

The facilitation of adoption and use of text intensive mobile services by low-literate users.

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Abstract: The challenge that low-literate users face when using text intensive artefacts is well documented. The barrier to entry and participation by these users to some socio-economic activities is exacerbated by current mobile phones which provide support for text intensive mobile services. Simple messaging, business and public service oriented mobile services may pose the most challenges. It is noted that text intensive mobile services carry significant impact in socio-economic participation involving communication, information seeking and knowledge generation. In order to support the emancipation of low-literate users and their voice in being heard it is of essence to enhance text intensive mobile services and motivate their adoption and use by these users. The aim of this paper is to explore attributes of text intensive mobile services that are inhibiting accessibility by low-literate users with the purpose of informing the enhancement of those mobile services to facilitate adoption and use by low-literate users. Tools facilitating the comprehension of users' acceptance, adoption and use of new technological systems and artefacts have successfully been applied to business related domains and will be explored for understanding and explaining low-literate user challenges with text intensive mobile services. The preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement will be used to select an appropriate tool from the available set. The use of such an acceptance tool may explain acceptance thus enabling the emancipation of low-literate users by facilitating their participation in socio-economic activities using text intensive mobile services.

Keywords: Low-literacy, text intensive mobile services, technology acceptance, socio-economic participation

Introduction and Background

Mobile phones have transcended from the simple facilitation of classical person to person communication as a complement for fixed line telephones to the multi-purpose devices providing support to individuals in a number of ways for a variety of tasks (Böhmer, 2013, p. 7). Mobile phones have eclipsed fixed line telephones in communication in the developed world and are competing with personal computers for information sharing and dissemination in the developing world (Donner & Gitau, 2009; infoDev, 2012) including South Africa (Mphidi, 2008). In fact mobile phones are in a new era by moving beyond being sources of information and communication to enabling knowledge sharing and dissemination allowing decisions to be made and adopted anywhere and anytime (Botha et al., 2010; Botha, van der Berg, Batchelor, & Islas Sedano, 2008). As a result, socio-economic participation is facilitated among different individuals (Aker & Mbiti, 2010; Wasserman, 2011). This is made possible by mobile services.

Mobile services are rich applications natively supported by mobile phones (Charland & Leroux, 2011; Holzer & Ondrus, 2011; Mei Min, Ling Hong, Jian Ai, & Pei Wah, 2012). Advanced mobile phones referred to as smart phones provide extensive support for mobile services which in turn allow the seamless support of different operations on mobile phones almost simultaneously (infoDev, 2012), in this regard mimicking personal computers. Voice communication, messaging (SMS and MMS) and even data services can be supported

simultaneously thus facilitating knowledge sharing and dissemination (Boyera et al., 2009; infoDev, 2012).

Mobile services inherently support information sharing and knowledge dissemination (Sharma, Fantin, Prabhu, Guan, & Dattakumar, 2016) and can play a pivotal role in facilitating sustainable development with minimalistic impact on the environment. Digital literacy particularly relating to mobile phones enable users to gain the most benefit in using mobile services for socio-economic participation and contributing to development within communities and society at large (Sharma et al., 2016; Wasserman, 2011). However literacy challenges inherent in society due to socio-economic challenges foster the emergence of illiterate individuals as well as individuals with differing degrees of low-literacy (Chipchase, 2005; Heugh, 2015). Low-literacy is not only manifested in academia but also in different sectors within communities thus posing challenges to the day to day functioning of individuals (Chipchase, 2005; *Functional Literacy In Eastern And Western Europe*, 1990). These challenges are more evident in users interacting with mobile phones since some mobile services required a degree of textual and numeric literacy in order to be used successfully (Chipchase, 2005).

Technological advancement in most mobile phones particularly smart phones, support multimedia and graphical user interfaces allowing users to successfully use mobile phones even with limited general literacy (Huenerfauth, 2002; Medhi et al., 2011; Medhi, Sagar, & Toyama, 2006). However, domain specific, public services related mobile services as well as information and knowledge dissemination mobile services are inherently text intensive and pose the greatest challenges to low-literate users (Anyasi & Otubu, 2009; Chaudry, Connelly, Siek, & Welch, 2012; Deep & Sahoo, 2015; Shaikh & Karjaluto, 2015). In the current study low-literate users refers to users experiencing challenges with low-literacy.

Text carries significance in general and particularly in text intensive mobile services. Text has been shown to provide direct and simple access to information with positive spinoffs on socio-economic impact within communities and society at large (Barker & Escarpit, 1973; Kirsch & Guthrie, 1977; Malale, 1996). According to Mphidi (2008) and infoDev (2012) e-services from which m-services (mobile services geared for government to citizen and citizen to government communication) are a subset of, are extensively employed by the government for public services in an effort to bridge the digital divide and make information available to its citizens. Current mobile phones especially smart phones provide extensive support for textual interfaces making them an ideal vehicle for mobile services geared for public, financial, health, education sectors and so forth thus encouraging socio-economic participation. The study will later show that text intensive mobile interfaces pose challenges to low-literate users potentially excluding these users from socio-economic participation.

Typically low-literate users prefer communicating through voice despite the associated cost instead of adopting more cost effective means of communication, information and knowledge sharing like messaging and social networks (Chipchase, 2005; Medhi et al., 2011). Due to the popularity of messaging and social network related mobile services low-literate users may be excluded from participating in these mobile services. Children at school going age have shown attraction to important features of mobile phones through social networks and messaging (Donner & Gitau, 2009; Kreutzer, 2009). Understanding and explaining challenges experienced by low-literate users with typical text intensive mobile services may foster participation and contribution to socio-economic activities by these users.

The current research will investigate the technology acceptance model (TAM) as a tool to understand text intensive mobile services for use by low-literate users. However, in light of the numerous extensions of the model the preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement will be used to identify a suitable version or extension of TAM to be used for the understanding of text intensive mobile services usable by

low-literate users. The rest of the paper is outlined as follows: the current section provides the introduction and background of the paper followed by the related work section. Subsequent to that section is the literature review; this will be followed by section on selecting a version of TAM appropriate for low-literate users. Finally, the discussion and the conclusion sections will be presented.

Related work

A number of studies have been undertaken to investigate the accessibility, potential adoption and use of mobile services by low-literate users. In the current section we highlight some of the studies that identified challenges experienced by low-literate users with mobile services, potential accessibility of mobile services with minimal text intensity as well as studies using visual interfaces as an intervention for providing mobile service access to low-literate users.

Chipchase (2005) noted that mobile phones, their interfaces and the services they provide inherently contain text and numbers which may pose challenges to low-literate users. According to Hellstrom and Scharff (2015, p. 55) the majority of mobile interfaces and their related services require some degree of literacy resulting in low-literate users being impeded from fully utilizing them. Subsequently the text intensive m-services employed by the government towards its citizens could potentially pose accessibility challenges to low-literate users. Rao and Ramey (2011) through their formal systematic literature review noted that low-literate users avoided text intensive mobile services and preferred calling rather than messaging and also preferred numeric or multimedia interfaces with minimal text intensity. Naturally, text intensive mobile services like USSD and SMS are extensively used by public services providers and financial institutions (Donner & Tellez, 2008; infoDev, 2012) for the benefit of users in the public sector and the associated clientele in the finance sector respectively. These mobile services are mainly text based only. Low-literate users generally experience challenges discerning and processing numerous text inherent in these mobile services (Kodagoda & Wong, 2008). Without intervention, such mobile services may potentially be not accessible to low-literate users (Medhi et al., 2011) and discourage adoption, acceptance and use of not only those mobile services but mobile services in general.

Medhi-Thies, Ferreira, Gupta, O'Neill, and Cutrell (2015) noted the significance of social media in low income communities within developing countries and tailored a social media mobile service for low-literate farmers assisted by mediators. Mediators were digitally literate individuals familiar with mobile phones in general and with solid educational background. From their findings it is noted that with the assistance of mediators a visual social media mobile service may be accessible to low-literate communities for socio-economic participation in restricted contexts due to privacy concerns by users stemming from the assistance provided by mediators (Medhi-Thies et al., 2015). Mediators may potentially eavesdrop on these users' communications. Ahmed et al. (2015) took advantage of interdependence between individuals within communities to design, with some success, an interface that would allow low-literate individuals to seek assistance from a digitally literate individual to access and use day to day operations of a mobile phone. These efforts may potentially facilitate the participation of low-literate users to socio-economic activities.

Beyond mobile services, Kemp and Eagle (2008) noted that low-literacy pose challenges to the health sector due to the lack of comprehension regarding the administration of medication for low-literate patients. According to Gribbons (2007) the health sector has a moral and economic responsibility to address the needs of low-literate users. Further, it is noted that that the health sector is on a trajectory of mobile services, for example the Mom Connect ("MomConnect," 2016) mobile service employing both SMS and USSD. Olivers, Huettig, Singh, and Mishra (2014) highlight that low-literate users may experience challenges

with visual searches due to cognitive shortcomings. This can potentially have an impact on the future use of general mobile services by low-literate users and not only text intensive mobile services as currently observed.

Kodagoda, Wong, Rooney, and Khan (2012), Kodagoda and Wong (2008) and Nielsen (2005) noted challenges experienced by low-literate users with text intensive interfaces, particularly those offered by mobile phones; from cognitive overload to general accessibility problems with discerning numerous text. Belay, McCrickard, and Besufekad (2016) sought to provide design guidelines for mobile interfaces geared for low-literate users. Challenges experienced by low-literate users were to be enhanced for designers potentially informing design considerations for mobile services in general to acknowledge the presence of low-literate users (Belay et al., 2016). Such an effort can potentially inform the design of not only general mobile services but also text intensive mobile services accessible and usable by low-literate users.

Challenges with text intensive mobile services experienced by low-literate users may result in these users being excluded in socio-economic activities and further widening the digital divide. The significance of designing mobile applications with low-literate users in mind to facilitate their socio-economic participation is considered essential (Chaudry et al., 2012) and is anticipated to occupy future design efforts (Meiselwitz, Wentz, & Lazar, 2010).

Current mobile services as supported by smart phones provide extensive support to multimedia and graphical user interfaces (infoDev, 2012). Designing current text intensive mobile services with low-literate users in mind could potentially allow the use of more visual interfaces making such mobile services accessible to low-literate users. Huenerfauth (2002) showed that interfaces designed for visually impaired users benefitted low-literate users while Gribbons (2007) noted that design considerations benefitting low-literate users may benefit aging populations as well. As a result text intensive mobile services accepted and usable to low-literate users may also extend the socio-economic participation of other users groups as well further contributing towards one of the goals of human computer interaction of promoting universal usability through designing for diverse user groups (Lazar, 2007).

Shneiderman (2000) points out that poor interface and interaction design remain one of the defining variables between technology haves and have not's and this extends to typical mobile services which are not designed with low-literate users in mind. According to Shneiderman (2000) accommodating user diversity including low-literate users, in application design is very important despite the challenge associated with such. Of essence is affording diverse user groups, including low-literate users access to text intensive mobile services, especially in light of the contribution of these services to the participation of users in socio-economic activities. In the next section we explore TAM as a tool that can be used in understanding and explaining the potential adoption, acceptance and use of text intensive mobile services by low-literate users as well as PRISMA as a tool that would enable the selection of attributes from TAM, text intensive mobile services and low-literate users that may afford low-literate users access and use thus facilitating socio-economic participation.

Literature review

The paper explores problems experienced by low-literate users with socio-economic participation using text intensive mobile services. The current section will undertake a literature review to address and ground concepts relating to low-literacy, mobile services and the tools identified in the study to explore interventions possible for enhancing mobile services for acceptance, adoption and use by low-literate users.

Low-literacy

Starting with low-literacy, the significance of profiling low-literate users is noted and such a profile is dependent on the concept of literacy. According to Lonsdale and McCurry (2004) literacy has no single universal definition. However, literacy is defined in a number of ways from different perspectives, contexts and aims (Malale, 1996). It is generally accepted that the classical definitions of literacy are mainly based on abilities to read and write (Kodagoda et al., 2012; Malale, 1996; Posel, 2011). According to Kirsch and Guthrie (1977) and Hellstrom and Scharff (2015) literacy is defined based on the acquisition of intellectual skills associated with basic competencies in reading and writing and other various educational measures. Closely associated with literacy is the concept of functional illiteracy which is noted to be interchangeable with functional literacy. Functional illiteracy is based on whether an individual can utilize written information in their day to day activities at home, work or in their communities (*Functional Literacy In Eastern And Western Europe*, 1990). Low-literate users are considered to experience degrees of functional illiteracy and are as a result of the different categorization of levels of literacy skills from no literacy skills to limited literacy skills (Hellstrom & Scharff, 2015; Kodagoda & Wong, 2008). It is noted that literacy plays a significant role in the general socio-economic participation of users and this potentially puts low-literate users at a disadvantage. Next mobile services are addressed highlighting their significance in supporting socio-economic participation by users as well as challenges some of them pose on low-literate users.

Mobile services

Mobile services consist of all applications geared towards the user running on a mobile phone, particularly smart phones and can be categorised in a number of ways. Some mobile services are considered basic services, mainly the communication related voice calling and messaging services (SMS, MMS and USSD) (Boyera et al., 2009; infoDev, 2012), while others are considered advanced services; mobile web, email and social media which are basically feature rich natively running mobile applications (Bouwman, Bejar, & Nikou, 2012; Nikou & Mezei, 2013). Some of the significant mobile services form social and community based interventions, others support self-expression and articulation while others are for consumption purposes (Bouwman et al., 2012). As a result the role of mobile services on socio-economic participation is indicative, from individual upliftment to community contribution.

Mobile services form part of the Mobile for Development (M4D) initiative involved with providing information and knowledge based services for individuals across a number of sectors, that is, government, health, finance, education and so forth (infoDev, 2012; Ogunleye et al., 2011; Svensson & Wamala, 2012; Wicander, 2010). However, some of the mobile services underlying the M4D initiative are text intensive thus not accessible to low-literate users with an adverse effect of excluding these users in socio-economic participation (Chaudry et al., 2012; Meiselwitz et al., 2010). As such, it is important to understand the use of text intensive mobile services by low-literate users in an effort to allow them to participate in socio-economic activities.

For an investigation of user acceptance, adoption and use of general mobile services, and text intensive mobile services in particular we turn to technology acceptance models, one of the most used in the field being the technology acceptance model. It is noted that a number of acceptance models exist as outlined partially in Venkatesh, Morris, Davis, and Davis (2003). However, the study opted to use the technology acceptance model due to its popularity and leadership status among competing acceptance models (Bagozzi, 2007; Marangunic & Granić, 2015). Bagozzi (2007) notes that the technology acceptance model has been a model of choice for a considerable period thus elevating its status among competing models.

The technology acceptance model

The technology acceptance model (TAM) has been used in a number of studies to understand and explain new technology acceptance, adoption and use (Bagozzi, 2007; Chuttur, 2009; Marangunić & Granić, 2015). According to Venkatesh et al. (2003) explaining user acceptance of a technology, particularly a new one is often described as one of the most mature research areas of contemporary Information Systems. According to Bagozzi (2007) the attributes of the technology acceptance model; perceived usefulness and the perceived ease of use of a (new) technology artefact determines the users intention to use it which in turn influences the users usage behaviour. According to Davis (1985) the acceptance of a technology artefact; an information or a computer system used by a user, is often affected by the attributes and characteristics of the artefact or system and its general appeal to that user. Users will be interested in adopting a technology only if they are comfortable using such technology and if it adds value to their work or day to day activities (Nelson, 2013). Having noted the significance of text intensive mobile services in supporting socio-economic participation, the technology acceptance model can be employed as a tool towards understanding and explaining the adoption, acceptance and use of text intensive mobile services by low-literate users thus affording low-literate users participation in socio-economic activities.

The current study needs to address attributes from TAM that can be beneficial to low-literate users in accepting text intensive mobile services. According to Marangunić and Granić (2015) the technology acceptance model has experienced a number of modifications and extensions as new constructs are added to the model to cater for different domains or to extend its validity. The process of selecting the appropriate version of TAM to be used in the study necessary to cater for low-literate users and text intensive mobile services and in light of the numerous modifications and extensions available (Bagozzi, 2007; Marangunić & Granić, 2015), will be guided by the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) statement (Liberati et al., 2009; Moher, Liberati, Tetzlaff, & Altman, 2009). In the next section the PRISMA statement will be applied to the literature on TAM to elicit the appropriate version to be used for enhancing text intensive mobile services for use by low-literate users.

Selecting a version of TAM appropriate for low-literate users

In the current section we present the preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement for the purposes of guiding the selection of an appropriate version of TAM to be used in the study. Such a version of TAM will facilitate eliciting attributes from text intensive mobile services and from low-literate users necessary for the successful application of the model. The PRISMA statement is the evolution of the Quality of Reporting of Meta-analyses standards (QUOROM) statement and generally provides weight to general literature reviews in particularly systematic and meta-analyses. The PRISMA statement was motivated by challenges highlighted by Mulrow (1987, p. 486) that most systematic literature reviews failed to meet a pre-specified scientific criteria. The investigative process on TAM was guided by the 27-item checklist of the PRISMA statement as advocated by (Liberati et al., 2009) and (Moher et al., 2009). This is presented in table 1 below – blank results were not given attention.

Table 1: PRISMA statement checklist

PRISMA Statement checklist item	Application on the research
Title	
1. Title	Exploring the Technology Acceptance Model on low-

	literate user challenges with text intensive mobile services.
Abstract	
2. Structured summary	The study explored the use of text intensive mobile services by users in general to make a case for the need to access these mobile services by low-literate users. Low-literate users generally have challenges using text intensive mobile services. Current smart phones provide support for designing mobile services to diverse user groups. Designers could consider low-literate users when designing mobile services.
Introduction	
3. Rationale	To inform research and practise on the needs of low-literate users with regards to text intensive mobile services and influence design considerations for general mobile service design and implementation.
4. Objectives	<ul style="list-style-type: none"> • To motivate low-literate users to use all mobile services through the design that acknowledges their challenges. • To enable the environment where there is free use and contribution to socio-economic activities by low-literate users through all mobile services.
Methods	
5. Protocol and registration	Not applicable as the articles to be evaluated were not split within a research team
6. Eligibility criteria	<ul style="list-style-type: none"> • Technology acceptance model studies • Mobile applications or mobile services • Studies involve low-literate users
7. Information sources	<ul style="list-style-type: none"> • Google scholar which also indexes Taylor & Francis Online, JSTOR, ACM Digital Library, Wiley Online Library and ScienceDirect among other journals, though theoretically all (Falagas, Pitsouni, Malietzis, & Pappas, 2008). • Search terms were: technology acceptance model mobile services low-literacy empirical study (0 results); empirical study (0 results); technology acceptance model mobile services low-literacy (0 results); technology acceptance model empirical study (20 results); technology acceptance model mobile (158)
8. Search	<p>The search strategy used followed the following approaches:</p> <ul style="list-style-type: none"> • Keyword search on the information sources specified in '7' above. The keyword used revolved around technology acceptance • Full title search on google scholar
9. Study selection	<ul style="list-style-type: none"> • Studies were selected primarily based on the title, abstract and where necessary scanning through the introduction, discussion and conclusion sections of the article. • Recommendations from the supervisor, co-supervisor and co-researchers.
10. Data collection process	Data extraction not undertaken. Fully read articles probed for the data analysis, methods and results.

11. Data items	User, mobile phone or mobile service attributes
12. Risk of bias in individual studies	
13. Summary measures	Perceived ease of use, perceived usefulness and behavioural intention
14. Synthesis of results	The studies investigated the acceptance, adoption and use of technology artefacts centred on mobile phones or mobile services in a number of domains. The technology acceptance model was the main tool used in the investigations. Mobile phones and mobile services were noted to provide support for business processes and participation of users with potential for adoption and use of the business processed in consideration facilitated by mobile phones or mobile services.
15. Risk of bias across studies	Constant or similar user groups despite potential benefit of artefacts to wider and more diverse user groups
16. Additional analyses	
Results	
17. Study selection	The final list of studies was selected based on the attributes: <ul style="list-style-type: none"> • Low-literacy • Mobile services • Technology acceptance or technology acceptance model
18. Study characteristics	Technology acceptance, mobile phones, low-literate users
19. Risk of bias within studies	<ul style="list-style-type: none"> • Generalize mobile services despite the requirements inherent in some like social media services, SMS, etc. • Generalize user groups in terms of literacy background due to bias towards developed countries.
20. Results of individual studies	Summarized in table 2 below
21. Synthesis of results	Not formally undertaken though key attributes of the original TAM, perceived ease of use, perceived usefulness and behavioural intention were investigated in detail.
22. Risk of bias across studies	Limited attention provided for the diversity of users particularly their different needs.
23. Additional analysis	The profile of the sample was given extensive detail as the attributes involving literacy were considered key in the study.
Summary of evidence	
24. Summary of evidence	Table 2 below.
25. Limitations	Limitations noted were the unavailability of low-literate users or attention given to literacy in the articles screened.
26. Conclusions	Text intensive mobile services from mobile phones may afford users support for socio-economic participation. However, low-literate users seldom considered in mobile service design in general with potential impact on their socio-economic participation.
Funding	
27. Funding	Centre for Industrial and Scientific Research (CSIR)

The flow diagram of PRISMA for study selection involving the stages of identification, screening, eligibility and inclusion (Liberati et al., 2009; Moher et al., 2009), is presented below:

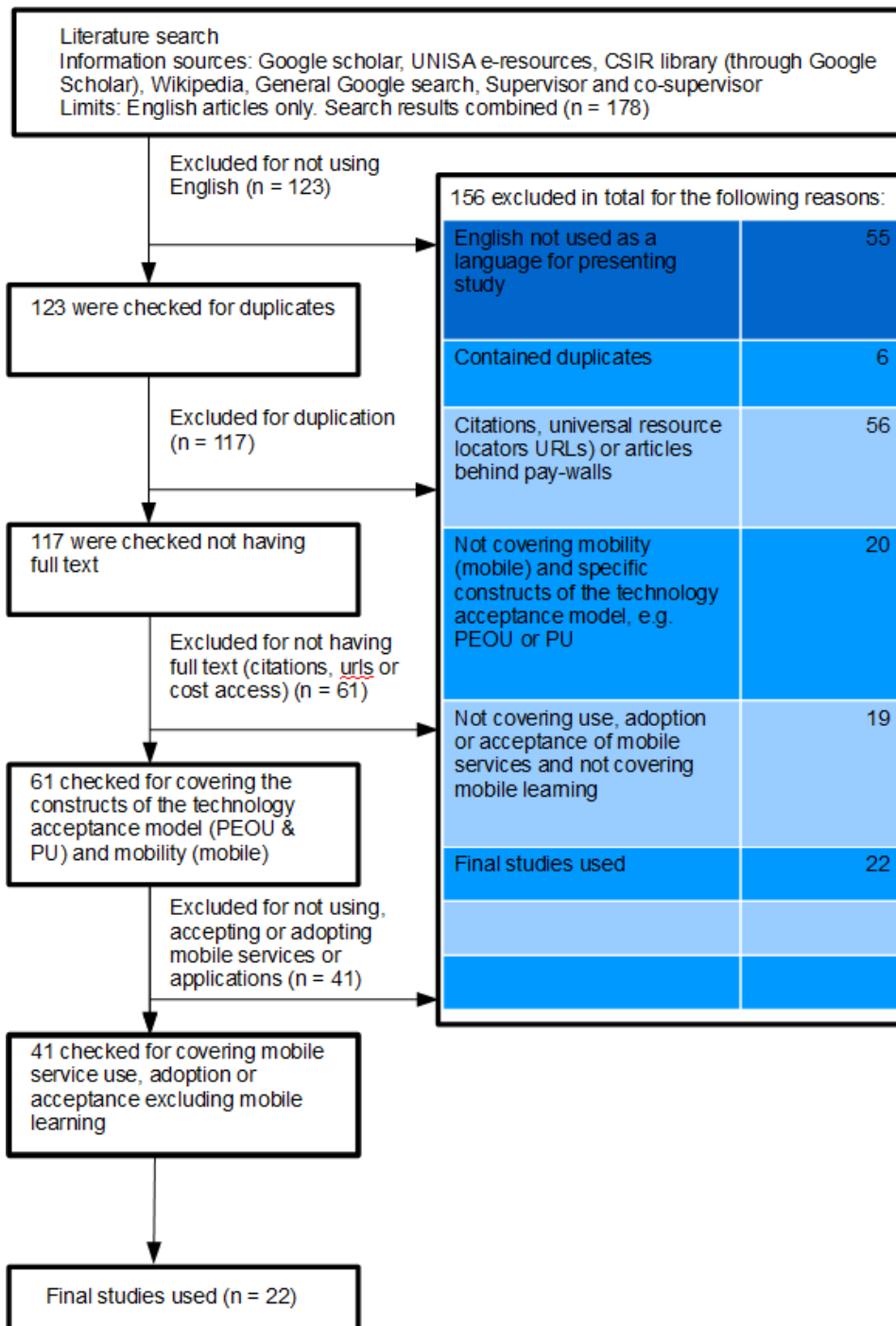


Figure 1: PRISMA flow diagram on TAM for mobile services

Key:
 TAM – technology acceptance model
 PEOU – Perceived ease of use
 PU – Perceived usefulness

The table below provides a list of articles which were dealt with in detail:

Table 2: List articles addressed in detail

Citation	Findings
1. Ozturk, Bilgihan,	TAM on m-commerce. Mobile Hotel booking (MHB)

Nusair, and Okumus (2016)	application. Small sample size, generalizability to diverse user groups limited.
2. Gebauer, Shaw, and Subramanyam (2007)	PEOU based on well-constructed mobile service may facilitate acceptance, adoption and use and may potentially be generalized to diverse user groups including low-literate users.
3. Ohk, Park, and Hong (2015)	PEOU and PU, both attributes of TAM are some of the attributes that have a positive behavioural intention. Sample did not take into account literacy consideration of the users
4. Choi, Park, and Park (2012)	Education mentioned as an attribute to be investigated in the study without any evidence. PEOU and PU tested with positive results in mobile services in tourism.
5. Lu, Yao, and Yu (2005)	Personal innovativeness in information technology (PIIT) has a positive impact on acceptance and usage of mobile services. PIIT is supported by PEOU and PU, constructs of TAM
6. Jayasingh and Eze (2009)	Malay individuals within the ages of 15 and 29. No information on educational background, literacy considerations not feasible. Messaging related communication, text, may be useful to low-literacy populations. PEOU and PU (TAM attributes) found to be significant in determining acceptance of mobile coupons.
7. Gao, Moe, and Krogstie (2010)	Mobile Student Information System assessed. PEOU from TAM among key determinants for adoption. PU has a negative impact on behavioural intention. Sample involved university students so relationship to low-literate users not applicable. However, it is necessary for designers to attend to specific needs of users geared for a mobile service, possibly low-literate users as well.
8. Kargin and Basoglu (2006)	TAM used in the study. However, university students used in the sample so relationship to low-literate users not applicable.
9. Gao, Krogstie, and Gransæther (2008)	Extended technology acceptance model, mobile services acceptance model (MSAM) used. MSAM contains PEOU and PU. Mobile service designed mainly with students in mind so consideration for low-literate users limited
10. Golding and Donaldson (2009)	Design science applied to TAM and used in the study. Random sample was used with a possibility of low-literate users. However, literacy was excluded in the study.
11. Whang, Lee, Kang, and Lee (2004)	Study deals with general mobile phone adoption using TAM. Low-literate users formed part of the sample but no special consideration was given. Main attributes considered for adoption mainly based on the mobile phone.
12. Praveena and Thomas (2014)	Continuance intention usage of Facebook – explanation through TAM. PEOU and PU influence behavioural intention (BI) to promote usage. Students used in the study with no attention to literacy.
13. Algethmi (2014)	Thesis – full analysis not undertaken.
14. Han (2005)	Thesis – full analysis not undertaken.
15. Pojon-Mannari (2011)	Thesis – full analysis not undertaken.
16. Nelson (2013)	Sample involved university students so relationship to low-literate users not applicable or possible to determine. PU useful and PEOU not that useful in determining behavioural intentions.

17. Bader, Baldauf, Leinert, Fleck, and Liebrich (2012)	TAM used in the study and PEOU with PU significant contributors in determining behavioural intention. Literacy considerations not made in determining sample.
18. Tsai, Wang, and Lu (2011)	TAM used in the study, but PEOU and PU not treated in depth. Sample profile not provided.
19. Yang and Zhou (2011)	Sample involved American college students who may not count as low-literate. TAM used in the study with PEOU and PU given little attention.
20. Jeung-tai and Chihui (2009)	TAM used in the study with PEOU and PU being significant contributors of behavioural intention. Literacy considerations not undertaken in the study.
21. Thanarithiporn (2004)	Dissertation – analysis not undertaken
22. Moon and Chang (2014)	Study undertaken on smart phones and not the associated mobile services. Literacy considerations not undertaken. However professional medical staff sampled in the study. TAM used and PEOU considered but not PU. PEOU shown to impact behavioural intention.

Discussion

The previous section illustrated the application of the PRISMA statement on TAM in investigating attributes necessary for the provision of text intensive mobile services to low-literate users. The original version of the technology acceptance model as explained by Davis (1985) and Davis, Bagozzi, and Warshaw (1989) contains attributes necessary to understand and explain the needs of low-literate users in adopting, accepting and using text intensive mobile services in light of the significance of the perceived ease of use and the perceived usefulness attributes of TAM.

A search was undertaken on Google scholar using search terms which were elicited through the study selection section (item 9) of the 27-item checklist of the PRISMA statement. The challenge of irrelevant studies (vom Brocke et al., 2015) was mitigated through starting off with more specific searches down to more general ones. In this way the challenge of returning thousands of results in search was alleviated. Initially 178 results were returned. The approach formed the identification process of the PRISMA flow diagram (Liberati et al., 2009; Moher et al., 2009).

From the 178 results, screening, eligibility and inclusion was undertaken resulting in 22 articles to be analysed in detail. These articles are listed in table 2. Five of the articles were thesis or dissertations, consequently detailed analysis not undertaken. From the remaining 17 articles, TAM was found to be significant in general particularly the core attributes PEOU and PU in the adoption, acceptance and use of mobile services. Other significant attributes from iterations of TAM were noted; subjective norm (TAM 2) (Venkatesh & Davis, 2000), and Social Influence Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). These were not taken into consideration.

It is noted that of the analyzed articles, the studies paid insignificant attention to the diversity of user groups which could potentially benefit in the use of the mobile services being studied. Bias was mainly towards developed countries with challenges like literacy not being addressed in the studies based on the sample chosen as most of the studies employed post basic education users to form the sample. From these studies it is noted that the technology acceptance model is significant in enabling practitioners to understand and explain the acceptance, adoption and use considerations for a new technology artefact. Consequently, the technology acceptance model can be extended to understanding and explaining the acceptance of text intensive mobile services by low-literate users. Future work in this regard

will need to properly define the attributes of low-literate users as well as define what constitutes text intensive mobile services and what does not.

The preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement applied to the literature review of the current study illustrated the lack of application of the technology acceptance model on mobile services use. Other models are generally used in investigating the usage of mobile services by users in set context, but few articles (Gao et al., 2008) and (Gao et al., 2010) used the technology acceptance model on mobile services. The situation is even more critical when the user group of low-literate users is used.

Conclusion

The study notes that text intensive mobile services play a significant role in affording users socio-economic participation. However, low-literate users generally experience cognitive challenges and challenges discerning numerous text making text intensive mobile services not accessible to these users. The technology acceptance model contain attributes that can be modified or extended to investigate the adoption and potential use of text intensive mobile services by low-literate users.

From the studies that were investigated for the acceptance of mobile services using TAM or its variants, little or no attempt was made to address the needs of diverse user groups as advocated by human computer interaction practises. The current study investigated socio-economic participation by low-literate users assisted by text intensive mobile services. In light of the user group of interest in the current study, the sample used in general in the studies analysed involved post basic education students or made no effort to investigate low-literate or illiterate users clearly illustrating a need for involving more diverse user groups.

The literature review investigated some studies which addressed the use of mobile services or mobile phones by low-literate users. However, in general the investigations in these studies did not employ TAM to understand and explain acceptance, adoption and use despite TAM having been validated numerously using a number of user groups and in different domains.

The preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement has been used for reviews in a number of domains particularly the health sector. However, there exists a gap in exploring TAM for a domain and a specific user group using the PRISMA statement. The current study provides a template for such an application as a contribution to the field of information systems in general and particularly where the needs of low-literate users are to be investigated.

The technology to enhance text intensive mobile services is available and supported by smart phones. So the onus is on the practitioners of text intensive mobile services like designers to have low-literate users in mind when designing mobile applications. The current study already explored key attributes from TAM, the perceived ease of use and the perceived usefulness involving mobile services and low-literate users necessary for the adoption, acceptance and use of text intensive mobile services by low-literate users. In this way it may be possible to minimise the text intensity inherent in these applications or provide support in other interfaces usable to low-literate users so as to afford these users socio-economic participation.

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