Mobile applications for quality improvement in technical and vocational education: A case study of Saudi Arabia

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ABSTRACT

Mobile applications are becoming ubiquitous in modern organizations in both services and manufacturing. With an increased number of smartphone applications and the benefits acquired from them, many private and government organizations tend to use this service. In developing countries, such as Saudi Arabia, this service has been introduced in order to keep pace with the development of the world's change. In fact, mobile applications have been adopted among the strategic objectives within "Saudi Arabia's Vision 2030" and the National Transformation Program launched recently by the country's leadership. However, many organizations, including Technical and Vocational Training Corporation (TVTC), started to implement smartphone applications as a part of their services. Hail College of Technology (HCT) has launched a smartphone application called "Tahseen App" to improve quality practices. The approach was quantitative in nature as it looks for customers' opinions and thoughts about this service to help HCT to develop solutions and recommendations for the future of "Tahseen App." The data gathering was conducted through a questionnaire to analyze the features and the effectiveness of the "Tahseen App." Also, to analyze consumers' perceptions and needs regarding smartphone apps. This paper stated that "Tahseen App" has some good features and impact on quality improvement; however, one of the most important issues is the fact that users tend to likely prefer to participate and engage in apps more often than the traditional ways based on suggestions or complaints box. Moreover, the findings have estimated that leadership is a key factor in the successful path of organizations.

1. Introduction

In the world of digitalization, mobile applications (Apps) are becoming ubiquitous in modern organizations in both services and manufacturing. They have changed the ways how people organize relationships, communicate, and live on a daily basis. The intensive usage of this new technology is evidence to ascertain whether it is successful or not (Mason and Mitroff, 1973). In addition, this new trend in the market and considering apps as business enablers, and they are an opportunity to improve service delivery for customers (Ngumi, 2013). This new trend in business has encouraged organizations in Saudi Arabia–both government and private-to adopt this technology in their provided services such as Absher, Alkahraba, and My STC.

In fact, mobile applications have been adopted among the strategic objectives within "Saudi Arabia's Vision 2030" (CPSA, 2016) and the National Transformation Program 2020 (GSA, 2016) launched by the country's leadership. However, many organizations, including the Technical and Vocational Training Corporation (TVTC), started to implement smartphone applications as a part of their services. Hail College of Technology (HCT) has launched a smartphone application which is called "Tahseen App" to improve the quality of services delivered to both trainees and trainers through promoting quality fundamentals, continuous improvement and to collect improvement suggestions.

With the expansion of smartphone applications used in many sectors which can be ideal tools to improve their provided services and increase customers' satisfaction level, there are strong needs to:

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- Analyze the effectiveness of mobile apps used for quality improvement in Technical and Vocational education.
- Analyze the effectiveness of the "Tahseen App" used in HCT.
- Investigate customers' reactions and perceptions towards the "Tahseen App."

The objectives of this research can be summarized as follow:

1. To better explore the development of smartphone apps for quality improvement purposes.
2. To critically discuss the power of mobile apps globally and in Saudi Arabia using real field data.
3. To analyze the strengths and weaknesses of the "Tahseen App."
4. To associate an appropriate methodology and data analysis method.
5. To provide recommendations for future improvement of the smartphone apps that can be used in Technical and Vocational institutions across the kingdom. This is believed to contribute to quality improvement of the training process of Saudi youth, and hence to the capability building of the human capital in line with the 2030 Saudi vision goals.

2. Literature review

Smartphones have spread faster than any consumer technology in human history, reaching market maturity faster than radio, TV, the commercial Internet, and many other devices and technologies (Kesari, 2015). In a report by Laufer et al. (2014), it revealed that 28,686 US online adults who personally use a smartphone to go online weekly or more (Fig. 1).
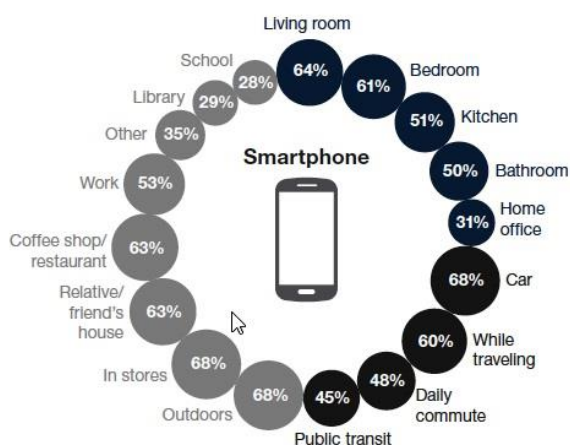

Fig. 1: Places where smartphone users access the internet (Laufer et al., 2014)

An app is a short expression of the word application, and it is designed by an organization or an individual to help consumers perform a specific task or service, as well as to provide entertainment (Alghamdi, 2014).

Chun et al. (2013) clarified that a good app must have some characteristics such as: focused on the value of its utility, fulfill a need, be effective, be attractive and looking good, be focused on a particular goal, be intuitive and easy to use, and be secured and trusted.

Tally (2012) stated his study carried out at Purdue University that students prefer apps to navigate more than the web page because apps are faster and simpler. This popularity of smartphone apps can be attributed to the constant accessibility of this technology anywhere and anytime.

It is critical for both researchers and practitioners to study and understand users' adoption and use of new technologies (Venkatesh and Davis, 2000). Additionally, understanding users' adoption and use of new IT plays an important role in determining users' needs and reducing business risk, especially with rapid changes in IT such as smartphone technology (Gilbert and Han, 2005).

Customer perception is defined as taking into consideration the beliefs of consumers when defining perceived ease of use, and describing perceived usefulness as the extent to which a person maintains that the use of the specific application can impact the act of their role or the amount of effort required (Davis et al., 1989). On the other hand, Jayawardhena (2004) argued that there is a correlation between service quality perceptions and service adoption and user satisfaction.

Laufer et al. (2014) explained key factors to obtain customers' satisfaction in terms of smartphone apps as following: Tried to accomplish relevant customer goals, performed head to head comparisons, deliver clear value, optimize efficiency, and simplify the presentation.

3. Research methodology

Smartphone application users were considered as a target population for this research because it is pre-requisite to have a smartphone for using Smartphone applications such as "Tahseen App." Accordingly, the sample consisted of a total of 95 respondents varying in 8 classifications in which participants were considered in and out of HCT, such as trainers and trainees in HCT, employees from different sectors, and society members.

The data collection tool was a structured questionnaire that enabled quantitative analysis of data collected. The questionnaire consists of three parts: A) to analyze the features and the effectiveness of "Tahseen App," B) to analyze consumers' perceptions and needs regarding "Tahseen App," and C) demographic characteristics of participants. The questions include close-ended questions, open-ended questions, Likert-type scale, and comments.

Data collected were analyzed in the shape of charts and graphs to give a visual representation of data. For the questions that used a 5 point Likert scale, central tendency statistics were used, such as the mean, the model, and the standard deviation. The

seven new quality control tools such as affinity diagram and tree diagram were implemented for the data received through "Tahseen App"–the improvement opportunities-which reflects the customers' perceptions.

4. Results and discussion

The sample consisted of a total of 95 respondents varying in 8 classifications in which participants were considered in and out of HCT, such as trainers and trainees in HCT, employees from different sectors, and society members.

In order to ensure the validity and consistency of the survey results, Cronbach's Alpha was determined for each individual question and for the whole questionnaire. The results are shown in Table 1.

Table 1: Cronbach's Alpha for the survey questions

Questions	Cronbach's Alpha
Question -1	0.9043
Question -2	0.8991
Question -3	0.9388
Question -4	0.8998
Question -5	0.8946
Question -6	0.8953
Question -7	0.9020
Question -8	0.8966
Question -9	0.9159
Overall Cronbach's alpha	0.9157

Since Cronbach's Alpha for the survey was 0.916, which well above the value of 0.7, it can be concluded that the survey results are consistent and valid for the purpose of the study.

The data collected together from the questionnaire and coded in an excel spreadsheet in order to enable the statistical analysis of data. The primary method of viewing the data was through tallying and graphing the data. The graphs and pie charts provided important data to enable some findings to be concluded.

In the context of the research, 8 classifications of participants have been taken as a target population. As Fig. 2 shows that 28% of participants were government employees, 24% were trainers in HCT, and 22% represents trainees in HCT, whereas poor participation from society members and military sectors ranging in 4%.
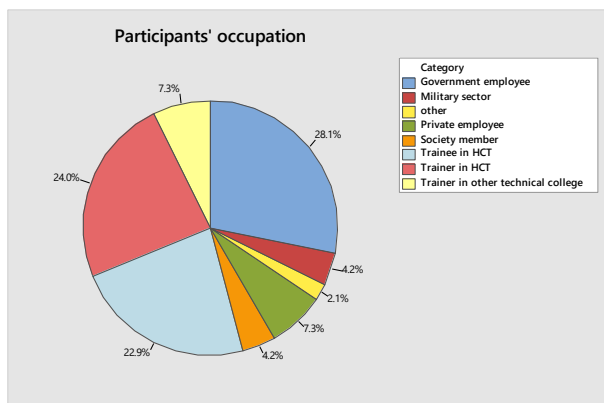
Fig. 2: Participants by occupation

In Fig. 3, it can be seen that 41 of the participants were between 30 and 39 years old and 23 between 19 to 29 years old, which represents more than 60% of youth respondents. However, the participation of females was limited to only 3%, and the rest were males representing 96%, although the factor of male or female does not have an importance in the study.
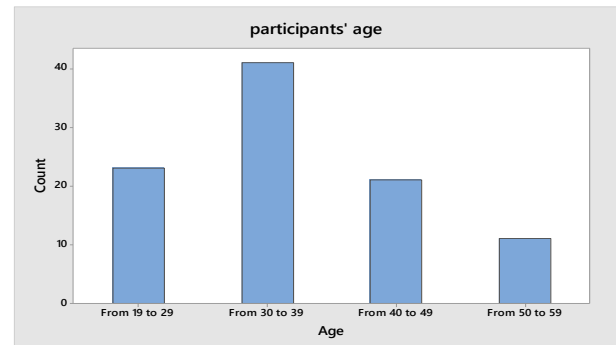
Fig. 3: Participants' age

Fig. 4 shows the education level of respondents in which 37% represents participants holding bachelor degrees, 26% with a master's degree, and 19% holding a diploma. The participation of Ph.D. holders was 3% and 13% for participants with secondary school or lower.
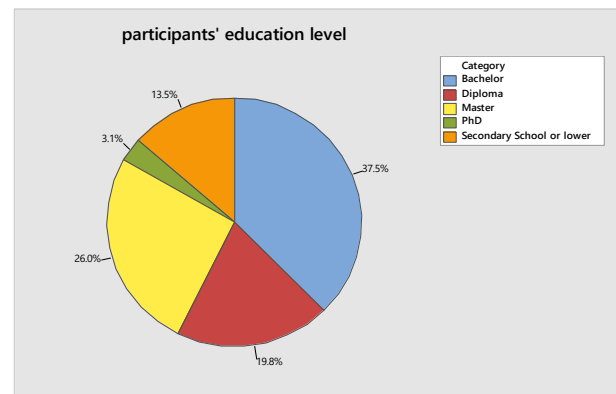
Fig. 4: Participants' education level

5. Technical features of Tahseen App and customers' perceptions

In this section of the survey, 9 questions were drawn in the type of Likert Scale which is one of the most used in survey research (Aldhaban et al., 2016) to measure the agreement and satisfaction level of participants as follows:

- Q1-Tahseen App provided me an easy way to connect my voice into the college management.
- Q2-I use "Tahseen App" for all of my comments related to quality.
- Q3-I use "Tahseen App" for entertainment.
- Q4-I use "Tahseen App" for comments related to leadership and management.
- Q5-I use "Tahseen App" for comments related to trainers.
- Q6-I use "Tahseen App" for comments related to trainees.

- Q7-I use "Tahseen App" for comments related to the curriculum.
- Q8-I use "Tahseen App" for comments related to the training environment.
- Q9-What is your general satisfaction with the "Tahseen App."

The Likert scale used in the present study was: (1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree.

Responses presented in Table 2 reveal that "Tahseen App" with its current features has got reasonable agreement on the part of respondents as the average is above 3 for all responses except Q3, which was about using the App for entertainment thus represents the serious usage of the App.

Table 2: Statistics of "Tahseen App": Technical features and consumers' perceptions

Questions	Average	StDev	Mode
Q1	3.75	1.31	5
Q2	3.39	1.26	3
Q3	1.99	1.30	1
Q4	3.43	1.31	3
Q5	3.41	1.33	3
Q6	3.46	1.30	3
Q7	3.35	1.34	3
Q8	3.65	1.33	5
Q9	3.60	0.81	3

Table 2 shows as well that participants preferred the app as an easy way to connect their voices into college management with an average of 3.75 and a mode of 5, which comes in line with Young's (2011) study on academics side. On the other hand, participants seemed to use the app more frequently for comments related to the training environment, with an average of 3.65 and a mode of 5. It has to be mentioned here that this represents the purpose behind the "Tahseen App."

In Question 9 of the survey, the general satisfaction level about "Tahseen App" was measured. The results presented in Table 2 and Fig. 5 show clearly that the general satisfaction of participants scored 3.60 in the average with a standard deviation of 0.81, and the mode of responses was 3. Based on this observation, it can be concluded that further investigation is needed to add into consideration other elements and factors that correlate with the satisfaction level about the App. Although 32% of participants were satisfied, and 15% were strongly satisfied.

During the conduct of the present research, over 80 improvement opportunities were received by the "Tahseen App," and the number is continuously subjected to increase. In order to organize the improvement opportunities and ideas provided by customers through the "Tahseen App," quality tools such as the affinity diagram was applied to sort ideas into groups to seek review and analysis, as shown in Fig. 6.

As the affinity diagram helps to organize ideas into groups based on their natural relationships, the affinity diagram used in Fig. 6 shows that there were five main groups, namely: Leadership and

Management, Trainers, Trainees, Curriculum, and Training Environment. Improvement opportunities or customers' insights received by the "Tahseen App" were separated and sorted under the main groups accordingly. It can be stated that the focus of customers centered on Training Environment, then Leadership and Management, followed by Trainees.
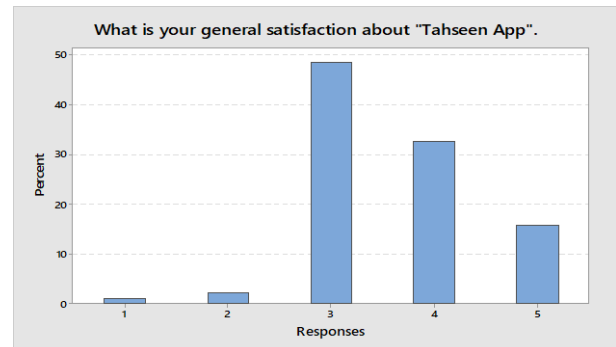

Fig. 5: General satisfaction level about "Tahseen App"

Trainers and Curriculum groups have got fewer ideas, but they are critical in the quality improvement endeavor. However, working on the improvement opportunities and solving problems regarding leadership and management can swallow other problems in the groups of training environments and trainees.

The affinity diagram for improvement opportunities provided by customers in Fig. 6, was then translated to another quality tool, which is "Tree Diagram," in order to break down the broad categories to finer levels of details, in other words, moving from generalities to specifics. This approach has been shown to be an effective way to achieve improvement in products, services, and processes.

It can be seen from Fig. 7 that the main objective is to improve the quality practices in HCT, which can be achieved through five categories as senior objectives. From each senior objective, there were some junior objectives or tasks to be fulfilled. Once the whole of the tasks has been accomplished, there will be an achievement for the targeted goal.

In fact, the leadership and management segment was a crucial element that can raise sustainable development and successful quality implementation. Moreover, the training environment was seen to be less modernized in terms of services.

6. Conclusions and recommendations

The primary goal of this paper was to show how mobile applications can be used for quality improvement in technical and vocational education in Saudi Arabia. Based on the analyzed data and the findings in line with reform mainstream and the National Transformation Program, it is possible to conclude the following:

- Mobile apps are a strategic choice for learning organizations.
- Customers have been more likely to utilize smartphone apps.

- Smartphone apps are considered as an easy way for customers' feedback.
- The young generation is mostly dependent on smartphone technology and apps.
- Mobile apps are a kind of power in hand for customers and organizations.
- Leadership is a key factor in the successful path of organizations.

- App interface is an important trait that cannot be neglected.
- Smartphone apps can be magnificent tools for quality improvement.
- It is better for mobile apps to fulfill a need in a delightful manner.
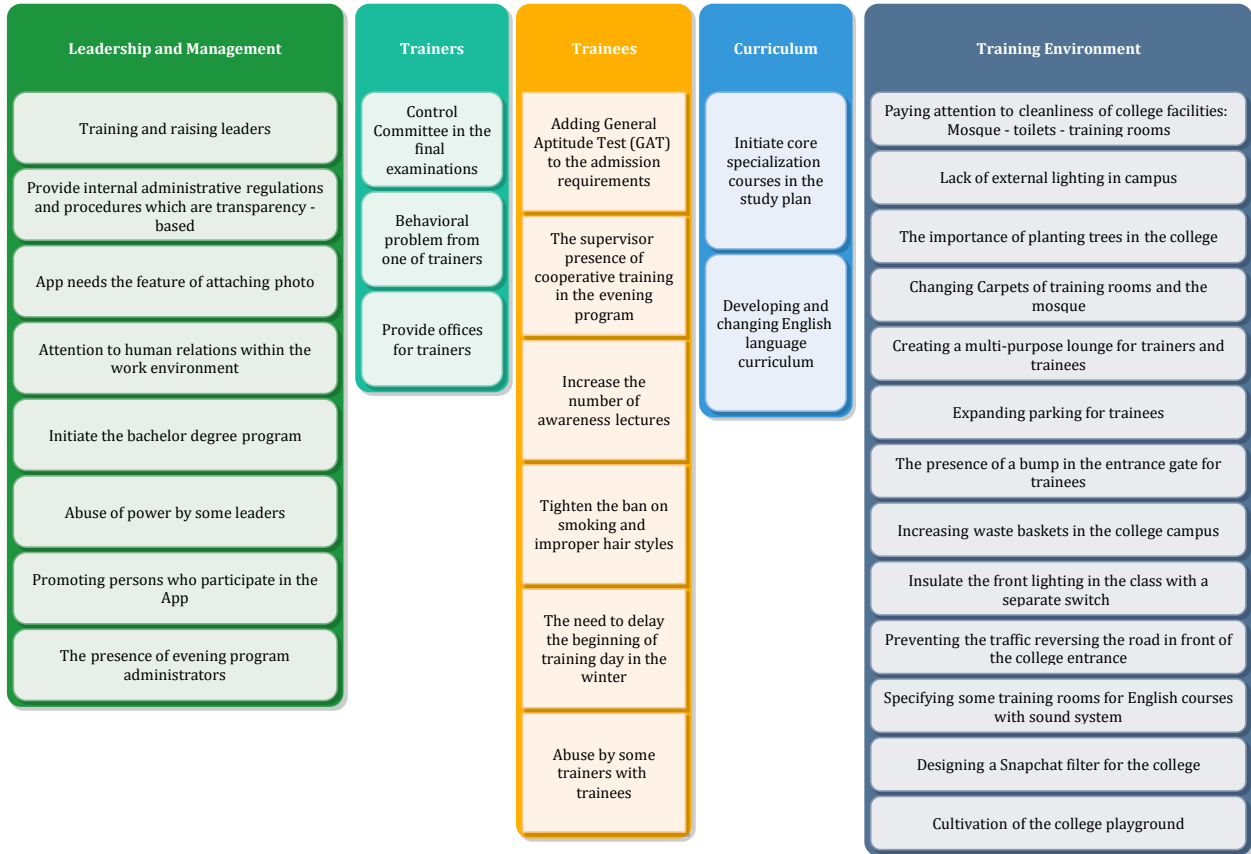
Leadership and Management	Trainers	Trainees	Curriculum	Training Environment
Training and raising leaders	Control Committee in the final examinations	Adding General Aptitude Test (GAT) to the admission requirements	Initiate core specialization courses in the study plan	Paying attention to cleanliness of college facilities: Mosque - toilets - training rooms
Provide internal administrative regulations and procedures which are transparency - based	Behavioral problem from one of trainers	The supervisor presence of cooperative training in the evening program	Developing and changing English language curriculum	Lack of external lighting in campus
App needs the feature of attaching photo	Provide offices for trainers	Increase the number of awareness lectures		The importance of planting trees in the college
Attention to human relations within the work environment		Tighten the ban on smoking and improper hair styles		Changing Carpets of training rooms and the mosque
Initiate the bachelor degree program		The need to delay the beginning of training day in the winter		Creating a multi-purpose lounge for trainers and trainees
Abuse of power by some leaders		Abuse by some trainers with trainees		Expanding parking for trainees
Promoting persons who participate in the App				The presence of a bump in the entrance gate for trainees
The presence of evening program administrators				Increasing waste baskets in the college campus
				Insulate the front lighting in the class with a separate switch
				Preventing the traffic reversing the road in front of the college entrance
				Specifying some training rooms for English courses with sound system
				Designing a Snapchat filter for the college
				Cultivation of the college playground

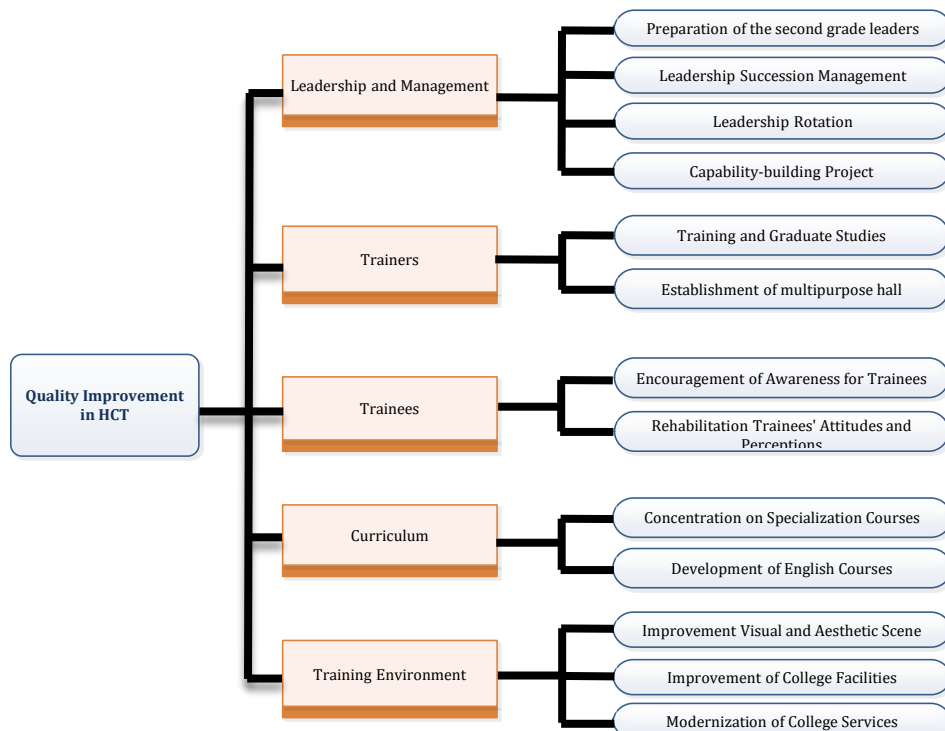**Fig. 6:** Affinity diagram of improvement opportunities provided by customers through "Tahseen App"

Fig. 7: Quality improvement through tree diagram implementation

Based on the results and findings of this study, the following recommendations can be made:

- For the app enhancement: It is very important to include more features and characteristics such as: Enabling customers to track their comments and to get feedback, adding some traits to make the app more attractive, saving comments history for each individual customer, and implementing quality tools within the app.
- For quality improvement: Smartphone apps are an ideal laboratory for quality improvement as long as the improvement opportunities are being followed up with the management commitment in parallel.
- For TVET: As one of the Initiatives for the National Transformation Program is to Establish King Salman University for Technical and Vocational Education, this requires an urgent adoption for the capability-building program in current TVTC colleges of technology.

Acknowledgment

Compliance with ethical standards

Conflict of interest

The authors declare that they have no conflict of interest.

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