Singaporean Consumers' Attitudes to Technology Usage

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Abstract: This research paper assists in understanding the factors affecting the adoption of technology among consumers in Singapore in the healthcare industry. A case study was carried out on a healthcare clinic. The case study and the Technology Acceptance Model (TAM) formed the theoretical framework for testing the factors affecting consumer willingness to adopt technology in healthcare. A random sample of 119 respondents was obtained using an online survey. Correlation and Analysis of Variance (ANOVA) were used to analyze the data. Perceived usefulness and Security and Privacy (SP) are the two most critical factors that affect attitudes of adoption greatly. Organizations that wish to use technology should consider these two factors to increase their adoption rates. This can be done by educating and informing consumers of all the potential benefits the new system could bring to arouse their perceived usefulness. Focusing on how the new system is secured will also allow an organization to win the consumers' attention to adopt the technology.

INTRODUCTION

Recent advances in the service industry have seen many organizations adopting technology, which is said to bring variety of benefits to not only the organizations but also the users. Finance industries, banking industries (E. J. Lee, Lee, & Eastwood, 2003), tourism industries (Kaushik, Agrawal, & Rahman, 2015), food and beverage (Wei, Torres, & Hua, 2017), and even medical industries (Ohuabunwa, Sun, Jubanyik, & Wallis, 2016) are currently showing an inclination towards using these advances to enhance the services they are already offering.

Technology comes in many forms: Self-Service Technology (SST), mobile communications, and Information Communication Technology (ICT). Adopting any of these technologies often brings about a positive outcome, for example, offering convenience as well as efficient transactions in the banking services (E. J. Lee et al., 2003). It allows consumers to be able to get the same service delivered to them at a shorter time and less cost (Taillon & Mueller, 2016). However, there are studies that indicate that the returns on technology investment were not promising (Timmor, Rymon, & Gal, 2011).

Can the healthcare sector implement technology to assist them in delivering high service standards while keeping their cost low, especially so since Singapore is facing a rapidly ageing population?

In a statement made by President Tony Tan in May 2014, he mentioned that Singapore will be improving the lives of its citizens by 'making full use of new technologies to develop sustainable and innovative solutions' (Chen, 2014).

A survey conducted by Infocomm Development Authority Singapore (IDA) in 2014 showed that there is an increase in technology adoption among senior citizens in Singapore (Chong, Chan, & Ooi, 2012). The survey results could imply that age is not a significant factor in technology adoption among Singaporeans. The survey also noted that there

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was high internet activity among Singaporeans, which showed technology savvy-ness and high technology acceptance among Singaporeans.

This paper looks at the user's factors in accepting technology with an emphasis on usage of technology in the healthcare sector. The paper explores whether the healthcare providers can improve service standards by adopting technology. This was done by looking at a case study of a Singapore-based healthcare organization. The case study explores the service issues faced by the organization and whether the use of technology can solve these issues and improve the service standards. The case study also reveals the impact anxiety and uncertainty management has on the acceptance of the technology by users/customers (patients).

For effective implementation of technology, organizations need to understand the factors contributing to users' acceptance of the technology. The TAM is one model identifying those factors (Akgün, 2017). This paper builds on TAM and tests if the factors identified by TAM are applicable to Singapore users in the Healthcare industry.

Case Study

The organization started as a small clinic in October 2003. Starting with just four staff members and two doctors, who were also the directors, the organizations has since expanded to a total of 73 full-time staff, 9 full-time doctors, 5 clinics, and one health screening centre. The organization offers health services to other organizations, which includes health screenings, health talks, and health programs. The organization is known to be one of the few competitive organizations in the health screening industry in Singapore.

The organization of 13 years is recently faced with a high number of complaints from their customers with regards to their quality of service. As the organization prospers, the volume of customer complaints is said to have increased. Although the volume is larger, the number of returning customers is seen to be dropping. The management view these complaints and the dropping number of returning customers as an urgent issue that needs to be tackled as they do not want to further lose their clientele to their competitors.

Complaints that arise mainly target the administration segment, and it leaves the customer feeling frustrated. Plenty of customers, who complain, never return to the organization. Major complaints were arising from the difficulty in getting through the hotline, causing difficulty among customers to make an appointment and enquiries. It is made worse as they had to hold on the line for a long time as they wait for an executive to answer their call after being answered by an answering machine. This leaves the customer feeling frustrated. As the first point of contact, the management is concerned of giving a bad first impression to the customers. They would like to address these appointment making and high call volume issues to not only bring in more clients but to also decrease the workload of the customer care executive who is seen to be constantly picking up one call after another without having any breaks.

We spoke to the head of customer care, who led a team of 3 other executives in dealing with phone calls and emails that come in. She mentioned that there were times when customers call in to ask questions that they could easily find on the organization website, thus decreasing productivity. She also mentioned about 50% of the calls are made for appointment rescheduling. She felt that her team is doing the best they could to cope with the volume of calls and emails, but is facing a hard time as business prospers.

The second issue that is raised by consumers was pertaining to the reminders that were not being sent to them for their appointment, resulting in many forgetting about their appointments. The organization works in such a way that when a client does not turn up for a stated appointment on a particular day, they ring the client up to ask about the stated appointment. Many had forgotten their scheduled appointment which they may have made a month back. The client will then be required to call the hotline to re-schedule their appointment. In doing so, these customers will jam the phone lines, which will, in turn, cause the issue raised earlier.

The last major issue is on the urgent need of medical reports that are often misplaced or forgotten by customers when they are being attended at another medical centre. Most of the time, they will ring up the organization and expect these reports to be given (faxed or emailed over) to them within minutes so that they can proceed with the procedures at the other side. However, daily operations might hinder these requests. As such, it not only frustrates the customer, but also the medical staff at both ends as they will not be able to finish their own set of tasks.

We spoke to a personnel dealing with medical reports and she mentioned that on a daily basis, she receives an average of 3-4 calls requesting for urgent medical reports. These reports can be those that were dated 2-3 years back as the customers require them for some procedures. More often than not, she is given very little time (as little as 5minutes) to generate these reports out and send them over to the customers. She finds it hard to handle at times, on top of her

daily tasks. She wishes there was a system that can upload the reports and allow customers to access them.

As mentioned earlier, the management team views all the above issues as crucial issues which they would like to solve as soon as possible. They are concerned over losing their customers to competitors.

The management team came together to brainstorm and discuss the issues that have been rising of late. With the inputs from personnel who were affected by the complaints and the IT department, they felt that using technology may assist in overcoming all the three issues at one time. The IT department can design a system that allows customers to self-managed these services. The management team applauded this idea as they felt that not only the issues will be resolved, but it also takes the load off the organization's resources.

There were some concerns that were raised in view of the implementation of the system. They mainly revolve around the willingness of customers to change and adopt the whole idea. Having been in the industry for 13 years, what are the attitudes of customers towards these changes? Will it be embraced? They were also concerned over the design of the system. It should be made to be as user-friendly as possible to avoid frustrations among users of all age ranges.
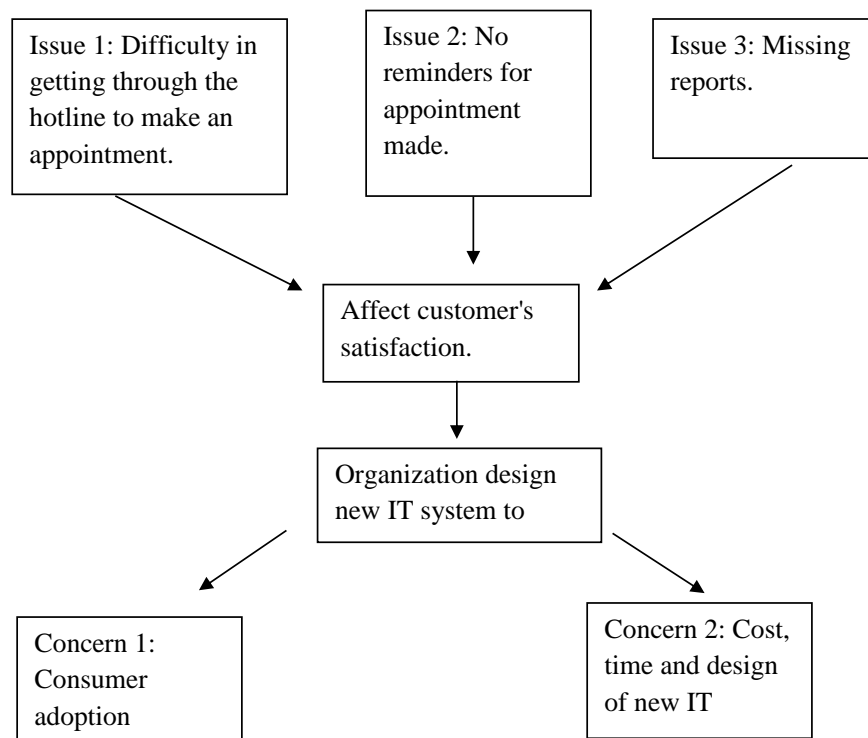
Figure 1 *Research Model*

In conducting the above case study of the organization, it seems that there was a need to understand what the consumers feel about adopting a SST in replacement of the medical administration, prior to implementation. As such, this research paper will cover the understanding of adoption attitudes among consumers in Singapore in a healthcare setting as depicted in the Figure 1.

LITERATURE REVIEW

The demand of using technology in the healthcare industry is on the rise. This can be seen in Demark, where patients are seeking to be in control over their personal health information, as well as in UK, Australia, and New Zealand, where enhancing communications are being worked on (Jian et al., 2012). Electronic Medical Records (EMRs) are in demand, even in the lower middle income populations in the third world countries (Ohuabunwa et al., 2016). The introduction of these EMRs was to tackle the issues on missing report that the healthcare industry faces. Plenty of studies, which study the effects of technology adoptions, indicate that it not only improves the productivity of the organizations, but at the same time, adoption of technology improves the quality and also reduces the cost of medical services (Goo, Huang, & Koo, 2015). This is further supported by the evidence that with greater use of health information technology, incidence of obstetric trauma is reduced (Deily, Hu, Terrizzi, Chou, & Meyerhoefer, 2013). Using the evidence above, we can infer that consumers will therefore lower their medical cost. At the same time,

physicians are also able to focus their time on more urgent cases, increasing efficiency and productivity. Successful implementation of technology in the medical industry has also been linked to providing continuous access to health services, personalizing these services as well as delivering timely services (E. Lee & Han, 2015). The benefits are said to be increased with greater use of technology (Deily et al., 2013; Direkwuttanakunchai & Yousapronpaiboon, 2017; Khuja & Mohamed, 2016).

SST is a common type of technology that is being used greatly to improve service quality and service standards (Kaushik et al., 2015). It also allows consumers to save money and offer convenience (E. Lee & Han, 2015). There are plenty of SSTs available currently in the market. Automated Teller Machine (ATM), self-checkout kiosk in supermarkets, and E-supports are types of SST that are presently being used by consumers. SSTs bring about a convenience to consumers by allowing them to control the type of services they would like to engage in, thus satisfying their needs (E. Lee & Han, 2015; Timmor et al., 2011; Thanyasunthornsakun & Boonmee, 2016).

Mobile applications are widely used in the current society as they offer convenience being available at their fingertips. They are often associated with being accessible and affordable, and, at the same time, offering high-quality services (Williams, 2012). A study concluded that patients appreciated the use of mobile applications in the medical industry as it was able to reduce their waiting time during their visits to the doctors (Williams, 2012). Combining these two technologies may reap the maximum benefits it can give on the medical industries.

Plenty of studies were conducted to understand the factors affecting the attitudes of consumers in adopting SSTs e.g., (Chang, Hajiyev, & Su, 2017; Shih, Lu, Liu, & Wu, 2017; Xia & Talib, 2017). The widely known model is the TAM (Jian et al., 2012; Venkatash & Davis, 2000). Venkatash and Davis (2000) have also extended the TAM to TAM2 to further understand consumers' adoption attitudes. TAM2 further outlines perceived usefulness and usage intentions, with the inclusion of social influence and cognitive instrument.
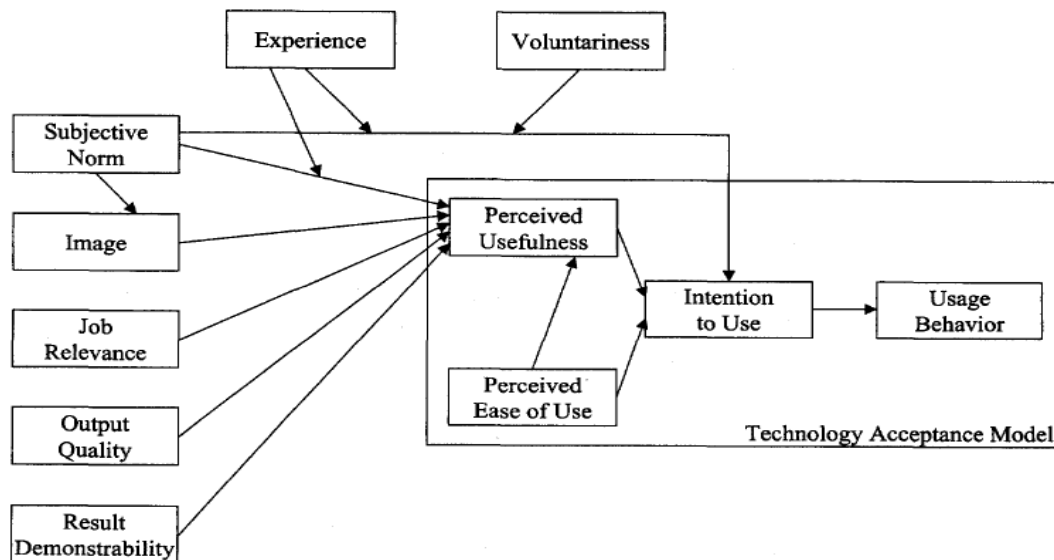

Figure 2 *Extension of TAM, TAM2 (Venkatash & Davis, 2000)*

As the Figures 1 and 2 demonstrate, the framework is designed to understand the factors that affect consumers' attitudes in adopting new technology, which is branched into two broad groups, ease of use and perceived usefulness. Ease of use is defined as how the new system can be used without putting in much effort while perceived usefulness is determined by the benefits that the new system will bring about to the users (Venkatash & Davis, 2000). Venkatash and Davis (2000) further added that these two factors may influence one another, where the easier the system, the more useful it is. This model can be applied to understand the consumers adoption attitudes towards the new technology that the organization is adopting to combat their issues (as mentioned in the case study). Based on the theories of TAM, two hypotheses can be derived to be tested in this research paper:

H1: *Perceived usefulness affects the willingness of consumers to adopt new technology.*

H2: *Perceived ease of use affects the willingness of consumers to adopt new technology.*

A study conducted in Taiwan included Subjective Norm (SN), Computer Self-Efficacy (CE), and SP to understand

the adoption behavior in addition to perceived usefulness and ease of use (Jian et al., 2012). Subjective norm is defined as 'a person's perception that most people who are important to him think he should or should not perform the behavior in question' (Jian et al., 2012; Venkatash & Davis, 2000). CE is associated with how one views and uses computer (Jian et al., 2012) while SP is one's concerns over data protection with the use of the technology. Subjective norms, as Figure 1 indicated, are associated with perceived usefulness, whereas Computer efficacy and SP will likely be associated with ease of use. These factors were said to have major impact on the adoption attitudes of consumers (Jian et al., 2012). The study concluded that SN and perceived usefulness were the main critical factors. In doing this research paper, the hypotheses below will be tested to determine if indeed these three factors play a major role in the adoption attitudes;

H3: *SN affect the willingness of consumers to adopt new technology.*

H4: *CE affects the willingness of consumers to adopt new technology.*

H5: *SP affect the willingness of consumers to adopt new technology.*

Demographics, such as age, gender, education levels, etc. are also said to have major impact on adoption attitudes towards technology (Boeldt et al., 2015; E. J. Lee et al., 2003; Timmor et al., 2011). Plenty of studies included demographics and found differences in their responses. A US study conducted in 2015 compares the difference of behavior of consumers and physicians in adopting medical technology. It is concluded that consumers were more enthusiastic and supportive of the new technology as compared to physicians (Boeldt et al., 2015).

Multiple studies showed that youths were more keen in adopting technology apart from older adults, which are associated with having lack of skills (Jian et al., 2012; E. Lee & Han, 2015). There were also differences noted in the adoption attitudes among genders. Men were seen to be more inclined towards the use of technology due to their higher computer skills (Timmor et al., 2011) while women are said to have higher computer anxiety (E. Lee & Han, 2015). The final hypothesis that will be covered in this research study is:

H6: *Demographics affect the willingness of consumers to adopt new technology.*

Having conducted both case study and literature review, the Figure 3 below summarizes what will be covered in this research study:
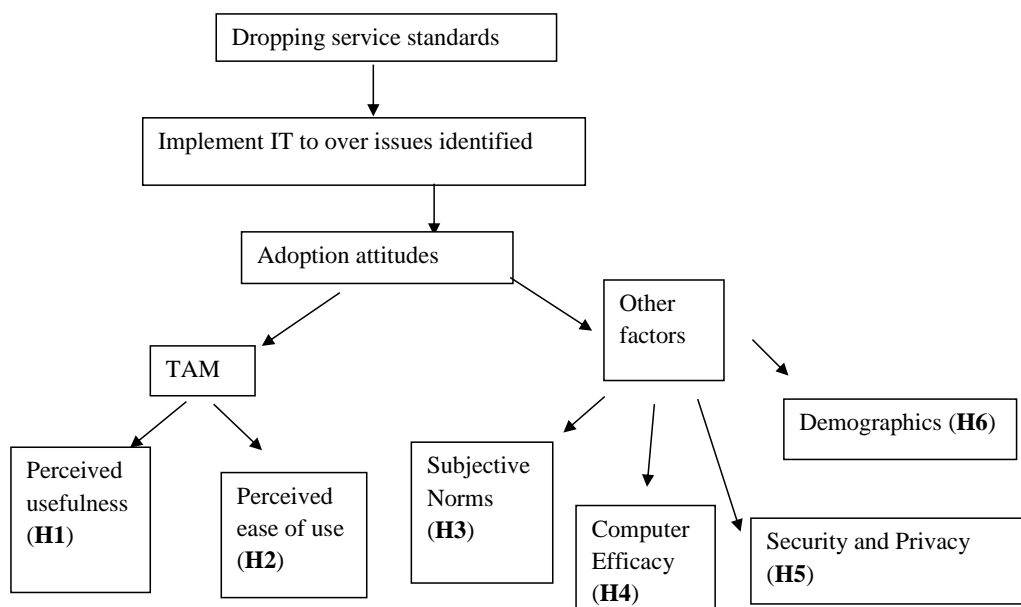

Figure 3 *Summary of Methodology*

METHODOLOGY

In order to find out the consumers' attitudes in adoption of technology in this research paper, a 28-question web survey was conducted. Web survey was chosen over other surveys as it assists in data collation and does not involve

plenty of cost. The survey was posted on Google Form, a type of survey platform, to allow respondents to access the survey through any smart appliances (smart phones, computers, tablets, etc.).

The survey was designed based on the case study done as well as the literature review conducted. The questions were mostly adapted from the comparison study in US by Boeldt et al. (2015). Questions asked were associated with the respondents' attitudes towards technology adoptions. Respondents were asked to choose how they would like to receive different types of services from any medical organization. This will allow us to understand if respondents are open to receive services with the use of technology. The survey also covers the issues that the case study identified, which can help us to find out if respondents who faced the issue will affect their adoption attitudes.

In relation to the TAM model, this survey will include questions that cover factors which had been identified in the earlier studies conducted by Venkatash and Davis (2000), which were said to affect the adoption attitudes of consumers. Prior research found that demographics were also important factors that affected adoption attitudes among consumers. As such, demographics will also be collected in administering this survey. This will, thus, enable us to understand the effect of demographics on adoption attitudes. In addition, based on the studies conducted by Jian et al. (2012), questions pertaining to SP were also added in the survey as it was discovered that this factor also affected user's adoption behavior.

Prior to the release of the survey online, a pilot test was conducted. This allows to gather feedback from the public if they could easily answer the survey. Pilot testing was conducted on 3 respondents, aged 25, 40, and 58. Feedbacks were generally positive as pilot testers were able to understand questions which had been phrased easily. After the pilot testing, only minor changes to the questions' structure were made to the survey before it was launched online.

Respondents were gathered through several uses of social medial platforms, mainly Facebook and WhatsApp. Responses were positive and a total of 119 responses was gathered, of which all could be used. Having used Google Forms as the survey platform, it guided the respondents to not miss any questions before moving on to the next set of questions.

Analysis of the results will be done via *t*-test to allow comparisons to be made between the factors that have been identified to affect technology adoption. *t*-test allows comparison between means to be done among two groups. This will assist in understanding if there are any differences in the responses gathered between the two group, in turn allowing conclusions to be made on whether those factors that were said really affected consumers' adoption attitudes.

Comparison between 3 different groups (status and education level) was done by using ANOVA instead of *t*-test; as *t*-test is only able to conduct testing on 2 groups, while ANOVA can do a similar comparison between three groups or more. ANOVA conducts a similar comparison of means among 3groups or more as *t*-tests. In adopting ANOVA, it is not only a fair comparison but also conclusions can be made on factors, with 3 groups or more, on whether it affects consumer's technology adoption. Both *t*-test and ANOVA will be conducted on significance level (α) of 0.05. In addition, a correlation test will be conducted to show the relationship between the groups of respondents. A positive value of 1 will indicate that there is a strong positive relationship among the two factors while a negative value of 1 will indicate a negative relationship among them.

RESULTS AND DISCUSSION

Table 1 summarizes the demographics of respondents. Of the total respondents, 68.9% were females and 31.1% were males, with the highest percentage of respondents being between the age of 21 and 35 years old. Most of the respondents had a university level education and were single. Majority of the respondents were not on regular medical appointment and had used SST before.

The data gathered were mostly useable except for the age group of > 65 years old, where there is only one respondent in that group. As such, these data will be omitted during further testing to ensure the consistency of the data. Further analysis will be done to determine if demographics affect the adoption attitudes of technology among consumers in testing H6.

From the Table 2, we were able to conclude that majority of the respondents (54%) preferred to schedule their appointments through the use of a smart application on their smart phones. It is also noted from the survey that majority of the respondents (75.6%) preferred to be reminded of their appointments through the use of sms-es. From the Table 2, it seems that consumers in Singapore prefer the use of their smart devices where technology is concerned.

More than half of the respondents (56.3%) felt that online medical records should be kept to patients and medical staff where the report originated from. From these responses, we were able to infer that patients were unwilling to

Table 1 *Summary of Demographics from Survey*

Questions	Number of Respondents	Percentage of Respondents
Gender	Females: 82	Females: 68.9%
	Males 37	31.1%
Age	< 21 yrs: 12	10.1%
	21-35 yrs: 76	63.9%
	35-50 yrs: 17	14.3%
	50-65 yrs: 13	10.9%
	> 65 yrs: 1	0.3%
Education level	Primary and Secondary: 22	18.5%
	Post Secondary: 46	38.7%
	University/Graduates: 51	42.9%
Status	Single: 69	58.0%
	Married without kids: 12	10.1%
	Married with kids: 30	25.2%
	Divorced/Separated/Widowed: 8	6.7%
On regular medical appointment	Yes: 22	18.5%
	No: 97	81.5%
Use SST before	Yes: 96	80.7%
	No: 23	19.3%

Table 2 *Respondents' Feel Towards Medical Technology*

Questions	Number of Respondents	Percentage of Responds
Preference of making appointment	Calling in: 26	21.8%
	Emailing in: 3	2.5%
	Online application: 54	45.4%
	Sms: 36	30.3%
Preference of appointment reminders	Phone call: 4	3.4%
	Emails: 4	3.4%
	Sms: 90	75.6%
	All of the above: 18	15.1%
	No need reminders: 3	2.5%
Who should access records online	Patient only: 23	19.3%
	Patient and medical staff from where the records originated : 67	56.3%
	Medical staff that patient is consulting at: 15	12.6%
	Open access: 14	11.8%
Thought on EMR	Unnecessary stress: 14	11.8%
	Better management of health: 51	42.9%
	Patients request unnecessary test: 6	5.0%
	Convenience of having records: 75	63.0%
	Ease of safekeeping of records: 66	55.5%

share their records across organizations. They still preferred to have privacy and wanted control over what is shared between different healthcare organizations.

The top two thoughts of respondents over the use of an EMR were the convenience it offers (63%) and the ease of safekeeping of records (55.5%), which is a good indicator. It tells us that consumers were able to relate to the benefits that technology is said to bring with the implementation in the industry. In addition, negative factors were the two lowest scores (11.8% and 5.0%) that respondents picked pertaining to this question, indicating that it was the least concerned by the consumers in Singapore.

Hypothesis Testing Using Statistical Analysis

Statistical analysis was done using a correlation test and *t*-test/ANOVA. This will allow comparisons to be made between different groups.

Table 3 *Summary of Correlation Test and t-Test/ANOVA*

	Correlation Value	*p*-Value
Perceived usefulness vs technology adoption	0.981059556	0.000378425
Perceived ease of use vs technology adoption	0.113318147	1.0122E-117
SNs vs technology adoption	0.290932478	2.93742E-08
Computer efficacy vs technology adoption	0.179121762	4.72248E-35
SP vs technology adoption	0.361377848	6.1113E-116
Gender vs technology adoption	-0.202972652	7.36668E-76
Age vs technology adoption (*)	0.022460105	6.56379E-21
Status vs technology adoption (*)	-0.054782439	7.32544E-18
Education level vs technology adoption (*)	0.130033349	1.76732E-24

All statistical tests were conducted at significance level (α) of 0.05. The decision rule states that the *p*-value of the test should be lower than α (0.05), we are to reject the null hypothesis, and accept the alternate hypothesis.

A positive value of 1 in a correlation test indicates a strong positive correlation between the two factors while a negative value of 1 will indicate a negative correlation between the factors. The Table 3 summarizes the results of the statistical test. Based on this, testing of each hypothesis will be further discussed.

H1: *Perceived usefulness affects the willingness of consumers to adopt new technology*

Perceived usefulness is an important factor that was identified by Venkatash and Davis (2000) in their TAM model that affects adoption attitudes of users (Venkatash & Davis, 2000). In conducting a test for the above, comparisons were made between respondents who prefer to use technology in booking, rescheduling, and viewing their scheduled appointment against ranking that these respondents gave based on the perceived usefulness that the technology brings to them. Perceived usefulness is identified as the convenience the system is said to bring to the respondents and this is identified based on 3 questions that were asked; convenience in accessing records anywhere, convenience of pre-paying their medical services, and the convenience of having their medical record consolidated in one system.

With reference to Table 3, the two factors had a correlation value of 0.98. This is indicative of a strong positive correlation among the use of technology and the convenience that technology brings, as the value is close to +1.

Further comparisons were conducted using *t*-test, at significance level of 0.05. The *p*-value of this comparison was at 0.00038, which was lesser than the alpha(α) value of 0.05. Since the decision rule states that the *p*-value should be lesser than the alpha level, we reject the null hypothesis. In this case, we are able to accept the alternate hypothesis that has been set, H1, that perceived usefulness does affect the willingness of consumers to adopt new technology.

This shows that responses among respondents in this study were in line with TAM model that Venkatash and Davis (2000) came out with. This meant that consumers in Singapore will adopt the new technology as long as there is usefulness that the technology can bring to the users.

H2: *Perceived ease of use affects the willingness of consumers to adopt new technology.*

Another factor that the TAM model is closely related to is the perceived ease of use. Perceived ease of use is subjective. Different people view ease of use differently. Age, gender, and social status affect one's thoughts towards perceived ease of use. In testing the above hypothesis, questions pertaining to the use of the system at any point of time

will be categorized as ease of use. This is in line with the issues that the organizations were facing, where consumers were having difficulty trying to get access to the customer service executives to make/reschedule appointments, and is made easy with the presence of the new system. Comparison will be made between these questions and their responses on using technology to allow the above hypothesis to be tested.

A correlation test was conducted, giving a weak positive correlation (correlation value at 0.11) among these two factors. Comparing with the earlier correlation test, perceived ease of use can be said to be of lesser relatedness as compared to perceived usefulness.

At significance level of 0.05, the *p*-value of this comparisons was 1.01^{117}, which was lower than the alpha(α) value. As such, following the decision rule, we are able to reject the null hypothesis and accept the alternate hypothesis, H2 that has been set. This meant that based on the above testing, perceived ease of use does affect the adoption attitudes of consumers.

Based on H1 and H2 testing, we are able to conclude that the findings are similar to most studies conducted on the TAM model. Both factors that Venkatash and Davis (2000) mentioned affected the adoption attitudes proves to be applicable to the consumers in Singapore.

In the next hypothesis testing, H3, H4, and H5, studies done by Jian et al. (2012) will be discussed. The finding from the study conducted in Taiwan suggested that all the three factors were relatively important on top of the two that were identified by Venkatash and Davis (2000) in their Technology Accpetance Model. In carrying out the analysis, we will be able to determine if there are any differences among consumers in Taiwan and Singapore.

H3: *SNs affect the willingness of consumers to adopt new technology*

SN are defined by a person's perception that he/she needs to perform the behavior in question and this is captured by the question asking if respondents have used any SST before. Often, when one has used these services before, it is a social norm that they are expected to use it the second time. As such, this question will be used to conduct the statistical analysis for H3.

As per comparisons before, the data for the above question will be compared against respondent's answer in wanting to adopt the new technology. Both correlation test and *t*-test findings are summarized in Table 3.

A correlation value of 0.30 depicts a weak positive correlation between subjective norms and the use of technology. However, in comparison with the earlier testing, subjective norms are seen to have a stronger correlation as compared to perceived ease of use.

A low *p*-value of 2.94^{08} was obtained from the *t*-test. At the significance level of 0.05, we are able to reject the null hypothesis and accept the alternate hypothesis, as the *p*-value is much lower than the alpha (α) value. As such, we can conclude that subjective norms affect adoption attitudes among consumers, which is similar to the study conducted in Taiwan.

H4: *CE affects the willingness of consumers to adopt new technology.*

In the same study, it was noted that age, education level, and computer efficacy were the factors that drove the adoption attitudes of users. In this research study, computer efficacy is determined by the age and the education level of respondents. Generally, university graduates are said to be computer savvy than those who have just primary education. This is similar to those age groups; younger adults are highly associated with having a higher level of computer literacy as compared to older adults. By combining these two factors, we will be able to determine the respondents' computer savvy-ness. This will then be compared against their responses towards technology adoption in order to test the above hypothesis, H4.
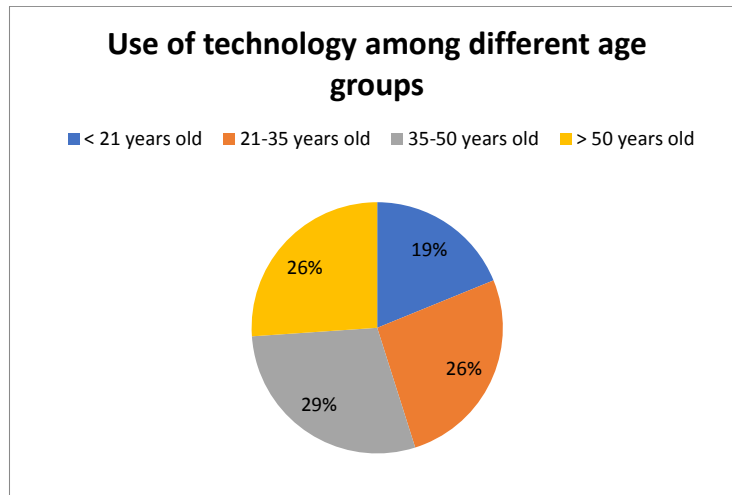
Figure 4 *Use of Technology Among Different Age Groups*

Table 4 *Usage of Technology Among the Different Age Groups*

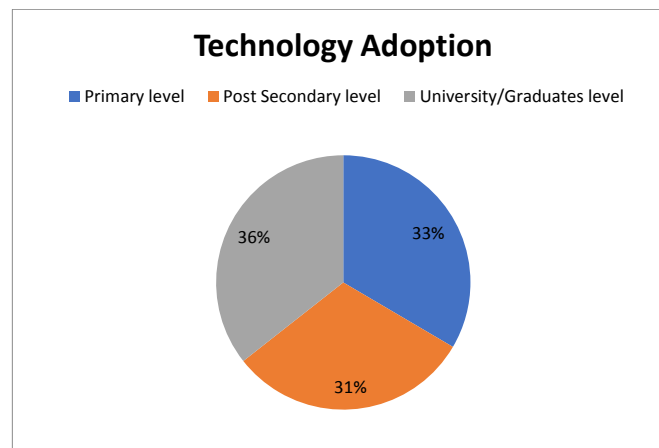|	< 21 years old	21-35 years old	35-50 years old	> 50 years old
Use of Technology	50.00%	69.74%	76.47%	69.23%

Figure 5 *Technology Adoption*

Table 5 *Usage of Technology Among the Different Education Levels*

	Primary level	Post Secondary level	University/Graduates level
Technology Adoption	68.18%	63.04%	72.55%

It is an interesting finding to have the highest percentage of respondents who were willing to adopt the technology falling in the age range of 35-50 years old, instead of the younger respondents. This could be because those within the age of 35-50 years were working adults, and they could have access to a computer easily while they are at work as compared to the other age groups. On the other hand, it was noted that respondents who had only post-secondary education were less willing to adopt technology as compared to the other two education levels, with majority of the university/graduates preferring the use of technology.

Having ran the statistical test, it was noted that computer efficacy (which was the sum of age and education) had a weak positive correlation with adoption attitudes, with a correlation value of 0.18. With a *p*-value of 4.72^{35} at significance level of 0.05, we are able to reject the null hypothesis and accept the alternate hypothesis, in this case, H4, where computer efficacy does affect the willingness of consumers to adopt new technology. With the rejection of null hypothesis, we are able to concur that once again, the findings for the above are similar to the study that was conducted in Taiwan by (Jian et al., 2012).

H5: *SP affect the willingness of consumers to adopt new technology.*

One other factor that was said to be of important value in the same study and affecting the adoption attitude among consumers was SP. This is in relation to the technology itself; how much data protection does the system comes with. Respondents were told to rank their concerns over three factors that were related to SP:
1. Concerned over data sensitivity
2. Privacy of EMR
3. Permission in obtaining EMRs.

Responses were collated based on the above factors and compared against respondents' willingness to adopt technology.

A weak positive correlation value was noted (0.36) for this factor. With a *p*-value of 6.1^{116}, which is lesser than the alpha value, we once again reject the null hypothesis, and accept the alternate hypothesis. In doing the testing, we are able to conclude that SP do affect adoption attitude among consumers, which once again concurs with the findings in the study done by (Jian et al., 2012).

H6: *Demographics affect the willingness of consumers to adopt new technology.*

Three demographics that were identified in most studies to impact adoption attitudes; gender, age and education level; will be tested in testing the above hypothesis, H6. In addition, we will be testing the status to determine if it plays a role in impacting consumers' attitudes in adopting technology.

Age and education level were tested earlier in H4, when we noted there were significant differences among the responses of the different groups. A further test was conducted based on just these factors alone, comparing them against the respondents' ranking of using the technology, and indeed, there is difference noted (related to *p*-value of 6.56^{21} and 1.77^{24} at significance level of 0.05, therefore rejecting the null hypothesis). In deriving this conclusion, we are able to confer that the findings of the survey conducted by MOM were different. In this study, age was determined to be a factor that affects technology adoption. It could be for the fact that this study covers a traditional service industry, which always had a personal touch and, therefore, the elderly find it hard to change, resulting in a least likely chance in adopting technology in this industry.

Both age and education level were also noted to have a weak positive correlation in comparison with the use of technology.
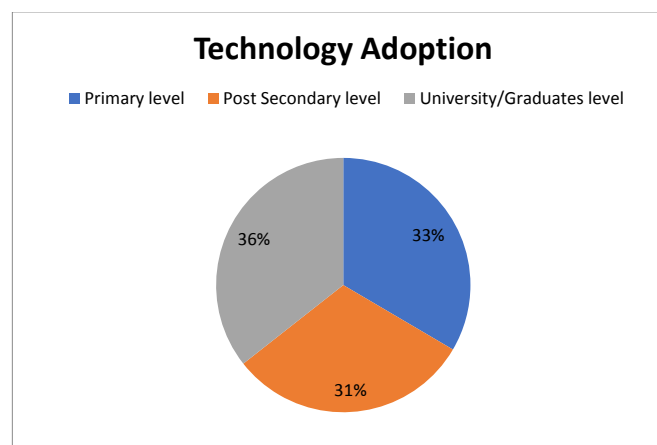

Technology Adoption

■ Primary level ■ Post Secondary level ■ University/Graduates level

33%

31%

36%

Figure 6 *Female vs Male Technology Adoption (Age)*

Table 6 *Breakdown of Female vs Male Technology Adoption Against Age*

Use of Technology	Female	Male
< 21 yrs old	62.50%	25.00%
21-35 yrs old	70.59%	68.00%
35-50 yrs old	80.00%	50.00%
50-65 yrs old	57.14%	83.33%

The above Graph 6 and Table 5 summarize the responses of males and females in their willingness to use technology against their age group. We are able to see that generally, females were more willing to adopt technology apart from males.

Table 3 indicates that gender has a weak negative correlation with technology adoption, with a negative correlation value. With a *p*-value of 7.3776, which is lower than the alpha(α) value of 0.05, the null hypothesis is rejected. We are able to conclude that gender does affect technology adoption.
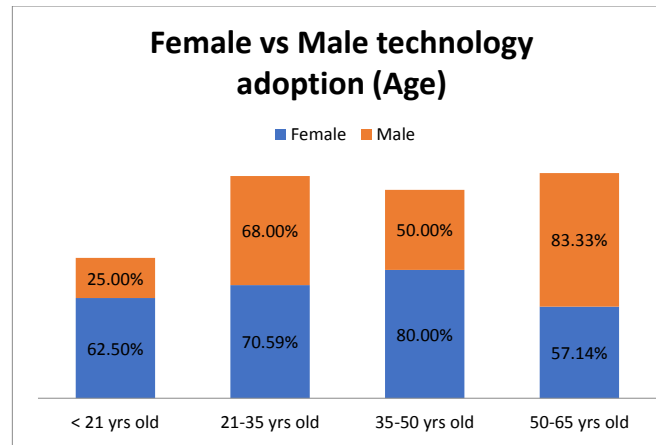

Figure 7 *Technology Adoption Among Different Status Groups*

Table 7 *Usage of Technology Among Different Status Groups*

Age/Status	< 21	21-35	35-50	50-65	Total
Singles	50%	71.15%	100%	100%	80.29%
Married	-	60.00%	100%	-	80.00%
Divorced	-	71.43%	44.44%	85.71%	67.19%

This survey noted that those who were divorced were less willing to adopt technology as compared to the other status group. Out of the 35% from the married group, it was noted that those who were married without kids were more willing to adopt the technology. However, there were no mean differences noted in these two groups, which likely indicated that having kids does not affect adoption attitudes.

From the above Table 7, we were also able to note that adoption increases with an increase in age. We are able to further confirm this with the earlier testing that age does affect adoption attitudes. Concluding the findings from Table 6 and 7, we can safely say that adoption attitudes among those who are in their 35s-50s, were noted to be high, regardless of their genders and status.

Status was said to have a weak negative correlation value of -0.05 when compared against technology adoption. *t*-test conducted showed that we are able to reject the null hypothesis as the *p*-value (7.32^{18}) was lower than the alpha

value. Having rejected the null hypothesis, we are able to conclude that status does play a role in deciding adoption attitudes among consumers.

Since testing on all demographics indicated that there were critical factors in adoption attitude, we are able to conclude that H6 stands, where demographics do affect the willingness of consumers to adopt technology.

CONCLUSION

This research study conducted has yielded results that were similar to most studies that studied the TAM model and the attitude adoption among consumers. All the factors, in accordance with TAM and TAM2 models, were concluded to be important in deciding if a consumer will adopt the technology or not.

Perceived usefulness and SP are the two most critical factors that affect attitudes of adoption greatly. As such, organizations that wish to use technology should consider these two factors in order to increase their adoption rates. This can be done by educating and informing consumers of all the potential benefits the new system could bring to arouse their perceived usefulness of the new system. Focusing on how the new system is secured will also allow an organization to win the consumers' attention in wanting to adopt the technology.

Having said the above, the management of the organization is able to use the findings from this research paper to understand different factors that will affect consumer's adoption attitudes. They can then use these findings to design their new system. One example is how consumers preferred the use of their smart devices. In relating to this finding, the IT department could design a system that can be easily accessed through the use of mobile phones (mobile-friendly page).

LIMITATIONS

This study was also able to capture only 1 respondent in the > 65 years group, which was omitted during the analysis earlier. We would suggest to gather more respondents, particularly males and older respondents, to achieve a normally distributed sample. In addition, question pertaining to ease of use in this research study was not directly asked. For further studies, the question relating to ease of use should be measured differently (i.e., users versus non-users). In carrying out further analysis, logistic and probit regression could be applied to measure these nominal data captured. This regression analysis will enable researchers to determine which factor is the most crucial in deciding the use of technology among users.

REFERENCES

Akgün, F. (2017). Investigation of instructional technology acceptance and individual innovativeness of academicians. *Turkish Online Journal of Qualitative Inquiry*, 8(3), 291-322. doi:https://doi.org/10.17569/tojqi.292135

Boeldt, D. L., Wineinger, N. E., Waalen, J., Gollamudi, S., Grossberg, A., Steinhubl, S. R., . . . Topol, E. J. (2015). How consumers and physicians view new medical technology: Comparative survey. *Journal of Medical Internet Research*, 17(9). doi:https://doi.org/10.2196/jmir.4456

Chang, C.-T., Hajiyev, J., & Su, C.-R. (2017). Examining the students behavioral intention to use e-learning in azerbaijan? the general extended technology acceptance model for e-learning approach. *Computers & Education*, 111, 128–143. doi:https://doi.org/10.1016/j.compedu.2017.04.010

Chen, J. (2014). Establishing a multinational harmonious society and resolving national issuesdepoliticizing and culturizing national issues. In *De-politicization of ethnic questions in China* (pp. 61–84). Singapore: World Scientific.

Chong, A. Y.-L., Chan, F. T., & Ooi, K.-B. (2012). Predicting consumer decisions to adopt mobile commerce: Cross country empirical examination between China and Malaysia. *Decision Support Systems*, 53(1), 34–43. doi:https://doi.org/10.1016/j.dss.2011.12.001

Deily, M. E., Hu, T., Terrizzi, S., Chou, S.-Y., & Meyerhoefer, C. D. (2013). The impact of health information technology adoption by outpatient facilities on pregnancy outcomes. *Health Services Research*, 48(1), 70–94. doi:https://doi.org/10.1111/j.1475-6773.2012.01441.x

Direkwuttanakunchai, P., & Yousapronpaiboon, K. (2017). A model of technology acceptance and trust that influences attitudes and affects the intention to use Samsung pay in Thailand. *Journal of Administrative and Business Studies*, 3(4), 171-179. doi:https://doi.org/10.20474/jabs-3.4.2

Goo, J., Huang, C. D., & Koo, C. (2015). Learning for healthy outcomes: Exploration and exploitation with electronic medical records. *Information & Management*, 52(5), 550–562. doi:https://doi.org/10.1016/j.im.2015.04.002

Jian, W.-S., Syed-Abdul, S., Sood, S. P., Lee, P., Hsu, M.-H., Ho, C.-H., . . . Wen, H.-C. (2012). Factors influencing consumer adoption of usb-based personal health records in Taiwan. *BMC Health Services Research*, 12(1), 1-8. doi:https://doi.org/10.1186/1472-6963-12-277

Kaushik, A. K., Agrawal, A. K., & Rahman, Z. (2015). Tourist behaviour towards self-service hotel technology adoption: Trust and subjective norm as key antecedents. *Tourism Management Perspectives*, 16, 278–289. doi:https://doi.org/10.1016/j.tmp.2015.09.002

Khuja, M. S. A. A., & Mohamed, Z. A. (2016). Investigating the adoption of e-business technology by small and medium enterprises. *Journal of Administrative and Business Studies*, 2(2), 71-83. doi:https://doi.org/10.20474/jabs-2.2.3

Lee, E., & Han, S. (2015). Determinants of adoption of mobile health services. *Department of Business and Technology Management*, 39(4), 556-572. doi:https://doi.org/10.1108/OIR-01-2015-0007

Lee, E. J., Lee, J., & Eastwood, D. (2003). A two-step estimation of consumer adoption of technology-based service innovations. *Journal of Consumer Affairs*, 37(2), 256–282. doi:https://doi.org/10.1111/j.1745-6606.2003.tb00453.x

Ohuabunwa, E. C., Sun, J., Jubanyik, K. J., & Wallis, L. A. (2016). Electronic medical records in low to middle income countries: The case of Khayelitsha Hospital, South Africa. *African Journal of Emergency Medicine*, 6(1), 38–43. doi:https://doi.org/10.1016/j.afjem.2015.06.003

Shih, Y.-Y., Lu, Y.-H., Liu, T.-Y., & Wu, M.-F. (2017). The staffs' adoption intention of knowledge management system in green hospital-the theory of technology acceptance model applied. *International Journal of Organizational Innovation (Online)*, 9(3), 27C.

Taillon, B. J., & Mueller, S. M. (2016). Self-service technologies: Increasing firm value through customer satisfaction and brand loyalty. In *Reimagining: The power of marketing to create enduring value* (p. 161-162). San Antonio, TX: Society for Marketing Advances.

Thanyasunthornsakun, S. J., K., & Boonmee, S. (2016). The causal effect of technology acceptance factors on the intention to use mobile application. *Journal of Administrative and Business Studies*, 2(5), 216-224. doi:https://doi.org/10.20474/jabs-2.5.1

Timmor, Y., Rymon, T., & Gal, T. (2011). Healthier for whom? technological service improvement in the healthcare industry. *The Service Industries Journal*, 31(11), 1725–1747. doi:https://doi.org/10.1080/02642060903580581

Venkatash, V., & Davis, F. D. (2000). A theoretical extension of technology acceptance model: Four longitudinal studies. *Management Science*, 46(2), 186–204. doi:https://doi.org/10.1287/mnsc.46.2.186.11926

Wei, W., Torres, E. N., & Hua, N. (2017). The power of self-service technologies in creating transcendent service experiences: The paradox of extrinsic attributes. *International Journal of Contemporary Hospitality Management*, 29(6), 1599–1618. doi:https://doi.org/10.1108/ijchm-01-2016-0029

Williams, J. (2012). The value of mobile apps in health care. *Healthcare Financial Management*, 66(6), 96–102.

Xia, C. B., & Talib, A. (2017). Factors influencing the acceptance of self-checkout machines in the supermarket industry in Singapore. *IJRDO - Journal of Applied Management Science*, 3(4), 76–99.