Functional requirements of mobile application for fishermen

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Abstract—Unusable information technology products and its unacceptability have been traced to the inability of the tech products to meet the needs and desire of the users, for whom the products are provided. Malaysia government has also been recording same users' neglect on information technological infrastructure provided despite huge amount of money invested on the ICT project, most especially for the rural dwellers. The major reason of this users' unacceptability have been traced to lack of proactive users' requirements gathering. To address this in the intending development of mobile application for fishermen; who are also members of the target group to be provided mobile technologies by the Malaysian government, this study aims to validate the functional requirements of mobile applications for fishermen using a Qualitative-based users' participatory design methodology. The result of the study shows that fishermen's ability to get weather updates, water safety information, track of storm and rain intensity, advertizing fish catch, real time market price and general fishing tips are functional requirements of a mobile application for fishermen.

Keywords— user-centered, mobile application, functional requirements, fishermen

I. Introduction

The affective feelings of the users of the products always result from the acknowledgement of the user-centeredness of the information system. Kourouthanasis et al. [9] in this regard posited that an enhancement of user experience through an innovative idea of pervasive information system is described as a new means that is capable of accommodating user needs and wants when they are desired. In the light of the foregoing, the information content of the mobile application as an example of information system is duly achieved to be user-centered when the users are involved in the design process,

and thus makes it unavoidable for a research phase that inquires from the prospective users about the type of information they access frequently and needed most

importantly, and their preferred interest in the cause of using mobile application generally.

This also informs why gathering information about the fishermen's needs before developing the application that is aimed to improve their job performance is necessary. The newness of this fishermen-friendly application, its emerging trend, and the observation that limited researches have been carried out to comprehensively understudy the farmers' requirements in the development phases of these mobile applications necessitate the need to fill the research gaps [11]. It is on the note that this study ascertained what the functional requirements of the mobile applications for fishermen are.

The outcome of this research is to be used as a starting point of actualizing a functional mobile application by helping mobile application developers in identifying the key needs of fishermen in the usage of mobile applications, and the needed information to be assessed by this set of users through mobile applications. The choice of information requirement as the functional users' requirements type is given preference because developing mobile applications for fishermen specifically is still in its emerging trend, thus information requirement that will firstly interest the usage of the application must be attended to before considering other types of the users' requirements.

II. Literature review

A. Mobile Applications

Mobile devices; or what can also be called handheld devices like mobile phones, tablets, personal digital assistants (PDAs), or enterprise digital assistants needs mobile applications for optimal usefulness and service delivery [6]. Mobile applications are to be taken as the utility software packages that enhance full functionality and the mobile devices' ability to meet diverse users' needs. These mobile apps as succinctly called are either pre-installed on mobile devices during the process of manufacturing or they are downloaded by users from mobile software distribution platform which could either be free or to be procured.

B. User-centered Design

Principally, the purpose of a well done requirement analysis phase is to achieve a user-friendly system by being user-

centered in the process of developing the system. The users' acceptance of any technology lies majorly on how it meets their behavioural intention [4], and this is largely determined by the extent at which the technology meets the desired needs of the users.

Shneiderman & Plaisant [18] posited that in a user-centered design, user behaviour studies must be done. The design must take the users' environment into consideration, and achieving this is through a collection of users' requirement information or reflection on an improvement from the present users' experience of a similar system.

C. *Past Related Works*

Inquirer Technology just recently developed an application for flood and weather forecasting, particularly to warn fishermen of any looming dangers in the weather. It is to guide the fishing job and eradicate the risk involved in fishing in poor weather [7]. However, the sophistication of the application and its sole compatibility with android smart phones, and tablet computers has limited its accessibility and usage by the fishermen in Philippines, owing to the fact that majority of these fishermen cannot operate complex applications.

Mallalieu & Sankarsingh [11] in their study proposed a conglomerate of mobile applications called mFisheries; designed for the fisher folk of Trinidad and Tobago with a specific one that centred on enhancing fishing chances and associated issues called GFNF (Got Fish, Need Fish). The mobile applications are expected to be used to advertise catch availability to wider public of fisher folk, indicate fish procurement need based on species and quantity, to facilitate contact information between interested parties, and to display the real time prices of fish by type and market.

Qualcomm [17] developed a brew-based mobile application in conjunction with other tech giants for the fishermen in Tamil Nadu and Puducherry villages in India. The mobile application is mainly to check weather information, and water safety information. Also are the real time market price and to receive information about locations of fishing areas. The observed constraint as shown in the application functionality is its constraint on operational ability on numerous mobile phone operating systems.

III. **Methodology**

In users' centred design methodology, ethnographic approach, users' participatory method, and information system development from Grounded theory are enumerated methods expected to be utilized by any system and application developer that is aimed in realizing a user-centric product [19, 18]. These are stances of Qualitative research methods in information technology [15]. In this study, a content analysis of online materials that show the designed functionalities of previous application developed was used to form the basis of a list of functional requirements [1]. User Interface Design methodology was adapted to develop a graphical user interface (GUI) of the mobile application and this invariably gives the fishermen a visual display of what the mobile app is. This was

then used to acknowledge the appropriateness of the task highlighted in the presented user interface. Figure 1 below presents this study's research methodological framework.
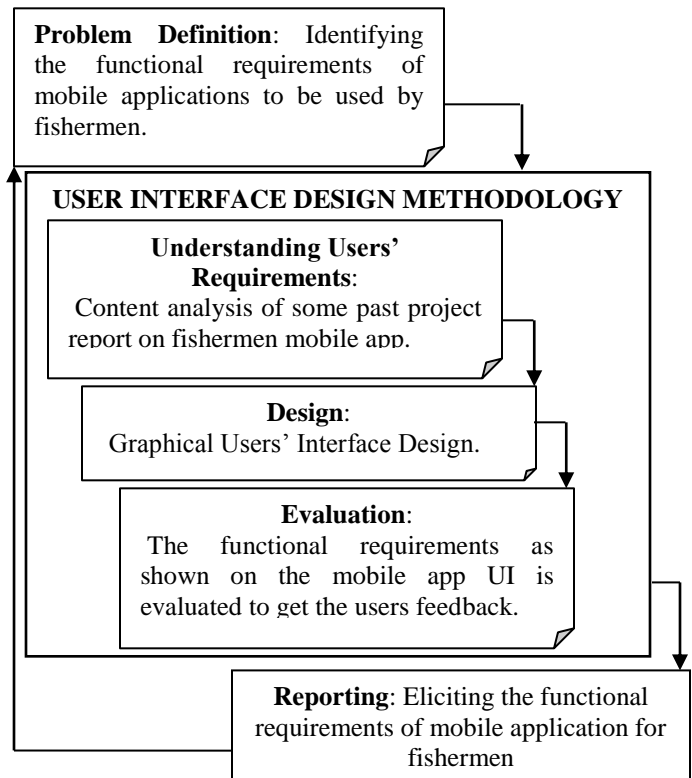

Fig.1. Research methodological framework

A. *Problem Definition*

The problem definition attended to by this study amongst other research deliverables is ascertaining the functional requirements of mobile application for the fishermen.

B. *Evaluation*

The functional requirements included in the designed mobile interface are evaluated in terms of its precision as it affects the needs of the fishermen and the attracting functionalities in the use of mobile application. A semi-structured interview with open-ended questions was used as the mode of enquiry and data collection method, purposefully to validate the appropriateness of the elicited requirements from the content analysis of previous fishermen-centered mobile application developments projects. A non-probabilistic sampling method was used, drawing its convenient sample size of nine (9) from the fishermen's population of the fishermen village, located in Kuala Kedah, Kedah, Malaysia. The choice of the number of the respondents of this study is borne out of its qualitative characteristics [13, 16, 3].

IV. USERS' INTERFACE DESIGN AND FUNCTIONAL REQUIREMENTS VALIDATION

A. *User Interface Design*

Understanding Users' Requirements

The content analysis of available related past projects are done to extract the functional requirements that this present design meets.

Table 1. Extract of the functional requirements from the content analysis..

	Content Analysis		
	Author & Year	*Product Description*	*Functional Requirements*
1	Qualcomm, 2007	A brew-based mobile application developed for the fishermen in Tamil Nadu and Puducherry villages in India.	To check weather information. To check water safety information. To check real time market price. To receive information about locations of fishing areas.
2	Mallalieu, K. & Sankarsingh, C.V. (2012)	A proposed set of mobile applications called mFisheries; designed for the fisher folk of Trinidad and Tobago. However, the specific one that centred on enhancing fishing chances and associated issues is called GFNF (Got Fish, Need Fish).	To advertise catch availability to wider public of fisher folk. To indicate fish procurement need based on species and quantity. To facilitate contact information between interested parties. To display the real time prices of fish by type and market.
3	Rolly Rulete, 2012	A mobile application operable on android and tablet computers; developed by a Philippine Graduate for fish farmers.	To check weather update. To give information about track of storms and intensity of rains.

The following user-centered functional requirements are adopted to attend to the earlier outlined research objectives:

1. To request information about weather update;
2. To request information about real time fish market price; and
3. To request fishing tips for profitable fishing practice.

System Design
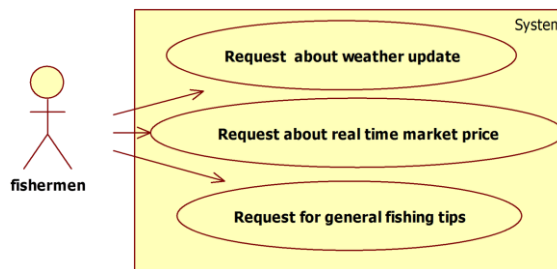Use Case Diagram is presented in figure 2 below

Fig. 2. Use case Diagram

Sequence Diagram
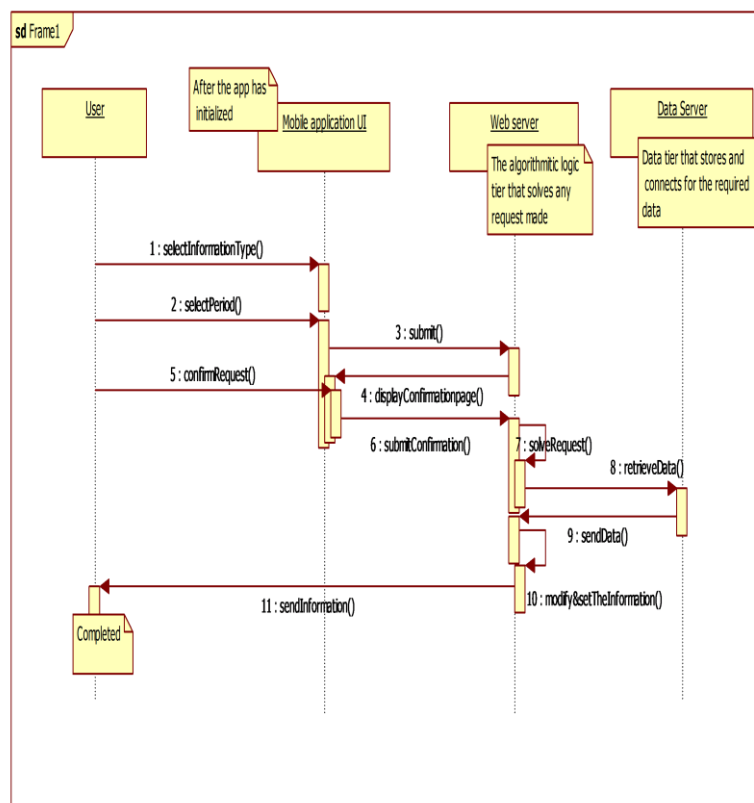The sequence diagram of the functions is given in the figure 3 below.

Fig. 3. Sequence Diagram

Graphical User Interface Design

The graphical user interface design stage is basically to visually display the application's functional requirements. As thus been shown in the design phase, it show-cased the result of the mobile app UI that this research achieved. This UI design was made using NetBeans 7.2.1 Visual Designer.

One of the designed interfaces of the mobile application is given in Figure 4 below with inscription in Bahasa Melayu.

Fig. 3. UI showing the functional requirements

B. *Functional Requirements Validation*

Functional Requirements Validation Methods
This research employed user participatory design method; as posited by Elizabeth & Sanders [5]. A paradigm shift from user centered design, characterizing users' involvement in the design process. To actualize this, a Qualitative method of data collection was employed through semi-structured interview [16] so as to exclusively ascertain the information needs of the respondents, taken from the group of fishermen at Kuala Kedah in Malaysia.

Nine (9) respondents were used for the validation process. This is done in consonance with the argument of Tullis & Albert [20] that though larger sample size creates a high level of confidence when evaluating usability and usability-related issues, a sample size like eight (8) and nine (9) is appropriate. Moreover, a Qualitative research method was used.

Functional Requirements Validation Results

This study presents the results in a quantitative-informed manner by arranging the data in line with statistical arrangement like central tendencies, clusters, ranges and frequencies [2]. Figure 4 represents the results of the functional requirements validation stage.
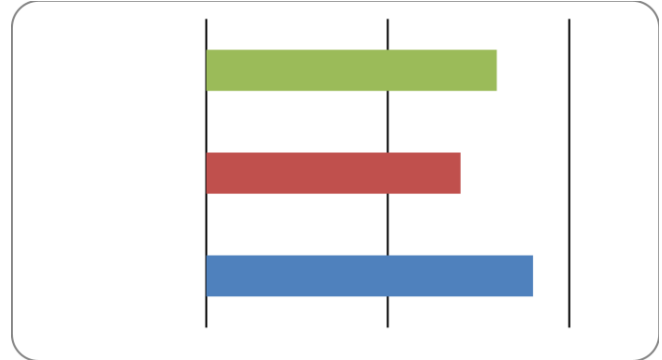

Fig. 4. Results of the functional requirements validation

From the bar chart shown in the figure above, all the nine (9) respondents validated weather update as a functional requirement, seven (7) validated real time market price, and eight (8) validated fishing tips.

V. DISCUSSION, LIMITATION AND CONCLUSION

A. *Discussion*

The findings of this research study supported the claims from [7,11] that people in rural areas are also gradually getting informed about the significance of employing information and communication technologies generally, and mobile technologies specifically in their daily pursuit. Accordingly, the findings show that the subjective usage of any mobile technologies and application is determined by its ability to be easily learnable and operable. This, as responded to after the visual display of the developed mobile application user interface, it was said that the criteria were meant, and invariably bridge the limitation of a previous related project [7] of its application sophistication and platform compliance with Android operating system only.

Relatively, all the respondents still use mobile phones with buttons either Java enabled, the Symbian operating system or the Windows phones. The respondents validated the essentiality and appropriateness of the three functional requirements as designed, with all the nine respondents interviewed validating weather updates, seven validated real time market price, and eight validated fishing tips.

In attending to the research objectives as stated by this study, the result of the content analysis of past related projects

revealed that functional requirements of mobile application for fishermen are given in the table below:

Table 2. Functional requirements of mobile application for fishermen

	Functional Requirement of mobile application for fishermen
1	Checking weather information which include water safety information
2	Giving information about track of storms and intensity of rains
3	Checking real time market price
4	Getting fishing tips which include receiving information about locations of fishing areas
5	Getting advertisement of catch availability to wider public of fisher folk.
6	Indicating fish procurement need based on species and quantity.
7	Facilitating contact information between interested parties for buying and selling.

However, the choosen three functional requirements used in the designing stage of the UI are: requesting for weather update, requesting for real time market price, and general fishing tips. Notably, all these three functional requirements are validated by the fishermen who are taken as the respondents, the prospective users of the mobile application.

B. *Limitation*

Larger sample size is suggested for future research to increase the confidence level of the study [20].
Future research is also expected to concentrate on full implementation stage following the system design as given by this study.

C. *Conclusion*

This study having taken the stages and phases as indicated in the research methodology, and precisely the user interface design using the Users' Interface design methodology, the set research objectives are achieved. This concludes that a field study of users' requirements as represented by this study is a key approach towards ensuring users' acceptability of any information technology products, and also serves as an awareness stage for the prospective users.
Also, the paradigm shift in users' experience study by emphasizing users' participatory design method; designing with the users as succinctly put, over the user-centred design; designing for the users as shown in this study further adds to the glamour of the advocacy. Having seen that designing with users has better opportunity of achieving a more users-friendly product.

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