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Winter 12-5-2004

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Intended Usage of Online Supermarkets: The Singapore Case

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ABSTRACT

The online grocery sales experienced a surge in Singapore especially in the early half of 2003 during the SARS outbreak. The Technology Acceptance Model and some basic demographic variables will be used to study the intended usage of online supermarkets. Based on a sample of size 211 shoppers, it was found that those 21-40 years old have a propensity in using the online grocery. However, those having income lower than $1,500 have less inclination in using the e-grocery. The stepwise discriminant analysis shows that two perceived variables, usefulness and ease of use, and two demographic variables, age, income are significant in differentiating the intended customers. Our results are different from the past studies where the gender and education are found to be significant. This may be due to the fact that most respondents in the sample are under 41 years old with at least tertiary and above education.

Keywords: Online supermarket, factor analysis, discriminant analysis

1. INTRODUCTION

A supermarket is a large self-service food store (McClelland, 1962). As the grocery industry grew, this definition also expands to encapsulate items such as basic household requisites although its strongest association remains with groceries. Priluck (2001) revealed that consumers in US make an average of 2.2 visits to a supermarket per week to shop for groceries which is signaling the importance of such an activity.

However, grocery shopping has taken on a new dimension with the advent of the Internet. Riding on the rising trend of online retailing, supermarkets and logistics companies have equally come out with their own version of online supermarkets. Lorek (2001) indicated that online grocery sales seven years ago in the United States were only $85 million but it was estimated that the online grocery store revenue may reach $1.3 billion in 2002. Today, traditional brick-and-mortar stores are increasingly entering the online market in an attempt to leverage both brand awareness and create distribution (Kempiak et al., 2002).

Nonetheless, not all is rosy for the players trying to create their own sphere in the e-grocery businesses. Britain's No. 1 supermarket chain – Tesco - has watched one rival after another put up the white flag on their e-grocery businesses (The Business Week, 2000). In the U.S., the failure of the Webvan Group Inc. in trying to establish a purely Web-based grocer was fuelled by the low customer demand that was not sufficient for Webvan to operate the facilities at anywhere near their capacity.

Given the mixed success signal sent by online grocery retailers, it is vital for supermarket operators to understand how people decide whether they will use the grocery services provided online, for systems that are not used cannot be effective no matter what their technical merits. This need is particularly relevant for the increasingly competitive online grocery retail market, in which numerous supermarkets compete among themselves within a relatively stable market (Rohm et al., 2004). Furthermore, from a managerial perspective, classification of potential users provides the basis for understanding and targeting different groups of consumers.

Given that online grocery shopping is nascent in Singapore, a typology specific to this medium of purchasing will enable us to identify distinct segments of potential consumers, thereby allowing retailers to effectively tailor their offerings to these customer types. Also, such a new retail channel cannot be effective unless they are used. Consequently, it is important for supermarket operators to understand their consumers' attitudes toward using online services. Our objective is thus to identify and profile the characteristics of such potential users of online supermarket and in turn, make a preliminary assessment of consumer demand for online grocery shopping services based on attitude measures.

More importantly, we have attempted to use a relatively new model, the Technology Acceptance Model (TAM), which serves to articulate the core psychological aspects associated with technology use. Based on a generic model of attitude and behavior, the TAM has provided a robust and valuable model when considering information technology acceptance by potential mainstream users (Taylor and Todd, 1995). It has also been able to provide good prediction of an individuals' intention to use a particular information system.

To date, Singapore enjoys reliable and sophisticated networks for information technology and telecommunications services, transportation and utilities. The information technology and

telecommunication infrastructure of the city-state is particularly well developed. During the height of dot-com boom, 47% of households have personal computers while 53.8% of the residential populations have Internet access or subscriptions. In 2003, online grocery sales experienced a surge, particularly in the early half of the year during the SARS outbreak. This was apparently good news for NTUC Fairprice and Cold Storage, the two main supermarkets in Singapore that offer online grocery shopping. It was reported that online sales of Fairprice Online have attained an increase of as much as 300% in one week at the peak of the outbreak.

It is our goal to construct a forecasting model to predict the intention of consumers to shop for groceries online, which in turn could give a reasonable estimation to actual system use. Specifically, we want to look at consumers who have access to the Internet, and to seek an understanding of their attitudes toward online grocery services. In short, we would like the prediction model that we have established to forecast an individual's intention to use the online service.

The paper is structured as follows. First, we take a look at the present situation of supermarkets in Singapore in the introduction section. Second, we review the literature on online grocery shopping and the TAM. Third, we discuss the methodology and data collection procedure. Fourth, we present our analyses and the results. Lastly, we discuss the limitations and the implications of this study, and draw a conclusion.

2. LITERATURE REVIEW

2.1 Profile of E-grocery Shoppers

Online grocery shopping accounted for less than 1% ($150 million) of the total supermarket sales ($440 billion) in 1998 (Beck, 1999). Sales of online grocers concentrated around specialty foods and it is likley that this trend will continue. In fact, market analysts expected that 5% to 8% of all groceries sales would transact through online within the next five years (Lundegaard, 1997; Kirsner, 1999). Furthermore, Anderson Consulting (Buss, 1999) had predicted the online supermarket market in US to increase significantly from 200,000 people currently to 20 million in 2007. With the increasing prevalence of online shopping in the long run, it is easy to understand the industry's interest in online grocery shopping. A recent forecast made in a Forrester research report predicted that online retail sales would increase from US$45 billion in 2000 to US$269 billion in 2005, which is a growth of close to 600 percent (Dykema, 2000). The study by Buss (1999) noted that even by achieving 1% of the grocery market would translate to a US$1 billion per year business for online grocers.

There is an extensive range of literature that can be found with relation to online grocery shopping. In particular, various demographical studies had been carried out to identify the various groups associated with online grocery shopping. It has been pointed out that such online shoppers tended to be "boomers" with large households, with their demographic profile skewed towards the 35-49 age groups. In addition, those who shopped for groceries online were generally well educated, with three-quarters having obtained at least a college degree. In a study conducted by Park et al., (1998), they categorized online grocery shoppers into two groups: hi-tech baby boomers and older/ low-income suburban families. Not surprisingly, a survey carried out by Priluck (2001) also revealed that education was the main demographic variable affecting the tendency to buy groceries online, whilst the other demographic variables proved to be less significantly related to consumers' willingness to purchase grocery items online.

A similar study by Hiser, Nayga and Capps (1999) also found that variables such as income, the number of people living in the household, the presence of children and gender were not significant determinants to the usage of the online grocery shopping service. Age and education have proved once again to have a positive relationship in this study. However, it also revealed that people over age 50 were less likely to consider the service, as compared to people from age 18 to 29 years old.

These studies on online grocery shoppers' demographics provide the basis of understanding and targeting different customer groups. Furthermore, through the identification of definite online shopper segments, retailers can strategize their services to tailor to the needs of specific segments.

2.2 Technology Acceptance Model

In an attempt to better understand user acceptance of new information systems, Davies et.al. (1989) developed the Technology Acceptance Model (TAM). They postulated how users' attitudes toward using a computer system influences the actual use, or acceptance of this system. The two major design features are the 'perceived usefulness' of the system, and the 'perceived ease of use'. The former is defined as the "degree to which an individual believes that using a particular system would enhance his or her job performance. The latter is defined as the "degree to which an individual believes that using a particular system would be free of physical and mental effort" (Davies, 1993). It was argued that these two features formed the users' attitudes toward using a computer system.

Research in social psychology has shown that behavior is best predicted by an individual's attitude toward the

behavior. For instance, it is difficult to estimate eventual system use if the system does not exist yet. Still, it was widely believed that an individual's intention to use the system could be measured. There is also considerable evidence that intention to perform a behavior predicts actual behavior (Sheppard et al., 1988).

Davies (1989) found that the TAM was able to predict the intention to use a word processing package fairly well. Henderson and Divett (2003) have also successfully applied the TAM to an online supermarket setting, thus providing empirical support for the ability of the TAM to predict actual behavior. It is the latter case that propelled us to adopt this model in predicting potential consumers' intention to use the online grocery services.

3. Methodology

3.1   Data Collection

The research sample employed in this empirical study consists of customers of two supermarkets in Singapore, namely NTUC-FairPrice and Cold Storage. Data were collected on February 2004 at each respective supermarket. A sample of 211 shoppers was taken altogether. These are customers who have just made their purchases from the supermarkets. Furthermore, we administered our questionnaires to those shoppers who have Internet access at home. The purpose of targeting only at grocery shoppers who have Internet access at home allows us to gain a specific understanding of the propensity of these actual grocery shoppers to shop for groceries online. Hence this group of grocery shoppers forms our target population. Furthermore, we only approach every third person that come out of the supermarkets to ensure randomness.

The majority of the respondents are below 40 years old (81.5 percent). Other than that, the profiles of the respondents are generally equitable, with approximately 50 percent of them being male and possessing some form of tertiary education. A total of 54 percent reports an annual income of $2000 or below.

3.2   Measures

The survey is divided into three sections. The first section requires the respondents to provide a broad detail of their socio-economic backgrounds. In section two, we present two dichotomous questions which are used to elicit their responses toward their use of and intention to use online supermarkets. As the e-grocery services in Singapore just take off, we postulate that the number of online grocery shoppers has yet to reach a critical mass. This is bore out by the fact that only two of our respondents have ever used the Internet to purchase groceries. It is thus appropriate for us to get acquainted with the consumers' intention to use, as

opposed to seeking consumers who have used such services. This is supported by the TAM model as explicated previously.

Finally, a set of multiple-item scales is constructed under two main variables which are guided by the TAM framework. The questionnaire contains 6 attitudinal statements on a five-point Likert scale anchored by strongly agree to strongly disagree. These items examine the consumers' attitudes and perceptions toward the use of online grocery services

Contingency analysis is first used to test whether the demographic variables are associated with the intention variable. This will at least give some ideas on which demographic characteristics are more inclined to the use of the internet for grocery.

Factor analysis is then used to classify the initial six variables derived from the attitudinal measures in the questionnaire into two distinct factors, namely 'perceived usefulness' and 'perceived ease of use' using principal component and varimax rotation. The resulting factor scores will be used for the subsequent analyses.

Using the factor scores from the two derived factors and the profile of the respondents, we proceed to use the discriminant analysis technique to evaluate whether the consumers' perceptions of Internet as a shopping medium for grocery purchase and their profile characteristics can be used to predict their intention of using e-grocery services in the next one year.

In this study, we have identified 6 predictor variables (based on the demographical profiles and the TAM model) to predict the intention of an individual to use the e-grocery services. Furthermore, we use only 190 responses as an estimation sample to construct the classification rule to enable us to perform a post-hoc test of our model later. Lastly, we would classify the remaining 21 hold-out cases according to our discriminant model in order to assess the predictive validity of the model, that is, to test whether our model that is estimated with one set of data continues to hold good for the hold-out data.

4. RESULTS

Based on the four demographical profiles against the intention to use variable, the chi-square tests derived from the contingency analysis only shows the presence of a relationship between the three profile variables, namely, age, education level, income level, and the intention to shop for groceries online (all p-value < 0.05), and not the gender variable (p-value = 0.710>0.05). We can thus conclude that the intention to use this service is dependent on the age, education and income levels of consumers.

From the same results, we also notice that generally, those around 21-40 years old have a higher propensity to use online grocery services. This is expected since this group is the most economically stable. On the same note, those who have some form of tertiary education also express their intention to use such services in the near future. Those who possess income of less than $1500 tend to have little inclination to using e-grocery services. As mentioned previously, the chances of consumers of any gender having the intention to use such services are almost equal. This initial profiling of the variable relationship would provide a basis for the affirmation of the results in the later analyses.

Two factors were extracted using Principal Component Analysis and rotated using Varimax with Kaiser Normalization. About 74.8% of the result can be explained by the two components, namely, the 'perceived usefulness' and 'perceived ease of use'.

The factor scores derived from the above factor analysis for the components of *Perceived usefulness* and *Perceived ease of use* are included as independent variables in the stepwise discriminant analysis. Other independent variables consist of Gender, Age, Income level and Education level. The Wilks' Lambda (p-value = 0.00) shows that the discriminant function is highly significant. The success rate for the predictions of membership of the criterion grouping variable's (i.e. intention to shop for groceries online) categories using the discriminant function developed in the analysis is 87.4%. The classification results also reveal that subjects with no intention to shop for groceries online are accurately classified for most of the cases.

5. DISCUSSION

Our prediction model obtained through discriminant analysis is able to predict the intended usage of online grocers with an accuracy of 87.4%, given their demographic and psychographic profiles. It is interesting to note that the discriminant analysis has yielded a different result from those of previous studies in our literature review. From the results, it is observed that the variables Gender and Education level are removed from the analysis. This result is deviated from those put forth in past literature (Hiser et.al. 1999; Priluck, 2001) which concludes that Age and Education level are the main variables in the determination of online grocery shoppers. These studies find that online grocery shoppers tend to skew towards a certain age group and that they are mostly well-educated, having obtained at least a degree.

The inclusion of Income level and the exclusion of Education level from the discriminant analysis can be explained from observations noted from the survey data from a sociological perspective of our local context. An analysis of the survey data reveals that most of our respondents under 41 years old with tertiary or above education level and, also those with income level below $1500 do not intend to purchase their groceries online in the next one year. These respondents are made up mainly of tertiary educated students who have no necessity to purchase groceries on a regular basis. Their parents would purchase the groceries for the family in most cases. Even if this is not so, this group of respondents is not constrained by the lack of time and family commitments. Also, it is observed that a significant number of working professionals under the same age group with tertiary education level and above, have intentions to use the online grocery shopping service in the next one year. In-depth analysis of their survey responses reveals that their main motive for intending to shop for groceries online is the convenience and timesaving factors online grocers provide. The main differentiating factor between the above two groups of respondents is their income level, as the later group of respondents earns a monthly income of $1500 and above. Therefore, this results in income level having a greater influence than education level in the determination of intention to shop for groceries online.

Our study has some potential limitations. First, given the few variables identified, the respondents might be given too few options to indicate their preferences over the choices provided. It is likely that there exist other important variables that could explain one's propensity to shop for groceries online or predict one's intention. These variables, such as price or Internet accessibility, have not been studied in this paper and thus constitute a limitation of this research. More variables should have been included to produce a more comprehensive and robust model in order to capture the variance that is not explained by the variables we have identified.

6. CONCLUSION

There is considerable evidence that intention to perform a behavior predicts actual behavior (Sheppard, Hartwick, and Warshaw 1988). Under this premise, the model that we have constructed using discriminant analysis validates the empirical support for the prediction of intention towards the use or acceptance of electronic supermarket. Other than attitudinal influence, the results have also illustrated how certain demographic variables such as age and income level significantly influence users' perceptions and intention towards the usage of online supermarket. These variables have helped us build a good forecasting model that provides good prediction of individual's intention to use the online grocery system. Our findings also suggest that consumers will be motivated to shop for groceries online if they perceive the services offered by the online grocer to be useful and easy to use. This has implications to retail and marketing managers who are intending or have already set up an online grocery business.

From the results reported, marketers can target the specific age and income groups that show a high tendency to shop for grocery online. They could design their online grocery service to cater to the needs of these consumers, such as providing a large variety of products or making the online shopping process quick and hassle-free. Furthermore, they could utilize the reported results to interpret the factors that are keeping other consumers from using such a service, e.g. online grocery shopping is not convenient and time-saving, and examine ways to improve their service to attract a greater proportion of other consumer segments.

Some of the limitations of this research would provide a premise for future research. Although our research has identified a few main variables influencing the motivations of consumers to shop for groceries online, however there is also a need to address some other key factors, such as the quality of product and price that are associated with home shopping, which will also have an impact on a consumer's perception.

Online grocery shopping is a relatively new phenomenon in Singapore. The characteristics of the sample used in our research may change when the trend starts to be widely adopted, signaling the need for future research. In addition, most of the past studies are conducted and analyzed in the U.S. context, which might culturally differ from the Singaporean context. Therefore, it is recommended that future research explore the factors associated with the possible mediation effect of usefulness upon ease of use in our local context.

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