Persuasive System Practices in Mobile Application Development

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Abstract. Mobile application development is at swift pace of growth across the globe. This industry also creates financial opportunities towards entrepreneurs also independent software developers. Yet, with the exponential growth of mobile applications released daily, hundreds of these software programs were being abandoned and neglected. The development of high quality mobile applications also requires the understanding of requirements needed associated with the development of the software products in order to fulfill the special needs of the products. This research was conducted with the aim to qualitative explore the persuasive technology practices followed and the processes involved which able to enhance the success level of the mobile applications. For this study, semi-structured interviews were conducted with the involvement of seven software developers and fifteen mobile applications as the case studies for the research. It has been shown that persuasive system design is appropriate to be incorporated in the process of software development as it provides a structural guideline that reflects users’ requirements in the context of attitudes and behaviours. Based on this assumption, it is identified that the incorporation of persuasive context at the initial stage of software development may affect the quality of the mobile applications in a long term.

1. Introduction
Mayhew [1] and Marache-Francisco and Brangier [2] state that there are five imperative qualities for the development of high quality software products which includes software systems, interactive tools, websites and mobile applications. These qualities are usability, utility, graphic design, functional integrities and persuasive. The involvement of these qualities is the essence in creating great user experiences. As defined by Nielsen [3], usability is the attributes of satisfaction, efficiency and effectiveness of the software products, utility is the usefulness which associated to the design’s functionality [4], graphic design represents the expression of personality of the software products while functional integrity is the reflections and representation of the software products’ credibility.

Yet, the main highlight for this research is the quality of persuasive in software development specifically in the process of mobile application development.

Persuasive as defined by scholars such as Fogg [5], Redstrom and Veludo-de-Oliveira, Pallister and Foxall [6] is the act with the intention to establish, that has the intention to establish, strengthen or change the attitude or behaviour of individuals or group of peoples without involving coercion or deception. The incorporation of persuasive in the technological domain has then establish a new

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branch of knowledge known as persuasive technology or captology. Persuasive technology as according to Fogg [7] and Oinas-Kukkonen, Hutchison and Michelle [8] is the involvement of technological medium to deliver the persuasive message with the intention to change the attitudes or behaviour of users. In addition, the incorporation of persuasive in software development process were thoroughly described in the framework of persuasive system design (PSD) proposed by Oinas-Kukkonen and Harjumaa [9].

The motivation behind this study is that there are low numbers of research conducted on the process of persuasive mobile application development although Oinas-Kukkonen and Harjumaa [9] has claimed that it may change and shape users’ attitudes and behaviours. Furthermore, recent statistics has report that there are numbers of mobile applications released were being abandoned [10], only used once [11] or being neglected or uninstalled by the users [12]. These issues have become the new concerns among software developers as it may jeopardize the credibility of developers and affect the revenue gained by the companies from the mobile applications developed. According to studies by Feng, Hoegler and Stucky [13] and Wohl, Parush, Kim, and Warren [14], the cause of these issues is because there is declining in the quality and design of the software products. Hence, there is the needs for more in-depth studies in the process persuasive of mobile applications development. This is because, Inukollu, Keshamoni and Kang [15] and Shah [16] state that part of good mobile applications relies on well-craft product development. Besides, persuasive system framework has incorporated the five qualities of high quality software products which has been discussed earlier in this paper.

For this purpose, this study has focused on exploring the persuasive technology practices as well as the process or actions taken followed by seven mobile application developers in enhancing the quality and the success level of the software products. In doing so, this study is able to emphasize on the advantages of persuasive system design process for software development specifically mobile applications and finding the additional aspects which are required and may contribute towards high quality mobile applications. Therefore, this paper has been structured as follows. The first section (Section 1) of this paper presents the introduction for the research conducted followed by the second section (Section 2) which focuses and reviewed on the mobile application development process as well as the framework of persuasive system design. The third section (Section 3) represents the methodology of research and the fourth section (Section 4) presents and discussed the findings of the research. The final section of this paper (Section 5) will conclude and discuss on the opportunities for future research.

2. Persuasive technology in software development process

2.1. Software processes activities

As defined by Shah [16], software processes are the framework or structure that act as a guideline to develop and maintain of software development. In consonance with Sommerville [17] and Hudli, Hudli and Hudli [18], there are abundance of software processes; however, there are four fundamental sequences of activities that are involve in the production of software products which is software specification, development, validation and evolution and each of the phases feeds into the next step and are substantial for mobile applications’ overall success (see Figure 1).
2.1.1. Phase 1: Software specification. The first phase of software development process is the most crucial phase as it requires the developers determine, refine in detail the specification as well as the constraints of the mobile application to be developed. During this phase, developers are required to determine, refine in detail the specification as well as the constraints of the mobile application to be developed. At this stage, ideas identification will be done and development strategy is created to ensure that the goals of the mobile application development are achievable. According to Lockton, Harrison and Stanton [19], the identification of ideas can be carried out through defining the problems aroused and the need that require the mobile application to solve. Later, the initial concept and ideas fortify by gap analysis that was proposed by Papazoglou and Van Den Heuvel [20]. Through this analysis, the proposed ideas and features will be compared to the existing software services as to devise the novelty and improvised ideas to the existent software products.

Moreover, the strategy of mobile application development is constructed to designate the objectives of the app, the constraints or scope on its operation, platform that will be targeting, justifying the target audience together with the details of the mobile application specifications. Salmre [21] mentioned that the scope of the mobile application is one of the most crucial aspects that need to be emphasized on as a successful mobile app should be prerequisite with clear and specific goals and it should be able to offer a focused experience to their users. Strategizing the fundamental purpose will also lead to determination of proper user interface (UI) design as each of mobile application require well-designed interface as it sets the best features as well as the flow of the app functionalities [22]. Salmre [21] and Sonderegger and Sauer [23] in their studies have stated that appropriate and intriguing interface will create focused and intuitive experience to the users thus it will govern the success of the mobile application. By the end of this phase, a set comprehensive mobile application requirement analysis that consists of objective abstraction and overall information technology design and architecture will be documented.

2.1.2. Phase 2: Software development. The second phase of software process is also known as the programming phase that involves the coding process for the production of the software. This phase is time consuming thus the development task will be divided into few models or units so that the software can be completed according to the schedule and interim results can be presented to the clients. The next phase in the mobile application development process is the design phase where by the ideas from the brainstorming session during the previous phase is being established into functional requirements and software architecture. According to Dix [24], functional requirement of a mobile app is a brief summarization of the services that the software product will offer to their users, the way it will respond to particular inputs and the way it will give feedbacks in particular situations and is written in general and abstract way that is understandable by the users. As for software architecture, it serves as a design plan of the requirement of the mobile application, structured discussions in between clients, developers and managers as well as part of essential tool for complexity management and is modelled using simple block diagrams that contain the details on the key system abstraction.

From these documentations, mobile application module and prototype is defined. Modules of a mobile app were determined to outline the concept of visual terms and act as visual representation for all the interfaces that will be finalized. Wasserman [25] emphasized that user experience and user interface are the most substantial facets that mobile developers need to focus on. This is because, user experience covers the interface, functions and application performance is critical as it creates the interaction architecture of design elements while user interface can create the look and the feel of the app [25]. This is supported by a research conducted by Robins and Holmes [26] which shows that, visual appearance of a mobile application could affect the way participants handled the device thus affects the users’ perception on the mobile application. The end result for this phase is the completed storyboard that has incorporates all the features as well as the flow of the application that have been defined previously.
2.1.3. Phase 3: Software validation. The third phase of software process involves the software’s modules or units to be integrated and tested to ensure that it is actually solving the needs addressed and gathered during the requirements phase. For the most part, the validation process will take some few testing such unit testing, integration testing, system testing, non-functional testing and acceptance testing. The user acceptance testing was done at the end of the validation phase as it is performed by the end users to ensure that software has meets their expectations. During this phase, there might be some minor or major defects aroused. Hence, the development and testing phase will be performed iteratively to correct and retested the software. Prototyping is the process where the ideas, concepts and feedbacks were organized in the way mobile app was set to be so that it can be tested later [27]. The process also allows developers to explore new ideas, validates ideas and giving room for software improvements to create better experience towards the users.

As part of the framework, functional requirements of prototypes are analysed then tested to gain new feedback. The received feedback will be used as a guideline to improve the performance of the software product and the required changes are implemented through the development phase. Thus, the development, prototyping and testing phases will be repeated for several times until the final prototype has been agreed on. This phase was emphasized as one of the crucial segment in mobile application development phase by Ohk, Park and Hong [28] when the development involves the clients. The mobile application prototype can be handy to present the overview of the software products thus allowing easier participation in voicing down their ideas.

2.1.4. Phase 4: Software evolution. The last phase of software process involves the modification of the system to reflect the software specifications and market requirements. Maintenance and upgrading the software every once in a while, will be done to adapt the changes that takes place in the user end environment as well as the technology that revolve. Furthermore, the needs for new requirements and newly aroused problems aroused once the users start using the released software. Hence, the improvements and enhancements of the software product will involve much longer time than the initial development since most maintenance required the developers to do new things which can lead to extending the time frame of the software development process. Software testing phase is one of the significant phases in any model of software development. As in this framework, the initial prototype will be tested on an emulator or simulator on a real device across multiple operating systems, versions and sizes of mobile applications’ screens. The aspects that will be tested are shown in Table 2.10. Nevertheless, the types of testing required for each mobile application is variant depending on the type of the application, target users and the distribution channel [29]. This is the last stage the development phase. The application is deployed after the software product has been tested and finalized by releasing the mobile application into the appropriate mobile application market for the users.

The existing framework have discussed thoroughly on the development processes, activities involved and guidelines which are meant to instruct developers in the creation of high quality mobile applications. Yet, there is absence or rather narrow guidance for the practitioners towards persuasive system development. This is because, software processes are a part of software engineering process by which it only concerns with methods and tools for general software development based on engineering principles while persuasive approach is more concerned on the psychology for system design. Years later, Oinas-Kukkonen and Harjumaa [9] have proposed a framework known as Persuasive System Design (PSD), a model which assist researchers and practitioners to develop and evaluate persuasive systems. This framework has included the understanding of the core issues for persuasive system, comprehensive planning of persuasive context and design of system qualities. As discussed previously, the implementation of persuasive approaches is in a system are necessary as it serves as one of the determinants for an engaging and successful technology. Hence, the development of good software products should consider on the constructed persuasive system design as well as the way people should use and interact with the software.
2.2. Persuasive system design

Persuasive system design is a model which incorporates general system development lifecycle model and the persuasive design principles as the software’s requirement definition. Furthermore, Harjumaa [30] identifies the objective for this model as to provide guidance for the development of a quality persuasive system through a lifecycle model. In their major study of PSD model, Oinas-Kukkonen and Harjumaa [9] have defined persuasive system as an information system or computerized software that is developed to change, shaping and reinforcing attitudes or behavior or both without involving the act of coercion or deception and it is anticipated that the development of a successful persuasive system will draw-in three potential outcomes which is; 1) voluntary reinforcement; 2) change of attitudes or behaviors or both and 3) shaping of attitudes or behaviors or both. Moreover, the persuasive design framework is also being designed for the prediction of consumer acceptance towards the products developed.

The framework of persuasive system design emphasizes on three main aspects which includes understanding the core issues in persuasive system, persuasive context and the persuasive system features. For this study, analysis of the persuasive context will be highlighted and discussed.

2.2.1. Persuasive context of persuasive system design.

Persuasion context is the thorough understanding on the intent, event and strategy of persuasion which comprised of the understanding towards the role of persuader (the persuasive system), persuadee (the users of the system), the messages to be conveyed and the channels for delivering the messages [9]. The understanding of the context can be guidance for system developers to identify the inconsistencies in users’ thinking and it can help to differentiate the opportune and inappropriate moments for delivering persuasive messages. The discussion on persuasive context also encompasses with the identification of the objectives or the intent of persuasion, understanding the way persuasion process occurs and determine or identify the persuasive strategies used.

2.2.1.1. The intent.

According to Bondi [31] computer is an electronic device that does not have the properties or the characteristics of persuasion to affects the users’ attitude or behavior. Therefore, persuasive system is designed and developed based on the aim or the intention of the developers to deliver their persuasive messages with the implementation of the human features, persuasive principles and technological characteristics in various ways.

As mentioned by Harjumaa [32], adapted from Fogg [33] seminal article, the intention of persuasive system development can be divided into three categories which are endogenous, exogenous and autogenous. Endogenous can be defined as the intention of the developers to influence the system’s users while exogenous can be defined as the intentions that were caused by the external factors with the intention to influence the system’s users. The external factors for an exogenous can be those who give or distribute persuasive opportunities to the other individuals. Finally, autogenous is the representation of the very person to adopt or using interactive technology to influence other system’s users.

However, as discussed by Bijker et al., [34], most of technologies were not fully developed for the purpose of persuasion as most of it has carried some cues of their preferable usage practices in which also known as micro suasion. Hence, in the process of software development, intent can be understood as the goals for the information system. Software developer will determine the expected goals and create the context which will persuade the users to adopt the expected position or action.

2.2.1.2. The event.

The event of a persuasive system comprises the analysis of context of use, users and the technology. Analysing the context of use require system developers to create plans and designed the system so that it can overcome the existing problems while user context involve the understanding of the target users [35]. Thorough understanding of use context will also influence the selection of persuasive design principles employed for the system as these principles were supposed to
support the primary task, create a relationship in between the users and the system, make the system much more credible and create a platform in between the users to interact with each other’s.

Oinas-Kukkonen and Harjumaa [9] point out that it is crucial for system developers to know the background of their potential and target users because each individual has a different level of cognitive requirement to process information which has been discussed in the third postulate of persuasive system. For example, some individuals have high cognitive requirements and there are also individuals who have a low level of cognition needs. By recognizing the characteristics of the target users, it is easier to plan for the persuasive approach to be implemented into the persuasive system.

Finally, the technological context refers to the platform that will be used for the development of persuasive system. As noted by Torning and Oinas-Kukkonen [35], the selection of the appropriate platform is important because it will affect the user context and the context of use. For example, persuasive system developed for a computer used is different compared to the mobile phones because of the differences in the characteristics as well as the features of both of the technological products. Furthermore, full utilisation of mobile application characteristics will be able to push the quality of software developed as it has multiple functions and features.

Petty and Cacioppo [36] identifies persuasion strategies are the ways persuasive message is delivered either through central or the peripheral route as described in the third core issues of persuasive system- the direct and indirect routes. The approach via central/direct route applies to a person who has the motivation to carefully evaluate the content presented on the persuasive message and the results of this approach are more permanent.

While the approach via indirect routes/peripheral route can be applied to someone who is less motivated. The strategy for the indirect routes is to use an easy or simple but strong cue to deliver the message. For an example, persuasive information is submitted to the users by using interactive yet understandable notifications in order to increase the motivation of the individual to the submission of the relevant persuasive information. Although this approach does not give a permanent result, but it is the most suitable way to be applied as the increasing and hectic of information flow, users are not able to really focus on one route of message delivered at any time. Therefore, this approach is used to help make decisions.

2.3. Persuasive system design in mobile application development

![Figure 2. The incorporation of persuasive technology practices in mobile application development](image)

The framework supports the four fundamental phases which have included the software specification, development, validation and evolution phases. The fundamental phases of software processes are adopted rather than the mobile application development life cycle (MADLC) as the software processes are much more common and accepted in every software development which includes systems and mobile applications. Moreover, as previously mentioned by Kumar and Kumar [37], the additional sub-activities were done to complement the requirement of the software itself.
This framework only emphasized on the first phase of software processes which is the software specification phase because it is the most important phase for the development of software products as mentioned by Jain and Suman [38]; Sommerville [39] and Vithani and Kumar [40]. Furthermore, it is clearly supported by Harjumaa [30] that the implementation of persuasive design practices should appear in the early stage of development as it makes easier integration of persuasiveness into the final system. This is because, the discussion of persuasive system design framework as proposed by Oinas-Kukkonen and Harjumaa [9] for the requirement definition of software qualities were require thorough understanding on the intent as well as the event of the software which is the same as activities described in the software specification phase in the software processes. However, the need to addressed the persuasive systems postulates were eliminated from this framework because it is expected to be relevant towards researchers instead of mobile developers. Other than that, several persuasive systems postulates such as the third and seventh postulates were already mentioned and applied in the event of persuasive context. Persuasive strategies were excluded from this framework because it is applied in the user and use context. This is because, the understanding for user requirements will assist the developers on providing the most convenient way to approach the users from the platform of mobile applications which were achieved in the use context.

3. Methodology

The approach employed for this research is qualitative approach as it allows the researcher to perform in-depth studies towards the research topic [41] and [42]. For the context of this research, qualitative method allows the researcher to explore the best practices of mobile applications development from the developers’ experiences and perspectives.

Furthermore, the research design of this research follows multiple case studies as it supports the nature of the research by allowing the researcher to gain in-depth understanding on the context of the persuasive system design or any other process of development followed from the developers’ perspectives and experiences hence producing detailed descriptions which will then be compared to identify the differences and similarities in between the cases. For this study, three categories of mobile applications which are successful (SMA), partially successful (PSMA) and less successful (LSMA) were identified and distinguished based on the numbers of application downloaded for the past three years. Seven participants were selected among project leader, project managers and programmers as these individuals have the adequate experiences and capabilities in ensuring the data collection process was able to meet the objective of this research.

Furthermore, qualitative technique with in-depth interviews were applied for the data collection process. As mentioned [41],[42] in-depth interviews allow the researcher to probe the participants in gaining thorough and in-depth interpretation of information based on the participants point of view. During the interview session, a set of interview guideline was used and were changed or more questions were added depending on the flow of the conversation. This was done to support the statement given hence enabling the participants to provide detailed information of features and functions incorporated in the mobile applications developed. In addition, the interviews were conducted in Malay and English language and took approximately 90 to 110 minutes. Each of the interview sessions were tape-recorded for the process of transcribing. Moreover, content and thematic analysis were conducted. NVivo software was used to analysed the content of the interview before the data were compared within the cases and in-between the cases.
Table 1. Case studies of research

| Case study         | Successful mobile applications (SMA) | Partially successful mobile applications (PSMA) | Less successful mobile applications (LSMA) |
|--------------------|--------------------------------------|-------------------------------------------------|--------------------------------------------|
| Characteristics    |                                      |                                                 |                                            |
| Numbers of mobile applications downloaded within (2013-2015) | 10,000 – 100,000 | 1,000 – 10,000 | <1,000 |
| Type of mobile applications       | Native apps                       | Native apps                                      | Native apps                                |
| Categories of mobile applications | Services and utilities            | Services and utilities                           | Services and utilities                      |

4. Result

Table 2. Persuasive technology practices of design process

| Persuasive technology practices of design process | Case Study 1 | Case Study 2 | Case Study 3 |
|--------------------------------------------------|--------------|--------------|--------------|
| Phase 1: Software Specification                  |              |              |              |
| The Intent                                       | 🟢🟢🟢🟢🟢       | 🟢🟢           | 🟢🟢🟢🟢🟢🟢     |
| The Event                                        | 🟢🟢🟢🟢🟢       | 🟢🟢           | 🟢🟢🟢🟢🟢🟢     |
| User Context                                     | 🟢🟢🟢🟢🟢       | 🟢🟢           | 🟢🟢🟢🟢🟢🟢     |
| Technology Context                               | 🟢🟢🟢🟢🟢       | 🟢🟢           | 🟢🟢🟢🟢🟢🟢     |
| Phase 3: Software Validation                     | 🟢🟢🟢🟢🟢       | 🟢🟢           | 🟢🟢           |
| Phase 4: Software Evolution                      | 🟢🟢🟢🟢🟢       | 🟢🟢           | 🟢🟢           |
| (–) Product Introduction                         | 🟢🟢🟢🟢🟢       | 🟢🟢           | 🟢🟢           |

The content analysis revealed distinctive differences in the persuasion practices followed by the three case studies of mobile applications and there are several considerations which have been found. As shown in Table x, mobile applications of the successful category will go through a thorough software specification process, which has included the consideration towards the intent also the event which comprise with the user context, use context and technology context. Furthermore, the mobile applications in this category also have gone through a repetitive process for the purpose of improvement towards the overall performance of the software products.

4.1. Software specification phase

4.1.1. The Intent. The findings showed that the procedures for all the three cases were almost familiar. However, based on Table 4.7, the activities conducted for developing the mobile applications of the successful category were more in-depth and comprehensive compared to the other two categories. According to all of the mobile developers, the first stage for the development of the mobile applications started with defining the objectives, drawing out the scope and also the limitation of the software products.
4.1.2. The event. Despite the similarities, the justifications of use context for each of the categories were different. This is because; the objectives of development for the mobile applications in the successful category were decided after in-depth market research has been conducted. As mentioned by these developers, the significance for conducting the market research was to identify the gaps in between the available mobile applications in the mobile app stores. Furthermore, through the research conducted by these developers have helped them in generating more diverse functions and features as to complete and fill the gaps of the existing mobile applications. As added by developers of mobile application 4, 9, 13 and 14, the act of in-depth market research also has increased the quality and the uniqueness of their software products. Yet, as summarized in Table 4.7, most of the mobile applications were developed based on the existing or the problems faced by the users while several mobile applications such as 6, 7 and 5 were only deliberately developed by the developers. The justification of user context by conducting the market research and set forth the problem-centred mobile application have then produced new and innovative mobile application as explained in mobile application 4, 9, 3, 14 and 1. New mobile applications were the result of the innovation made on the new proposed ideas to fulfil the users’ demand.

As mentioned by Oinas-kukkonen and Harjumaa [9] and Sommerville [17], the development of system with persuasive features need to consider the use context which associate the selection of pertinent persuasive design principles. Based on the findings across the three categories, the development for each of the mobile applications have involved the selection of relevant functions and features whereby each of these were the reflection of the primary functions delivered by the mobile applications. Although all of these software products did consider the context of use, yet the incorporation of the persuasive design principles were different for each of the categories. The implementations of these persuasive principles have been thoroughly discussed in the previous subsection and the patterns for the number of persuasive design principles implemented were identified.

Oinas-kukkonen and Harjumaa [9] in their persuasive design framework also have discussed the consideration of technology context for the development of persuasive system. In this context of research, it is clearly understood that the selection of the software platform is mobile application. However, in-depth deliberations for technology context have been done in both categories of successful and partially successful mobile applications. Yet, the only different identified in both of these categories were made during the validation phase.

4.2. Software Validation Phase
In software validation phase, mobile applications will have to go through few stages of testing whereby each of all of the software’s modules or units to be integrated and tested to ensure that the mobile application is able to deliver the functions and features as expected. Based on the analysis conducted, the validation process for the mobile applications of the successful category involves the mobile application to be released in the mobile application stores for several weeks or months. Over the time, the performance of the mobile applications will be assessed based on users’ feedbacks and responses over the time. Furthermore, the mobile applications were also will have to go through real time performance assessments over several months until the software products have achieved the stagnant phase before another improvement or any additional modules were made. Yet, the same processes were followed in the mobile application 2 and 10 of the partially successful mobile application category. In these mobile applications, the software products were released into the mobile application market for several weeks to reach out for much more users. However, it is found that the responses given by the users were only validated once or twice before abandoning the mobile application.
4.3. Software Evolution Phase

Software evolution phase is the phase whereby the mobile applications will go through several software improvement processes and reflecting the software specifications and market requirements. During this phase, maintenance as well as upgrading the mobile applications will be made. Based on the findings, all of the mobile applications of the successful category have gone through this process as well as the mobile application 2 and 10 in the partially successful category and mobile application 6 of the less successful category. However, based on the description given by the developers of these three mobile applications, the evolution phase only happened once or twice before the mobile applications were abandoned in the mobile app stores.

Yet, in this phase, product introduction of users’ acceptance was obtained from the qualitative findings. According to the mobile developers of the mobile application 4, 8, 9, 3 and 14, the product introduction was done to reach out for more users. However, it is agreed by the three mobile developers that the product introduction through the strategic partnership and cross-promote strategies were only the add factor for the mobile applications as the core functionalities were more prominent. As added by the developer of mobile application 4, 9 and 14, the product introduction was only as act to gain more users which will benefit the developers in terms of mobile application assessment, yet the primary functions and features of the mobile application that will help the continuous use of the software products.

5. Conclusion

It is obviously noticed that the incorporation of persuasive technology practices in mobile application development has shown to be associated with higher achievement as these mobile applications have implemented much more comprehensive and detailed process of development. Furthermore, product introduction by creating strategic partnership and cross-promote strategies have allow these software products to attract a lot more users hence allowing these mobile applications to went through continuous transition phase which then has lead towards quality software products. This can be proved as these six mobile applications are still being used by the users after being developed after three years of the apps being released in the mobile apps stores.

This paper aims to explore the persuasive technology practices for the development process of mobile applications and the other contribution aspects that have been employed by developers in order to have good quality mobile applications. To achieve these objectives, 15 native Android mobile applications were selected of the utilities and services category and seven semi-structured interviews were conducted based on the proposed theoretical framework as shown in Figure 2. In effort to gain in-depth and thorough description of mobile applications’ development process, probing technique was used.

The content analysis from the interviews revealed that all of the mobile applications have followed the persuasive system design for software development. Yet, only one mobile application that has been conducting a study as to understand their target users’ personality and the way the mobile application will be used. The analysis also revealed that, all of the software products in the successful mobile application category have the additional process known as product introduction as strategic partnership and cross-promote strategies were being done to gain and attract more users for the mobile applications. According to the developers, the advantages of having a lot more users will them to have much more insights and feedbacks for the products which will then be taken into consideration before validation process will be conducted.

However, there are several limitations of this study. This is because, this study only focusses on the software aspects of mobile applications development while a high quality mobile application should be considering other issues such as wireless communications, mobility, portability and much more which need to be cope with. Yet, the implementation of the persuasive system design and creating product introduction are imperative as it also play the important roles in software development process for better high quality mobile applications.
As conclusion, persuasive system design has provided the adequate application guideline which comprised with the consideration on the purpose of the mobile applications, users’ personality and characteristics, non-functional requirements which are required to support the functions and features of the software products and the technological capabilities of the mobile applications. This study also has found that product introduction is a crucial phase as it will attract a lot more users which will attract a lot more comments and feedbacks which are beneficial for the improvement of the mobile applications. Nevertheless, these approaches should be highlighted and emphasized by the research community also for the developers to improve and provide the knowledge of the guideline should be applied in the mobile application development.

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