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Correlation Analysis of Attitudes towards SMS Technology and Blood Donation Behaviour in Malawi

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Abstract. In this paper we use SMS technology acceptance models to assess the relationship between attitude towards SMS technology and blood donation behaviour in a predominantly associative culture. Firstly, we show that blood donors at the Malawi Blood Transfusion Services in Malawi have a positive attitude towards both the SMS technology and the content of the SMS message. However, the attitude towards the content of SMS message is moderated by level of education. Furthermore, we show that the level of education affected the perceived ease of use of SMS technology, informativeness and irritation of the SMS message. Secondly, we establish that there is a positive and statistically significant relationship between blood donation behaviour and attitude towards SMS technology and attitude towards the SMS message content. However, these relationships are moderated by gender, age and level of education. Specifically, subjective norms which depict social forces are related to socially accepted behaviour such as blood donation among the old or less educated donors in a predominantly associative culture like Malawi. However, this research was limited to blood donation behaviour which is a socially accepted behaviour. It will be interesting to relate attitude towards SMS technology and other behaviours which may not necessarily be socially accepted. Furthermore, the study was limited to blood donors who had received SMS reminders.

Keywords. SMS Application; Blood donation; Technology Acceptance

1. Introduction

The recent proliferation of mobile technology use in developing countries has generated a parallel increase in the number of sectors that deploy Short Message Service (SMS) function of a GSM mobile phone. Initially, SMS started as a supplementary service to voice communication through transmission of simple text message which was limited to 160 characters by the mobile application part (MAP) protocol in GSM [1]. However, the technology has been used to address an array of issues in recent years. Furthermore, several studies have been conducted to understand attitudes towards SMS in commercial activities such as advertising [2-5].

In the health sector, SMS applications have been used to improve the diagnoses, monitoring and communication [6]. In addition to the foregoing, empirical studies have investigated the application of SMS technology as means of providing reminder service for health promotion and monitoring [7-9], managing patients' appointment [10-13] and treatments [14]. Such studies found that SMS based reminders can help to change the behaviour of SMS technology users in the promotion, monitoring, keeping

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appointments and commitment to treatment regimes. However, the studies were limited to applications where the individuals had a direct benefit from the reminders. Thus, it could be interesting to find out if similar results could be obtained in applications where individuals do not benefit directly from the activity such as blood donation. Furthermore, although Manda [15] reported that SMS texting is as effective as voice call reminders as means of health information access and reporting or even better than voice call [13] in encouraging patients to honour follow-ups, the attitude of the users towards SMS technology was not explored. As Vinkatesh [16] argues, the understanding of user acceptance, adoption and usage of technology is essential if technology is to be successful. Additionally, the majority of the studies focused in the developed world. However, although developing countries such as Malawi have much to gain from application of mobile technologies, they have received little research attention. Fusilier and Durlabhji argue [17] that culture influences technology adoption and use. According to Kedia and Bhagat [18] cultures could be characterized as abstractive or associative. Abstractive cultures are characterised by linear thinking that use a rational cause-effect paradigm to create perceptions. Furthermore, such cultures are prevalent in North America and Europe. On the other hand, associative cultures existing in Africa and Asia do not normally use a logical basis for linking events. It is therefore essential to assess whether blood donation behaviour after receiving SMS reminders is linked to attitude to SMS technology in a predominantly associative culture like Malawi.

Therefore, this study assessed the relationship between attitude towards SMS technology and blood donation behaviour. The researchers defined blood donation behaviour as the intention to donate blood after receiving an SMS reminder. Specifically, the study assessed the attitude towards SMS technology and content of SMS based reminders among blood donors. Furthermore, the study assessed the relationship between attitude towards SMS technology and SMS based reminders on one hand and blood donation behaviour on the other. Such analyses were aimed at bridging the knowledge gap existing in developing countries, [19] especially in Malawi. This study therefore contributes towards transfer and diffusion discourse as well as transformative discourse in that it demonstrates how SMS technology is used and how it transforms behaviour.

The remainder of the paper is arranged as follows: Section 2 reviews the available literature on technology acceptance and its applications while section 3 presents the methodology that was used in this study. Section 4 presents the results of the study and section 5 discusses the results. Finally, section 6 concludes the paper.

2. Literature Review

Conceptually, an attitude is used to understand and predict people's reaction to an object or change and how behaviour can be influenced [20]. It is defined as a learned orientation, or disposition toward an object or situation, which provides a tendency to respond favourably or unfavourably to the object or situation [21]. An attitude towards a SMS technology can explain whether the technology can successfully be used to influence the behaviour of blood donors. Specifically, although individuals can donate blood four times a year, trends have shown that most do not come for repeat donation [15]. Voice call reminders have been used to encourage individuals for repeated blood

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donation [15]. However, voice call reminders are expensive. SMS technology offers an alternative to voice calls.

There are two models that are used to understand attitudes towards SMS technology, namely Technology Acceptance and Acceptance of SMS messege content.

2.1. Technology Acceptance Model

The first model focuses on the acceptance of the SMS technology based on Theory of Planned Behaviour (TPB) [22] and Theory of Reasoned Action (TRA) [2] resulting in Technology Acceptance Model (TAM). TAM represents the antecedents of technology usage through beliefs about initially two factors: perceived usefulness (PU) and perceived ease of use (PEOU) of a technology. The former antecedent is defined as the degree to which a person believes that using a particular system would enhance his or her job performance while the later refers to the degree to which a person believes that using a particular system would be free of effort. A meta-analysis of TAM [23,24] presents a comprehensive literature on TAM. Recently, the perspective of subjective norms was included. The subjective norms refer to the extent to which an individual believes that people who are important or influential to him or her think he or she should perform the behaviour in question [25].

Several researchers have assessed the attitude towards SMS technology using TAM. Yan, *et al*. [26] used TAM to assess attitude towards SMS technology and usage and found that perceived usefulness, ease of use, and subjective norms lead to attitudinal changes toward text messaging and usage. Similarly, Aripin and Omar [27] found that attitude towards SMS usage is influenced by perception that SMS is easy to use, useful, fun, and expressive. However, Tang and Wong [28] investigated the role of permission towards the attitude of SMS message recipients. They found that consumers had negative attitude towards mobile text messaging as a communication channel when permission is not granted. These studies, however, focused on commercial applications and were based on quantitative research approach. Baron *et al*., [4] applied interpretivist perspective that focused on cultural context of technology acceptance underscoring the role of culture. Furthermore a meta-analysis of TAM revealed that different type of population and time period resulted in varying results suggesting that TAM may not be applicable in certain context [23]. In other words, applicability of TAM is moderated by organisational, system and users' characteristics. Furthermore, the link between attitude towards technology and its application may be influenced by culture [17] and economic status [29].

2.2. Acceptance of SMS Message Content Model

The second model focuses on the attitude towards content of the SMS message. Differentiating between attitude towards a technology itself and attitude towards usage of the technology is important because it is possible for people to hold positive attitude towards a technology and negative attitude towards its usage [23]. Towards that end, Ducoffe [30] developed a model depicting the dimensions of entertainment, informativeness and irritation used to determine consumers' attitudes towards Internet advertising. Subsequently, Brackett and Carr [31] added a dimension to the model namely credibility and used the modified model to test consumer attitudes towards web advertising. However, these models were developed and validated for Internet advertising. Nevertheless, a few studies have used it widely to study attitude towards

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SMS technology in advertising. Tsang *et al.* [2] investigated consumer attitude toward mobile advertising using Short Message Service. Similarly, Suher and Ispir [25] found that the respondents held negative attitudes toward receiving mobile ads because they found them irritating. On the other hand, they found out that respondents attitude were however favourable for advertisements that were sent with permission. These findings agree with early researchers [32] although Barnes, [33] pointed out that SMS advertising is a more effective medium to generate consumer responses.

Technology acceptance and Message content acceptance models served as theoretical foundation for this study with gender, age and level of education as moderating factors.

3. Methodology

A cross- sectional survey study based on deductive research approach was conducted using a pre-tested questionnaire at the Malawi Blood Transfusion Service (MBTS) in Blantyre, Malawi. MBTS is a state-owned institution mandated to coordinate the process of blood supply to hospitals. Both the MBTS and the Ministry of Health in Malawi provided clearance for the study.

Data were collected through a self administered questionnaire that was developed based on models for assessing attitude towards SMS technology and attitude towards content of SMS messages. The questionnaire consisted of four parts. Firstly, it comprised items that measured respondents' attitude towards SMS technology based on TAM's 3 dimensions [25]. Secondly, it included items that measured respondents' attitude towards the content of SMS message [30,31]. Thirdly, the questionnaire had an item that measured the respondents' intention to donate blood after receiving an SMS based reminder. All the items were measured on a five-point Likert scale (1=strongly disagree to 5=strongly agree). Finally, the instrument included questions used to collect demographic data that characterise the respondents.

The sample was randomly drawn from a population of blood donors who had received SMS-based reminders to donate blood. A total of 120 questionnaires were distributed to a randomly selected sample from a population of 1137 blood donors. However, only 114 questionnaires were correctly completed and returned representing a response rate of 95%.

Both descriptive and inferential statistical analyses were carried out using SPSS. Descriptive statistical analysis was used to summarize the results while inferential statistics was used to test the relationships.

This research ensured that particulars of respondents were anonymous so that the data collected would not be traced back to them. Furthermore, permission was granted from relevant authorities before conducting the research to ensure that all ethical issues were taken on board. Thus the Malawi Blood Transfusion Service was requested to provide clearance to access blood donor data and the Ministry of Health was requested to provide ethical clearance.

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4. Results

4.1. Demographic Characteristics of the Respondents

Table 1 summarizes the demographic characteristics of the respondents. The results show that the majority of the respondents (41.2%) were young (18-24 years) while some (8.7%) interestingly were in the senior (45 years and above) age category. Additionally, the results show that most of the respondents (38.9%) had a secondary school qualification (MSCE) while 9.8 % did not have a formal education qualification. The results further showed that most of the respondents (72.8%) were male. Finally, the results showed that the majority were single (61.8%). Interestingly 1.8% of the respondents indicated that they were widowed.

Table 1: Characteristics of the Respondents

Variable	Attribute	Percent
Age (years)	55 and above	2.6
	45-54	6.1
	35-44	17.5
	25-34	32.5
	18-24	41.2
Academic Qualification	Postgraduate	8.8
	Bachelors	12.4
	Diploma	7.1
	MSCE	38.9
	JCE	16.8
	PLSCE	6.2
	Others	9.8
Gender	Female	27.2
	Male	72.8
Marital Status	Single	61.8
	Married	36.4
	Widowed	1.8

4.2. Attitude Towards SMS Technology

Table 2 presents the survey results on attitude towards SMS technology using technology acceptance model on three dimensions, namely, perceived ease of use (PEOU), perceived usefulness (PU), and subjective norms (SN). Firstly, the results show that the items used to measure respondents' attitude towards SMS technology were reliable on all the three dimensions, with Cronbach's Alpha values above the conventional minimum of 0.70 [34]. Secondly, the results show that the respondents had an overall positive attitude towards SMS technology (*M=4.20, SD=0.72*) on a five points scale. Furthermore, the results show that the respondents had a positive attitude towards SMS technology on all the three dimensions: perceived ease of use (*M=4.41, SD=0.79*), perceived usefulness (*M=4.19, SD=0.93*) and subjective norms (*M=3.99, SD=0.97*).

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Table 2: Attitude towards SMS technology

Dimension	Mean (standard Deviation)	Scale Reliability (Cronbach's Alpha)
Perceived ease of use	4.41 (0.79)	0.79
Perceived usefulness	4.19 (0.93)	0.87
Subjective norms	3.99 (0.97)	0.78
Overall SMS Technology acceptance	4.20 (0.72)	

Finally, the difference in means of the overall attitude towards SMS technology moderated by respondents' characteristics (age, education qualification, marital status and gender) was analysed using one-way analysis of variance (ANOVA). The results show that there was no statistically significant difference in means of the overall SMS technology acceptance based on age $F(4)=0.38, p>0.05$; qualification $F(7)=1.20, p>0.05$; marital status $F(2)=0.36, p>0.05$; and gender $t(112)=-0.51, p>0.05$. However, the results show that there was a statistically significant difference in means of the perceived ease of use among the respondents based on education qualification $F(7)=3.09, p<0.05$.

4.3. Attitude Towards SMS Message Content

Table 3 presents the survey results on attitude towards SMS message content on four dimensions, namely, entertainment, informativeness, irritation and credibility. Firstly, the results show that the items used to measure respondents' attitude towards SMS message content were reliable on all the four dimensions, with Cronbach's Alpha values above the conventional minimum of 0.70 [34]. Secondly, the results show that the respondents had an overall positive attitude towards SMS message content ($M=4.27, SD=0.73$) on a five points scale. Furthermore, the results show that the respondents had a positive attitude towards SMS message content on all the four dimensions: entertainment ($M=4.43, SD=0.91$), informativeness ($M=4.50, SD=0.83$), irritation ($M=3.90, SD=1.16$) and credibility ($M=4.25, SD=1.01$).

Table 3: Attitude towards SMS message content

Dimension	**Mean (standard Deviation)**	**Scale Reliability (Cronbach's Alpha)**
Entertainment	4.43 (0.91)	0.83
Informativeness	4.5 (0.83)	0.78
Irritation	3.90 (1.16)	0.77
Credibility	4.25 (1.01)	0.77
Overall attitude towards Content	4.27 (0.73)	

Finally, the difference in means of the overall attitude towards SMS message content moderated by respondents characteristics (age, education qualification, marital status and gender) were analysed using one-way ANOVA. The results show that there was no statistically significant difference in means of the overall attitude towards SMS message content based on age $F(4)=0.67, p>0.05$; marital status $F(2)=0.02, p>0.05$; and gender $t(112)=0.62, p>0.05$. However, there was a statistically significant difference in the overall attitude towards SMS message content based on education qualification $F(7)=2.40, p<0.05$. The attitude towards SMS message for those without

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formal academic qualification (*M=3.44, SD=0.71*) was lower than that for those with MSCE (*M=4.40, SD=0.59*). or JCE (*M=4.40, SD=0.79*) and the differences were statistically significant *p<0.05*.

4.4. Relationship Between Blood Donation Behaviour and Attitude towards SMS

Firstly, Table 4 presents the results of the assessment of the relationship between blood donation behaviour and attitude towards SMS technology using correlation analysis. The results show that there was a positive and statistically significant relationship between blood donation behaviour and overall attitude towards SMS technology *r(112)=0.40, p<0.05*, perceived usefulness *r(112)=0.28, p<0.05*, perceived ease of use *r(112)=0.29, p<0.05*, and subjective norms *r(112)=0.39, p<0.05*. Furthermore, the results show that among the dimensions of the modified TAM model, subjective norms had the strongest correlation with blood donation behaviour *r(112)=0.39, p<0.05*, while perceived usefulness had the weakest correlation *r(112)=0.28, p<0.05*. On the other hand, perceived usefulness of SMS technology had the strongest relationship with overall attitude towards SMS technology *r(112)=0.90, p<0.05* while subjective norms had the weakest relationship with the overall attitude towards SMS technology *r(112)=0.78, p<0.05.*

Table 4: Correlation between blood donation behaviour and attitude towards SMS technology

Variables	BDB	AST	PU	PEOU	SN
BDB	1.00				
AST	0.40*	1.00			
PU	0.28*	0.90*	1.00		
PEOU	0.29*	0.74*	0.61*	1.00	
SN	0.39*	0.78*	0.55*	0.26*	1.00

Notes: Variables key is as follows: BDB-Blood donation behaviour, AST=Attitude toward SMS Technology, PU= Perceived Usefulness, PEOU=Perceived Ease of Use and SN=subjective norms. *Pearson correlation is significant at the 0.05 level (two-tailed).

Secondly, Table 5 presents the results of the assessment of the relationship between blood donation behaviour and attitude towards SMS message content using correlation analysis. The results show that there was a positive and statistically significant relationship between blood donation behaviour and overall attitude towards SMS message content *r(112)=0.33, p<0.05;* entertainment *r(112)=0.29, p<0.05;* informativeness *r(112)=0.36, p<0.05;* and credibility *r(112)=0.26, p<0.05.* However, the results show that there was no statistically significant relationship between blood donation behaviour and irritation *r(112)=0.12, p>0.05.* Furthermore, the results show that among the dimensions of the model, informativeness had the strongest relationship with both blood donation behaviour and overall attitude towards the SMS message content *r(112)=0.36, p<0.05* and *r(112)=0.84, p<0.05*, respectively. On the other hand, irritation had the weakest relationship with both blood donation behaviour and overall attitude towards the SMS message content *r(112)=0.12, p>0.05* and *r(112)=0.65, p<0.05*, respectively.

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Table 5: Correlation between blood donation behaviour and attitude towards SMS message content

Variable	BDB	ASMC	EN	IN	IR	CR
BDB	1.00					
ASMC	0.33*	1.00				
EN	0.29*	0.78*	1.00			
IN	0.36*	0.84*	0.69*	1.00		
IR	0.12	0.65*	0.24*	0.37*	1.00	
CR	0.26*	0.74*	0.50*	0.55*	0.19*	1.00

Notes: Variables key is as follows: BDB-Blood donation behaviour, ASMC=Attitude toward SMS Message Content, EN=Entertainment, IN=Informativeness, IR=Irritation, CR=credibility. *Pearson correlation is significant at the 0.05 level (two-tailed).

Thirdly, tables 6, 7 and 8 compare the direction and strength of the relationship between blood donation behaviour and overall attitude towards SMS technology with gender, age and level of education, respectively, as moderating factors.

The results show that there was a positive and statistically significant relationship between blood donation behaviour and overall attitude towards SMS technology for both male $r(81)=0.39$, $p<0.05$ and female $r(28)=0.43$, $p<0.05$; young $r(82)=0.39$, $p<0.05$ and old $r(28)=0.42$, $p<0.0$; educated $r(93)=0.40$, $p<0.05$ and less educated $r(16)=0.46$, $p<0.05$ blood donors. Comparatively, the relationship was stronger for female donors than male, for old donors than young; and for less educated than educated donors. Furthermore, the results show that the relationship was stronger for females than males in the perceived usefulness and perceived ease of use dimensions of TAM. Similarly, the relationship was stronger for old donors than young donors, males than females and less educated donors than educated donors on the subjective norm dimension of TAM.

Table 6: Correlation between blood donation behaviour and attitude towards SMS technology: Male and Female

Variables	**BDB**	**AST**	**PU**	**PEOU**	**SN**
BDB		0.43*	0.37*	0.35	0.38*
AST	0.39*		0.93*	0.86*	0.78*
PU	0.25*	0.88*		0.77	0.61*
PEOU	0.27*	0.69*	0.54*		0.42*
SN	0.39*	0.78*	0.53*	0.21	

Notes: Variables key is as follows: BDB-Blood donation behaviour, AST=Attitude toward SMS Technology, PU= Perceived Usefulness, PEOU=Perceived Ease of Use and SN=subjective norms. *Pearson correlation is significant at the 0.05 level (two-tailed). The results below the diagonal line are for males and those above are for females.

Table 7: Correlation between blood donation behaviour and attitude towards SMS technology: Young and Old

Variables	**BDB**	**AST**	**PU**	**PEOU**	**SN**
BDB		0.42*	0.27	-0.07	0.72*
AST	0.39*		0.88*	0.69*	0.72*
PU	0.28*	0.90*		0.54*	0.48*
PEOU	0.50*	0.76*	0.64*		0.12
SN	0.22*	0.81*	0.60*	0.34*	

Notes: The results below the diagonal line depict young donors of 34 years and below and those above depict old donors who were above 34 years.

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Table 8: Correlation between blood donation behaviour and attitude towards SMS technology: Educated and Less Educated.

Variables	BDB	AST	PU	PEOU	SN
BDB		0.46*	0.22	0.16	0.63*
AST	0.40*		0.79*	0.74*	0.69*
PU	0.30*	0.91*		0.43	0.33
PEOU	0.35*	0.76*	0.66*		0.21
SN	0.35*	0.81*	0.61*	0.34*	

Notes: The results below the diagonal line depict educated donors who have a qualification above primary certificate and above depict less educated donors with at most primary qualification.

Finally, tables 9, 10 and 11 compare the direction and strength of the relationship between blood donation behaviour and overall attitude towards SMS message content with gender, age and level of education, respectively, as moderating factors.

The results show that there was a positive and statistically significant relationship between blood donation behaviour and overall attitude towards SMS technology for males $r(81)=0.40$, $p<0.05$; old $r(28)=0.43$, $p<0.05$; young $r(82)=0.31$, $p<0.05$ and educated $r(93)=0.34$, $p<0.05$ donors. However, the relationship was not statistically significant for female $r(29)=0.12$, $p>0.05$ and less educated $r(16)=0.33$, $p>0.05$ donors. Furthermore, relationship was statistically significant for males on entertainment $r(81)=0.30$, $p<0.05$, informativeness $r(81)=0.43$, $p<0.05$, irritation $r(81)=0.23$, $p<0.05$, credibility $r(81)=0.30$, $p<0.05$, while the relationships were not statistically significant on these dimensions for females. Additionally, the overall relationship was stronger for old $r(28)=0.43$, $p<0.05$ than the young $r(82)=0.31$, $p<0.05$ and on informativeness and credibility dimensions.

Table 9: Correlation between blood donation behaviour and attitude towards SMS message content: Male and Female

Variable	BDB	ASMC	EN	IN	IR	CR
BDB		0.12	0.28	0.20	-0.18	0.11
ASMC	0.40*		0.81*	0.81*	0.59*	0.64*
EN	0.30*	0.77*		0.79*	0.21	0.35
IN	0.43*	0.86*	0.62*		0.19	0.41*
IR	0.23*	0.67*	0.25*	0.46*		0.15
CR	0.31*	0.78*	0.57*	0.62*	0.22*	

Notes: Variables key is as follows: BDB-Blood donation behaviour, ASMC=Attitude toward SMS Message Content, EN=Entertainment, IN=Informativeness, IR=Irritation, CR=credibility. *Pearson correlation is significant at the 0.05 level (two-tailed). The results below the diagonal line are for males and those above are for females.

Table 10: Correlation between blood donation behaviour and attitude towards SMS message content: Young and Old

Variable	BDB	ASMC	EN	IN	IR	CR
BDB		0.43*	0.30	0.57*	0.09	0.38*
ASMC	0.31*		0.60*	0.76*	0.70*	0.73*
EN	0.31*	0.81*		0.36	0.14	0.34
IN	0.30*	0.86*	0.75*		0.41*	0.45*
IR	0.15	0.63*	0.25*	0.35*		0.22
CR	0.21	0.74*	0.54*	0.58*	0.18	

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Notes: The results below the diagonal line depict young donors of 34 years and below and those above depict old donors who were above 34 years.

Table 11: Correlation between blood donation behaviour and attitude towards SMS message content: Educated and Less Educated.

Variable	BDB	ASMC	EN	IN	IR	CR
BDB		0.33	0.48*	0.31	-0.04	0.15
ASMC	0.34*		0.82*	0.82*	0.42*	0.64*
EN	0.26*	0.79*		0.77*	-0.04	0.50*
IN	0.39*	0.86*	0.65*		0.01	0.48*
IR	0.19	0.69*	0.32*	0.48*		-0.03
CR	0.27*	0.78*	0.56*	0.60*	0.26*	

Notes: The results below the diagonal line depict educated donors who have a qualification above primary certificate and above depict less educated donors with at most primary qualification.

5. Discussion

Several studies have assessed the application of SMS technology in delivery of health care services. Such studies however focused on application where individuals were benefiting from such applications, for example, health promotions and monitoring [7-9], appointments [10-13] and treatment [14]. Furthermore, the majority of such studies focused in developed countries. Although developing countries such as Malawi have much to gain from application of mobile technologies, they have received little research attention [17]. Additionally, developing countries such as Malawi are culturally different from developed countries. Malawi can be classified a predominantly associative culture [18]. This study therefore contributes towards technology transfer and diffusion discourses on one hand and transformative discourse of technology [19] on the other, in that it demonstrates how SMS technology is used and how it transforms behaviour.

5.1. Assessment of Attitude towards SMS Technology and Message Content

Firstly, the results suggest that there is internal consistency among the items used for measurement scales for attitude towards SMS technology acceptance and SMS message content consistent with meta-analysis results of the TAM model reported in [23,24] which suggested that perceived usefulness and perceived ease of use are robust constructs with high predictive validity and empirical results in [29, 35]. However, it is not known whether these models are moderated by external factors as pointed out by Yousafzai, *et al*.[23,24].

Secondly, although the SMS messages were sent without prior permission, the results suggest that there is still a positive attitude towards SMS technology among blood donors in Malawi which is a predominantly associative culture irrespective of age, marital status and gender. This contradicts results reported by Tang and Wong [28] who found that consumers had a negative attitude towards SMS message sent without permission. The reason could be that blood donation behaviour is a socially accepted norm. Furthermore, the results contradict the proposition by Lu *et al.* [36] that technology acceptance for wireless Internet is influenced by age and gender. Consistent

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with literature [23, 24, 26, 37] the construct of perceived ease of use is moderated by level of education even among blood donors.

Similarly, the results suggest that blood donors have a positive attitude towards SMS message content regardless of age, marital status and gender, contradicting results reported by Waldt and others [39] who found that there was negative attitude towards SMS adverts sent without permission among young consumer segment. However, the results suggest that attitude towards SMS message content among blood donors in Malawi is moderated by level of education. Donors without formal education qualification exhibit relatively negative attitude towards the content of the SMS message compared with those with formal educational qualification. Okozaki *et al*. [38] suggested that attitude towards mobile adverts had two antecedents, namely, informativeness and irritation; the results in this study further suggest that informativeness and irritation are significantly moderated by level of education.

These results show that the TAM and model for assessing acceptance of SMS message content provide a better understanding of the factors that influence attitude towards SMS technology and its use for sending and receiving SMS based reminders. The findings confirm existence of a positive attitude towards both SMS technology as a means of communication consistent with results in [37] and the content of the SMS message [5]. The attitude is however moderated by level of education which affects perceived ease of use, informativeness and irritation. However, the study did not investigate the effects of trust on the brands [5, 28] of MBTS and SMS operators had on the attitude towards SMS technology acceptance and content.

5.2. Relationship between Blood Donation Behaviour and Attitude towards SMS

Firstly the findings suggest that there is a positive relationship between attitude towards SMS technology and intention to donate blood after receiving an SMS based reminder. However, the strength of such relationship depends on gender, age and level of education. The relationship is stronger for female, old or less educated donors than male, young or educated donors. This suggests that female, old or less educated donors are more likely to be driven by an SMS based reminder to donate blood than male, young or educated donors. Although young males are normally early adopters of mobile technology [36], these results suggest that the young male donors are not necessarily driven by their attitude towards technology to donate blood. Furthermore, the results suggest that female donors are more likely to be driven by the perceived ease of use and perceived usefulness of SMS technology to donate blood than male donors. However, male, old or less educated are more likely to be driven by the subjective norms to donate blood than others. Although, in a predominantly associative culture, subjective norms dimension which is a social dimension is more likely to be strongly related to a socially accepted behaviour such as blood donation, the results suggest that social influence is becoming less among the young and/or educated people even in the associative cultures consistent with results in [29] among young urban Chinese. These results therefore suggest that individuals' characteristics (gender, age and level of education) moderate the strength of the relationship between attitude towards SMS technology and intention to donate blood after receiving SMS reminders.

Secondly, the results suggest that there is a positive relationship between attitude towards the content of SMS message and intention to donate blood after receiving an SMS based reminder. However, the strength of such relationship depends on gender, age and level of education in line with literature [31]. The relationship is stronger for

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male, old or educated donors than female, young or less educated donors. This suggests that male, old or educated donors are more likely to be driven by the content of the message of the SMS based reminder to donate blood than female, young or less educated donors. Furthermore, the results suggest that male, old or educated donors are more likely to be driven by the informativeness of the SMS message while young and less educated are more likely to be driven by the entertainment content of the SMS message. These results therefore suggest that individuals' characteristics (gender, age and level of education) moderate the strength of the relationship between attitude towards SMS message content and intention to donate blood after receiving SMS reminders.

These results demonstrate that SMS technology and its application in advertising can be used to influence reasoned behavioural change even in associative culture predominant in developing countries. Additionally, the strength of such influences is modified by individuals' characteristics. However, the effect of trust on brand and SMS provider were not considered in this study. Furthermore, this research was limited to blood donation behaviour which is a socially accepted behaviour. It will be interesting to relate attitude towards SMS technology and other behaviours which may not necessarily be socially accepted. Finally, this study was limited to blood donors who had received SMS reminders. It will be interesting to include those who did not receive reminders as a control group.

6. Conclusions

In this paper we applied the SMS technology acceptance models to assess the relationship between attitude towards SMS technology and blood donation behaviour in a predominantly associative culture. Firstly, we showed that blood donors at the MBTS in Malawi have a positive attitude towards both the SMS technology and the content of the SMS message. However, the attitude towards the content of SMS message is moderated by level of education. Furthermore, level of education affects the perceived ease of use of SMS technology, informativeness and irritation of the SMS message. Secondly, we established that there is a positive and statistically significant relationship between blood donation behaviour and attitude towards SMS technology and attitude towards the SMS message content. However, these relationships are moderated by gender, age and level of education. Specifically, subjective norms which depict social forces are related to socially accepted behaviour such as blood donation among male, old or less educated donors in a predominantly associative culture like Malawi. However, this research was limited to blood donation behaviour which is a socially accepted behaviour. It will be interesting to relate attitude towards SMS technology and other behaviours which may not necessarily be socially accepted. Furthermore, the study was limited to blood donors who had received SMS reminders. It will be interesting to include those who did not receive reminders as a control group.

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References

[1] Agarwal, N. Chandran-Wadia, L., and Apte, V. (2004) Capacity analysis of the GSM short message service, *in the Proceedings of the National Conference on Communications*, Bangalore, India.

[2] Tsang, M.M., Ho, S.C. and Liang, T.P. (2004) Consumer attitudes toward mobile advertising: An Empirical Study, *International Journal of Electronic Commerce*, 8(3): 65-78.

[3] Haghirian, P. and Madlberger, M. (2005) Consumer attitude toward advertising via mobile devices - An empirical investigation among Austrian users. *In Proceedings of European Conference of Information Systems*. Regensburg, Germany.

[4] Baron, S., Patterson, A. and Harris, K. (2006) Beyond technology acceptance: understanding consumer practice, *International Journal of Service Industry Management*. 17(2): 111-135.

[5] Suher, H.K. and Ispir, N.B. (2009) SMS advertising in Turkey: Factors affecting consumer attitudes. *Selçuk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 21: 447-458.

[6] Cole-Lewis, H. and Kershaw, T. (2010) Text messaging as a tool for behavior change in disease prevention and management. *Epidemiologic reviews*, 32(1): 56-69.

[7] Scherr, D., Zweiker, R., Kollmann, A., Kastner, P., Schreier, G. and Fruhwald, F.M. (2006) Mobile phone-based surveillance of cardiac patients at home, *Journal of Telemedicine and Telecare*, 12, 255-261.

[8] Armstrong, A.W., Watson, A.J., Makredes, M., Frangos, J.E., Kimball, A.B. and Kvedar, J.C. (2009) Text-message reminders to improve sunscreen use: A randomized, controlled trial using electronic monitoring, *Archives of Dermatology*, 145(11): 1230-1236.

[9] Ollivier, L., Romand, O., Marimoutou, C,. Michel, R., Pognant, C., Todesco A, Migliani, R., Baudon, D. and Boutin, J.-P. (2009) Use of short message service (SMS) to improve malaria chemoprophylaxis compliance after returning from a malaria endemic area, *Malaria Journal*, 8(236): 1475-2875.

[10] Downer, S.R., Meara and Da Costa, A.C. (2005) Use of SMS text messaging to improve outpatient attendance, *Med J Aust*, 183(7): 366-368.

[11] Koshy, E., Car, J. and Majeed, A. (2008) Effectiveness of mobile-phone short message service (SMS) reminders for ophthalmology outpatient appointments: Observational study. *BMC Ophtha*lmology, 8(9): 1471-2415.

[12] Foley, J. and O'Neill, M. (2009) Use of mobile telephone short message service as a reminder: The effect on patient attendance. *European Archives of Paediatric Dentistry*.

[13] Liew, S-M., Tong, S., Lee, V., Ng, C., Leong, K. and Teng, C. (2009) Text messaging reminders to reduce non-attendance in chronic disease follow-up: a clinical trial, *British Journal of general practice*, 59(569): 916-920.

[14] Mao, Y., Yantao, Z. And Suodi, Z. (2009) Mobile phone text messaging for pharmaceutical care in a hospital in China, *Journal of telemedicine and Telecare*, 14**,** 410-414.

[15] Manda, T.D. (2009) Understanding opportunities and challenges in using mobile phones as a means for health information access and reporting: A Case study from Malawi. *Master of Science in Information Systems thesis*, University of Oslo.

[16] Vinkatesh, V. (2000) Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the Technology Acceptance Model, *Information Systems Research*, 11(4): 342-365.

[17] Fusilier, M. and Durlabhji, S. (2005) An exploration of student internet use in India the technology acceptance model and the theory of planned behavior, *Campus-Wide Information Systems*, 22(4): 233-246.

[18] Kedia, B.L. and Bhagat, R.S. (1988) Cultural constraints on transfer of technology across nations: implications for research in international and comparative management, *Academy of Management Review*, 13(4): 559-71.

[19] Avgero, C. (2008) Information systems in developing countries: a critical research review, *Journal of Information Technology*. 23, 133-146.

[20] Fishbein, M. and Ajzen, I. (1975) *Belief, attitude, intention and behaviour: An introduction to theory and research*, Reading: Addison-Wesley.

[21] Gross, R. (2001) *Psychology: The Science of Mind and Behaviour*, London: Hodder and Stoughton.

[22] Ajzen, I. (1991) The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50*(2):*179-211.

[23] Yousafzai, S.Y., Foxall, G.R. and Pallister, J.G. (2007a) Technology acceptance: a meta-analysis of the TAM: Part 1. *Journal of Modeling in Management*, 2(3): 251-280.

Submitted: September 13, 2011 *Accepted: September 23, 2011*

[24] Yousafzai, S.Y., Foxall, G.R. and Pallister, J.G. (2007b) Technology acceptance: a meta-analysis of the TAM: Part 2. *Journal of Modeling in Management*, 2(3): 281-304.
[25] Venkatesh, V. and Davis, F.D. (2000) A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 46(2): 186-205.
[26] Yan, X., Gong, M.T. and James, Y.L. (2006) Two tales of one service: user acceptance of short message service (SMS) in Hong Kong and China, *Journal of Policy, Regulation & Strategy for Telecommunication, Information & Media*, 8(1):16-28
[27] Aripin, N. and Omar, S.Z. (2007) Perception and attitude of short messaging services (SMS) among students of Universiti Utara Malaysia, *International conference on Media, Culture and Society*, Malaysia.
[28] Tang, E.P.Y. and Wong, M.M.T. (2008) Consumers' attitude towards mobile advertising: The role of permission, *Review of business research*, 8(3): 181-185.
[29] Tong, X., (2010) A cross-national investigation of an extended technology acceptance model in the online shopping context, *International Journal of Retail & Distribution Management*, 38 (10): 742-759.
[30] Ducoffe, R.H. (1996) Advertising value and advertising on the web, *Journal of Advertising Research*, 36(5): 21-35.
[31] Brackett, L. K. and Carr, B. N. Jr. (2001) Cyberspace advertising vs. other media: Consumer vs. mature student attitudes, *Journal of Advertising Research*, 45(5): 23-32.
[32] Zanot, E. (1984) Public attitudes toward advertising: The American experience, *International Journal of Advertising*, 13:3-15.
[33] Barnes, S. (2002) Wireless digital advertising: Nature and implications. *International Journal of Advertising*, 21(3): 399-420
[34] Nunnally, J.C. and Bernstein, I.H. (1994) *Psychometric Theory*, 3rd ed., New York: McGraw-Hill.
[35] Gebauer, J., Shaw, M.J., & Gribbins, M.L.(2010) Task-technology fit for mobile information systems, *Journal of Information Technology* 25, 259–272.
[36] Lu,J., Yu, C.S., Liu, C. and Yao, J.E. (2003) Technology acceptance model for wireless Internet, *Internet Research: Electronic Network Application and Policy*. 13(3). 206-222
[37] McKechnie, S., Winklhofer, H. and Ennew, C. (2006) Applying the technology acceptance model to the online retailing of financial services. *International Journal of Retail & Distribution Management*, 34 (4/5): 388-410.
[38] Okozaki, S, Katsura, A. and Nishiyama, M. (2007) How mobile advertising works: The role of trust in improving attitudes and recall. *Journal of Advertising Research*, 47 (2), 165-178.
[39] Waldt, D.L., Rebello, T. M and Brown, W. J. (2009) Attitudes of young consumers towards SMS advertising, *African Journal of Business Management*, 3 (9),. 444-452.