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Well-Defined Interface Development Process: An Important Interface Design Strategy to Create Easy-to-use Banking ATM System Interfaces in Nigeria

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Abstract-
Banking ATM interfaces that are perceived as useful and easy-to-use are key enablers in the effort to adequately cater for the illiterate and semiliterate users. Despite the significant importance of banking ATM technological innovations in Nigeria, written language level used by software developers in their design is one of the major factors that affect easy-to-use ATM system interfaces. ATM system interfaces have failed to cater for the illiterate and semiliterate Nigerians, representing about 40.33%, who do not perceive the ATMs as useful or easy-to-use. ATM interface design strategy, especially in the context of well-defined software development process, is key in overcoming these barriers. This case study was to identify strategies used by software developers of banking ATM systems in Nigeria to create easy-to-use banking ATM system interfaces in Nigeria. The technology acceptance model was adopted as the conceptual framework. Semi-structured and in-depth face-to-face interviews were conducted with nine banking ATM system interface developers form one organization in Enugu, Nigeria, and the analysis of 11 documents. Findings were validated through member checking. One major theme that emerged from data analysis was the importance of well-defined interface development process, that encompass the use of: (a) Software Development Life Cycle, (b) well-defined system design process, and (c) old system and new system analysis requirements to create desired system.This study's finding may equip interface developers with strategies to make tremendous impact on other services that require easy-to-use system interfaces.

Keywords: Banking ATM, SDLC, well-defined, system design, easy-to-use, ease of use, literacy levels.

1. Introduction

With banking ATMs, customers can make bank transactions from almost any other ATM system in the world. However, despite the importance attached to ATM systems in Nigeria, their usefulness, usage, and value have not been effectively realized. This is because the banking ATM system interface in Nigeria is difficult to use as it does not provide a good user-centered interface that can cater for a broad range of illiterate or semiliterate Nigerians. About 40.33% Nigerians aged 15 years and older are illiterate or semiliterate (Worldometers, 2017; United Nations World Population Prospects, 2015). Only 7.9% of Nigerians use ATMs, and 53% of adult Nigerians who are bank customers use their ATM cards (EFInA, 2014). These statistics point to the fact that ATM system interfaces are not perceived as useful or easy-to-use by variety of Nigerians with varying abilities and literacy levels. An easy-to-use banking ATM system interface has been found to be a significant dimension of ATM technology usability (Nasir, Wu, Yago, & Li, 2015).One of the important factors that affect perceived usefulness or easy-to-use of banking ATM system interfaces in Nigeria is that the written language level used by software developers in their design does not provide good understanding and most suitable tools and techniques that can cater for a broad range of illiterate or semiliterate Nigerians. (Jimoh & Babatunde, 2014).

Since ATM systems are no longer the province of the specialized users, software developers of banking ATM systems must learn to create easy-to-use system interfaces for a variety of people with varying abilities and literacy levels (Kim, Smith-Jackson, & Kleiner, 2014). Developers should be able to simulate users' needs on well-defined software development standards to gather knowledge about their abilities, limitations, and the most suitable dataset, tools, and techniques in the use of the system (Castillejo, Almeida, & López-de-Ipiña, 2014).The general IT problem postulated in this study was the lack of easy-to-use ATM system interfaces that are centered on well-defined software development standards for people with varying abilities and literacy levels in Nigeria. The specific IT problem is that some software developers of banking ATM systems in Nigeria lack strategies to create easy-to-use ATM system interfaces for a variety of people with varying abilities and literacy levels.

2. Review of the Professional and Academic Literature

In this section, we provided a review of professional and academic literature centered on strategies to create easy-to-use banking ATM interface systems in Nigeria whose design processes majored around the users' cultural backgrounds, literacy levels, and the use of well-defined software development standards. Our purpose was to review and critically analyze existing research by accredited scholars and researchers to identify what knowledge and ideas impact the various facets of this study. We critically detailed the strengths of the conceptual framework to give professional direction to this study. We examined and unveiled the need for software developers of banking ATM systems in Nigeria to acquire strategies to create easy-to-use ATM system interfaces for a variety of people with varying abilities and literacy levels by adhering to well-defined software development

processes.This review is organized in sections comprising of the technology acceptance model (TAM) conceptual framework, the existing banking ATM interface system in Nigeria, existing system interface development process, and significance of a well-defined interface development process.

This review was based on a literature search of online information obtained from the following international library databases: the ProQuest databases, ScienceDirect, UNESCO database, government and nongovernmental organization reports, Walden University collection of scholarly and peer-reviewed journals, and other related texts. A combination of phrases and terms were used as key search words in the databases for related literature.

2.1. Conceptual Framework

Customers are driven to adopt a technological innovation based on how easy it is to use and their perception of the usefulness of that technology (Safeena, Date, Hundewale, & Kammani, 2013). If a system user judges him or herself as more productive because of a technology that is perceived as easy to use, then the user will also perceive that technology as useful (Armenteros, Liawb, Fernández, Díaz, & Sánchez, 2013). It is against this premise that Davis's (1989) TAM conceptual framework was regarded the most suitable for this study aimed at developing easy-to-use banking ATM interfaces that will meet the needs of a variety of people with varying abilities and literacy levels. Designing an easy-to-use system interface is similar to the goals for introducing a new technology, with perceived usefulness (PU) and perceived ease of use (PEOU) as important in creating an easy-to-use system interface adoptability that may close the gaps created by user interface challenges (Wallace & Sheetz, 2014). The TAM conceptual framework therefore provided the foundation for this qualitative case study and how it was approached.

User centered design strategies empowered by well-defined interface development processsignificantly influence PU, and PEOU of users (Joo, Lee, &Ham, 2014). An understanding of how TAM's PU and PEOU are often influenced by the adoption of well-defined interface development processes will impact strategies developers use to create easy-to-use Banking ATM user interface that will cater for people with varying abilities and literacy levels. This property of TAM makes TAM to be the preferred user-acceptance model for this study which focuses on strategies developers use to create easy-to-use banking ATM system interfaces for a variety of people with varying abilities and literacy levels.

2.2 Existing Banking ATM Interface System in Nigeria

Some existing banking ATM user interfaces in Nigeria lack simple and easily understandable design and contents, which rendered them not easy-to-use by all users with varying abilities and literacy levels. Only 7.9% of Nigerians use ATMs and 53% of adults who are bank customers use their ATM cards (EFInA, 2014). One significant setback of banking ATM system adoption in Nigeria is that ATMs lack customized user-friendly interfaces. This makes the ATMs appear complex and difficult to use by users. To the ATM user, the interface is the product, not necessarily the ATM machine (Zhang,Wang, Deng, & Yin, 2013), and the most critical component of the ATM system that determines ATM acceptability (Darejeh & Singh, 2014a).

A relationship exists between concepts of "software non-usability" with complexity arising from user-unfriendly interface designs. ATM interface screen designs differ among the banks depending on the software developer organization engaged by the bank. Generally, there are menu options such as "Withdraw", "Current", "Savings", "Account number of beneficiaries" etc., which are not well understood by all people with varying abilities and literacy levels(Darejeh & Singh, 2014a;Jimoh & Babatunde, 2014, p. 116). Most existing ATM systems do not have interface facilities that are easy-to-use by users with varying abilities and literacy levels, such as (a) the ability of zoom in the software; (b) provision of speech recognition for interacting with software, and (c) customized abilities in software for tailoring font size and color (d). applying the principles that will reduce the complexity of the interface such as use of easily understandable words; (e) use of larger icons in preference to small icons; (f) use of attractive avatars (Cruz-Zapata, Hernández-Niñirola, Idri, Fernández-alemán, & Toval, 2014).

These deficiencies made some existing interfaces not easy-to-use by all users with varying abilities and literacy levels. Some existing banking ATM user interfaces in Nigerialack easily understandable design and contents such as the use of graphical metaphor to encourage those that are weak in vocabularies (Jegede,2014). Some are not very visible, because they just have a black background screen with illuminated text, which is quite dull and not very visible. This does not go well for the elderly users whether literate, or not. Poorly designed user interface (UI) is not easy-to-use or usable, no matter how well the machine performs (Alshameri & Karim-Bangura, 2014). However, a well-defined interface development process centered on a combination of text and graphical metaphor may improve the UI (SathishKumar &Kamalraj, 2014).

A study by Alfimtsev, Basarab, Devyatkov, and Levanov (2015), analyzed the values of human brainwaves when dealing with UI, and claimed that the brainwaves indicate "calm" when working with a friendly interface and "exited" or "nervous" or "agitated" when dealing with inconvenient UI. Alfimtsev, et al. (2015) claimed that the average values of brainwaves in calm and excited states depend on the interface usability. When users are agitated because the UI is not easy-to-use, more time is wasted on the ATM machine, resulting in long queue or much crowd at the ATM center (Zhang, et al., 2013). This is because the developers of these ATM user interfaces have assumed that ATMs are the province of the specialized or literate users (Darejeh & Singh, 2014b). In this case that assumption fails because the ATMs are not easy-to-use by all people of varying abilities and literacy levels who must not be denied of the use of ATMs(Omari & Zachary, 2013). Hence this study aims at identifying strategies software developers of banking ATM systems use to create easy-to-use ATM system interfaces for a variety of people with varying abilities and literacy levels.

2.3Existing System Interface Development Process

There are contributions in literature that point to existing system interface development process for providing high-quality and easy-to-use system interface products (Singh& Kaur, 2017). With the evolution of component-based software development methodologies, a couple of patterns or models of Software Development Life Cycle (SDLC) has emerged over the years (Elamin& Daleel,2016). This model forms the basis for the development of software products, system performance and efficiency. Software life cycle typically includes the following activities: requirements

analysis, specification, software architecture, implementation, testing, documentation, training and support, and maintenance (Gulia & Palak, 2017). While it is expedient for software developers to select the right SDLC model in line with thegoal and requirements, researchers have recommended a couple or combination of SDLC models for actualizing well-defined interface development process, categorized into two types: (a)traditional models which are characterized by their linear nature such as Waterfall model, Incremental model, Spiral model, V-shaped model, and RAD model, and (b) Contemporary models that are based upon the principle of iteration of SDLC processes: Agile model, and Extreme programming model (Abdullahi, & Ogwueleka, 2017; Suryantara&Andry, 2018).

Conformity to well-defined guidelines and standard practices is a prudent design strategy. However, some researchers have remarked that when developers are solely evaluated based on their conformityto well-defined guidelines and standard practices, they tend to default into the low effort and poor result-oriented strategies of conforming to standard practices (Patil, Tetlock, & Mellers, 2016). Developers may claim that their best strategies fall within the bounds of what is currently deemed as well-defined guidelines and best practiceeven whenthe desired results are not achieved, (Chang, Atanasov, Patil, Mellers, & Tetlock, 2017). As a result, process accountability has been put in place to evaluate system interface developers on the process they follow to achieve results, rather than on the results themselves (Chang, et al., 2017).

Nevertheless, in dynamic environments, using standard practices and well-defined interface development process can also boost performance for a few reasons (Patil,Vieider, & Tetlock, 2014). First, it is well-known that system interface developers are susceptible to a large number of cognitive biases (Bhatnagar&Singh, 2013), which can cause systematic errors (Sharma & Singh, 2015). Therefore, well-defined interface development standard practices that incorporate non-bias and error free guidance can protect developers from moving away from the organization design strategies (Karim, Albuolayan, Saba, & Rehman, 2016).Second, current stock of organizational know-how and their shared knowledge of cause-effect relationships that have worked in the past are usually embedded and reflected in the organization software development standard practices (Jindal, 2016). It is also imperative for developers to take an initial step toward assessing whether the interface designs that worked in the past primarily comply with desired usability principles that maximize user satisfaction and adoptability (Ezeanya, Choi, Friedman, & Kannaley, 2017). Standard practices can direct system developers' attention to relevant users' information in an uncertain environment (Elamin & Daleel, 2016; Agarwal, Singhal, & Garg, 2017), thereby sparing developers the frustrations of repeating the mistakes of their predecessors.

By contrast, system developers working under pure outcome accountability where they are simply expected to deliver results, may not be bound or protected by well-defined guidelines and standard practices. While outcome accountability may provide an additional incentive to produce a positively evaluated response, there is no guidance inherent in how to achieve that goal. Thus, faced with evaluative pressures to deliver results in an unfamiliar environment, developers under outcome accountability may flail under the uncertainty, sensing that they have been tasked with predicting the unpredictable (Patil et al., 2016). Nevertheless, some portion of developers' evaluations are still contingent on delivering outcomes that may or may not be possible to deliver. Under this situation, developers are put under cross-pressure: pulled between "staying safe" with standard practices and reaching for desired strategies and solutions to achieve outcomes (Patil et al., 2016). The consensus among researchers is that system interface developers should not overlook the importance of well-defined interface development standard practices that engage a couple of SDLC models, well-defined system design process, and the organizational shared knowledge and experiences that have worked in the pastto create desired system interfaces.The choice or combination of appropriate model(s) on a well-defined process and guidelines helps to shape strategies interface developers use to create easy-to-use system interfaces for intended users.

2.4Significance of a Well-Defined Interface Development Process

Choosing the appropriate SDLC between the system's modules are of paramount importance to ensure functional composability and scalability of the system interface developed within the specified well-defined software development process (Ribeiro & Hochwallner, 2018). Outside the specified well-defined software development process, the system interface created might be difficult to understand and use by users. A well-defined software development process eliminates ambiguities and enables design strategies to create system interfaces perceived as easy-to-use and useful by users (Woznowski, Tonkin, & Flach, 2018). Many researchers who attested to the benefits of adopting the SDLC model, noted that it is a good technique, easy to comprehend and well-defined, with facilities that can help developers to create user-centered and easy-to-use interfaces (Oluwaseun, Muyiwa, Olanrewaju, Omolaran, & Iyabo, 2017). Other researchers have suggested the inclusion of a piece of software's security objectives embedded in the software development process (Morrison, Moye, Pandita, & Williams, 2018; Aruna,Reddy, & Sunitha, 2016), to measure security risks and mitigations during software development (Aljawarneh, Alawneh, & Jaradat, 2017).

Making a good choice of SDLC is important, in continuing the traceability that defines and maintains relationships between artifacts involved in the software life cycle in both forward and backward directions, that is, from requirements to code and from code to requirements, respectively (Díaz, Pérez, & Garbajosa, 2014). It also set the developmental strategies that will yield the desired product within the time limit, while maintaining the quality of software products as per the standards (Awwad, 2017).The quality of a system interface is significantly dependent on its usability (Gupta, Ahlawat, & Sagar, 2017), and measured by different quality factors such as efficiency, effectiveness, reliability, usability, functionality, maintainability, and portability (Gupta, et al., 2017). Among these software quality factors, usability or user friendly or ease of use or easy-to-use, is found to be a significant software quality factor that needs to be considered in a well-defined software development process.Studies by Hoehle, Zhang, & Venkatesh(2015) have noted that a well-defined interface development process is important for improving usability values required for creating easy-to-use, and acceptable system interfaces. Also, fulfilling Users' requirement while creating system interfaces within the given budget and timeframe is the measurement of the success

of the project, and a requirement that must follow the standards process in a software engineering model (Ihsan & Kadir, 2018).

Also, software development life cycle (SDLC) provides planned and systematic arrangement of processes and strategies to create easy-to-use system interfaces (Kim, et al., 2014). Contributing to the issue of design process, Elamin and Daleel(2016)noted that SDLC model, which is mainly based on the concept of reusability and management of reusable components, provides additional resources to developers by making developers' research data services discoverable and reusable. This process, according to Machado, Rita, and Santos (2017), reduces the required skills due to impacted service reuse, and provides an important advantage of avoiding replication of software that already exists. This enables the reuse of system data services where applicable. Tracing or referencing each of the requirements at any phase of the developmental process, are important functions of a well-defined SDLC in the process of creating user-centered interfaces that users will perceive as useful or ease of use.

3. Methodology

This study was guided by the research question: What are strategies used by software developers of banking ATM systems in Nigeria to create easy-to-use ATM system interfaces?Interview questionsthat addressedour research questionwere designed to answer "how" or "why" questions that are tied to gaining in-depth knowledge of strategies and methodologies to create easy-to-use banking ATM system interfaces.Our study was largely exploratory in nature, with the intention to gain subjective in-depth knowledge of strategies developers use to create easy-to-use banking ATM system interfaces. Case studies are typically designed to answer "how" or "why" questions (Fagerholm, Kuhrmann, & Münch, 2017). Qualitative case study research method was deemed suitable when the research is largely exploratory in nature (Odeyemi, 2017), with a pre-defined population within a specific geographic area (Navroodi, Zarkami, Basati, & Limaei, 2016), intended to gain in-depth understanding and richness of insights from relatively few participants who can describe their in-depth experiences or knowledge (Dey & Lehner, 2017), and the interest is focused on the specific case itself and not on the participants (Yohannes, 2017). Subjective in-depth gathering of knowledge to explore and discover meaning are often associated with data generally gathered in words, texts, images, including non-verbal cues (Odeyemi, 2017). We adopted a qualitative single case study approach.

We engaged a non-random (non-probability), purposive census sampling. Purposeful sampling has been adopted as a distinctively precise qualitative sampling approach to case study selection (Patton, 2015), designedfor an in-depth exploration of the object of study or phenomenon of interest, with a pre-defined population within a specific geographic area (Navroodi, et al., 2016).Case study emphasizes the use multiple data sources to gain multiple perspectives and validation of data (Carter, Bryant-Lukosius, Blythe, & Neville, 2014). The phenomenon of interest (the case) is the strategies used by ATM system interface developers to create easy-to-use ATM system interfaces for people with varying abilities and literacy levels.We adopted a holistic single case approach because this study is focused on a specific case. Therefore, single case study was selected for this study.The analysis methods that are adopted in a case study further develop and explore the case, guided by context and emergent data to generate the expected reports, codes and themes (Brobeck, Odencrants, Bergh, & Hildingh, 2014).Case study design was considered appropriate for this study. Exploratory case study seeks to gain in-depth knowledge of the phenomenon of interest, often with the use of face-to-face interviews conducted in open-ended semi-structured questions (Lekunze & Strom, 2017).

To gain in-depth knowledge of strategies and methodologies to create easy-to-use banking ATM interfaces we adopted face-to-face interviews conducted in open-ended semi-structured questionnaires. We also used multiple sources of data from participant observation, interviews, field notes and reflective journals, and documentary to leverage the use methodological triangulation to gain multiple perspectives, maximize reliability and validation of data and build coherent justification of data interpretation. This we further achieved through member checking. Member checking establishes a back and forth conversation between the researcher and her participants around every stage of the process of data collection as a means achieving saturation, by giving participants the ability to read the researcher's interpretations and provide any corrections or additional information (Burda, van den Akker, van der Horst, Lemmens, & Knottnerus, 2016; Simpson & Quigley, 2016). We engaged member checking as a means of achieving saturation, by giving participants the ability to read the transcribed data, interpretations and by providing any corrections or additional information.

4. Data Collection and Analysis

The eligibility criteria that defines the population of this study included developers from one banking ATM system interface developer organization who have the required English proficiency, are 18 years or older, have strategies to create easy-to-use ATM system interfaces for people with varying literacy levels, within the last three years, and live in Enugu, Nigeria. Eligibility criteria in a qualitative case study minimizes the heterogeneity of the study population (Hanson et al., 2016), majorly results to less varied populations (Morar, et al., 2015), and defines the required case participants (Noyes, et al., 2016). The eligibility criteria limited this study to participants from one case organization, estimated to have 12 developer employees. Based on the small population size, resulting from the eligibility criteria that defines the population and the peculiarity of the study, we adopted a type of purposeful sampling known as census sampling for this study. A good sampling technique is one that deploys strategies that are coherent, achievable, appropriate (Annamdevula &Bellamkonda, 2016), and can explicitly and systematically address greater validity and stronger quality of the study (Roy, Zvonkovic, Goldberg, Sharp, & LaRossa, 2015).

Purposeful sampling is distinctively engaged asprecise qualitative approach to case selection (Patton, 2015). Moreover, purposeful sampling was used mostly by qualitative case study researchers (Bogaert, Bochenek, Prokop, & Pilc, 2015; Gokmen, et al., 2017), especially where it is quite difficult to select samples by random to represent the measuring tools in the case study (Palinkas, et al., 2015), and where the intent is to sample information-rich or in-depth cases (Benoot, Hannes, & Bilsen, 2016). According to Etikan, Musa, & Alkassim(2016, p.3), where the number of cases being investigated is relatively small, census sampling, is generally used.The selection of census sampling implies the inclusion of the entire population of 12 developers as eligible

participants for our study.The consensus of many qualitative case study researchers on data saturation, is that data saturation is achieved by continuous collection of enough data to the point where additional input from further sources of data do not continue to generate new information (Marshall, Cardon, Poddar, & Fontenot, 2013; Veletsianos, & Shepherdson, 2016), or continue to impact the research question (Suárez-Guerrero, Lloret-Catalá, & Mengual-Andrés, 2016), or generate new themes (Coorey, et al., 2017).

To ensure data saturation we interviewed all the participants and ensured that we asked the questions that will generate rich (high quality) and thick (enough quantity) data that there will be no more information to get. Data saturation from the interview data was reached with the ninth participant. The idea of securing data saturation based on rich (high quality) and thick (enough quantity) rather than the size of the sample alone is widely approved (Azmat, & Rentschler, 2017). We further ensured data saturation by gathering multiple sources of data from participant interviews, case organizations' regulations, policies, and design guidelines documents that are focused on well-defined interface development process from participant case organization and from other non-participant case organizations. We reviewed Central Bank of Nigeria (CBN) documentary guidelines for ATM software designs in Nigeria. Also, we reviewed data from our field notes and reflective journals that contained some major issues raised during the interviews. Qualitative case study approach generally calls for the use of multiple sources of data (Kandasamy, et al., 2017), as a strategy to further secure data saturation, gain multiple perspectives and validation of data (Ledo-Andión, López-Gómez, & Castelló-Mayo, 2017), and to enhance data credibility, and triangulation (Mccardle, & Hadwin, 2015; Patton, 2015).This is because, in a single case study that is limited to one case organization, the external validity, which is related to generalizability, can be lacking (Stålberg & Fundin, 2016), except if the case study was strengthened with other multiple sources of data aside participant interviews.

We collected data using semi-structured, in-depth face-to-face interviews with these 9 banking ATM system interface developersinterviewed at locations determined according to participant's preference. Researchers have claimed that while conducting semi-structured, face to face interviews, it is expedient that the interview location be determined according to participant's preference (Foley, Boyle, Jennings, & Smithson, 2017; Power, Kiezebrink, Allan, & Campbell, 2017; Spillane, Larkin, Corcoran, Matvienko-Sikar, & Arensman, 2017). This is because determining interview location according to participant's preference, serves as a methodological function that provides an opportunity to shape the research process (Ecker, 2017). However, providing appropriate interview location should not be based on technical matter of convenience and comfort alone but should be examined within the social context of the study (Ecker, 2017), and regarded as an integral part of the interpretation of the findings from the study (Foley, et al., 2017). We worked with participants to ensure that interviews were held in a suitable and quiet location at the participants' choice place with no other individuals present.This allowed participants to share personal views more freely in a setting that will suit their comfort, convenience, confidence, privacy, and with the least distraction.We also analyzed 11 documents: 5 from participant case organizations and 6 from nonparticipant case organizations with emphasis on well-defined interface development process design strategies. Other documents included our field notes and reflective journals that contained some major issues raised during the interviews. The distribution of these 11 documents is shown in Table 1.

Table 1
Documents Reviewed by Sources

Participant case organization	Sources of Documents Reviewed				
	Nonparticipant case organization				
	CBN	80 ATM system interface screen shots	Systems Development Life-Cycle Phases	Field notes	Reflective journals
n=5	n=2	n=1	n=1	n=1	n=1
Regulations and ATM technology and specification	Standards and guidelines on ATM operations in Nigeria	80 ATM system interface screen shots	Systems Development Life-Cycle Phases	Field notes	Reflective journals
User interface design guidelines for creating easy to use interfaces	Guidelines on Operations of Electronic Payment Channels in Nigeria				
User requirements analysis (proactive) procedures					
Reactive (feedback) guidelines					
System development and simulation procedures					

Note. n = number of documents

Researchers have recommended various strategies such as methodological triangulation and member checkingto ensure data saturation (Hoque, Covaleski, & Gooneratne, 2013; ODonnell, Tierney, Austin, Nurse, & MacFarlane, 2016), build coherent justification of data interpretation (Hoque, et al., 2013; Seth, Mustonen-ollila, Taipale, &

Smolander, 2015; Yilmaz & Özkan, 2016), and to ensure the validity and credibility of instruments used (Morse, Lowery, & Steury, 2014). Member checking givesthe participants the ability to read the researcher's interpretations and provides any corrections or additional information (Burda, et al., 2016; Simpson & Quigley, 2016). We engaged member checking to increase the reliability and validity of our findings from the participants. To achieve this, we provided each participant a summary of the interview to verify if we understood the intent of their responses. Through member checking, we also allowed participants an opportunity to verify the accuracy of the interview by giving them the opportunity to read the transcribed data and the interpretations from the data, and to provide any corrections or additional information. We employed methodological triangulation to facilitate validation of multiple sources of data collected through interviews, observations, and documents.ATLAS.ti7 (version 7) was used to facilitate our data analysis.

4.1 Ethical Considerations

We obtained Ethical approval for this study fromthe Institutional Review Boards (IRB) of Walden University's Center for Research Quality (11-10-17-0512580). We also adopted the Belmont Report's three principles for ethical research: respect for persons, beneficence, and justice (The Belmont Report, 1979) as the standard for conducting this study and for providing the ethical principles required for this study

5. Findings

One major theme that emerged from data collection and analysis was the importance of well-definedinterface development process. A well-defined software development process ensures good software quality product based on the following software quality factors: efficiency, effectiveness, reliability, usability, functionality, maintainability, and portability. Among these factors, usability or easy-to-use,wasfound a significant software quality factor that needs to be considered in a well-defined software development process.This theme relates to the conceptual framework for this study because usability factor or easy-to-use is consideredas significant drivers of TAM. This is because software development process usually incorporates usability testing, and during the usability testing, PU and PEOU, TAM's major determinants, are mostly useful for user acceptance testing (Davis, 1989; Sharma, &Singh, 2015).

Table 2
Frequency of Major Theme

Source of data collection	Important components of well-defined interface development process		
	Software Development Life Cycle (f)	System design has a well-defined process (f)	Analyze old system and new system requirements to create desired system (f)
Participants	9	6	4
Documents	1	3	2

Note. f = frequency

The Theme, Importance of well-defined interface development process,encompasses the process that follows a well-defined standard Software Development Life Cycle (SDLC) which the developers follow when creating easy-to-use ATM system interfaces. Table 2 shows three important components of well-defined interface development process as evident from this study and the frequency (number) of participants who indicated these components of well-defined interface development process as strategies to create easy-to-use system interface. Table 2 also shows the number of supporting documents that contained these important components of well-defined interface development process. These frequencies are not mutually exclusive because two or more of these components may appear in one document. The content included SDLC processes that start with the definition, gathering and analysis of users' requirements and system boundary(varied cultural and literacy levels); the design, to the deployment of products. All participants stated that while the SDLC provides valuable guidance for developing the system interface processes, developers must not fail to address the continual change for end-users' requirements that demands a continual cycle of implementation support until the requirements of the users are met.

All the participants attested that a well-defined interface development process is important because it enhances developers' resource skills, effective communication and decision-making abilities along the project life cycle, that majorly contributes to the delivery of high-quality interface products. It was stated that, while developers come with their skills set, knowledge and expertise in the developmental process, there is the impression that the ability and freedom to clearly articulate what is required and what should be delivered is critical in developing high quality user-centered and easy-to-use system interface. Participant #8 stated, "system design has a process. What is important is developer skill in software development to implement correctly the component or subsystem assigned to him, and to perform effectively the verification and validation function". Participant # 5 stated that design process is well-defined, progressing from studying and understanding the current or old system to using the analyzed requirement within the old system, to affect some changes within the current system, thereby producing interfaces that are required by intended users.

Furthermore, most of the participants believed that knowledge sharing among project team members is very important especially during the time to bring together all developers' design strategies in the organization to ensure one coherent, easy-to-use, and acceptable banking ATM system interface. Participants # 1, 2 and 8 noted that, aside the SDLC model providing an important platform for synergy for developers' resource skills, effective communication and decision-making within and among developers on how well the process is adhered to, is important in creating easy-to-use interfaces. Contributing to the issue of design process, participant #7 noted that the model also provided additional

resources to developers by making developers' research data services discoverable and reusable. This process, according to this participant provides an important advantage of avoiding replication of software that already exists and enabling the reuse of system data services where applicable. According to participant # 7, 8 and 1, following the developmental processes in a manner that makes it possible to trace or reference each of the requirements at any phase of the developmental process, are important strategies in the process of creating user-centered interfaces that users will perceive as useful or ease of use. These findings from participants support the theme.

Out of the eleven documents reviewed in this study, six were used in achieving methodological triangulation to enhance the reliability and validity of this theme. They include documents on regulations and ATM technology and specification, user interface design guidelines for creating easy to use interfaces, user requirements analysis (proactive) procedures, reactive (feedback) guidelines, system development and simulation procedures, and SDLC phases as shown in Table 1. The document onregulations and ATM technology and specification on the design process received from the case organization highlighted some attributes of system requirements: correctness, conciseness, completeness, unambiguous, verifiability, modifiability and traceability. This document details good users' requirements analysis and supports the findings from the participants in this study. Also, provided by our case organization is another document on the system development and simulation procedures, providing developers with information on the foundation and principles to guide practices throughout the systems development life cycle and beyond. A document onSDLC was also reviewed, contains guidelines to follow in tracing some of the case challenges from user requirement analysis (varied cultural and literacy levels) to implementation or the other way around. Also, SDLC models other than the conventional Waterfall Model were also reviewed that showed practicalevidence of differences between the models and potential inconsistencies. These apparent differences and potential inconsistencies between the models encourage developers to work independently without requiring a continuous reconciliation of their models and views for some periods of time. This also promotes skills and talents within and among interface developers required to strategize for the creation of easy-to-use system interfaces. Findings from document reviewed support the finding from participants. These findings are consistent with the theme, and with the conceptual framework for this study.

It is evident from the review of professional and academic literature of this study that many researchers and developers of ATM system interfaces have worked with well-defined interface development processes for creating easy-to-use, and acceptable system interface. Studies by Hoehle et al. (2015), have noted that A well-defined interface development process is important for improving usability values (Hoehle et al., 2015),which is measured by efficiency, effectiveness, reliability, usability, functionality, maintainability, and portability (Gupta, et al., 2017). These factors are duly considered in a well-defined software development process. The theme supports the literature and is consistent with TAM conceptual framework for this study in that usability or easy-to-use, efficiency, and effectiveness, considered in a well-defined software development process as significant software quality factors, are also significant drivers of TAMThese factors that validate usability: effectiveness, efficiency, self-efficacy, enjoyment, and satisfaction also validate TAM's two major determinants: PU and PEOU and found in literature to be significant drivers of TAM (Teoh, Siong, Lin, & Jiat, 2013). This theme supports the literature and the conceptual frame work for this study.

Thebenefits of well-defined interface development process include, among others, reduced required skills due to impacted service reuse (Machado, et al., 2017; Sinha &Jain, 2013). Recent research studies reported that it takes a well-defined interface development processes to actualize improved interface products that are reliable, easy-to-use, and acceptable (Liou,Hsu, &Chih, 2017), with increased developer productivity (Branco, Xiong, Czarnecki, Küster, & Völzer, 2014). The success of designing a system interface that is easy-to-use and perceived as useful and ease of use is tied to the adoption of a well-defined interface development process. A well-defined interface development process has numerous benefits that included, among many others, users' perceived usefulness, ease of use, and improved software quality (Sun, Ha, Teh, & Huang, 2017). The findings from this study support their research findings.The theme supports this literature and is relevant in providing answer to the research question for this study, because the theme: well-defined interface development process, is considered as strategy by software developers of banking ATM systems in Nigeria to create easy-to-use ATM system interfaces for a variety of people with varying abilities and literacy levels.Recent literature also supports the findings from this study regarding the adoption of one of the primary, very common, and the oldest software development architecture: the waterfall method with a five-step developmental series of phases that are simply and well-defined, with the output of one phase providing the input to the next phase (Nugroho, Hadi, & Hakim, 2017; Mitri, Cole, & Atkins, 2017). The choice or combination of appropriate model(s) on a well-defined process and guidelines helps to shape strategies interface developers use to create easy-to-use system interfaces for intended users.The findings in this section is consistent with the conceptual framework of this study,the purpose of this study, and provided answer to the research question for this study.

6. Discussion and Conclusion

Well-defined interface development process is important for the success of creating easy-to-use banking ATM system interfaces that will cater for people with varying abilities and literacy levels. Developers of banking ATM system interfaces that have value for adaptability and reusability of services as their top priorities, must see the need to synergize their skills and talents with a well-defined SDLC guidelines. Well-defined interface development process is the key strategy to shorten developers' development lifecycle time, reduce developmental costs, improve valuable guidance for developing user-centered system, increase developer productivity, improve software quality, and prioritize accurate requirements to understand how users may perceive the product as reliable, useful, ease-to-use, and acceptable. Easy-to-use is an important criterion to assess the quality of banking ATM systems, and one of the success indicators of a system that is suitable with the users' needs. However, this process is perfected with the use of well-defined interface development process.

References

Abdullahi, Y. E., & Ogwueleka, F. N. (2017).A Software System Development Life Cycle Model for Improved Students' Communication and Collaboration.

International Journal of Computer Science & Engineering Survey, 8(4), 1-11. doi:10.5121/ijcses.2017.8401

Agarwal, P., Singhal, A., & Garg, A. (2017). SDLC Model Selection Tool and Risk Incorporation. *International Journal of Computer Applications, 72*(10), 6-10. doi:10.5120/ijca2017915143

Alfimtsev, A.N., Basarab, M.A., Devyatkov, V.V., & Levanov, A.A. (2015). A new methodology of usability testing on the base of the analysis of user's electroencephalogram. *Journal of Computer Sciences and Applications, 3*(5), 105-111. doi:10.12691/jcsa-3-5-1

Aljawarneh, S. A., Alawneh, A., & Jaradat, R. (2017). Cloud security engineering: Early stages of SDLC. *Future Generation Computer Systems, 74*(1), 385-392. doi:10.1016/j.future.2016.10.005

Alshameri, F., &Bangura, A. K. (2014). Generating metadata to study and teach about African issues. *Information Technology & People, 27*(3), 341-365. doi.:10.1108/itp-06-2013-0112

Annamdevula, S., &Bellamkonda, R. S. (2016). The effects of service quality on student loyalty: The mediating role of student satisfaction. *Journal of Modelling in Management; Bradford, 11*(2), 446-462. doi:10.1108/jm2-04-2014-0031

Armenteros, M., Liawb, S., Fernández, M., Díaz, R. F., & Sánchez, R. A. (2013). Surveying FIFA instructors' behavioral intention toward the multimedia teaching materials. *Computers & Education, 61*, 91-104. doi:10.1016/j.compedu.2012.09.010

Aruna, E. R., Reddy, A. R. M., & Sunitha, K. V. N. (2016). Design of Patient Monitoring System (PMS) Application using Security Design Patterns in Architecture Phase of Secure SDLC. *International Journal of Modern Trends in Engineering & Research, 3*(12), 29-34. doi:10.21884/ijmter.2016.3147.wiihu

Awwad, A. M. A. (2017). Localization to bidirectional languages for a visual programming environment on smartphones. *International Journal of Computer Science Issues, 14*(3), 1-13. doi:10.20943/01201703.113

Azmat, F., &Rentschler, R. (2017). Gender and ethnic diversity on boards and corporate responsibility: The case of the arts sector. *Journal of Business Ethics, 141*(2), 317-336. doi:10.1007/s10551-015-2707-0

Belmont Report (1979). *The Belmont Report: Ethical principles and guidelines for the protection of human subjects of research.* National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. Retrieved from hhs.gov/ohrp/humansubjects/guidance/belmont.html

Benoot, C., Hannes, K., & Bilsen, J. (2016). The use of purposeful sampling in a qualitative evidence synthesis: A worked example on sexual adjustment to a cancer trajectory. *BMC Medical Research Methodology, 16*(1), 21. doi:10.1186/s12874-016-0114-6

Bhatnagar, M., &Singh, P. K. (2013). Research Methodology as SDLC Process in Image Processing. International Journal of Computer Applications, 77(2), 43-45. doi:10.5120/13369-0972

Bogaert, P., Bochenek, T., Prokop, A., & Pilc, A. (2015). A qualitative approach to a better understanding of the problems underlying drug shortages, as viewed from Belgian, French and the European union's perspectives. *PLoS One, 10*(5), 1-20, doi:10.1371/journal.pone.0125691

Branco, M. C., Xiong, Y., Czarnecki, K., Küster, J., & Völzer, H. (2014). A case study on consistency management of business and IT process models in banking. *Software and System Modeling, 13*(3), 913-940. doi:10.1007/s10270-013-0318-8

Brobeck, E., Odencrants, S., Bergh, H., & Hildingh, C. (2014). Patients' experiences of lifestyle discussions based on motivational interviewing: A qualitative study. *BMC Nursing, 13*(1), 1-7. doi:10.1186/1472-6955-13-13

Burda, M., van den Akker, M., van der Horst, F., Lemmens, P., &Knottnerus, J. A. (2016). Collecting and validating experiential expertise is doable but poses methodological challenges. *Journal of Clinical Epidemiology; Elmsford, 72*(1),10-15. doi:10.1016/j.jclinepi.2015.10.021

Carter, N., Bryant-Lukosius,D. A., Blythe, J., & Neville, A. J. (2014). The Use of Triangulation in Qualitative Research. *Oncology Nursing Forum, 41*(5), 545-547.

Castillejo, E., Almeida, A., & López-de-Ipiña, D. (2014).Modelling users, context and devices for adaptive User Interface systems. *International Journal of Pervasive Computing and Communications, 10*(1), 69-91. doi:10.1108/ijpcc.09.2013-0028

Chang, W., Atanasov, P., Patil, S., Mellers, B. A., & Tetlock, P. E. (2017). Accountability and adaptive performance under uncertainty: A long-term view. *Judgment and Decision Making, 12*(6), 610–626

Coorey, G. M., Neubeck, L., Usherwood, T., Peiris, D., Parker, S., Lau, A. Y. S., … Redfern, J. (2017). Implementation of a consumer-focused eHealth intervention for people with moderate-to-high cardiovascular disease risk: protocol for a mixed-methods process evaluation. *BMJ Open, 7*(1), 1-10. doi:10.1136/bmjopen-2016-014353

Cruz-Zapata, B., Hernández-Niñirola, A., Idri, A., Fernández-alemán, J. L., & Toval, A. (2014). Mobile PHRs Compliance with Android and iOS Usability Guidelines. *Journal of Medical Systems, 38*(8), 1-16. doi:10.1007/s10916-014-0081-6

Darejeh, A., & Singh, D. (2014b). An investigation on Ribbon interface design guidelines for people with less computer literacy. *Computer Standards & Interfaces, 36*(5), 808-820. doi:10.1016/j.csi.2014.01.006

Darejeh, A., & Singh, D. (2014a). A review on user interface design principles to increase software usability for users with less computer literacy. *Journal of Computer Science, 9*(11), 1443-1450. doi:10.3844/jcssp.2013.1443.1450

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance. *MIS Quarterly, 13*(3), 319-340. doi:10.2307/249008

Dey, P., & Lehner, O. (2017). Registering Ideology in the Creation of Social Entrepreneurs: Intermediary Organizations, 'Ideal Subject' and the Promise of Enjoyment. *Journal of Business Ethics, 142*(4), 753-767. doi:10.1007/s10551-016-3112-z

Díaz, J., Pérez, J., & Garbajosa, J. (2014). A model for tracing variability from features to product-line architectures: a case study in smart grids. *Requirements Eng., 20*(1), 323–343. doi:10.1007/s00766-014-0203-1

Ecker, J. (2017). A Reflexive Inquiry on the Effect of Place on Research Interviews Conducted with Homeless and Vulnerably Housed Individuals Forum. *Qualitative Social Research, 18*(1), n/a.

EFInA (2014). EFInA access to financial services in Nigeria 2014 survey. Retrieved from http://www.efina.org.ng/assets/ResearchDocuments/2014-Documenst/EFInA-Access-to-Financial-Services-in-Nigeria-2014-Survey-Key-Findings.pdf

Elamin, M., & Daleel, E. (2016). Software Engineering Development and Analysis of Life Cycle Models. *International Journal of Computer Applications, 133*(10), 9-13. doi:10.5120/ijca2016907979

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics, 5*(1), 1-4. doi:10.11648/j.ajtas.20160501.11

Ezeanya, V., Choi, S. K., Friedman, D., &Kannaley, k. (2017). Review of Alzheimer's Disease Focused Mobile Applications. Iproceedings, 3(1), 44. doi:10.2196/iproc.8460

Fagerholm, F., Kuhrmann, M., & Münch, J. (2017). Guidelines for using empirical studies in software engineering education. *Computer Science, 3*(1), 131-166. doi:10.7717/peerj-cs.131

Foley, T., Boyle, S., Jennings, A., &Smithson, W. H. (2017). "Were certainly not in our comfort zone": a qualitative study of GPs dementia-care educational needs. *BMC Family Practice, 18*(1), 1-10. doi:10.1186/s12875-017-0639-8

Gokmen, O. F., Uysal, M., Yasar, H., Kirksekiz, A., Guvendi, G. M., &Horzum, M. B. (2017). Methodological Trends of the Distance Education Theses Published in Turkey from 2005 to 2014: A Content Analysis. *Egitim ve Bilim, 42*(189), 1-25. doi:10.15390/eb.2017.6163

Gulia, P., & Palak, P. (2017). Component Based Software Development Life Cycle Models: A Comparative Review. *Oriental Journal of Computer Sciences and Technology, 10*(2), 467-473. doi:10.13005/ojcst/10.02.30

Gupta, D., Ahlawat, A. K., & Sagar, K. (2017). Usability Prediction & Ranking of SDLC Models Using Fuzzy Hierarchical Usability Model. *Open Engineering, 7*(1), 161-168. doi:10.1515/eng-2017-0021

Hanson, L., Haas, M., Bronfort, G., Vavrek, D., Schulz, C., Leininger, B., … Neradilek, M. (2016). Dose-response of spinal manipulation for cervicogenic headache: study protocol for a randomized controlled trial. *Chiropractic & Manual Therapies, 24*(1), 1-12. doi:10.1186/s12998-016-0105-z

Hoehle, H., Zhang, X., & Venkatesh, V. (2015). An espoused cultural perspective to understand continued intention to use mobile applications: a four-country study of mobile social media application usability. *European Journal of Information Systems, suppl. Special Issue: Cross-Cultural IS Research: Perspectives, 24*(3), 337-359. doi:10.1057/ejis.2014.43

Hoque, Z., Covaleski, M. A., & Gooneratne, T. N. (2013). Theoretical triangulation and pluralism in research methods in organizational and accounting research. *Accounting, Auditing & Accountability Journal, 26*, 1170-1198. doi:10.1108/aaaj-may-2012-01024

Ihsan, S. N., & Kadir, T. A. A. (2018). Adoption of Software Development Life Cycle (SDLC) Model in Games Development Framework for Serious Games Applications. Advanced Science Letters, 24(10), 7300-7304(5). doi:10.1166/asl.2018.12932

Jegede, C. A. (2014). Effects of Automated Teller Machine on the Performance of Nigerian Banks. *American Journal of Applied Mathematics and Statistics, 2*(1), 40-46. doi:10.12691/ajams-2-1-7

Jimoh, R. G., & Babatunde, A. N. (2014). Enhanced automated teller machine using short message service authentication verification. *African Journal of Computing & ICT,7*(1), 115-120.

Jindal, T. (2016). Importance of Testing in SDLC. *International Journal of Engineering and Applied Computer Science, 1*(2), 54-56. doi:10.24032/ijeacs/0102/05

Joo, Y. J., Lee, H. W. H., & Ham, Y. (2014). Integrating User Interface and personal innovativeness into the TAM for mobile learning in Cyber University. *Journal of Computing in Higher Education, 26*(2), 143-158. doi:10.1007/s12528-014-9081-2

Kandasamy, S., Vanstone, M., Oremus, M., Hill, T., Wahi, G., Wilson, J. A. … Anand, S. S. (2017).

A Case Study of a Methodological Approach to Cocreating Perinatal Health Knowledge Between Western and Indigenous Communities. *International Journal of Qualitative Methods, 16*(1), 1-11. doi:10.1177/1609406917696742

Karim, N. A. K., Albuolayan, A., Saba, T., & Rehman, A. (2016). The practice of secure software development in SDLC: an investigation through existing model and a case study. *Security and Communication Networks, 9*(18), 5333-5345. doi:10.1002/sec.1700

Kim, H. N., Smith-Jackson, T. L., & Kleiner, B. M. (2014). Accessible haptic User Interface design approach for users with visual impairments. *Universal Access in the Information Society, 13*(4), 415-437. doi:10.1007/s10209-013-0325-0

Ledo-Andión, M., López-Gómez, A., & Castelló-Mayo, E. (2017). The Role of Original Version Cinema into the European Digital Space/El rol del cine en versión original en el espacio digital europeo. *Comunicar, 25*(51), 73-81. doi.org/10.3916/c51-2017-07

Lekunze, L. M. G., & Strom, B. I. (2017). Bullying and Victimisation Dynamics in High School: An Exploratory Case Study. *Journal of Teacher Education for Sustainability, 19*(1), 147-163. doi:10.1515/jtes-2017-0010

Liou, D., Hsu, L., &Chih, W. (2017). Understanding broadband television users' continuance intention to use. *Industrial Management & Data Systems, 115*(2), 210-234. doi:10.1108/imds-07-2014-0223

Machado, L. M., Rita, F. J., &Santos, C. H. (2017). Mobile and cloud based systems proposal for a centralized management of educational institutions. *Independent Journal of Management & Production, 8*(2), 271-286. doi:10.14807/ijmp.v8i2.540

Marshall, B., Cardon, P., Poddar, A., & Fontenot, R. (2013). Does sample size matter in qualitative research? A review of qualitative interviews in is research. *The Journal of Computer Information Systems, 54*(1). 11-22. doi:10.1080/08874417.2013.11645667

Mccardle, L., & Hadwin, A. F. (2015). Using multiple, contextualized data sources to measure learners' perceptions of their self-regulated learning. *Metacognition and Learning, 10*(1), 43-75. doi:10.1007/s11409-014-9132-0

Mitri, M., Cole, C., & Atkins, L. (2017). A Systems Analysis Role-Play Exercise and Assignment. *Journal of Information Systems Education, 28*(1), 1-9.

Morar, P., Read, J., Arora, S., Hart, A., Warusavitarne, J., Green, J., … Faiz, O. (2015). Defining the optimal design of the inflammatory bowel disease multidisciplinary team: results from a multicentre qualitative expert-based study. *Frontline Gastroenterology, 6*(4), 290-297.doi:10.1136/flgastro-2014-100549

Morrison, P., Moye, D., Pandita, R., &Williams, L. (2018). Mapping the field of software life cycle security metrics. *Information and Software Technology, 102(*1), 146-159. doi:10.1016/j.infsof.2018.05.011

Morse, W. C., Lowery, D. R., & Steury, T. (2014). Exploring saturation of themes and spatial locations in qualitative public participation geographic information systems research. *Society & Natural Resources, 27*(5), 557-571. doi:10.1080/08941920.2014.888791

Nasir, M. A., Wu, J., Yago, M., &Li, H. (2015). Influence of Psychographics and Risk Perception on Internet Banking Adoption: Current State of Affairs in Britain. *International Journal of Economics and Financial Issues, 5*(2), 461-468.

Navroodi, I. H., Zarkami, R., Basati, M., &Limaei, S. M. (2016). Quantitative and qualitative characteristics of Persian oak along altitudinal gradation and gradient. *Journal of Forest Science, 61*(7), 297-305. doi:10.17221/13/2015-jfs

Noyes, J., Hendry, M., Lewin, S., Glenton, C., Chandler, J., & Rashidian, A. (2016).Qualitative "trial-sibling" studies and "unrelated" qualitative studies contributed to complex intervention reviews. *Journal of Clinical Epidemiology, 74*(1), 133-143. doi:10.1016/j.jclinepi.2016.01.009

Nugroho, S., Hadi, S., & Hakim, L. (2017). Comparative analysis of software development methods between Parallel, V-Shaped and Iterative. *International Journal of Computer Applications, 169*(11), 7-11. doi:10.5120/ijca2017914605

Odeyemi, J. O. (2017). Context and Discourse Intonation in English-Medium Product Advertisements in Nigeria's Broadcast Media. *i-Manager's Journal on English Language Teaching, 7*(2), 13-28.

ODonnell, P., Tierney, E., Austin, O., Nurse, D., &MacFarlane, A. (2016). Exploring levers and barriers to accessing primary care for marginalised groups and identifying their priorities for primary care provision: a participatory learning and action research study. *International Journal for Equity in Health, 15*(1), 197-212. doi:10.1186/s12939-016-0487-5

Oluwaseun, B. R., Muyiwa, O., Olanrewaju, B. A., Omolaran, B. B., & Iyabo, B. S. (2017). E-Attendance System using Waterfall Software Development Life Cycle Simulati on. *Journal of Computer Science and Control Systems, 10*(2), 10-15.

Omari, O. J.,& Zachary, O. B. (2013). Investigating ATM system accessibility for people with visual impairments. *Journal of Computer Engineering, 15*(5), 13-18.

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful Sampling for Qualitative Data Collection and

Analysis in Mixed Method Implementation Research. *Adm Policy Ment Health, 42*(15), 533-544. doi:10.1007/s10488-013-0528-y

Patil, S. V., Tetlock, P. E., & Mellers, B. A. (2016). Accountability systems and group norms: Balancing the risks of mindless conformity and reckless deviation. *Journal of Behavioral Decision Making, 30*(2), 282-303. doi:10.1002/bdm.1933

Patil, S. V., Vieider, F., & Tetlock, P. E. (2014). Process versus outcome accountability. *In M.Bovens, R. E. Goodin, & T. Schillemans (Eds.), Oxford Handbook of Public Accountability. NewYork: Oxford University Press*, pp. 69–89.

Patton, M. Q. (2015). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed.). Thousand Oaks, CA: Sage.

Power, B., Kiezebrink, K., Allan, J. L., &Campbell, M. K. (2017). Understanding perceived determinants of nurses eating. qualitative interview study. *BMC Obesity, 4(*1), 1-12. doi:10.1186/s40608-017-0154-4

Ribeiro, L., & Hochwallner, M. (2018). On the Design Complexity of Cyberphysical Production Systems. *Complexity, 12*(1), 1-15. doi:10.1155/2018/4632195

Roy, K., Zvonkovic, A., Goldberg, A., Sharp, E., & LaRossa, R. (2015). Sampling richness and qualitative integrity: challenges for research with families. *Journal of Marriage and Family, 77*(1), 243-260. doi:10.1111/jomf.12147

Safeena, R., Date, H., Hundewale, N., & Kammani, A. (2013). Combination of TAM and TPB in Internet Banking Adoption. *International Journal of Computer Theory and Engineering, 5*(1), 146-150. doi:10.7763/ijcte.2013.v5.665

SathishKumar, A., & Kamalraj, R. (2014). Study on user interface design to increase software usability. *International Journal of Science, Engineering and Technology Research (IJSETR), 3(*3), 2278-7798.

Seth, F. P., Mustonen-ollila, E., Taipale, O., & Smolander, K. (2015). Software quality construction in 11 companies: an empirical study using the grounded theory *Software Quality Journal, 23*(4), 627-660. doi:10.1007/s11219-014-9246-2

Sharma, P., & Singh, D. (2015). Comparative Study of Various SDLC Models on Different Parameters.*International Journal of Engineering Research, 4*(4), 188-191. doi:10.17950/ijer/v4s4/405

Simpson, A., & Quigley, C. F. (2016). Member Checking Process with Adolescent Students: Not Just Reading a Transcript. *The Qualitative Report, 21*(2). 377-392.

Singh, A., & Kaur, P. J. (2017). A Simulation Model for Incremental Software Development Life Cycle Model. *Journal of Advanced Research in Computer Science, 8*(7), 126-132. doi:10.26483/ijarcs.v8i7.4136

Sinha, A., & Jain, H. (2013). Ease of reuse: An empirical comparison of components and objects. *IEEE Software, 30*(5), 70-75. doi:10.1109/ms.2012.131

Spillane, A., Larkin, C., Corcoran, P., Matvienko-Sikar, K., & Arensman, E. (2017). What are the physical and psychological health effects of suicide bereavement on family members? Protocol for an observational and interview mixed-methods study in Ireland. *BMJ Open, 7*(3), 1-8. doi:10.1136/bmjopen-2016-014707

Stålberg, L., & Fundin, A. (2016). Exploring a holistic perspective on production system improvement. *The International Journal of Quality & Reliability Management, 33*(2), 267-283. doi:10.1108/ijqrm-11-2013-0187

Suárez-Guerrero, C., Lloret-Catalá, C., & Mengual-Andrés, S. (2016). Teachers' perceptions of the digital transformation of the classroom through the use of tablets: A study in Spain. *Comunicar, English ed, 24*(49), 81-89.doi:10.3916/c49-2016-08

Sun, H., Ha, W., Teh, P., & Huang, J. (2017). A Case Study on Implementing Modularity in Software Development. *The Journal of Computer Information Systems, 57*(2), 130-138. doi:10.1080/08874417.2016.1183430

Suryantara, G. N., & Andry, J. F. (2018). Development of Medical Record with Extreme Programming SDLC. *International Journal of New Media Technology, 5*(1), 47-53. doi:10.31937/ijnmt.v5i1.706

Teoh, W. M., Siong, C. C., Lin, B., & Jiat, W. C. (2013). Factors affecting consumers' perception of electronic payment: an empirical analysis. *Internet Research, 23*(4), 465-485. doi:10.1108/IntR-09-2012-0199

United Nations World Population Prospects (2015). World Population Prospects the 2015 Revision, Key Findings and Advance Tables. Retrieved March 9, 2017 from https://esa.un.org/unpd/wpp/publications/files/key_findings_wpp_2015.pdf

Veletsianos, G., &Shepherdson, P. (2016). A Systematic Analysis and Synthesis of the Empirical MOOC Literature Published in 2013-2015. *International Review of Research in Open and Distance Learning, 17*(2), 198-221.doi:10.19173/irrodl.v17i2.2448

Wallace, L. G., & Sheetz, S. D. (2014). The adoption of software measures: A technology acceptance model (TAM) perspective. *Information & Management 51*(7), 249-259. doi:10.1016/j.im.2013.12.003

Worldometers (2017). Nigeria population. Retrieved from http://www.worldometers.info/world-population/nigeria-population/

Woznowski, P. R., Tonkin, E. L., & Flach, P. A. (2018). Activities of Daily Living Ontology for Ubiquitous Systems: Development and Evaluation. *MDPI, 18*(1), 1-23. doi:10.3390/s18072361

Yilmaz, B., &Özkan, Y. (2016). An Investigation into English Language Instructors' and Students' Intercultural Awareness. *The Qualitative Report, 21*(10), 1932-1959.

Yohannes, M. A. (2017). Challenges and opportunities of women participating in informal sector in Ethiopia: A special focus on women street vendors in Arba Minch City. *International Journal of Sociology and Anthropology, 9*(2), 8-16. doi:10.5897/IJSA2016.0695

Zhang, M., Wang, F., Deng, H., & Yin, J. (2013). A survey on human computer interaction technology for ATM. *International Journal of Intelligent Engineering & Systems*, *6*(1), 20-29.