultural dimensions to predict acceptance. The research case compares differences between Taiwanese and Swedish university students. A multi-attribute model shows that Taiwanese prefer innovations with a lower level of self-service. On the other hand, Swedish prefer opposite types of retail innovations. We propose future research to show that these barriers of acceptance can be lowered through the use of advertising, social media, and in-store interaction between customers and staff. The research yields new research directions to help international retailers develop competitive strategies to fit the cultural characteristics of consumers.

Keywords: cultural dimensions; retail digital innovation; service acceptance; retail service models.


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1 Introduction

Retail profitability is dependent on the control of costs, merchandise selection, logistics, management, and creating a monopoly on consumer satisfaction (Gómez et al., 2004; Samli, 1989). Modern retailing relies on service technology to gain and sustain competitive advantages. When technology is introduced into the retail mix, costs can be better managed and controlled while increasing consumers’ loyalty. However, the effective adoption of retail innovations is known to vary across cultures (Martenson, 1987; Zentes et al., 2011). Notably, different cultures exhibit different levels of factors such as self-efficacy, social pressure and technology anxiety. These differences will lead to different levels of self-service technology (SST) adoption (Schliewe and Pezoldt, 2010). Hofstede (1980, 2013) has researched the cross-cultural dimensions that influence behaviours, particularly the factors affecting consumers’ technology adoptions. According to his studies, Taiwanese consumers represent a typical East Asian culture with a developed economy characterised by collectivism and high uncertainty avoidance. On the other hand, Swedish consumers exhibit high levels of individualism and low levels of uncertainty avoidance. As such, it is important to understand how different cultures, defined by different levels of collectivism and uncertainty avoidance, differ in the acceptance of retail innovations. Further, two different cultures may also present differences not only in their general acceptance rate of retail innovations but also in their preferences toward different retail innovations. The purpose of this research is to compare the influence of cultural dimensions on the adoption of in-store retail innovations across Taiwan and Sweden. The research structure explores the influence of
cultural dimensions for retail service innovations in preparation for larger scale and generalised cross-cultural and inter-cultural studies.

2 Literature review

This section reviews internet-based SSTs with references to effective implementations used by global retailers, cultural dimensions related to adaptation factors for SSTs and a comparative cultural analysis of the target research population in Taiwan and Sweden. The literature provides a basis for data collection, modelling, and prediction.

2.1 Self-service technologies

Retail SSTs are characterised by the use of information and communications technologies to replace the labour of service clerks. The customers themselves are playing the role of service employees with the assistance of new information systems and electronic retail service applications. The business processes are changing from one where the retailer serves all customers to one where the customers serve themselves. SSTs are technological interfaces that allow customers to perform the entire service on their own, without direct assistance from service employees (Meuter et al., 2000). SSTs are used in various industries. A large number of research papers analyse the efficacy of SSTs in banking and tourist industries. These SSTs are classified into different types. For example, SSTs include automated teller machines (ATMs), automated hotel checkout, banking by telephone and services offered over the internet such as express package tracking and online brokerage services (Meuter et al., 2000). Retailing, with a labour intensive and information rich supply chain, offers new opportunities for the implementation of SSTs. There are different concepts used to define modern retailing. Kalyanam et al. (2010) have presented the concept of The Metro Group Future Store, which depends on the successful implementation of SSTs. Metro’s approach defines the technology underlying their vision of the modern retail business model and includes technological innovations such as personal shopping assistants (PSA), intelligent weighing scales, electronic price tags, self-scan checkouts and digital advertising displays. These important retailing technologies decrease the number of employees, increase information transferring and sharing, and decrease the costs of operations. Technological innovations in retailing also improve the speed and accuracy of service and enable greater economies of scale through standardisation (Zeithaml and Gilly, 1987). Usage of SSTs improves sales revenues. According to results collected from Metro Future Store, a consumer without technology assistance will fill a basket with about ten items worth about 18 euros. Installation of personal shopping assistants increases the basket size to about 14 items worth about 31 euros (Kalyanam et al., 2010). Given the future stores increased turnover, the cost of implementing the technology is quickly covered in short term.

2.2 SST adoption factors

There is no general framework or concept used to analyse the acceptance of SSTs by consumers. According to Kelly et al. (2010), there were over 60 SST research articles
published in the past decade and 29 different SST adoption factors were identified. Among these factors, Kelly et al. (2010) examined the seven most critical factors, i.e., trust, perceived ease of use, perceived risk, perceived usefulness, preference for personal contact, technology readiness, and demographic variables. Further, personal characteristics are also identified as important psychological determinants of technology acceptance. These characteristics include the constructs social pressure, self-efficacy, and technology anxiety (Eastin, 2002; Meuter et al., 2003, 2005; Schliewe and Pezoldt, 2010). Social pressure is defined as the degree to which an individual believes that people who are important to themselves influence their actions to do something (Fishbein and Ajzen, 1975). As applied to this research, it is the degree where others in groups influence the individual to use SSTs. The perceived self-efficacy relates people’s beliefs to their capabilities to produce given activities (Bandura, 1977). There is a positive relationship between self-efficacy and technology acceptance and therefore customers with higher self-efficacy are expected to have more confidence in their ability to use self-scan checkouts (Schliewe and Pezoldt, 2010). Technology anxiety is related to the level of anxiety of an individual, or level of comfort with decision to use a new technology (Igbaria and Parasuraman, 1989).

2.3 Cultural dimensions

Zhang et al. (2008) reviewed 20 service research journals and discovered 40 articles that focus on cross-cultural customer service research. The most popular categorisation of cultural dimensions is the framework proposed by Hofstede (1980) which includes individualism versus collectivism, masculinity versus femininity, high power distance versus low power distance, and high uncertainty avoidance versus low uncertainty avoidance. Prior studies show that individualism and uncertainty avoidance are important to consumer acceptance of innovations in different cultures (Lim et al., 2004). Individualism defines cultures where there are loose ties between individuals and there is a greater propensity for people to take care of themselves and their close family with low levels of concern for the rest of society. Collectivism defines cultures where people are integrated into cohesive groups and have strong loyalties to the group. People in individualistic cultures are encouraged to make their own choices whereas people in collective cultures are more willing to conform to the norms of the group (Erumban and Jong, 2006). Members of individualist cultures feel free to express their own views and act accordingly and are more willing to innovate and adopt new ideas (Erumban and Jong, 2006). Further, individualistic cultures have more innovative people that are more likely to accept retail innovations implementations than collectivistic cultures. Uncertainty avoidance varies across counties and is measured using a scale defining low or high uncertainty avoidance. The main characteristic of uncertainty avoidance is the orientation of society members toward the new and the unknown. According to Hofstede (1980), uncertainty avoidance is related to the degree by which members of a society feel uncomfortable with uncertainty and ambiguity. Therefore, people from cultures with low levels of uncertainty avoidance are more tolerant to risk and are more willing to try new things. According to Yeniurt and Townsend (2003) uncertainty avoidance has a negative effect on the acceptance rate of new products. Therefore uncertainty avoidance will likely be related to consumer willingness to adopt new technologies such as SSTs in retailing.
2.3.1 Cultural dimensions of Taiwan

Taiwan, with a score of 17 on the individualistic culture dimension, is considered as a collectivistic society. Thus, it is expected that Taiwanese will have a low level of retail innovation acceptance. Taiwan’s score for uncertainty avoidance is 69 and consumers have a high propensity for avoiding uncertainty (Hofstede, 1980, 2013). A high level of uncertainty avoidance means that Taiwanese consumers will likely be laggards in the acceptance of self-service retail innovations. Individualism and uncertainty avoidance are congruent with the attitude toward the acceptance of retail innovations. The SST adoption factors include social pressure, self-efficacy and technology anxiety which are related to cultural characteristics. Thus, the lower the level of individualism, the more likely it is that the individual will experience higher levels of social pressure. Social pressure is related to collectivistic cultures where individuals belong to a group and follow group decisions and values. Self-efficacy and technology anxiety are related to uncertainty avoidance. Higher levels of uncertainty avoidance will likely increase technology anxiety.

2.3.2 Cultural dimensions of Sweden

According to Hofstede’s studies (1980, 2013), Sweden with a score of 71 on the individualistic culture dimension is defined as a highly individualistic society and, thus, is expected that Swedes will have a high level of retail innovation acceptance. Further, Sweden’s score for uncertainty avoidance is 29 and consumers should have a propensity for avoiding uncertainty. With low levels of uncertainty avoidance, Swedes will likely be early adopters of retail innovations. Individualism and low levels of uncertainty avoidance are congruent with a positive attitude toward retail innovation acceptance, indicating that Swedes will likely be positively oriented toward accepting retail innovations.

2.3.3 Comparison of Taiwanese and Swedish cultures

Cultures are complex constructs and include many factors, definitions and measurements. A simplified approach based on Hofstede’s cultural dimensions will be used to compare Taiwanese and Swedish consumers. These two cultures will be compared according to individualism/collectivism and high/low uncertainty avoidance. These dimensions are selected since prior research shows that they are relevant for studying cross-cultural adoption of innovations (van Everdingen and Waarts, 2003). According to Hofstede’s research Taiwan and Sweden are characterised by opposing cultural dimensions. While Taiwan has a low score on individualism and is perceived as a collectivistic culture, Sweden with a high score and is perceived as an individualist culture. Moreover, Taiwan with high uncertainty avoidance is opposite to Sweden with low uncertainty avoidance. Since Taiwan and Sweden are quite opposite in cultural dimensions, these two countries are selected for studying cross-cultural adoption of innovations. The literature review supports the expectation that Taiwanese and Swedish’ attitudes toward retail innovations should be different and opposite. The verification of these cross-cultural and bi-polar relations provides retailers with much needed insight for developing sustainable retail market entry strategies.
3 Research methodology

This section reviews the research method, including a summary of the research hypotheses. The hypotheses are tested using survey research (see Appendix). The proposed research framework helps relate the research questions to the research design, sample selection, and survey procedures.

3.1 Research hypothesis

The primary research is divided into two parts. The first part measures the role of cultural dimensions on the acceptance of retail innovations. The second part measures consumers’ attitude toward five different types of retail innovations including personal shopping assistants (PSA), intelligent weighing scales, electronic price tags, digital advertising displays, and self-scan checkouts. The SST adoption factors include social pressure, self-efficacy and technology anxiety as they influence the adoption of retail innovations. This research proposes cultural dimensions (individualism/collectivism and uncertainty avoidance) as moderating factors in the adoption of retail innovations. The formal research hypotheses follow. Please note that the Hypotheses 1(a), 2(a) and 3(a) are written with the inverse relations (b).

**H1a** Given that Taiwan is a collectivistic culture, consumers will experience higher levels of social pressure which negatively effects retail innovation acceptance in comparison to Swedish consumers (TW’CC and SW’IC, TW’SP > SW’SP and TW’RI < SW’RI).

**H1b** Given that Sweden is an individualistic culture, consumers will experience lower levels of social pressure which positively effects retail innovation acceptance in comparison to Taiwanese consumers (SW’IC and TW’CC, SW’SP < TW’SP and SW’RI > TW’RI).

**H2a** Given a high level of uncertainty avoidance, Taiwanese consumers will likely show a low level of self-efficacy which will most likely negatively affect retail innovation acceptance in comparison to Swedish consumers (TW’UA > SW’UA and TW’SE < SW’SE, TW’RI < SW’RI).

**H2b** Given a low level of uncertainty avoidance, Swedish consumers will likely show a higher level of self-efficacy which will most likely positively effects retail innovations acceptance in comparison with Taiwanese consumers (SW’UA < TW’UA and SW’SE > TW’SE, SW’RI > TW’RI).

**H3a** Given a high level of uncertainty avoidance, Taiwanese consumers have a higher level of technology anxiety which will negatively effects retail innovation acceptance in comparison with Swedish consumers (TW’UA > SW’UA and TW’TA > SW’TA, TW’RI < SW’RI).

**H3b** Given a low level of uncertainty avoidance, Swedish consumers have a lower level of technology anxiety which positively effects retail innovation acceptance in comparison with Taiwanese consumers (SW’UA < TW’UA and SW’TA < TW’TA, SW’RI > SW’RI).
The hypotheses stated that collectivistic culture negatively affects users’ acceptance of retail innovation. Oppositely, it is expected that individualistic culture will positively affects users’ acceptance of retail innovations. Influence of collectivistic/individualist culture on acceptance of retail innovations is moderated by the independent variable social pressure. Since uncertainty avoidance is hypothesised to negatively affect the users’ acceptance of retail innovations, then it follows that the higher the uncertainty avoidance, the lower the acceptance of retail innovations. Uncertainty avoidance is moderated by technology anxiety and self-efficacy. The hypotheses state that uncertainty avoidance is positively related to technology anxiety, which itself is negatively related to retail innovation acceptance. Thus, the higher the levels of uncertainty avoidance and technology anxiety, then the lower the likelihood that consumers will accept retail innovations. Uncertainty avoidance is negatively related to self-efficacy which is positively related to retail innovation acceptance. Thus, the higher the levels of uncertainty avoidance and self-efficacy, then the lower the likelihood that consumers will accept retail innovations.

The second part of the survey uses a multi-attribute model for comparing cultural attitudes toward five retail innovations. The measurement was based on retail innovations proposed by Metro Future Store (Kalyanam et al., 2010). Respondents are asked to evaluate beliefs and importance for each of the five retail innovations. Based on Hofstede (1980, 2013) collectivistic and uncertainty avoidance culture measures for Taiwanese, it is expected that innovations with lower levels of self-service and lower levels of technology development will have a higher attitude score. The opposite result is predicted for Swedish consumers. Five in-store retail innovations are ranked according to their level of self-service and technological innovations. The innovation with the highest level of self-service is the personal shopping assistant (PSA), followed by self-scan checkouts and intelligent weighing scales. Electronic price tags and digital advertising displays have the lowest level of self-service since consumers simply look at the displays to receive information. However, the level of self-service for electronic price tags is higher than digital advertising displays, as every consumer needs to use electronic price tags while shopping while digital advertising displays are optional choices. Thus, the hypotheses derived from this line of reasoning follow:

H$_{4a}$ Given a Taiwanese collectivistic and high uncertainty avoidance culture, consumers prefer retail innovations with lower levels of self-service and lower levels of technology development. The highest preference will be for digital advertising displays, followed by electronic price tags, intelligent weighing scales, self-scan checkouts and then personal shopping assistants (TW’CC and TW’UA > SW’UA, TW’RI $\in$ (LSS, LTD) $\rightarrow$ TW’P (DAD > EPT > IWS > SSC > PSA).

H$_{4b}$ Given a Swedish individualistic and low uncertainty avoidance culture, consumers will prefer retail innovations with higher levels of self-service and higher levels of technology development. The highest preference is for personal shopping assistants, followed by self-scan checkouts, intelligent weighing scales, electronic price tags and then digital advertising displays (SW’IC and SW’UA < TW’UA, SW’RI $\in$ (HSS, HTD) $\rightarrow$ SW’P (PSA > SSC > IWS > EPT > DAD).
3.2 Research framework

Based on the literature review and the proposed research framework, Figures 1, 2 and 3 depict the consumer evaluation of different retail innovation types across cultures.

As shown by Figure 1, the independent variables social pressure, self-efficacy and technology anxiety influence the culture-based users’ acceptance of retail innovations.

In Figure 2, social pressure, self-efficacy and technology anxiety are the moderating cultural dimension variables. Given a collectivistic culture and high uncertainty avoidance, hypothesis H₄a states that Taiwanese will have a higher attitude toward innovations with lower levels of self-service and technology development.

Figure 1  Research framework – part 1

Figure 2  Research framework for Taiwan – part 2
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Figure 3  Research framework for Sweden – part 2

Figure 3 shows that Swedes with an individualistic culture and low uncertainty avoidance will have a higher attitude measure toward higher levels of self-service and technology development.

3.3 Sample and procedures

Primary data is collected using a survey distributed to a convenience sample of university students in Taiwan and Sweden. The best matched populations, that we could find and afford to collect data from that were culturally very different on the power distance/individualism index (Hofstede, 1980, 2013), were from Taiwan and Sweden. Given the exploratory nature of the research, which can be extended to more extensive survey study in the future, we felt that the correct strategy for collecting data was to use an established university student exchange network which enabled us to ethically sample students in a valid and reliable manner from similarly ranked national technical universities. In addition, university students represent a very important segment of consumers that will soon enter the workforce with new demands, behaviours, beliefs, opinions, preferences, and significant discretionary income. Further, university students are often used for exploratory academic retail research to establish procedures that can be refined by international retailers for larger scale demographically and culturally diverse studies. A small incentive in the form of a chocolate candy bar was given to each participant. The total number of questionnaires issued was 50 to each cultural group. The total return rate was 89%, with a return rate of 96% for Taiwan and 82% for Sweden. The usable questionnaires among the returned numbered 73. This means 73% of the distributed questionnaires were returned and correctly answered and were used in the analysis of the research results. The sixteen discarded questionnaires were omitted for incompleteness and no response.

3.4 Questionnaire design

The questionnaire (Appendix 1) consists of two parts. In the first part students were asked questions about their attitudes toward retail innovations as a general category. In the second part, students were asked questions about their beliefs and importance related to five different types of retail innovations. To ensure the validity and reliability of the study, the questionnaire was adapted and modified based on a proven cross cultural
survey designed by Schliewe and Pezoldt (2010). The first part of the survey includes three series of questions used to test the primary hypotheses (H1a, H1b, H2a, H2b, H3a and H3b). The questions used to test the primary hypothesis are separated into three series. The first part includes five questions and tests social pressure, or the importance of the opinion of relevant persons to individuals considering the use of retail innovations. The second part consists of six questions and measures the self-efficacy or the level of confidence of respondents to use retail innovations. The last part consists of eight questions to test respondents’ technology anxiety and their attitude toward technology usage. Respondents were asked to answer the questionnaire as a means to test the primary hypotheses. The questionnaire measured responses using a five-point scale ranging from ‘strongly agree’ to ‘strongly disagree’. The second part of the questionnaire is based on multi-attribute attitude model for evaluating retail innovations based on a weighted-average score (Levy and Weitz, 2012). The questionnaire began with an introduction and picture with explanations used to define five retail innovations. To ensure that respondents were familiar with the terms. Respondents were asked to rank their importance of retail store attributes on a seven point scale and to relate the importance measures with their belief measures for each of the five retail innovations on the five point scale.

4 Research results

The following section presents the results of the hypotheses tests. The first part covers analysis of data related to the influence of cultural dimensions on the acceptance of retail innovations. The second part reports the results of data related to the consumers’ evaluation of different retail innovation types across cultures.

4.1 The relationship between cultural dimensions and acceptance of retail innovations

The following sections discuss the test of H1a, H1b, H2a, H2b, H3a and H3b, which study how social pressure, self-efficacy and technology anxiety relate to acceptance of retail innovations. The first six questions in the first part of the questionnaire are used for testing the influence of social pressure on the acceptance of retail innovations. Respondents were asked to rank the statements for measuring the influence of social pressure on retail innovations on a five point scale from strongly agree to strongly disagree. Strongly agree is graded with a 5, agree with 4, and strongly disagree with 1. Therefore, the higher the score, the higher the social pressure experienced by the respondent. The group statistics for social pressure influence is shown in Table 1.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Overview of the group statistics for social pressure influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>Variable</td>
</tr>
<tr>
<td>Sweden</td>
<td>Social pressure</td>
</tr>
<tr>
<td>Taiwan</td>
<td>Social pressure</td>
</tr>
</tbody>
</table>

We consider both Taiwanese and Sweden populations are normal distributions, which are mutually independent with different values of variances (or standard deviations). An
An independent sample t-test was used to compare the significance level of the mean differences (with respect to social pressure) between Taiwan and Sweden. As shown in Table 2’s overall statistical results, a t-test for equality of means ($t = -4.38$, degree of freedom $= 52$, and $p$-value $= 0$) leads to the rejection of the null hypothesis. Therefore, it can be concluded that with 95% confidence that mean social pressure for Taiwanese students is significantly higher than the mean social pressure for Swedish students. This leads to acceptance of the $H_{1a}$ in Taiwanese perspectives and the counter-part $H_{1b}$ also holds true, from Sweden perspectives. The data and test result show that a collectivistic culture exhibits higher social pressure in Taiwan which impedes the level of retail innovation acceptance (Kelly et al., 2010; Schliev and Pezoldt, 2010). There is sufficient statistical evidence from the sample tested to support the following hypotheses:

$H_{1a}$ Given that Taiwan is a collectivistic culture, consumers will experience higher levels of social pressure which negatively effects retail innovation acceptance in comparison to Swedish consumers.

$H_{1b}$ Given that Sweden is an individualistic culture, consumers will experience lower levels of social pressure which positively effects retail innovation acceptance in comparison to Taiwanese consumers.

The second six questions in the first part of the questionnaire are used for testing the influence of self-efficacy on the acceptance of retail innovations. Respondents were asked to rank statements that measure the influence of self-efficacy on the acceptance of retail innovations on a five point scale. The higher the score for each statement indicates a higher level of self-efficacy. The survey results show that the means and standard deviations of self-efficacy influence measures are 2.83 and 0.83 for Sweden and 3.57 and 0.53 for Taiwan respectively. Similarly to the $H_1$ hypothesis test, an independent sample t-test was used to compare the significance level of the self-efficacy mean differences between two countries. As shown in Table 2, the $t$ value is 6.55 ($df = 57$ and $p$-value $= 0$) leads to the rejection of the null hypothesis. Therefore it can be concluded that with 95% confidence that mean of self-efficacy for Swedish students is significantly higher than the mean of self-efficacy for Taiwanese students. This leads to acceptance of the $H_{2a}$ and $H_{2b}$ of this research:

$H_{2a}$ Given a high level of uncertainty avoidance, Taiwanese consumers will likely show a low level of self-efficacy which will most likely negatively affect retail innovation acceptance in comparison to Swedish consumers.

$H_{2b}$ Given a low level of uncertainty avoidance, Swedish consumers will likely show a higher level of self-efficacy which will most likely positively affects retail innovations acceptance in comparison with Taiwanese consumers.

Self-efficacy is characterised by high/low uncertainty avoidance. Likewise, low uncertainty avoidance cultures exhibit higher self-efficacy. Based on the literature review, the lower the uncertainty avoidance level of an individual, then the more likely that the individual will accept higher levels of retail innovation. The counter-part $H_{2b}$ also holds true from the Swedish perspective. The last eight questions in the first part of the questionnaire are used for testing the influence of technology anxiety on the acceptance of retail innovations. An independent sample t-test was also used to compute the significance level of the mean differences between Sweden and Taiwan. The t-test result
(t-value = –5.69, df = 66, p-value = 0) concludes that technology anxiety for Taiwanese students is significantly higher than the technology anxiety for Swedish students. This leads to acceptance of the H3a and H3b of this research:

H3a  Given a high level of uncertainty avoidance, Taiwanese consumers have a higher level of technology anxiety which will negatively effects retail innovation acceptance in comparison with Swedish consumers.

H3b  Given a low level of uncertainty avoidance, Swedish consumers have a lower level of technology anxiety which positively effects retail innovation acceptance in comparison with Taiwanese consumers.

Table 2  The statistical results of independent sample tests (H1, H2 and H3)

<table>
<thead>
<tr>
<th>Variable</th>
<th>T-value</th>
<th>Degree of freedom</th>
<th>P-value</th>
<th>Mean difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social pressure</td>
<td>–4.38</td>
<td>52</td>
<td>0.0</td>
<td>–0.7336</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>6.55</td>
<td>57</td>
<td>0.0</td>
<td>0.8716</td>
</tr>
<tr>
<td>Technology anxiety</td>
<td>–5.69</td>
<td>66</td>
<td>0.0</td>
<td>–0.7823</td>
</tr>
</tbody>
</table>

The data show that a low uncertainty avoidance culture has lower level of technology anxiety. According to the literature review, the lower the uncertainty avoidance level, than the higher the level of retail innovations acceptance. In Table 2, the statistical results of H1, H2 and H3 are summarised.

4.2  The relationship between cultural dimensions and attitude toward retail innovation types

The following section reports on the influence of cultural dimensions on the consumers’ attitude toward five different types of retail innovations. This section is used for testing the hypotheses H4a and H4b. A multi-attribute model was used for testing the attitude of Taiwanese and Swedish students toward different innovation types. The multi-attribute model is based on the notion that customers see a retailer, a product, or a channel as a collection of attributes or characteristics. This model is design to predict the importance of attributes or characteristics to consumers and their beliefs that retailer, product or a channel possesses those attributes (Levy and Weitz, 2012). The overall evaluation of every of the retail innovations is calculated as the sum of importance weights multiply by performance beliefs (Levy and Weitz, 2012). The evaluation is performed for both cultures. Secondly, the weights of the respondents’ beliefs for the five retail innovations were calculated. These numbers were multiplied (importance × belief) and summed to obtain the overall attitude toward each retail innovation.

The results of the multi-attribute model are shown in Table 3. Taiwanese ranked the digital advertising displays with the highest score of 91.5. As a result, their attitude toward usage of digital advertising displays is the highest among the retail innovations. The lowest score of 75.1 was for the personal shopping assistant. The results of multi-attribute model support H4a of this research.

H4a  Given a Taiwanese collectivistic and high uncertainty avoidance culture, consumers prefer retail innovations with lower levels of self-service and lower
levels of technology development. The highest preference will be for digital advertising displays, followed by electronic price tags, intelligent weighing scale, self-scan checkouts and then personal shopping assistant.

<table>
<thead>
<tr>
<th>Retail innovation types</th>
<th>Overall evaluation: (\Sigma (importance \times belief))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital advertising display (DAD)</td>
<td>91.5</td>
</tr>
<tr>
<td>Electronic price tags (EPT)</td>
<td>86.7</td>
</tr>
<tr>
<td>Intelligent weighing scale (IWS)</td>
<td>80.2</td>
</tr>
<tr>
<td>Self-scan checkout (SSC)</td>
<td>78.6</td>
</tr>
<tr>
<td>Personal shopping assistant (PSA)</td>
<td>75.1</td>
</tr>
</tbody>
</table>

The results of multi-attribute model are shown on Table 4. The Swedish consumers ranked the personal shipping assistant with the highest score of 93.5. As a result, their attitude toward usage of personal shopping assistant is the highest among the retail innovations. The lowest score of 75.28 was for the digital advertising display. The results of multi-attribute model support hypothesis H_{4b}:

H_{4b} Given a Swedish individualistic and low uncertainty avoidance culture, consumers will prefer retail innovations with higher levels of self-service and higher levels of technology development. The highest preference is for personal shopping assistant, followed by self-scan checkouts, intelligent weighing scale, electronic price tags and then digital advertising displays.

<table>
<thead>
<tr>
<th>Retail innovation types</th>
<th>Overall evaluation: (\Sigma (importance \times belief))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal shopping assistant (PSA)</td>
<td>93.54</td>
</tr>
<tr>
<td>Self-scan checkout (SSC)</td>
<td>90.90</td>
</tr>
<tr>
<td>Intelligent weighing scale (IWS)</td>
<td>88.49</td>
</tr>
<tr>
<td>Electronic price tags (EPT)</td>
<td>78.14</td>
</tr>
<tr>
<td>Digital advertising display (DAD)</td>
<td>75.28</td>
</tr>
</tbody>
</table>

5 Conclusions and discussions

This section will introduce our final thoughts and discussion, including conclusions about the research, managerial implications, research limitations, and the future research suggestions.

5.1 Research conclusions and managerial implications

This research has a number of important implications for understanding future implementations of global in-store retail innovations. Cultural dimensions such as collectivistic/individualist and high/low uncertainty avoidance influence the acceptance of retail innovations through moderating factors such as social pressure, self-efficacy and
technology anxiety. A collectivistic culture exhibits higher levels of social pressure and result in lower levels of retail technology acceptance. An individualistic culture has the opposite effect. High uncertainty avoidance combined with low levels of self-efficacy and high levels of technology anxiety do not favour retail technology innovations. However, we do not believe that these results should discourage retailers from implementing modern technologies globally. The idea is to do research that demonstrates the differences and then based on the results, use advertising, promotion (experiment with social media and rewards), and try in-store interaction between customers, staff, and friends. The results of this research do show that customers from Taiwan and Sweden should be addressed in different ways when implementing retail innovations. Retailers should take into account differences among cultures when planning and promoting retail innovations. Perhaps Taiwanese customers should be introduced to technological innovations with lower levels of self-service and lower levels of technological development such as digital advertising displays. Perhaps Swedish customers should be approached with the more advanced innovations that offer high levels of self-service such as the personal shopping assistant. The data implies that Taiwanese customers require promotional materials and demonstrations before implementation of in-store innovations to decrease their technology anxiety and increase their self-efficacy and to increase the chance of accepting the technology.

5.2 Research limitations and future research suggestions

The research results should be interpreted within the bounds of the limitations. First, respondents did not have a chance to use and judge the physical in-store retail innovations (especially with friends). They judged the retail innovations after seeing pictures and reading written explanation about the functions. Therefore it is possible that consumers with usage experience and in the presence of peers will respond differently. Secondly, the number of respondents is limited, as it represents opinion of forty respondents from Taiwan and thirty three respondents from Sweden. Respondents are coming from a specific social group – university students. Thirdly, the research includes only two cultures – Sweden and Taiwan. These two counties are opposite to each other with respect to collectivistic and uncertainty avoidance cultural dimensions. Therefore, results should be applied with caution as generalisation to other cultural groups and their different cultural measures.

Future research should enlarge the number of respondents to gain broader insights for a larger group of respondents across a more diverse range of cultures. This will allow retailers to understand how different moderators and cultural levels influence the better acceptance of retail innovations and creating a competitive and efficient retail chain based on technological innovations. Afterward, it will be possible to make generalised statements about the influence of cultural dimensions on the acceptance of retail innovations. Future research is needed to confirm these research directions and develop successful strategies to fit the cultural characteristics of consumers in different global markets.
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Acknowledgements

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References


**Appendix 1**

*Survey questionnaire*

Pictures used with the permission of the Taiwan Institute for Information Industry, Innovative DigiTech-Enabled Applications and Services Institute, IDEAS, 2012. Before you answer the questionnaire, please read about five retail innovations.

**Figure A1** Personal shopping assistant (PSA) (see online version for colours)

PSA is a shopping basket equipped with a portable touch screen computer, UPS scanner, and wireless connectivity. The PSA leads the consumer through the store, identifying promotions, and providing a purchasing list and to assist to the consumer during the purchase process. It also allows consumers to self-scan and pay for purchased products using RFID technology (Kalyanam et al., 2010).
Improving the global competitiveness of retailers using a cultural analysis

Figure A2 Self-scan checkouts (see online version for colours)

Self-scan checkouts are checkouts where customers scan the barcodes of their products, pay for the products, and put the purchased goods into bags on their own without the help of service employees (Schliewe and Pezoldt, 2010).

Figure A3 Intelligent weighting scale (see online version for colours)

An intelligent weighing scale allows consumers to weigh products, obtain a price and a barcoded label. A critical characteristic of this weighting scale is that it recognises the product using a camera so consumers do not need to indicate the product themselves (Kalyanam et al., 2010).

Figure A4 Electronic price tags (see online version for colours)
Electronic price tags are used for automatic changes of price on shelves, letting customers know the exact price of the product before being charged. Thus, there is no unexpected price differences between the price shown on the shelf and the price charged at the cashier counter (Kalyanam et al., 2010).

**Figure A5** Digital advertising display (see online version for colours)

Digital advertising displays consist of a flat screen display that shows interactive advertisements of products and promotions (Kalyanam et al., 2010).

**Table A1** Primary hypothesis and research question used for testing consumers’ acceptance of retail innovations

| H1a, H1b, H2a, H2b, H3a, H3b | Q1 The people who are important to me think that I should use retail innovations | Q2 It is expected that people who like me use retail innovations | Q3 People I look up to would expect me to use retail innovations | Q4 Most people who are important to me approve of me using retail innovations | Q5 The people who are important to me agree that using retail innovations is a good thing | Q6 I can use retail innovations without the help of others | Q7 I can use retail innovations even if I had never used them before | Q8 I can use retail innovations if I can call someone to help me if I get stuck | Q9 I can use retail innovations even if no one showed me how to do it first | Q10 I can use retail innovations on my own | Q11 I can use retail innovations particularly when I have seen someone else using them before | Q12 I am unconfident that I can learn technology-related skills | Q13 I have difficulty understanding most technological matters | Q14 I feel apprehensive about using technology | Q15 Technological terminology sounds like confusing jargon to me | Q16 I hesitate to use technology for fear of making mistakes I cannot correct | Q17 I have avoided technology because it is unfamiliar to me | Q18 I am not able to keep up with important technological advances | Q19 When given the opportunity to use technology, I fear I might damage it in some way |

*Source:* Based on and adapted from Schliewe and Pezoldt (2010)
Table A2  Primary hypothesis and research question used for testing consumers’ importance and believes about five different retail innovations

<table>
<thead>
<tr>
<th>$H_{4a}$, $H_{4b}$</th>
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<tbody>
<tr>
<td>Q20</td>
<td>People that are important to me approve of me using retail innovations</td>
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<tr>
<td>Q21</td>
<td>Society has already adapted and approved many retail innovations</td>
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<tr>
<td>Q22</td>
<td>Retail innovations are similar to previous generations of retail innovations</td>
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<tr>
<td>Q23</td>
<td>I have already experienced retail innovations (including that I have seen others using it, I have read about it, or I used it myself)</td>
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<tr>
<td>Q24</td>
<td>Technological retail innovations are easy to use even with self service and automation</td>
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<tr>
<td>Q25</td>
<td>Retail innovations are not easy to destroy or damaged</td>
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<tr>
<td>Q26–Q31</td>
<td>Relate importance of every of the statements Q20–Q25 to beliefs about every one of the five retail innovations</td>
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