Mahak Rana Report 2

by Mahak Rana

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SECTION 2: DISSERTATION

Evaluation of user satisfaction among hospital mobile app users in Artemis hospital using system usability scale

Mahak Rana

PG/17/31

CHAPTER 1: INTRODUCTION

Background

In the past few decades there has been advancing growth in information and technology and its application in various fields. The employment of mobile web devices and applications (apps) has revolutionized health care, communications, commerce, education, and recreation, and all the other aspects of human life. The utilization of mobile devices and apps has also remodeled several other aspects of clinical healthcare. The use of mobile web devices, smart phones, and apps can enhance communication among healthcare professionals (HCPs) and patients. HCPs can use medical devices and apps for several functions, most of which might be sorted underneath 5 broad categories:

In spite of these benefits some HCPs are reluctant to adopt these mobile medical apps. The key reason being lack of installation of higher standards and validation practices. Integration of these progressively complex and innovatory tools in clinical healthcare is done through installation of these standards that successively can raise the barrier for entry into the medical app market. The standard and safety of the apps in the market for the HCPs use will be considerably increased and therefore the probability of being adopted by more HCPs is increased further.

The most noteworthy advantage offered by mobile devices and apps is that they permit access to point-of-care tools that boost effective clinical decision making on the part of HCPs and produce better patient outcomes. Ideally, HCPs need access to plenty of data and communication resources in an exceedingly clinical setting including:

- voice call, video conference, message and via e-mail
- Hospital information systems (HISs) – electronic medical records (EMRs), electronic health records (EHRs), clinical decision support systems (CDSSs), picture archiving and communication systems (PACSs) etc.
- Clinical software applications – disease diagnosis aids, medical calculators.

There is a need for mobility in healthcare settings and all the above resources were previously provided by stationary computers and devices which did not support this requirement of portability. Workstations on Wheels (WOWs) or Computers on Wheels (COWs) were some attempts by healthcare environments to address the issue. Although availability of mobile devices such as smart phones and tablets have now made all the information and resources instantly accessible at the fingertips of clinicians.

A 2012 study dealing with the reasons behind the utilization of mobile devices by HCPs called the Manhattan Research/Physician Channel Adoption Study showed some interesting results. The results clearly showed that the most prominent activity was searching and 98% HCPs used their personal computers/laptops to search, 63% used their tablets and 56% used their smartphones for it. Specifically in the case of doctors, searching dominated as the most frequent use of smartphone utilizing 48% of phone time and professional apps taking an additional of 38%. Similar results were obtained in case of physicians as well, who spent an average of three hours per week watching internet videos for professional purposes on personal computers/laptops (67%), tablets (29%), and smartphones (13%); the most regularly viewed content (55%) was continuing medical education (CME) activities. 85 % of medical school students and HCPswere also seen using mobile devices mostly for communication, time management or information relating to education and patient care and other clinical purposes.

Medical apps and mobile devices have shown beyond doubt that they are indispensable tools for HCPs to this point, and as their uses and features expand, they're expected to be incorporated more extensively in healthcare domain to encompass the majority aspects of clinical practice.

However, there is an exigency for rigorous analysis, validation, and in turn the development of best-practice standards for medical apps. An elementary level quality and safety of these tools ought to be ensured. This may establish to be the most determinant factor of an app's worth to provide meaningful, timely and accurate data, information and guidance to the end user so as to serve the crucial purpose of improving patient outcomes.

CHAPTER 3: OBJECTIVES

Objectives

1. To evaluate the level of satisfaction amongst mobile app users in Artemis Hospital, Gurugram
2. To assess the possible barriers and facilitators for successful adoption of mobile app in Artemis Hospital.
3. To examine hospital staff and patients perception of mobile app.

CHAPTER 4

LITERATURE REVIEW

A literature review provides us with the present knowledge together with substantive findings, in addition to theoretical and methodological contributions towards a particular topic. It is the first step for any research work. Literature review brings us at par with the current status of our research as well as provides us with the problems left unsolved laying the ground work for new research.

A study in the year 2016 examined physicians' perception on the use of tablets with EMRs in an inpatient setting. They constructed a survey questionnaire of total 57 items that aimed to examine users' perceptions of and attitudes toward tablets with mobile EMRs during the workday. The conclusions were favourable in the use of tablets in an inpatient setting and it was also concluded that physicians view tablets with EMR as clinically useful. (**Julian Duhm, et al.**)

A study conducted by **C. Lee Ventola** in the year 2014assessed the uses and benefits of mobile devices and apps for health care professionals. He concluded that meticulous evaluation, validation, and the best-practice needs development which requires the raise in the standards of medical apps and it needs a check on the quality and safety of the tools being used in the practice. The execution of such measures would decide the main determinant of an app's value and it may ultimately be its ability to provide meaningful, accurate, and timely information and guidance to the end user which would help to serve the vital purpose of improving patient outcomes.

A study by **Mosa AS**et al. conducted a systematic review of the healthcare apps available for smart phones wherein he found out that many medical apps for smart phones are in use, professionals and patients are getting used to it and this has shown a great improvement in the health sector. The extensive use of smart phones in healthcare sector is capturing more and more attention every day. The apps used in medical care make smart phones informative tools which help in the practice of evidence-based medicine at the point-of-care, apart from their use in mobile clinical communication. Also, smart phones play a vital role in patient education, self-management of disease, and remote monitoring of patients.

CHAPTER- 5
METHODOLOGY

Study design: Cross-sectional study

Study Type- Quantitative

Sampling Methodology- Convenient sampling

Location of Study: Artemis Hospital, Gurugram,

Study Population: Users of Mobile App in Artemis Hospital, Gurugram

Sample size: A sample size of 100 is targeted

Targeted group - People who use hospital mobile app

Sampling Method:

Users were divided into the following four groups:-

1. Doctors-- 10
2. Nurses--60
3. Administrative Staff--10
4. Patients--20

Type of Data: Primary data

Data Collection Tool: System Usability Scale Questionnaire

Data Analysis Tool: SPSS Software

TIME FRAME: 4 February 2019 to 4 May 2019

Data Collection Tool: System Usability Scale Questionnaire

For the purpose of this study, a paper form of System Usability Scale questionnaire was used which was given hand to hand to the study participants. It is one of its kind tool that has not been used before for the analysis of mobile app in any Indian hospital setting. The SUS was originally designed, for the purpose of measuring the usability of a system, by John Brooke in 1986. It was developed as a part of the usability engineering programme in integrated office systems development at Digital Equipment Co. Ltd, Reading, UK. It is straightforward, ten-item high-levelled scale with five responses (from strongly disagree to strongly agree).The questionnaire does a subjective assessment of multifarious aspects of system usability. One of the key factor for the selection of SUS questionnaire is that this questionnaire is simple, adaptable and covers varied aspects extending to the usability of system is concerned so as to evaluate the satisfaction of the user.

Apart from the set of 10 questions of SUS, some demographic questions such as name, age including work experience, experience with hospital mobile app etc were also added.
Another two questions of great importance were added towards the end of the final questionnaire to measure the possible barriers and facilitators for adoption of hospital mobile app in the hospital.
As reported by its creator, while using the SUS questionnaire the following things should be taken into consideration.
Respondents must not suppose for an extended time what to check. The response given immediately is valuable.
All items ought to be checked.
If respondents are not confident of what to respond to a specific item, they must mark the centre point of the scale.
All these points were taken care of for the sake of reliability of the information.
It was planned that every selected participant will be visited thrice till he/she fills the questionnaire. For whatever reasons, if despite three visits, the participant is unable to fill the questionnaire, it will be taken into account as non-response.
This planned procedure was followed and 100 responses in total were collected.

ANALYSIS OF THE DATA

Step 1: Scoring the System Usability Scale:

The following methodology is used to calculate the SUS score according to Brooke:
>>Each item's score contribution will range from 0 to 4.
>>For positive questions/queries the score input is scale position minus 1. For negative questions/queries, the input is 5 minus in the scale position.
>>The score inputs from each item are summed.
>>The aforesaid sum is multiplied by 2.5. The result of this multiplication is the total value of SUS.
>>The SUS scores range from 0 to 100.
>>Separate scores of each item are pointless on their own.

In this manner, the SUS Score was calculated for all the 100 responses and an average score for the hospital mobile app of Artemis hospital was figured which came out to be 74.53.

Step 2: Data analysis in SPSS

The statistical package used for the analysis of the data was SPSS. The collected data was coded and an analysis run using several factors was done which will be discussed in the "Result" section. The statistical methods used were descriptive statistics which included mainly of frequency statistics and cross tabulation statistics.

Also, a manual analysis of the extra questions was done so as to figure out the possible barriers and facilitators involved for the successful adoption of hospital mobile app in the hospital.

CHAPTER-6
Results

PART I

- **SUS Score** - The data collected via SUS questionnaire suggested that the subjects rated the system as "good" usable with an SUS score of 74.53.

System measurement variables	Strongly Disagree Percentage (Frequency)	Disagree Percentage (Frequency)	Neutral Percentage (Frequency)	Agree Percentage (Frequency)	Strongly Agree Percentage (Frequency)	Total Percentage (Frequency)

Frequency of use	4.0%	4.0%	12%	20%	60%	100%
Complexity	33%	26%	9%	9%	23%	100%
Ease of use	1%	6%	7%	27%	59%	100%
Need for technical support	39%	20%	14%	9%	17%	100%
Functional integration	4%	4%	7%	38%	47%	100%
Inconsistency	24%	34%	15%	13%	14%	100%
Quick learning of the system	0%	3%	12%	22%	63%	100%
Cumbersome to use	35%	35%	16%	13%	1%	100%
Confidence in use	0%	2%	8%	24%	66%	100%
Need to learn before the use of the system	23%	25%	21%	16%	15%	100%

Table No.1

- After clubbing the above data (responses for strongly disagree and disagree; strong agree and agree were summed up) for easy and simplified output generation, the following result was obtained:

System measurement variables	Disagree Percentage (Frequency)	Neutral Percentage (Frequency)	Agree Percentage (Frequency)	Total Percentage (Frequency)
Frequency of use	8.0%	12%	80%	100%
Complexity	59%	9%	32%	100%
Ease of use	7.0%	7%	86%	100%
Need for technical	59%	14%	26%	100%

support				
Functional integration	8%	7%	85%	100%
Inconsistency	58%	15%	27%	100%
Quick learning of the system	3%	12%	85%	100%
Cumbersome to use	70%	16%	14%	100%
Confidence in use	2%	8%	90%	100%
Need to learn before the use of the system	48%	21%	31%	100%

Table No.2

- **SUS – System measurement variables**

1. **Frequency of use**

   The statistical assessment of the data disclosed that 80 percent of the users would rather use use the mobile app frequently and 8.0 percent of the users disagreed with wanting to use the mobile app frequently. While, another group of 12 percent were neutral on using this statement.

   It would be appropriate to note that the users rated this aspect of the mobile app as highest among all the other variables amongst the SUS questionnaire.

2. **Complexity**

   According to the statistical evaluation of the data, 59 percent did not find the mobile app to be complex at all. While 32 percent found that using the mobile app was complex and another group of 9 percent was neutral regarding the mobile app's complexity.

3. **Ease of use**

A group of 86 percent of the users defined the mobile app was easy to use providing a probable reasoning for similar high statistics for a good percentage of users to want to use the mobile app frequently.

While, only 7.0 percent of the users did not perceive the mobile app to be easy to use and 7.0 percent of the users neither found the mobile app to be easy to use nor difficult.

Also, it is worth mentioning that this variable was rated as the second best feature of the mobile app by the users.

4. **Need for technical support**

Though 59 percent of users did not believe that the support from a technician is necessary in order to be confident to use the mobile app, a large percentage of the group of users that is 14 percent had no specific opinion regarding this statement. The remaining 26 percent considered the support and guidance from the technician as important.

5. **Functional integration**

Group of respondents that are 87 percent considered the mobile app as functionally well integrated. A probable reasoning for similar high statistics for a good percentage of users to want to use the mobile app frequently. The opposite opinion was reported by only 7 percent of the respondents; 8 percent neither agreed nor disagreed as far as for the well integration of the mobile app is concerned.

6. **Inconsistency**

Regarding the inconsistency of the mobile app, 58 percent totally disagreed. Though 27 percent agreed on the mobile app being inconsistent, a similar group of 15 percent neither regarded nor disregarded the mobile app as consistent.

7. **Quick learning of the system**

A majority of 85 percent users supported that the mobile app was easy to be learnt. The proportion that supported the mobile app was difficult to be learnt rated to 8 percent.

Finally, the percentage that neither agrees nor disagrees with the statement was found to be a considerable of 7 percent.

8. **Cumbersome to use**

More than half the users that is 70 percent claimed that the mobile app was convenient to use and not at all cumbersome. A group of 14 percent of the users agreed with the mobile app being cumbersome in use whereas a significant 16 percent felt neutral about this statement.

9. **Confidence in use**

A significant majority of 90 percent users felt confident in using the mobile app and only 2 percent felt doubtful while using the mobile app. The remaining group of 8 percent felt neither confident nor doubtful while using the mobile app.

10. Need to learn before the use of the system

Nearly half of the users, 48 percent said that there was no need of training before the use of the mobile app.

A group of 21 percent who felt neutral about the need for technical support to use the mobile app also felt neutral about their need to learn the mobile app before using it while clearly 31 percent expressed their need towards being trained before the use of the mobile app.

Therefore, it is evidently found that the top three rated variables of the mobile app which satisfy the users of the mobile app to a great extent are-

- Frequency of use
- Ease of use
- Confidence in use
- Functional Integration
- Quick learning of the system

The following variables were found to be least rated –

- Need to learn before the use of the system
- Cumbersome to use
- Need for technical support

		Experience with Application		
		0-1 Year	>1 year	Total
Average SUS Score	<68	26	11	37
	>68	34	29	63
Total		60	40	100

Experience with application

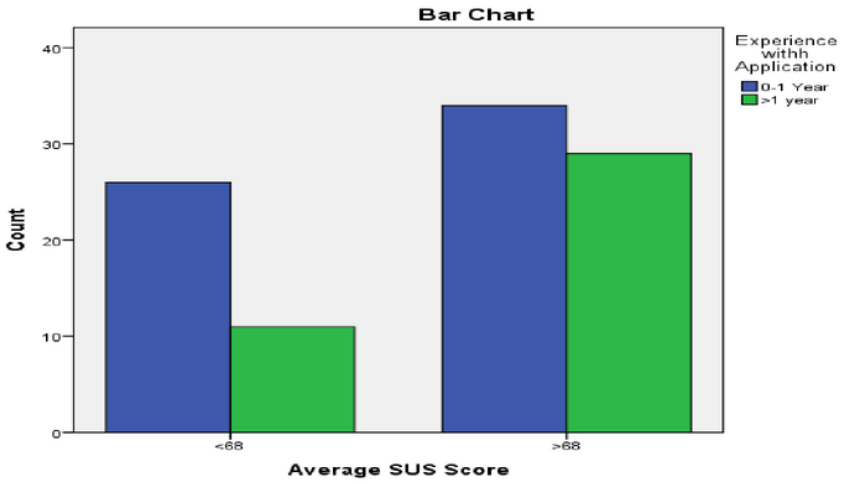


Table No.3

This graph shows 34% of users around experience of 0-1 year with mobile app has given score more than 68 and 26 percent of user with the same experience has given less than 68 score. While considering the experience greater than 1 year, 29 percent of users have given greater than 68percent. However, 11percent of users has given less than 68 score with the similar experience.

		Age Groups			Total
		0-25 years	26-35 years	36-45 years	
Average SUS Score	<68	13	19	5	37
	>68	24	32	7	63
Total		37	51	12	100

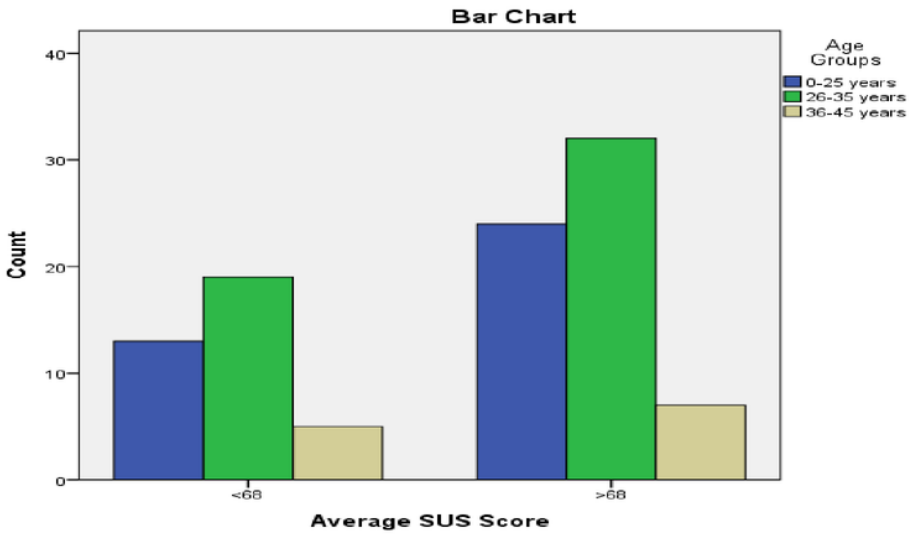


Table No. 4

This graph shows 24 percent of users around the age of 0-25 years with mobile app has given score more than 68 and 13 percent of user within the same age group has given less than 68 score. While considering the age ranging from 26-35, 32 percent of users have given greater than 68 percent. However, 19 percent of users have given less than 68 score with the similar age group. With increase in age i.e. from 36-45years, 7 percent of users have shown greater than 68 score than the 5 percent of users with less than 68 score.

These age group divisions were done to see if there is a correlation between the SUS scores and the belief that youngsters are more comfortable with technology and its application in daily use.

		Average SUS Score		Total
		<68	>68	
Response Type	Hospital Staff	31	59	90
	Patients	6	4	10
Total		37	63	100

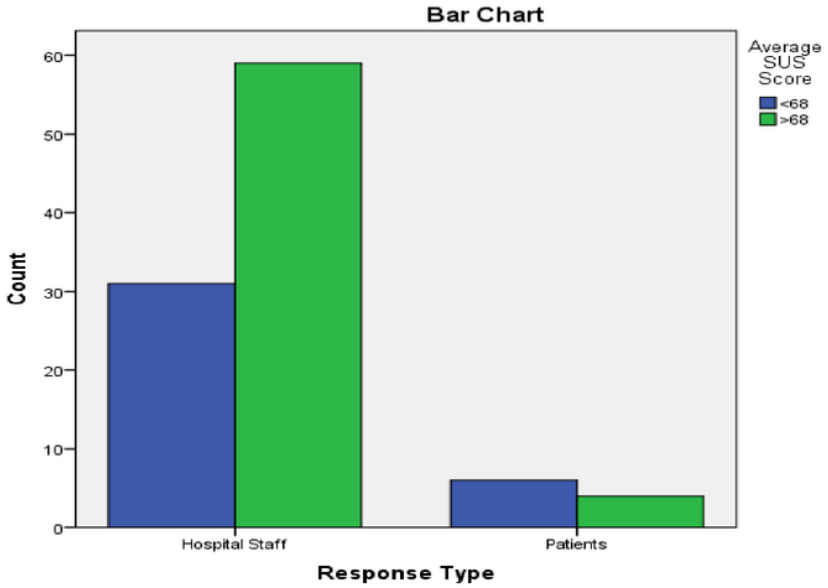


Table No. 5

This graph shows 59 percent of hospital staff using mobile app has given score more than 68 and 31 percent of user has given less than 68 score. While 6 percent of patients has given less than 68 percent and 4 percent of users has given more than 68 score.

PART II

Further analysis of the last two questions on the questionnaire revealed the following results that were tabulated according to the "Barriers" and "Facilitators" for successful adoption of mobile app in the hospital. Another sub-category made for simplifying the analysis was among "hospital staff" (viz. nurses, doctors and administrative staff) and "patients".

HOSPITAL STAFF (N=80)		PATIENTS (N=20)	
BARRIERS	**FACILITATORS**	**BARRIERS**	**FACILITATORS**
Technical • Slow • Hangs when typing notes • Location restriction is there	**Technical** • Very easy and comfortable system • User friendly • Quick • Less time consuming • More efficient	**Technical** • Outsourced test reports are not available • Slow	**Technical** • Easy to use • Very comfortable system • Smooth **Behavioural** • Reports are accessible at any time. • Time saving. • Appointment booking is easy • Easy to upload documents

CHAPTER-8
DISCUSSION

The purpose of this study was to better understand hospital staff and patients attitudes towards mobile app. Results indicate extreme satisfaction with the mobile app among hospital staff and patients along with a motivation to use mobile app in the future. Users of mobile app felt that mobile app allowed for fast access to patient data. The users rated the Mobile app at Artemis hospital, Gurugram as "Good" with a SUS Score of 74.53. The top rated variables of the system which satisfy the user needs to a great extent are-Frequency of use, Ease of use, Confidence in use, Functional Integration, Quick learning of the system.

The variables that are causing plight to the users of the system proving to be in need of succour are the least rated-Need to learn before the use of the system, Need for technical support, Cumbersome to use. As mentioned earlier that an SUS Score of 75 is considered to be good. Here, only a total of 59% users rated the mobile system with a SUS Score of 68 and above, while the remaining 31% users rated the system below 68. It also reported that mobile app use improved hospital staff-patient interaction and streamlined hospital workflow. Time saved as a result of hospital mobile app use.

In my study, another important point provided was the extreme degree of satisfaction between hospital staff and patients with the way data were presented on the mobile app. Mobile app encouraged physicians to share medical information over the app with patients. This promotes the physician-patient interaction because one causation in patient satisfaction appears to be the amount of time patients spend with their physician.

CONCLUSION

- The facilitators such as proper documentation, developing a paper free environment, the legibility of the prescription, ease of working on reports etc; in a manner, depict the user perception regarding the present usefulness of the mobile app or how further it can be utilized. These are the possible factors that motivate the users for working on the mobile app.
- Moving ahead, the technical factors of both the categories (hospital staff and patients), need to be rectified by the IT team at the hospital. As discussed, the users reported the

system to be slow with hanging problem. These act as obstacles in the functioning of the system.. These require simplification for better efficiency of the system.

- Lastly, the barriers are the perceived factors that prevent them from using or accepting the system completely. As discussed, some users mentioned "minimal keyboard usage makes patient search time consuming". Factors like these seem to be a result of lack of training or improper identification of the systems functions.

Recommendations

Conduct training sessions

The SUS results clearly suggest that the users feel the "Need to learn before the use of the system" and the "Need for technical support" as these were among the least three rated system measurement variables. A "Hands on" session is a mandatory for the users to learn themselves and for immediate clarification to their doubts.

Mobile app performance enhancement

To rectify the slowness and hanging issue in the functionality of app by upgrading the mobile application.

E-consultation

There is a provision of E-consultation in mobile app. It should be fully functional for the easy communication.

Information exchange practice

There should be an option of sharing medical records with the other hospitals.

REFERENCES

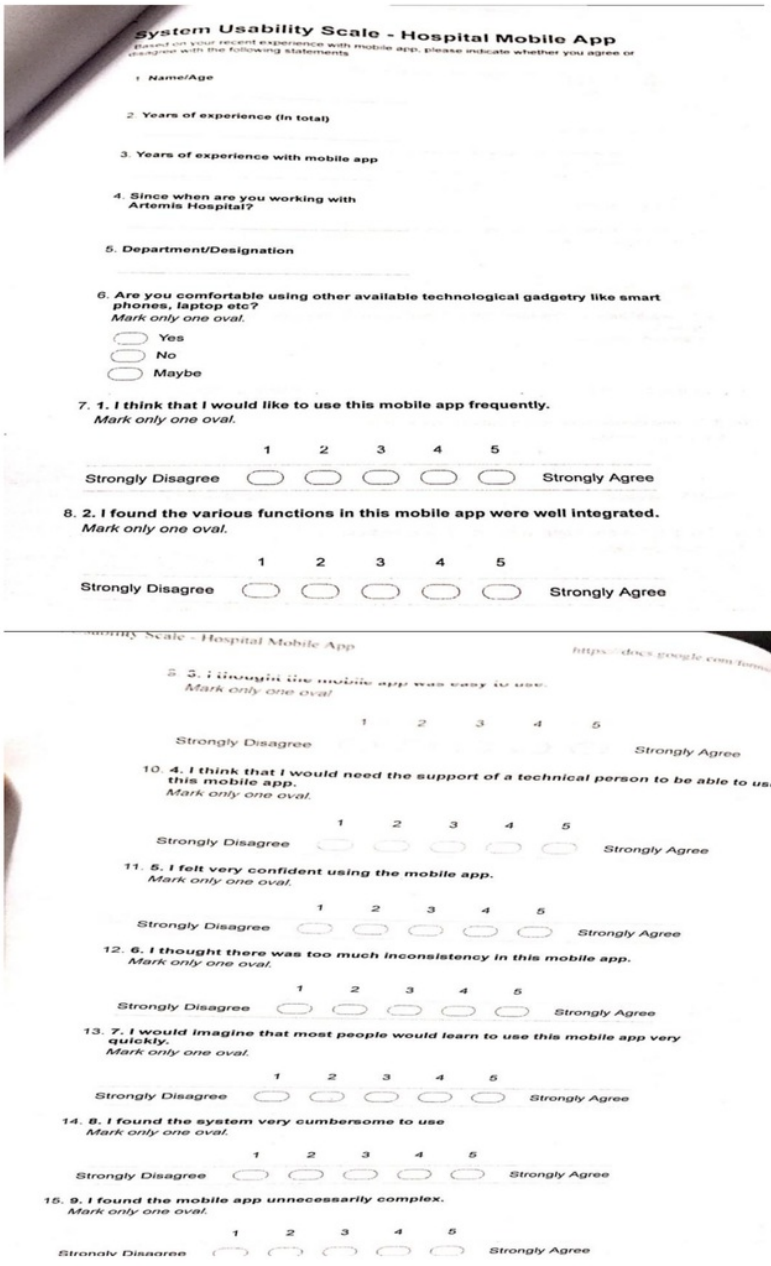
- https://www.usability.gov/how-to-and-tools/methods/system-usability-scale.html

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4029126/ Ventola CL. Mobile devices and apps for health care professionals: uses and benefits. PharmTher.

- https://www.ncbi.nlm.nih.gov/pubmed/22781312/ Mosa AS, Yoo I, Sheets L. A systematic review of healthcare applications for smartphones.

ANNEXURE

Questionnaire: - System Usability Scale



System Usability Scale - Hospital Mobile App

Based on your recent experience with mobile app, please indicate whether you agree or disagree with the following statements

1. Name/Age

2. Years of experience (In total)

3. Years of experience with mobile app

4. Since when are you working with Artemis Hospital?

5. Department/Designation

6. Are you comfortable using other available technological gadgetry like smart phones, laptop etc?
Mark only one oval.

- Yes
- No
- Maybe

7. **1. I think that I would like to use this mobile app frequently.**
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

8. **2. I found the various functions in this mobile app were well integrated.**
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

...mmity Scale - Hospital Mobile App https://docs.google.com/forms/d/...

5. 3. I thought the mobile app was easy to use.
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

10. **4. I think that I would need the support of a technical person to be able to use this mobile app.**
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

11. **5. I felt very confident using the mobile app.**
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

12. **6. I thought there was too much inconsistency in this mobile app.**
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

13. **7. I would imagine that most people would learn to use this mobile app very quickly.**
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

14. **8. I found the system very cumbersome to use**
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

15. **9. I found the mobile app unnecessarily complex.**
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

...I needed to learn a lot of things before I could get going with this mobile app.

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

17. **11. Do you feel any gaps and challenges while using this mobile app? If yes, then kindly mention them in brief.**

____

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____

____

18. **12. Are there any factors that motivate you to use this mobile app? If yes, then please elaborate.**

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Consent Form

I .....hereby give my consent to participate in the study titled "Evaluation of user satisfaction among mobile app users in Artemis hospital using system usability scale". I have been informed about the title, nature and procedure of study.

I have been given the opportunity to ask all/ any question and I have been given option to withdraw myself from the study at any moment if I don't feel satisfied with the study. Confidentiality: All the data recorded will be kept confidential. Apart from the investigator no one will ever access to the data without my consent. If the data are used for publication in the medical literature or for teaching purpose, no name will be used.

I confirm that Ms. Mahak Rana has explained me the purpose of this research, the study procedure and the possible risks and benefits associated that I may experience. I have read and understood this consent form to let myself participate as a subject in this research project and I am giving the consent wilfully.

Name and signature of subject .....

Name and signature of researcher .....

Mahak Rana Report 2

ORIGINALITY REPORT

13%	10%	4%	11%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

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