

# Usability impact of adaptive culture in smart phones

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## Abstract

A smartphone is a gadget playing out the undertakings of a PC system and cellular system joined by having a touchscreen and easy-to-understand interface. The utilization of smartphones and their versatile highlights turned into a culture of society from youngsters to adults and more seasoned ones too. The review examines various papers and talked about exhaustively web access and an operating system commonly for a few downloaded applications to run fast and proficiently, the paper that it will write later has usability evaluation of various highlights of smartphones, This paper presents the usability as far as versatility, efficiency and adaptability of the smartphone include and its examination altogether. The smartphone usability includes that are talked about in this paper incorporate Screen rotation, the easy screen turns on/off, raising to awake, smart pause, Eye contact, smart alert, voice commands, face recognition QR code Reader, Touch disables mode, Battery Saving mode, Night Mode and a few Apps operating at continuous. The viability of these highlights is estimated through the After Scenario Questionnaire (ASQ) Lewis-1999 strategy and International standard organization (ISO) ISO-9241-11 standard questionnaire. The investigation is done with the participation of 110 clients of smartphones both Android (Google) and iPhone (Apple) clients. Usability evaluation enabled the smartphone culture, its elements, and its use.

## Keywords

Usability patterns, adaptive mobile feature, smartphone, user experience, user satisfaction, user interface, cultural heritage

## 1. Introduction

A smartphone is a gadget playing out the undertakings of a PC system and cellular system joined having a touchscreen and easy-to-use interface, I read various papers and examine exhaustively web access and an operating system normally for a few downloaded applications to run at a high velocity and proficiently, the paper that I will write in later has usability evaluation of various elements of smartphones, This paper presents the usability as far as versatility, efficiency and adaptability of the smartphone include and its examination altogether. The smartphone usability includes that are talked about in this paper incorporate Screen rotation, the easy screen turns on/off, awake, smart pause, Eye contact, smart alert, voice commands, face recognition, QR code Reader, Touch disable mode, Battery Saving mode, Night Mode and a few Apps operating at continuous, so by evaluating such features we use Survey technique for evaluating such features because usability evaluation is the need of a product development company to know if the features are maintained as user-friendly as well as environment friendly [1]. As if we want to maintain or increase the sales of a product, developers have to keep the

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product user-friendly [2]. So, taking a review of the product from the public about the product is the best idea to keep the developers informed about the need of the day [2] [3]. The various mechanism used like feedback and usability test is used. User-centered design (UCD, and User Experience (UX) are the features that we evaluate. A user experience test is just a try to make sure the product goes well with the user. It facilitates the user properly and as the details promised. The user's experience is biased. The characteristics that make up the user experience, on the other hand, are quantitative. 'User experience,' according to Nielsen Norman Group, involves all elements of the end-engaged users with the firm, its services, and its goods,

## 2. Literature Review

Usability evaluation is the need of a product development company to know if the features are maintained as user-friendly as well as environment friendly [1]. To maintain or increase the sales of a product, the developers have to keep the product up-to-date and user-friendly [4]. To keep it up to date they must keep an eye on the competent products available in the market out there and to keep it user friendly they need to communicate somehow with the public [5]. So, taking a review of the product from the public about the product is the best idea to keep the developers informed about the need of the day [2] [3]. *How do the users like it?* Is the main concern of the developers? Users' reviews can be obtained through feedback or questionnaire from the users. Once the feedback is obtained, the developers then need to evaluate the whole process to get the average feedback. This evaluation is the essence of the whole scenario which is known as Usability Evaluation. There are various methods to take the feedback among which one will be discussed in the methodology section afterward.[6] No matter which method is used, the feedback mechanism either formal or informal in the specific environment is called the Usability Test [7]. The Nielsen Norman Group did usability research on the usability of mobile phone applications in 2009, [8] which found that 59 percent of the test was completed successfully, with three usability difficulties identified: efficiency, screen size, and text input [9]. For the experiment, 230 internet users were chosen based on many characteristics such as age, years of internet usage, level of education, and processing speed [10]. The values of these attributes were utilized to compute the response time [11]. The research mentioned above not only emphasizes usability difficulties but also the influence of user interface on mobile technology [12]. User-centered design (UCD) is a process for analyzing demands, tasks, surroundings, preferences, and limits in the context of the user [13] [14]. It focuses on high usability and low-cost products [15]. The UCD differs from other design theories in that it aims to improve user usability and experience through optimizing interfaces [15][16]. The required tasks should be matched with the user's understanding for good mobile interface usability [17] [18]. AUIs may be utilized directly to increase a user's usability and satisfaction level. Because of their non-contextual User Interfaces, many apps have usability concerns [19] [20]. User Experience (UX) is a test to know how users interrelate with a product or some service from a certain company [21]. It involves users' views on the accuracy, efficiency and usefulness of that particular product or service [22].

Smart Phone Industry has boosted in Asian countries 72% of children have their smartphone at age of 11 or 12, Smartphones are central to many societies but they have been integrated into Asian cultures, Asian countries have 2.5 billion smartphone users and its have a huge impact on daily life, With mobile phones firmly ensconced in the car, hand, and pockets, and adorning the bodies and the clothes of literally billions of people around the world, it is high time for consideration of the cultures associated with this exemplary everyday technology.

Socially Mobile Phone has a big impact on social perspective and In the case of social interaction nowadays the latest experience has a variety of applications of social media accessing mediated experiences equates to experiencing them. Brand or campaign slogans constitute a good example of this: 'connecting people, 'experience life'; 'don't miss a moment, 'see new, hear new, feel new', 'the vivacity of life, or 'live it!'. From a functional point of view, advertisements are addressed to produce discursive coherence between institutional and non-institutional discourses, becoming a sort of meeting point where advertisers' meaning proposals and social context-situated meaning practices confront their symbolic imaginaries and represent each other. So it's being a huge impact on our culture everything performs on mobile phone and its being culture of our society.

Mobile phone culture also impacts students learning, most of the students even work with this smart device and pay their tuition charges, even its an essential part of student's life and due to excessive usage, its being creates a huge impact on students learning, Now students can discuss their educational matters with online devices like smartphones, smartphone industry can create huge opportunities in the current era, It's Going a culture for our society, everyone of every age can use the smartphone, The smartphone usage has become a more popular day by day and it's being our culture.

### 3. Methodology

The methodology is the system of techniques that are practiced during a study or activity. Research methodology defines the techniques used to scrutinize and gather information about a survey, study, or a topic. A research methodology is meant to evaluate the key functions for example effectiveness, efficiency, and satisfaction.[23]. We are going to find out the usability evaluation of smartphones by collecting some real-time responses from smartphone users as our data and then we will apply our effectiveness, efficiency, and satisfaction checkpoints to perform the task.

#### 3.1.Culture of Usability Evaluation

Effectiveness, efficiency, and satisfaction are the three parameters used to evaluate the usability of a product's features. The ASQ technique mentioned above is used to evaluate satisfaction whereas to evaluate effectiveness and efficiency the ISO method will be used.

*To Evaluate Effectiveness*

Effectiveness = (Total no. of tasks completed)/ (Total no. of tasks allocated) \*100

*To Evaluate Efficiency*

Efficiency = (Time taken for the task)/ (Total time allocated) \*100

*To Evaluate Satisfaction*

The ASQ questionnaire mentioned above is used to evaluate satisfaction. The users are given a brief questionnaire that is both straightforward to comprehend and fill out.

#### 3.2. Research Questions

Three questions that are mainly asked in the ASQ questionnaire are as follows:

**Question 01** The task allocated was easy to understand and perform in terms of difficulty.

**Question 02** The time provided for the completion was enough or more than enough.

**Question 03** Provided information related to the task was helpful and enough to the satisfaction level of requirements.

ASQ method consists of some questions which are answered as follows.

Strongly Disagree, Disagree, Neither Disagree nor Agree, Agree, and Strongly Agree

The After Scenario Questionnaire or ASQ is a 3-question scale used to evaluate how strenuous a user recognized the task in a usability experience test. This survey is developed by James R. Lewis in 1995 and it is popular among all the other usability tests because of its simplicity.

The After Scenario Questionnaire Statements are as follows:

- The task allocated was easy to understand and perform in terms of difficulty.
- The time provided for the completion was enough or more than enough.
- Provided information related to the task was helpful and enough to the satisfaction level of requirements.

#### 3.3.Selection of Parameters

Effectiveness, efficiency, and satisfaction are the three parameters used to evaluate the usability of

a product's features. The ASQ technique mentioned above is used to evaluate satisfaction whereas to evaluate effectiveness and efficiency the ISO method will be used. The results however will be shared at the end accordingly. Participants in this study had at least 15 months of experience using mobile phones. A pre-questionnaire was created to identify the most appropriate individuals for user testing. Initially, 180 people were discovered using a questionnaire, with 39 of them being eliminated in the first phase because they had less than a year of smartphone experience. 11 participants had no prior knowledge of usability or were not willing to participate. 10 individuals had eyesight or other issues because of which they could not participate. The remaining 120 participants were further divided into 12 groups each having 10 participants that is Group 1, Group 2, Group 3, Group 4, Group 5, Group 6, Group 7, Group 8, Group 9, Group 10, Group 11, and Group 12. Each group gets its task to be performed by the participants. After gathering all the data results will be declared accordingly at the end. Note that the groups were divided into equal genders each group had 5 male participants and 5 female participants of almost the same age group.

### 3.4. Sampling and Experiment

During this study, participants were selected according to their experience with smartphones. At least two-year experience was mandatory to participate in this questionnaire. A small pre-test was developed to find out the participants who were perfect to go under this ASQ through which we could get the most accurate results. Initially, 50 participants underwent the pre-test. 30 out of 50 were selected based on their experience with smartphones. 19 participants were disqualified as they did not have the minimum two-year experience in using a smartphone. Furthermore, 9 participants were not willing for the ASQ themselves and 7 participants were unable to understand the adaptive features whereas the remaining 5 were rejected due to other reasons. Then those 30 participants who were selected for the ASQ were divided further into five groups i-e, Group A, Group B, Group C, Group D and Group E. Each group had 22 participants in total making 30 overall as mentioned before. These groups were provided with the tasks they had to perform as well as some relative information about those tasks assigned. The experiment was carried out in a specialized manner.

### 3.5. Conducting

*Tasks were assigned to each group, respectively.*

**Group A:** (communication app): 5 topics were provided to each participant. The participants had to use WhatsApp, Skype, and Instagram apps. The time assigned for this task was 30 minutes. The average time consumed for the completion of this task was 25 minutes. The task was monitored properly as well as maintaining the record.

**Group B:** (social news app): All participants were allocated the task to check the features of the social app and check its functionality

- Google news app
- Flip board
- CNN
- VOA

These commands were executed by each participant, respectively. The total time given to accomplish these tasks was 10 minutes. The average time consumed by the participants to perform these tasks was 8.96 minutes.

**Group C:** (service provider app): participants were given an option to either use Uber App to book a ride by using GPS to locate themselves to the driver or use Snapchat to locate their friend on the maps using Olx or use WhatsApp for sending their live location or current location through the Daraz apps. The accuracy of the location was recorded in each participant's activity. The total time allocated for this task was 6 minutes whereas the average time taken by the participants to complete this task was 5 minutes.

**Group D:** (browsing app): All the participants of this group were assigned to search for some task. Then they were told to swap their smartphones with each other and try to unlock the smartphone which

they get after swapping. The time provided for this task was 15 minutes.

**Group E:** (utility apps): All the participants of this group were assigned to search for some task. Then they were told to swap their smartphones with each other and try to check the calculator, google assistant. The time provided for this task was 15 minutes and the detailed time and no of participants are tabulated as follow (Table I).

**Table 1**  
Sample groups and tasks for the experiment

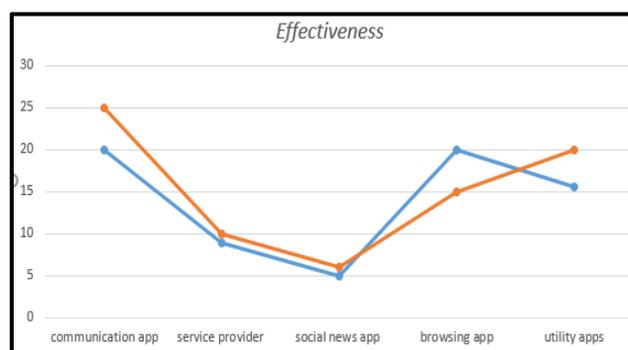
Sample Groups, tasks and subtasks are recorded for the experiment.					
Group	Task	Sub-Task	No.of Participant	Time in minutes	Evaluation
A	Communication App	WhatsApp, Instagram	22	30	ASQ
B	Social News App	Perform 4 task	22	10	ASQ
C	Service Provider App	Screen rotation	22	15	ASQ
D	Browsing App	Smart alert	32	15	ASQ
E	Utility App	Calculator, google Assist	22	15	ASQ

## 4. Results and Discussion

This study explains how adaptive features are addressed to be found effective and efficient in terms of adaptively

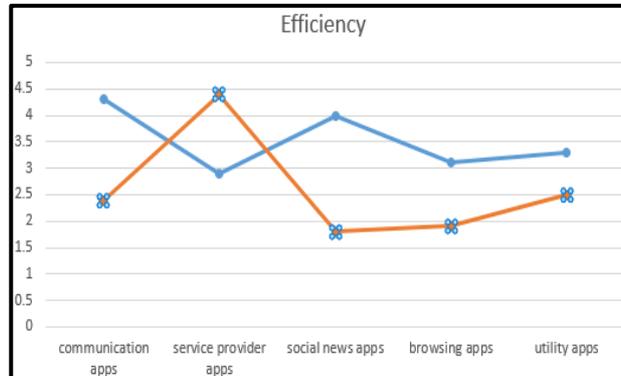
### 4.1. Effectiveness

This graph shows the time taken by each task versus the total time provided. The usability in terms of the effectiveness of these mobile features is stated in a line graph having all five features on the x-axis and the time difference on the y-axis [24]. The effectiveness of Communication apps is 90% efficient. Service provider apps are 40% effective Effectiveness of these apps can be shown via this graph and this is shown in Fig. 1.



**Figure 1: Efficiency of Usability Features**

The five usability features are discussed in terms of effectiveness and efficiency. Effectiveness is being discussed already and the remaining results in which we have demonstrated the inquired outcome for efficiency are below, the efficiency of features is shown in Fig. 2.

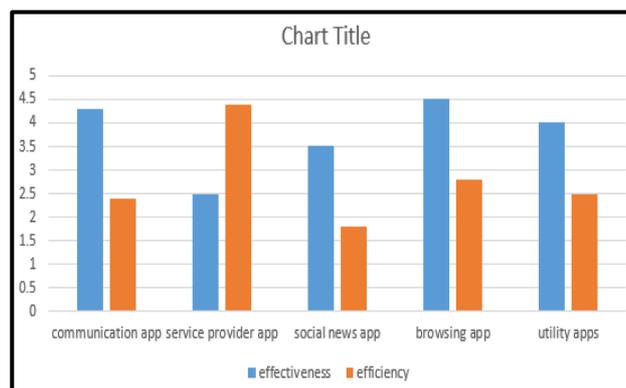


**Figure 2: Efficiency of Usability Features**

The usability of work acquired by something at its maximum capability is called efficiency. Web browsing is more efficient than the rest of the features but it's not about comparison rather it is a different approach toward usability in terms of efficiency. Communication apps are 99% efficient. Browsing apps is 50% efficient whereas privacy is 75% efficient. Social news apps are above all 85-90% efficient again.

#### 4.2. Effectiveness vs Efficiency

Now compare the selected usability features in both terms altogether. This shows how well a smartphone can operate in such conditions with effectiveness and efficiency on one screen, and the comparison of these is shown in Fig. 3.



**Figure 3: Comparison of Effectiveness and Efficiency of Usability Features**

### 5. Conclusion

The paper examined the usability of adaptive features in smartphones anticipated by sellers of smartphones which is a culture in underdeveloped Asian countries now. The study evaluated these features grounded on the effectiveness, efficiency, and a comparison between both, it identified that usability issues of adaptivity still exist due to uniform adaptive features provided by the smartphone

sellers and dealers regardless of user ability and task context Currently, it is more on user's choice to turn on or off any adaptive feature while performing a specific task. The experimental result concludes that the adaptivity in the user interface has a greater ability to increase the Web browsing is more efficient than the rest of the features but it's not about comparison rather it is a different approach towards usability in terms of efficiency. Communication apps are 99% efficient. Browsing apps is 50% efficient whereas privacy is 75% efficient. Social news apps are above all 85-90% efficient again; utility apps effectiveness is 80%.

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