

TECHNOLOGY READINESS AND SEGMENTATION PROFILE OF MATURE CONSUMERS

Janelle Rose

James Cook University, Australia

Gerard Fogarty

University of Southern Queensland, Australia

ABSTRACT

Technology plays a vital role in the delivery of services, with consumers exhibiting varying levels of readiness to embrace their role to interact with technology. The aim of this study was to validate an abbreviated technology readiness (TR) scale and segmentation profile among mature consumers over 50 years of age. The four technology readiness dimensions, optimism, innovativeness, discomfort and insecurity were replicated in this study. Support was also found for the five technology adoption segments. However when compared to USA findings, mature consumers were less likely to be early adopter (explorers and pioneers) and more likely to adopt at the late growth stage or decline (skeptics and laggards). Mapping the TR dimensions against the five segments provided a more complete picture of the mature market. The propensity to use various technologies such as internet banking, ATM's and mobile phones provides further evidence to support the segments. Along with a demographic profile of each mature segment, these findings enable service firms to alter their marketing strategies to increase adoption rates of each segment. Finally, evidence from this study suggests that the mature consumer market is heterogeneous and should no longer be viewed as one market.

INTRODUCTION

In the global economy, technological change is a strong external force that has a far reaching impact on the competitive landscape of the service industry. This situation has resulted in services increasingly being delivered through self-service technologies (SSTs), providing many benefits to consumers including flexibility, customisation and greater satisfaction (Curran & Meuter, 2005; Meuter, Bitner, Ostrom, & Brown, 2005). However, some consumers have negative experiences and feelings towards SSTs (Mick & Fournier, 1998) and may be less than eager or even resistant to using SSTs (Lee & Allaway, 2002). It is therefore important for service firms to assess the extent to which consumers are ready and willing to actually use technologies prior to adopting new service technology delivery methods.

The purpose of this study was to investigate the propensity of mature consumers to use technologies and more specifically, self-service banking technologies (SSBT's). This propensity is captured by the construct technology readiness (TR) which refers to '...people's propensity to embrace and use new technologies for accomplishing goals in home life and at work' (Parasuraman, 2000, p. 308). Parasuraman (2000) and Parasuraman and Colby (2001) developed the technology readiness scale to measure this construct. A further aim of this study was to validate an abbreviated technology readiness (TR) scale and segmentation profile using a mature consumer sample of respondents over the age of 50 years. While the TR scale has been used in many studies (Elliott, Meng, & Hall, 2008; Liljander, Gillberg,

Gummerus, & van Riel, 2006; Tsikriktsis, 2004; Victorino, Karniouchina, & Verma, 2009), with varying degrees of success, the majority of the sample respondents were less than fifty years of age. Thus there is a need for validation and elaboration of the TR scale in a new context, an approach that is supported in the service management literature (Hubbard & Armstrong, 1994). Further, these findings are expected to provide evidence that the mature consumer market is heterogeneous and therefore should not be considered as a single market for new technologies (Carrigan, 1998; Moschis, 2003).

THEORETICAL FRAMEWORK

The degree to which consumers are willing to use SSTs is influenced by such factors as attitude toward specific technologies (Dabholkar & Bagozzi, 2002; Liljander et al., 2006; Rose & Fogarty, 2006), level of technology anxiety (Meuter, Ostrom, Bitner, & Roundtree, 2003; Venkatesh, 2000), and consumers' capacity and willingness to adopt (Walker, Craig-Lees, Hecker, & Francis, 2002). According to the literature (Mick & Fournier, 1998), consumers interacting directly with technology simultaneously experience positive and negative feelings towards using new technology. Although these negative and positive feeling about technology may coexist, the relative strength of these feelings are likely to vary across individuals (Parasuraman, 2000). Parasuraman (2000) captured this range of positive and negative feelings towards technology in his TR scale which comprises four dimensions: optimism, innovativeness, discomfort and insecurity. As a combined measure technology readiness does not predict intention or behaviour, but merely provides a measure of how ready a market is to adopt technologies.

The first two dimensions of TR, optimism and innovativeness, are related to positive feelings towards adopting technology. Optimism refers to 'a belief that technology offers people increased control, flexibility and efficiency in their live'; while innovativeness is defined as 'a tendency to be a technology pioneer and thought leader' (Parasuraman, 2000, p. 311). These two dimensions are regarded as drivers of technology readiness. The final two dimensions of TR, discomfort and insecurity are referred to as inhibitors of technology readiness. Discomfort is defined as 'a perceived lack of control over technology and a feeling of being overwhelmed by it', while insecurity refers to 'distrust of technology and scepticism about its ability to work properly' (Parasuraman, 2000, p. 311).

Based on their scores on the TR scale consumers can be classified into one of five segments. Those consumers with higher scores on optimism and innovativeness dimensions are more likely to be early adopters of new technologies and belong to either the Explorers or Pioneers' segments (Parasuraman & Colby, 2001, p.60). The Explorers are highly motivated and confident in their ability to make technology work. They are younger, generally male, have a higher income, and are better educated than members of other segments. Pioneers, the second of the segments, are above average on the two driver dimensions but they exhibit a slight level of resistance to technology. Consumers in this segment have an average income and education, are equally likely to be male or female, and tend to be younger relative to the remaining segments (Parasuraman & Colby, 2001).

Consumers high on the other two TR dimensions, discomfort and security belong to either the Paranoids or Laggards segments. The paranoids believe in technology and are optimistic but lack a tendency to innovate. They adopt technologies when growth begins to decline. This segment is slightly older, more likely to be female, less affluent and less educated. Consumers in the Laggards segment are least likely to adopt technology. They are the opposite to Explorers, low on the driver dimension and high on discomfort and insecurity.

Laggards are the oldest segment in age, mostly female (67%), have the lowest income and have the lowest levels of education (Parasuraman & Colby, 2001).

The Skeptics segment represents the middle segment in the five segment profile. Skeptics are not against technology, they just lack enthusiasm, and are less likely to believe technology offers them more control over their lives. This segment is more likely to wait until the benefits of a technology are proven. They are low on the driver and inhibitor dimensions. Consumers in this segment are of average age, income, and education level, and half are males (Parasuraman & Colby, 2001).

The four TR dimensions and technology adoption segmentation profiles discussed above are based on US data, with a relatively small percentage of mature consumers in the sample (Parasuraman & Colby, 2001). The four TR dimensions have been successfully replicated (Lam, Chiang, & Parasuraman, 2008; Lin & Hsieh, 2006; Tsikriktsis, 2004; van der Rhee, Verma, Plaschka, & Kickul, 2007; Victorino et al., 2009) using a 10-item and 36-item scale, however Liljander and colleagues (2006) were able to derive only the two driver dimensions using a 12-item scale. Prior studies using an abbreviated scale to measure TR have not consistently used the same items thus limiting opportunities to compare findings. In terms of the segmentation profile, in two prior studies researchers have been unable to replicate the five segments. Tsikriktsis (2004) in a UK study identified four segments with Paranoids excluded. Victorino et al., (2009) in a study of US hotel users profiled three segments: Innovators, Paranoids and Laggards. In the following sections of this paper, the TR scale and segmentation profiles will be examined in the mature consumer context.

METHOD

The primary data for this study were collected from mature consumers (over 50 years of age) who were selected using a proportional stratified sampling method from a large Australian Seniors database that had greater than 300,000 members across Australia. To ensure the findings were representative of all age groups in the population of interest, eight age categories were closely aligned with the population age categories provided by the Australian Bureau of Statistics. For each age group, names were selected at random from the database to the size of each state/territory's population in the corresponding age bracket. Based on the type of information that was required for the analysis, the wide dispersion of respondents across Australia, and confidentiality and privacy issues, a mail self-administered questionnaire was considered most appropriate. A total of 6000 surveys were sent to selected respondents and a total of 2076 (35%) usable questionnaires were returned.

The technology readiness of each respondent was assessed using 10 items selected from the original 36 item scale that were recommended in instructions provided by Colby and Parasuraman (2002). The items were measured using a five-point scale ranging from 1 'strongly disagree' to 5 'strongly agree'. Each dimension was measured using two or three items (refer to Table 1, number in parenthesis and Appendix 1 for list of items). Demographics including gender, age, education and income were collected. Questions relating to the use of technologies including SSBT's were also included in the questionnaire.

RESULTS

Respondents ranged in age from 50 to over 85 years of age with 42% of the sample aged 50-59, 31% aged 60-69 and 27% were over the age of 69 years. There were slightly more female (55%) than male respondents. The annual gross household income (before tax) varied from

less than A\$9,000 to greater than A\$60,000, with approximately 30% of respondents in the A\$20,000 to A\$39,000 category. Highest education achieved ranged from primary/some secondary (approximately 20%) to degree/postgraduate qualification (approximately 15%). Respondents who completed the questionnaire lived in regional and rural areas of Australia.

To determine if the four underlying dimensions of technology readiness scale could be recovered in this mature consumer data set, an exploratory factor analysis was conducted. The extraction method used was principal axis factoring followed by an oblique rotation of the axes to account for the expected correlations among the dimensions (Netemeyer, Bearden, & Sharma, 2003). The data matrix was suitable for factoring with the Bartlett's test of specificity significant ($\chi^2_{(45)} = 4155.01, p < 0.000$) and the Kaiser-Meyer-Olkin measure of sample adequacy 0.805. The requested four-factor solution aligned with the four technology readiness dimensions, with no standardised cross factor loading greater than 0.30. Only two of the items had standardised factor loadings of slightly less than the 0.50 criterion recommended by Netemeyer et al., (2003), with the remaining items loading from 0.50 to 0.74, thus providing evidence of convergent validity. At the dimension level, discriminant validity was evident with the square of the correlation between any two dimensions being less than the average variance extracted for the two dimensions (Fornell & Larcker, 1981; Hair, Anderson, Tatham, & Black, 1998). The four factor solution explained 66% of variance in the data. Three of the factors had eigenvalues greater than 1, with the fourth factor at 0.90. Similar results using a 10-item scale were noted in two prior studies by van der Rhee et al., (2007) and Victorino et al.,(2009).

The items comprising each dimension were summed to form an average measure for that dimension. Summary statistics for these scales, intercorrelations among scales, and scale reliabilities are provided in Table 1 including an overall TR average. With only two or three items for each scale, the internal consistency reliability estimates were restricted. Ideally, each dimension should be represented by four or more items as this would improve the internal consistency reliability and content validity of the scale (Netemeyer et al., 2003, p. 59). Comparison of results with other studies is not possible as the TR dimensions were measured using different items than the 10 items provided by Colby and Parasuraman (2002) for this study.

Table 1: Summary statistics, correlations and reliability estimates for TR scale

TR dimensions	Mean	Standard Deviation	Optimism	Innovativeness	Discomfort	Insecurity	Cronbach's alpha
Optimism (2) ^a	3.63	0.84	1.00				0.520
Innovativeness(3)	2.47	0.96	0.467**	1.00			0.735
Discomfort (2)	3.03	0.95	-0.218**	-0.195**	1.00		0.542
Insecurity (3)	3.34	0.98	-0.273**	-0.294**	0.366**	1.00	0.675
Overall TR	2.94	0.64	0.681**	0.711**	-0.651**	-0.714**	N/A

Notes: All mean values are on a five-point scale, anchored on 1 (strongly disagree), 2 (somewhat disagree), 3 (neutral), 4 (somewhat agree), 5 (Strongly agree); **significant at $p < 0.01$; ^a Parenthesis denotes the total measurement items for each TRI dimension; The Cronbach's alpha measures the internal consistency of the measurement scales for each TR dimension; The overall TR score for each respondent was obtained by averaging the scores of the four dimensions, i.e. Optimism + Innovativeness + (6-Discomfort) + (6-Insecurity)

The analysis of the data to determine the technology readiness consumer segments was undertaken by Rockbridge Associates, USA. Cluster analysis technique was user to

determine distinctive segments followed by multiple discriminant analysis to examine group differences. Results from this analysis confirmed five dominant segments in the mature consumer marketing in Australia. The findings presented in Table 2 in the left column display the five segments and number of respondents per segment with the percentage comparison across the segments provided in the next column. When comparing these results to the general USA population, percentages of mature consumers in the Explorers and Pioneers segments were lower in Australia. Mature consumers were found to be more dominant in the Skeptics and Laggards segments. The final column profiles online users and as expected they are more dominant through the early and growth stages of technology entering the market.

Table 2: Comparison of USA segments with the Australian mature consumer segments

Segments (<i>n</i> = number of respondents)	Australia Mature Consumers %	USA General Population ⁽¹⁾ %	USA Online at Home Population ⁽¹⁾ %
Explorers (<i>n</i> = 341)	16.4	19.2	24.5
Pioneers (<i>n</i> = 271)	13.1	26.2	27.0
Skeptics (<i>n</i> = 709)	34.2	21.8	26.0
Paranoids (<i>n</i> = 268)	12.9	15.4	12.6
Laggards (<i>n</i> = 487)	23.5	17.5	9.9

Note: ⁽¹⁾ Data provided by Charles Colby, Rockbridge Associates, USA

While a general profile of mature consumer segments was provided in the previous table, the analysis is extended to profile these segments in terms of TR dimensions and the results are presented in Table 3. The mean score on each dimension for each segment provides a pattern that describes the differing beliefs held by each segment. For example, the average score for the Explorers' segment declined in an almost linear fashion as one moves across the TR dimensions from optimism to insecurity. The reverse trend is true for the Laggards. The profile of the TR dimensions provided in Table 3 closely matches that provided by Parasuraman and Colby (2001, p.60).

Table 3: Differing beliefs of technology adoption segments

Segments <i>n</i> = 2076	Drivers		Inhibitors	
	Optimism	Innovativeness	Discomfort	Insecurity
Explorers <i>n</i> = 341 (16.4%)	4.38 (H)	3.70 (MH)	2.27 (L)	2.16 (L)
Pioneers <i>n</i> = 271 (13.1%)	4.09 (H)	3.47 (MH)	3.34 (MH)	3.85 (MH)
Skeptics <i>n</i> = 709 (34.2%)	3.60 (MH)	2.26 (L)	2.72 (L)	2.90 (L)
Paranoids <i>n</i> = 268 (12.9%)	4.02 (H)	1.90 (L)	3.77 (MH)	4.10 (H)
Laggards <i>n</i> = 487 (23.5%)	2.67 (L)	1.69 (L)	3.42 (MH)	4.10 (H)

Note: (H) High; (MH) medium/high; (L) Low

Mapping the technology adoption segments against selected SSBTs and general technologies provides a more complete picture of the mature consumer market. The first four listings in Table 4 are self-service banking technologies. The results show that mature consumers in the Explorers segment are higher users of SSBTs, as expected. While phone banking is low relative to the other three SSBTs, findings indicate that many mature consumers have moved to internet banking. Pioneers and Skeptics appear to have a similar level of adoption of

SSBTs while adoption decreases with Paranoids and even more so with Laggards, as expected.

For the three general technologies the adoption of these technologies decline in use from Explorer to Laggard. It is interesting to note that while mature consumers have adopted the use of computers and the internet, this same level of adoption does not flow through to internet banking. The higher level of discomfort and in particular insecurity, play a stronger inhibiting role when it comes to adopting internet banking across the segments.

Table 4: Usage of self-service technologies and general technologies by Segment

Technologies	Explorers % <i>n</i> = 341	Pioneers % <i>n</i> = 271	Skeptics % <i>n</i> = 709	Paranoids % <i>n</i> = 268	Laggards % <i>n</i> = 487
Internet Banking	73	32	34	16	9
Phone Banking	48	39	47	35	33
ATM's	91	79	79	70	62
EFTPOS	74	59	62	58	52
Internet	95	77	68	65	39
Computers	98	87	78	81	52
Mobile Phone	88	84	77	75	65

In the introduction to this paper, brief sketches were provided of demographic profiles typical of the various segments. Table 5 provides these data for the mature consumers in the present study. This table can be read in a number of ways. Because there were large discrepancies in the total number of respondents in the demographic categories represented by the rows in this table, analysing each column separately does not give a completely accurate account of the characteristics of particular segments. For example, the 50-59 years age group represented almost half of the sample, so they are likely to make up a reasonable percentage of every segment. A more accurate picture can be formed by following each of the rows across the various segments. One can then see the changing proportions as one moves from the early adopters side of the table to the laggards. There are other ways of presenting the data that take the differing base rates into consideration but that step is not necessary. Even within this restricted age range, the trends that have been noted in the literature apply here. Early adopters tend to be younger, have higher income levels, and be better educated. Laggards tend to be older, female, and have lower education levels.

Table 5: Demographic profile of respondents by segment

	Explorers % <i>n</i> = 341	Pioneers % <i>n</i> = 271	Skeptics % <i>n</i> = 709	Paranoids % <i>n</i> = 268	Laggards % <i>n</i> = 487
<i>Gender: Male</i>	<u>53</u>	<u>52</u>	44	40	39
Female	47	48	<u>56</u>	<u>60</u>	<u>61</u>
<i>Age: 50-59 years</i>	<u>54</u>	<u>41</u>	<u>40</u>	<u>38</u>	39
60-69 years	31	33	30	<u>35</u>	30
> 69 years	15	26	30	27	<u>40</u>
<i>Income: < A\$19,000</i>	8	16	16	24	25
A\$20,000-39,999	27	<u>35</u>	<u>31</u>	<u>32</u>	<u>38</u>
A\$40,000-59,999	26	22	23	20	20
>A\$ 60,000	<u>39</u>	27	<u>30</u>	24	17
<i>Education</i>					
Year 10 or lower	20	34	30	28	<u>40</u>
Year 12, Voc, Dip	<u>44</u>	<u>45</u>	<u>48</u>	<u>53</u>	46
Bachelor, Postgrad	<u>36</u>	21	22	19	14

DISCUSSION AND IMPLICATIONS

Drawing on the TR scale and technology adoption segment profile developed in the USA by Parasuraman and Colby (Parasuraman, 2000; Parasuraman & Colby, 2001) this study aimed to replicate the findings using a mature consumer sample of respondents. Using an abbreviated 10-item TR scale the four dimensions of technology readiness - optimism, innovativeness, discomfort and insecurity - were all identified as TR dimensions in this study. The robustness of the four dimensions could be improved by increasing the number of items used to measure each dimension. An abbreviated 18-item TR scale tested by Lam, Chiang and Parasuraman (2008) would be a more appropriate measure of TR and this scale appears to have sound psychometric properties.

In this study the five technology adoption segments were successfully identified. While the proportion of respondents in each segment did vary from the USA profile, the findings from this study support the claim that the mature consumer market is heterogeneous. Thus, even within the restricted age range of a mature consumer population, the trends apparent in the general population can also be observed here. The different profiles of beliefs held by consumers in each segment towards technology adoption provide evidence upon which strategies can be developed to increase the rate of diffusion of new technologies into the market. For example, while Pioneers are optimistic and innovative, they also are slightly resistant to technology. Therefore it will be important to provide reassurance about the new technology and ensure that the practical benefits and instructions to use are clearly communicated. Providing help and assistance will assist this segment to adopt sooner.

The findings from this study provide a more complete profile of mature consumers' technology adoption across a range of SSBTs and general technologies. These findings contribute to our understanding of their behaviour patterns and can be beneficial when examining the diffusion of new technologies such as mobile banking and medical technologies to assist older mature consumers to stay in their home longer. For example, based on the demographic profile, some of the over 69 age group do belong to the Explorers and Pioneers segments that are early adopters.

CONCLUSIONS

This study has provided further support for the TR dimensions and the five-segment technology adoption profile in the mature consumer context in Australia. Further, evidence forthcoming from this study substantiates claims by Moschis (2003) that the mature consumer market is heterogeneous in nature. Overall the findings from this study have contributed to an enriched profile of the mature consumer market in Australia and provided a deeper understanding of the technology beliefs of mature consumers. New technologies will continue to develop at an increasing rate. The findings from this study will greatly assist service providers to understand the likely adoption of technologies when targeting the mature market.

Future studies need to consistently use the same items in the TR scale to allow for scale refinement and replication of findings. Finally the TR dimensions, which are beliefs held by consumers towards technology adoption could be tested as antecedent variables in the Technology Acceptance Model.

APPENDIX 1

Technology Readiness Scale

1. You find new technologies to be mentally stimulating.
2. If you provide information to a machine or over the Internet, you can never be sure it really gets to the right place.
3. You like computer programs that allow you to tailor things to fit your own needs.
4. You do not consider it safe to do any kind of financial business online.
5. Other people come to you for advice on new technologies.
6. You worry that information you send over the Internet will be seen by other people.
7. You can usually figure out new high-tech products and services without help from others.
8. When you get technical support from a provider of a high-tech product or service, you sometimes feel as if you are being taken advantage of by someone who knows more than you do.
9. In general, you are among the first in your circle of friends to acquire new technology when it appears.
10. It is embarrassing when you have trouble with a high-tech gadget while people are watching.

(Note: Q's 1, 3 – Optimism; Q's 2,4,6 – Insecure; Q's 5,7,9 – Innovative; Q's 8,10 – Discomfort
Items measured using a five-point scale: 1 'strongly disagree' to 5 'strongly agree')

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