

Towards Employee Perceived Satisfaction in using Citrix Workspace Technology

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Abstract—In view of increasing use of technologies and their impacts in businesses, companies are now using technology to accelerate business processes. However, some companies are still failing to achieve the desired promising results by using technology. Technology in any company succeeds only when the people working in the company accept the technology wholeheartedly and show diligence in learning and using it. In this research we have evaluated the perceptions about a technology called Citrix Workspace in a Saudi company to see whether workers are satisfied with this technology and how they find its usefulness at work. A theoretical framework Technology Acceptance Model (TAM) has been used in this research to study different variables. The data collected by employees within the organization has been analyzed in order to determine level of satisfaction with the technology and to know factors that keep the workers away from remote use of the technology. These results also help managers decide how Citrix Workspace technology or other such technologies can be used in remote sites of the company.

Keywords—Citrix workspace; employee satisfaction; secure remote access; mobile worker; TAM

I. INTRODUCTION

These days working remotely has become an accepted practice in business organizations due to its ease, effectiveness and emerging technologies. Therefore, remote working and its applications need to be deeply understood from employees' perspectives. A Saudi company has been using Citrix Workspace platform to enable its employees to work anywhere and anytime. Citrix Workspace offers users a secure, single sign-on (SSO) channel to access all of the applications and content of an organisation's network so that it can be run across various appliances including laptops, smartphones and tablets, thereby enabling employees to work anywhere. It brings all employees applications, desktops and files into one place anywhere, anytime. Employees have access to everything they need in one location. This includes access to applications, desktop and their files with full desktop experience. Applications in Citrix Workspace can be collated in customized categories which make quick access to required application. Citrix Workspace integrates applications whether they are running in clouds or they are hosted on-premises. In order to use Citrix Workspace, employees use two factors authentication to access more than one-hundred applications and information systems to do their jobs anywhere. A reliable communication to the information systems, appliances and content workers has been founded to increase worker output and improve business performance. Technology has changed the way we interconnect with the world around us. It has

modified the way of learning, shopping, socializing and working. In today's workforce, technology has changed the way companies interact with their employees and make online business interactions [1-2]. In recent Corona-19 pandemic situation organizations allowed employees for remote working using various applications. The management of the Saudi company decided to allow employees of the company to work remotely using Citrix Workspace platform following the regular office hours. A part of the vision of the Saudi company in information technology and digital transformation is to deliver best practice, transparent and secure information technology and communication services to customer. Because Citrix Workspace is a new remote work system, the matter of estimating employees' satisfaction and performance with and perceptions of Citrix Workspace has received little attention. This motivated us to assess the level of satisfaction and performance of the employees using Citrix Workspace as a remote platform. This research will attempt to fill this gap by addressing variables that influence employees' satisfaction and performance with and perceptions of Citrix Workspace. Researchers have been evaluating performance of different technologies to determine effectiveness [3] that also motivated us to conduct this study.

Since the Citrix Workspace has been introduced recently, a little investigation has been conducted to determine the employees' satisfaction and performance in terms of ease of use and effectiveness. In order to conduct our research following research question has been devised to which answer will be sought:

“What are perceptions of employees' satisfaction and performance about Citrix Workspace?”

In order to answer the question, Technology Acceptance Model (TAM) is the best model to measure employees' acceptance and satisfaction with Citrix Workspace in the Saudi company. The model is one of the most predominate and common models of research. It concludes that perceived usefulness and perceived ease of use are central to determining an individual's attitude to using the technology and, thus, eventually relating to actual use. Researchers and companies have consequently been attempting to realise variables that positively impact an individual's acceptance of information technology, thereby finally supporting its use. In the information technology field, TAM is one of the better-known models for clarifying why people use technology.

TAM is a model used in information to assess individual's attitude in adoption of technology in working environment. It concludes the perceived usefulness and perceived ease of use

are central to this assessment. Researchers and companies have consequently been attempting to realize variables that positively impact an individual's acceptance of information technology, thereby finally supporting its use:

Based on the TAM, the following hypotheses have been developed:

H1: Perceived ease of use has a significant positive influence on perceived usefulness.

H2: Perceived ease of use has a significant positive influence on actual usage.

H3: Actual usage has a significant positive influence on user satisfaction.

H4: User satisfaction has a significant positive influence on performance.

This study aims to determine employees' satisfaction and performance with using Citrix Workspace and to address any factors that may lead to dissatisfaction.

II. LITERATURE REVIEW

Remote working and work from home policies were promoted during 1970s in response to the hike in oil prices, but recent Covid-19 pandemic has given executives a serious thought to shift major section of workforce remotely [4]. Although Covid-19 has forced people to work remotely, but the success of this practice shows many will continue to work remotely on permanent basis and number of remote workers will rise in future. Organisations must take great care when approaching, designing, implementing, and fine-tuning their remote work solutions. The current context of the remote work revolution not only transforms any company into a possible case study but also provides an opportunity to investigate remote work trends at a worldwide level. This could possibly give all of the necessary evidence to justify adjusting remote work initiatives to different nations with different backgrounds [5]. This provides the basis for choosing the Saudi company as a case study to explore new remote work initiatives by assessing employees' satisfaction and performance of using Citrix Workspace as a remote work solution.

With regards to remote work solutions, for so many years organisations have relied on virtual private networks (VPNs) to allow remote workers access to their networks. However, when actions to contain the coronavirus led many businesses to shift from traditional office workspace to remote working, many more employees became remote workers. When this occurred, VPN technology proved insufficient to cope with the increasing need for a larger number of employees to work remotely. Consequently, Some IT departments shifted from VPN solutions to Citrix Workspace using on-premises servers without sacrificing security. With Citrix Workspace, system administrators are able to tailor and distribute any number of workspaces effectively and easily, each with its required applications, appliances, data, and networking services to be aligned with an organisation's needs for different uses [6]. Citrix system is widely used as a mean for remote working which has strong position in the market of remote applications and desktop virtualization [7]. Therefore, user satisfaction and

performance with Citrix Workspace need to be measured in the current study. In a study [8] it is reported that employees' productivity increased by 13% due to work at home and fewer breaks taken and better performance per minute. Furthermore, remote workers also reported extraordinarily high work satisfaction and their job exhaustion rate was approximately 50% decreased. Nevertheless, the study did not mention either technology used or relationship between technology and employees' satisfaction and performance which is core focus in the current study. In a separate study it is reported that in addition to saving money on traditional office workspace, employee satisfaction rankings were approximately 90 percent due to working remotely [9]. In another study it is reported that flexible work schedule has a positive impact on the life satisfaction of employees [10]. There is a positive relationship between flexible work schedules and worker satisfaction. A research study has addressed the impact of psychological happiness on employee satisfaction which can be linked to increased productivity resulting from flexible work schedules [11]. The research conducted by [10-11] has analysed the impact of flexible work schedules on worker satisfaction without determining which remote work solution was used as a variable which could affect employees' satisfaction.

A. Perceptions of Ease of Use

There is a considerable body of empirical research indicating that perceptions of ease of use significantly influence the information system context [12]. Perceptions of ease of use refer to the extent to which an individual anticipates being able to utilise a system with relatively little effort or struggle [13]. It is widely suggested in the empirical literature relating to IS that the greater is a system's ease of use, the greater will be the perceptions of how useful that system is [14]. Several studies in the empirical literature have established a positive relationship between perceptions of ease of use and perceptions of how useful a system is [15].

B. Perceived Usefulness

It is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" [13]. It is the perception of technology users which they build based on the results of their experience. In view of perceived usefulness, frequency of actual use of technology is suggested and its positive effect on individual's performance studied [16].

C. User Satisfaction

When considering the context of information systems, it is necessary to establish whether use of the system results in the satisfaction of users [17]. In the current study, the satisfaction of users is gauged in terms of the extent to which users of the Citrix Workspace are satisfied with their decision to use the technology and whether it lived up to their expectations.

D. Performance Impact

There are many reports in the empirical literature that higher levels of user satisfaction are associated with superior performance impact [16, 18-19]. Each of these investigations add to the existing body of knowledge and help to better understand the nature of the relationship between actual use and how individuals perform in the context of organizations.

Staff performance is influenced by the quality of the system and user satisfaction. If workers are satisfied with a computer system, it will add value and contribute to their performance and productivity [20]. The study also stated the impact of technology attributes on user satisfaction. The relationship between user satisfaction, performance and Citrix Workspace will be further investigated in the proposed research, as mentioned in hypothesis.

III. METHOD AND DATA PREPARATION

The study was devised as a quantitative correlational research design to examine the relationship between employee satisfaction and performance using Citrix Workspace to work remotely within the Saudi company. A quantitative method was deemed most suitable in this research because quantitative researchers concentrate on exploring measurable phenomena using statistical techniques [21]. Correlational designs are suitable when the objective of the study is to examine the relationship between variables of interest. The TAM is used to measure the employees' satisfaction and performance when using Citrix Workspace. An online survey questionnaire was designed using Google Forms to collect data from the respondents and that data is analyzed to draw out results and findings. Questionnaire is a best tool to determine user intention, expectation and perception [22-23].

Based on the four hypotheses stated above, relationships between five variables will be examined. These variables are perceptions of ease of use, perceptions of usefulness, actual use, the satisfaction of users, and performance.

A. Survey Instrument and Data Collection

The main instrument to conduct the study is an online self-administered questionnaire which was developed for this study. The population of the study is users of Citrix Workspace from all departments of the Saudi company. The purpose of the survey instrument was to determine employees' level of satisfaction in using Citrix Workspace technology remotely. The questionnaire was distributed among all work areas of the Saudi company (Central, Western, Eastern and Southern region) and 191 responses were received. 5 of the responses were rejected because the respondents did not use Citrix Workspace at all. Consequently, the sample of the research was 186 responses.

The questionnaire consisted of two main sections with 39 items/statements. It included various types of questions such as the following: (1) rating scale questions utilizing a Likert-type 5-point scale (i.e. 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree); (2) multiple choice single answer questions; and (3) an open question. The questionnaire was devised using Google Forms in the English and Arabic languages, as the workers mainly are native Arabic speakers. Google Forms is a website allowing users to create and disseminate surveys for business or individual purposes such as this research. Google Forms allows the survey creator to use a ready-made survey or create a customized one. The data results of surveys are collected and exported to Microsoft Excel so that they are ready to be used on SPSS software.

Participation in the research study was non-compulsory and participants were informed of the volitional nature and

confidentiality measures at the beginning of the survey. Moreover, the data were collected anonymously in the survey and we analysed and interpreted it during the research period, before being deleted at the end of the research.

IV. RESULT AND DISCUSSION

In this study descriptive analytical method has been used to describe characteristics of the study respondents and their opinions around the components of the study. The hypotheses have been tested by means of Pearson correlation to explain the relationship between research variables at a significant level of 0.05. The internal consistency and reliability of the questionnaire were tested using SPSS version 23. After verifying the validity and reliability of the questionnaire test, a link of online questionnaire was distributed to the study population. Total of (191) questionnaires were retrieved, 5 participants were excluded from the study sample because they did not use Citrix workspace at all and the final study sample was 186.

Validity and reliability of the research questionnaire is an essential in the data collection phase, where these two essentialities ensure the procedure of getting precise and consistent data and results. Validity demonstrates whether the instrument or test measures what it is assumed to measure. It also refers to the ability of a study to measure what was set out to be measured or the validity of the resulting data. The measurement that needs to be valid is taken using instruments. In the case of the current study, the instrument was taken from empirical literatures and then modified according to the stated research objectives.

Before dissemination of the final version of the questionnaire for the research, a pilot test was conducted using an online questionnaire on Google Forms. The pilot test was conducted via Google Forms by asking experts users of Citrix Workspace in the Saudi company to complete the questionnaire using a link that directed them to Google Forms to complete the survey. For the purpose of the pilot test, 15 surveys were completed. During the pilot test, the participants were given an optional comment area on each question to provide feedback regarding the clarity of the question or any spelling or linguistic errors. Therefore, any modifications required to the expression of the questions could be made prior to the data collection process for the current research.

In order to evaluate reliability of the survey instrument, Cronbach's alpha test of reliability and internal consistency was done on all questionnaire variables and items. Cronbach's alpha test of reliability and internal consistency was done on the four scales. The alpha values were explained through the guidance determined by George and Mallery (2016), in which $\alpha > .9$ Excellent, $\alpha > .8$ Good, $\alpha > .7$ Acceptable, $\alpha > .6$ Questionable, $\alpha > .5$ Poor, and $\alpha < .5$ Unacceptable. So, for reliability, this research investigated Cronbach's alpha coefficients to gauge the reliability of each of the five variables in the questionnaire. Those variables are ease of use, usefulness, actual usage, user satisfaction, and performance. We calculated the internal consistency of the questionnaire by calculating Pearson correlations between items-items in each variable. Pearson correlation coefficients measure the strength and direction of a linear relationship between two variables. Table I

shows the Pearson correlation coefficients between items of each variable "ease of use, usefulness, user satisfaction, and performance impact" and the total score of the field. The Pearson correlation coefficients were ranged from 0.344 to 0.772 for Ease of use variable, from 0.872 to 0.907 for Usefulness variable, from 0.747 to 0.934 for User satisfaction variable, and from 0.780 to 0.867 for Performance impact variable, indicating that all the correlation coefficients shown are significant at ($\alpha \leq 0.01$), thus the fields are considered valid of what is being measured. The correlation is significant at 0.01 level.

In order to measure the stability of questionnaire, Alpha Cronbach method and split-half coefficients were used. The split-half reliability method requires dividing up the variables' items into two parts and calculating correlations between the first half and the second half of each variable's items using Spearman's correlation test. It is clear from the results shown in Table II that the value of the Alpha Cronbach coefficient is high for each field, ranging from (0.739 to 0.960) which is greater than the recommended level of 0.7. As well as

Spearman's correlation coefficient which it was ranging (0.740 to 0.948), indicating very strong reliability of these items where their correlations were statistically significant at 0.01.

A total of 186 participants completed the questionnaires. Out of them, 172 (92.5%) were males and 14 (7.5%) were females. Most of the participants were from western region (49.5%). The age groups of the participants were as follows: 20 to 29 years (12.4%), 30 to 39 years (42.5%), 40 to 49 years (38.1%) and 50 years or above (7%). Most of them married and bachelor degree holders (67.7%). A large number of participants belonged to distribution and customer services (43.5%) followed by IT and digital transformation (25.8%). Table III depicts the statistical analysis of the variables under study that include mean, standard deviation and weighted percentage for the variables.

Participants' responses toward the items for Perceived ease of use variable, Perceived usefulness variable, User satisfaction variable and Performance impact variable have been represented graphically in Fig. 1, Fig. 2, Fig. 3 and Fig. 4a and 4b, respectively.

TABLE I. PEARSON CORRELATION COEFFICIENTS BETWEEN ITEM AND VARIABLE

Ease of use		Usefulness		Use satisfaction		Performance impact	
Item	Correlation	Item	Correlation	Item	Correlation	Item	Correlation
1	0.772	1	0.879	1	0.747	1	0.803
2	0.344	2	0.900	2	0.82	2	0.867
3	0.782	3	0.905	3	0.934	3	0.780
4	0.709	4	0.892	4	0.880	4	0.838
5	0.757	5	0.907			5	0.806
6	0.761	6	0.872			6	0.86
						7	0.832
						8	0.815
						9	0.860
						10	0.858

TABLE II. ALPHA'S CRONBACH AND SPLIT-HALF COEFFICIENTS

Variable	Cronbach's Alpha	Split-half reliability coefficients		
		Correlation coefficient	Length corrections	
			Spearman coefficient	Guttman coefficient
Perceived ease of use	0.739	0.587	0.740	0.733
Perceived usefulness	0.947	0.851	0.920	0.919
User satisfaction	0.863	.0761	0.864	0.834
Performance impact	0.960	0.901	0.948	0.947

TABLE III. STATISTICAL ANALYSIS OF THE VARIABLES

Variable	Item	Responses					Mean	SD	%
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree			
Perceived ease of use	1	87	84	11	3	1	4.36	0.72	87.2
	2	30	57	50	35	14	3.29	1.17	65.8
	3	5	88	23	9	1	4.11	0.84	82.2
	4	74	84	22	6	0	4.22	0.78	84.4
	5	45	68	54	16	3	3.73	0.98	74.6
	6	98	62	11	14	1	4.30	0.92	86.0
	Mean = 4.0 SD = 0.60 80								
Perceived usefulness	1	98	64	9	12	3	4.30	0.94	86.0

Variable	Item	Responses					Mean	SD	%
	2	106	63	9	5	3	4.42	4.42	88.4
	3	77	75	22	7	5	4.14	0.95	82.8
	4	85	73	13	12	3	4.21	0.94	84.2
	5	69	74	27	12	4	4.03	0.99	80.6
	6	75	79	21	5	6	4.14	0.95	82.8
	Mean = 4.21 SD = 0.83 84.2								
User satisfaction	1	113	63	8	2	0	4.54	0.63	90.8
	2	75	87	17	6	1	4.23	0.79	84.6
	3	85	82	9	8	2	4.29	0.83	85.8
	4	63	76	29	12	6	3.96	1.02	79.2
Mean = 4.26 SD = 0.70 85.2									
Performance impact	1	69	82	24	9	2	4.11	0.88	82.2
	2	66	87	22	7	4	4.10	0.90	82
	3	48	73	46	15	4	3.78	0.99	75.6
	4	42	86	43	12	3	3.82	0.91	76.4
	5	34	69	53	26	4	3.55	1.01	71
	6	67	90	18	6	5	4.12	0.90	82.4
	7	33	71	61	16	5	3.60	0.97	72
	8	40	71	57	12	6	3.68	0.99	73.6
	9	68	77	27	10	4	4.05	0.96	81
	10	78	73	24	7	4	4.15	0.94	83
	11	64	96	13	9	4	4.11	0.89	82.2
	12	76	73	24	8	5	4.11	0.97	82.2
Mean = 3.93 SD = 0.79 78.6									

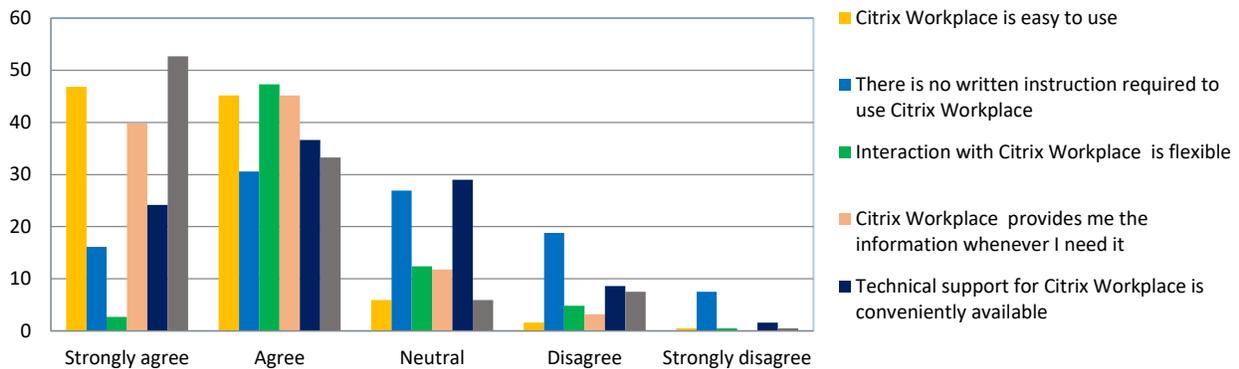


Fig. 1. Participants Responses for the Items of Perceived ease of use Variable.

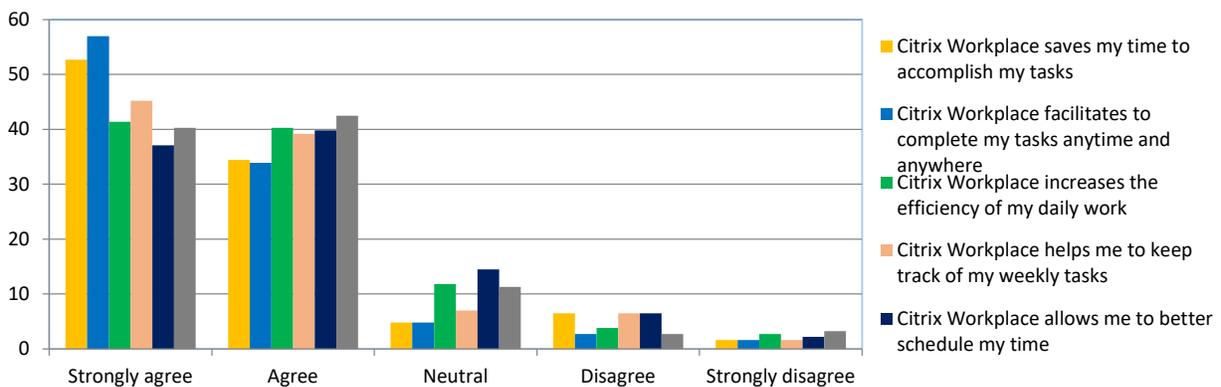


Fig. 2. Participants Responses for the Items of Perceived usefulness Variable.

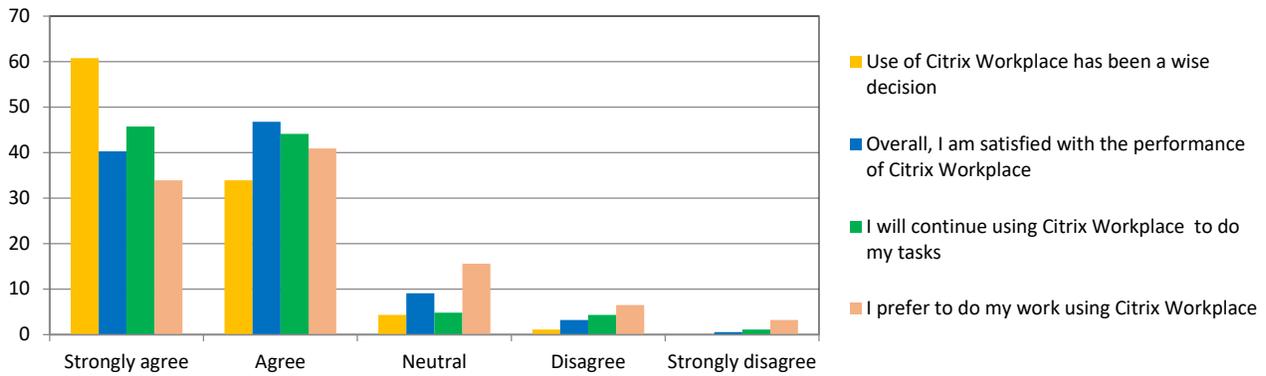
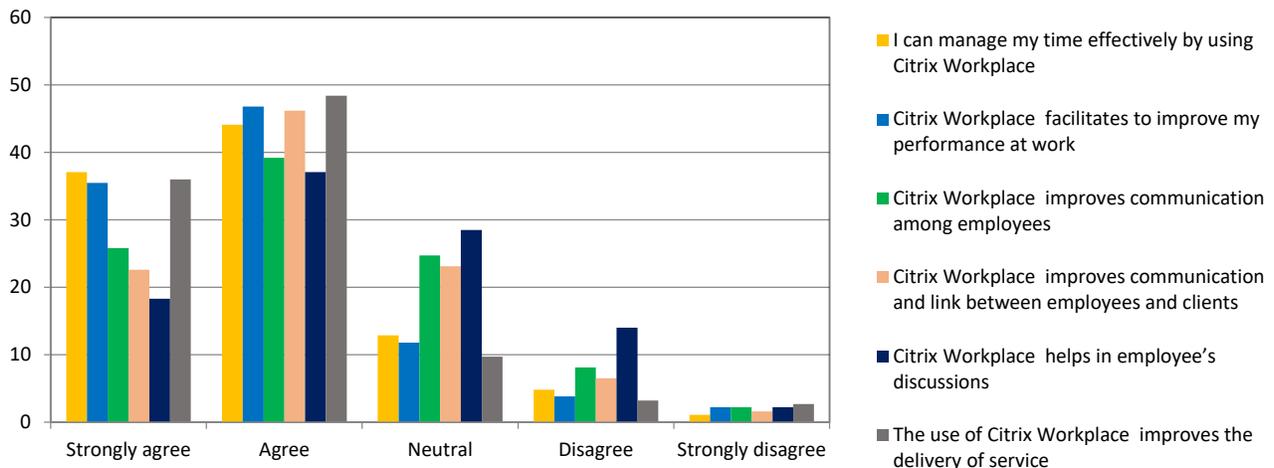
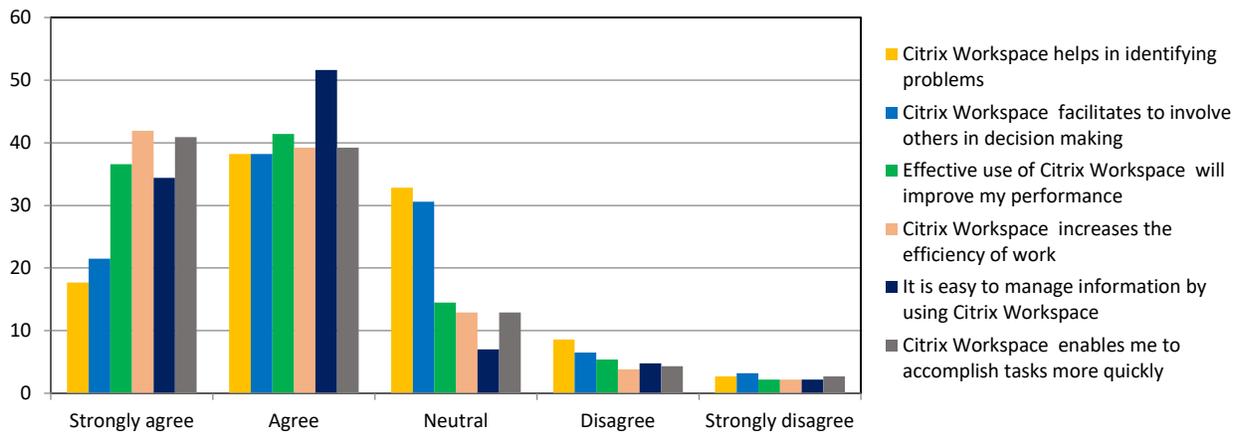


Fig. 3. Participants Responses for the Items of user Satisfaction Variable.



(a)



(b)

Fig. 4. (a) Participants Responses for First 6 Items of Performance Impact Variable. (b) Participants Responses for Rest of Items of Performance Impact Variable.

B. Test of Hypotheses

We postulated four hypotheses for our study in the beginning of this research. Now following are the tests for each of the hypothesis.

H1: Perceived ease of use has a significant positive influence on perceived usefulness.

This study found that there was statistically significant and strong positive relationship between perceived ease of use and perceived usefulness which is compatible with results of the study [24].

The Pearson correlation coefficient between perceived ease of use and perceived usefulness was a strong positive correlation, the value of the correlation coefficient was 0.669.

The correlation was statistically significant at the level of significance ($\alpha \leq 0.01$).

H2: The Pearson's correlation between Perceived ease of use and actual usage.

The study revealed statistically significant positive relationship between perceived ease of use and actual usage at a statistical significance level. This is in common with other studies which found a significant relationship between ease of use and actual usage [25,26].

The Pearson correlation coefficient between perceived ease of use and actual usage was a weak positive correlation, the value of the correlation coefficient was 0.264. The correlation was statistically significant at the level of significance ($\alpha \leq 0.01$).

H3: Actual usage has a significant positive influence on User satisfaction.

This states that actual usage has a significant positive influence on user satisfaction which is consistent with the findings of previous studies [27-28]; another statistically significant relationship was found between actual usage and user satisfaction.

The Pearson correlation coefficient between actual usage and user satisfaction was a moderate positive correlation, the value of the correlation coefficient was 0.394. The correlation was statistically significant at the level of significance ($\alpha \leq 0.01$).

H4: User satisfaction has a significant positive influence on Performance.

Higher satisfaction implies higher performance as the same finding was found in parallel studies indicate that the higher the user satisfaction, the higher performance impact [27, 29].

The Pearson correlation coefficient between user satisfaction and performance was a very strong positive correlation, the value of the correlation coefficient was 0.838. The correlation was statistically significant at the level of significance ($\alpha \leq 0.01$).

V. CONCLUSION AND FUTURE WORK

This study has helped to understand if a relationship existed between an employee's satisfaction and performance with using Citrix Workspace to work remotely. The remote work has become more important with advent of Covid19 and employees have been given access of using technologies remotely [30].

The results revealed that there is a high level of satisfaction among respondents regarding the decision to use the Citrix Workspace. The main motive for most of the participants to use Citrix Workplace was their ability to work remotely. There is statistically significant positive relationship between perceived ease of use and perceived usefulness. Also this study revealed statistically significant positive relationship between perceived ease of use and actual usage. Another statistically significant relationship was found between actual usage and user satisfaction the relation was found to be positive. This

study also revealed statistically significant relationship between user satisfaction and positive performance impact.

For future research, findings of this study may lead to similar studies being conducted to measure users' satisfactions and performance with other remote work platforms in other Saudi organisations. Furthermore, they can be used as a road map to apply TAM to conduct investigations and research to assess employees' satisfaction and performance with using other information systems in Saudi Arabia and other places.

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