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2. Objectives:

- i. To provide a platform to researchers and academicians for bringing innovative research ideas from diverse disciplines of engineering and science.
- ii. To give scholars a chance to be part of the scholars' community who assists and helps others in publication and review
- iii. To promote research by disseminating research ideas at affordable or at no cost in long run
- iv. To upkeep a platform for researchers, in alignment with HEC's objectives of creating research-culture in higher education institutions
- v. To bridge the academia-industry gap for socio-economic development.

Scope and Focus

The PJETS scopes the wide range of topics within domain of Computer Science, Computer Engineering, Physical Sciences and Technology. Authors are encouraged to submit complete unpublished and original works, which are not under review in any other journals. The scopes of the journal include, but not limited to, the following topic areas:

- i. Computer Science (theory), big data analytics, Data mining, Data ethics, Machine Learning and neural networks, artificial Intelligence, Geo-informative systems, parallel processing, pervasive computing, image and video processing, computer vision, cloud computing, network security, blockchain technology, internet of things.
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- iv. Digital signal processing, embedded systems, fuzzy logic, VLSI, wireless communication, wireless sensor networks, robotics, mobile communication, optical circuits, green
- v. Computer engineering, systems engineering, software engineering, web engineering, and their allied topics

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QUALITY OPTIMIZATION OF THE FACEBOOK IN ACCESS IMPACTS OF THE ACADEMIC PERFORMANCE ON THE UNIVERSITY STUDENTS

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Abstract: The most common social media platform is Facebook social network. Apart from IT experts and professionals, social media is used by the people from every walk of life. When it comes to the users of social media, students are not an exception. Using social media is one of the main online activity of students, since it is easier for them to formulate a group and share study material and assignments with each other. Students are busy in the peers in educational institutes for the enhancement of the skills of learning for improving the learning experience. However, the academic performance of university students may suffer due to excessive use of social media. This study will investigate the impact of social media usage on the academic performance of university students. In this case, has potential to distract young learners around academics and to develop a distraction to undergraduate students at university. The current study requires the data to be taken from the original subjects in the method of quantitative type. To accomplish this research, a comprehensive questionnaire is going to be developed and subjective tests are going to be performed to collect user data. Finally, results are collected and analyzed using statistical packages.

Keywords: Social Media Platform, Facebook Social Network, Impacts Educational Institutes

I. INTRODUCTION

Excessive use of social media has been observed in our country for last many years. The most common social media platform is Facebook social network. Apart from IT experts and professionals, social media is used by the people from every walk of life. When it comes to the users of social media, students are not an exception. Using social media is one of the main online activity of students, since it is easier for them to formulate a group and share study material and assignments with each other. Students are busy in the peers in educational institutes for the enhancement of the skills of learning for improving the learning experience. However, the academic performance of university students may suffer due to excessive use of social media. This study will investigate the impact of social media usage on the academic performance of university students. In this case, has potential to distract young learners in the area of academics and to develop a distraction to undergraduate students at university. The current study requires the data to be taken from the original subjects in the method of quantitative type. To accomplish this research, a comprehensive questionnaire is going to be developed and subjective tests are going to be performed to collect user data. Finally, results are collected and analyzed using statistical packages. This thesis defines a study to determine ‘Facebook’ as a social network which provides a base for developing relationship between different group of students and technologies in use in an academic area. Essentially, it is important to study whether “The influence Facebook on the performance

of academic side” is significant among the students at University. This section provides an introduction and background of Community networking. Facebook has an important part in the among the routine of the students who are in university, it is able to create a key concept and maintain a meaningful part in the sector of education.

A. Social Media: Social media plays a significant part in interconnected network for connecting the people internationally through web services. It has been very useful part of our daily social life. On order to share the information, connect people and much more. The social media is used for several purposes such as Marketing, Education and so on. One of the most important applications of social media commonly used is Facebook. The electric technology has been emerged very fast since last two decades. The internet-based technology has interconnected the people through email as well as social media. Furthermore, the social media is expected to solve the problems related to academics by using online events such as delivery of the courses remotely courses that enhance the learning opportunities of the students. the learning responsibility of the students, higher grade expectations of students in the examinations, the Social media has several advantages as well as threats concerned with its usage. Social media increased the learning as well as teaching methodologies. The social media facilitates the teachers as well as students to exchange and produce the activity of learning like syllabus material, notes, reports, assignments, tests and much more by utilizing the social media for resolving the problems in the education.

B. Social Networks: The Social networks provide the services created on the web. Several applications have been created. Social network is based on the web. Several web applications are made of exchanging the ideas among the internal and external communities for building the specialized links. The frequent use of social network for creating the relationship with the people to exchange the ideas. There are many interactive groups of peoples who uses social network for the common interest of any organization. The term network is concerned with mode of communication through the persons who can communicate easily on social sites for discussing asking with each other. When the people are creating the relationships with each other. As a social network part, the creation of profile must be needed.

C. Social Networks in Education: The social media like Facebook is very popular and widely used in the community specifically in education field where the age of every gender is available for creating the relationships with each other. Every time, the student of every age takes part in the social network. The educational information is exchanged among the thousands of students that interact with each other for the common interests. It is not employed for that purpose, but it is commonly utilized for the purpose of documentation. Social network is familiar mode of information and to educate the students. The social network is a reliable source for learning latest ideas for sharing around the society. The performance of academics is one of the important roles of student that is commonly worked over the several years. There is no doubt that the recent usage of the social network has been impacted the academic performance with the help of advanced technology. The adoption of electronic technology in several aspect has been increased for re-furnishing the environment as well as integrating the effective process of learning like users of library, faculty users as well as admin users. The social networks are very essential technology as an online tool. The Facebook is one of the emerging and popular social networks since last decade. The Facebook impacts the different activities of the students.

D. Problem Statement and Objectives: The current study is the identify the usage and impact of the social site in the university students. It is necessary to analyze Facebook as a social site for student’s perspective. The Facebook has been emerged since year 2004 till today. The Facebook played very significant role in the life of every individual, but it has also suffered the education of the students. The Facebook is very common among the university students. It is considered as a main activity of students. The University Students use to browse Facebook while the timing of study and the course work is badly suffered. It looks that the students are giving more priority to social sites more than their studies. The concentration is a major element for the successful student. While social site reduces the concentration of students from studies. The motive of the current study is to explore the pros and cons of social media in the sense of university student’s concentration. The results of this research will contribute to the awareness among the students, teachers, universities and individuals about the appropriate usage of Facebook.

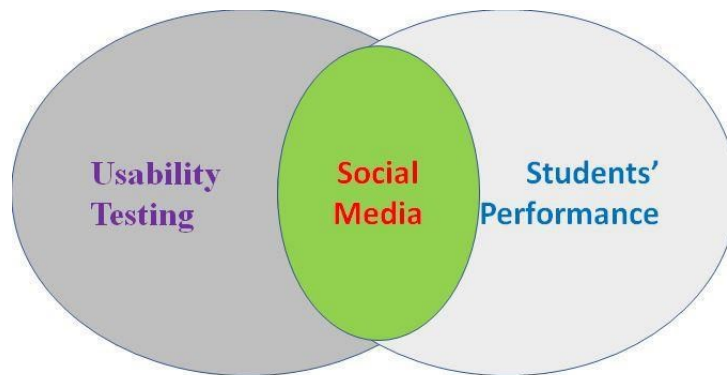


Fig 1: Usability of social media on the performance of students

The figure 1 shows the relationship between the usability of social media in the context of the academic performance of students.

II. RESEARCH STRUCTURE

The Internet was introduced of ARPANET in 1967. The Internet has been very common around the globe due the introduction of world wide web. The user of the internet has been dramatically increased since 1990s to date. The internet provides many services such world wide web, instant message, electronic mail, social networking and much more. Today, the major usage of Facebook is to communicate with each other. The people share information quiet easily as compared to manual communication. It is one of the sources of information for communication. Teachers commonly use the social sites as well students for different purposes such as learning purpose, interacting with each other for social friendship and so on. In the field of education, the technology has changed ways of doing the things. The Technology provides the students to learn effectively, and it enables the teachers to teach effectively the rapid growth of information and communication technology has changed the social life of every individual.

A. History and Development of Facebook: The Facebook was introduced by Mark Zuckerberg. It was introduced at Harvard University during the February 2004. The Facebook was openly allowed to use by anyone in 2006. Many people joined social network site Facebook for sharing information and communication with each other. The Facebook allows the people to connect with each other, create the relationship, to show their information to other. It allows the people to share the images, videos, posts, to comment on someone's posts, to like someone post, to play games, to create the groups for different purposes and much more. The researchers contributed a lot to explore the impacts of the social network sites on an individual as well the university level students. The authors [1] proposed that the modern technologies won't to provide the facilities to CMC embrace debates between the user of internet., the correspondence of email as well as online database. However, as technological emerge, therefore, to do new varieties of CMC. The latest audio-visual aid technologies to supply much more functionalities than simply using text-based tools. Authors [2] proposed that social network sites were distinctive type of information sharing as an outcome of they formed associations between individuals and supported the common backgrounds as well as same interests. The unknowns who explored same look and thoughts became connected and type of relationships that may preferably be engaged. [3]–[5] found that social networks have started to get popularity much more among users due to availability of internet. Before 2000, different social networking

sites were created for finding the friends. The commonly used services were Friendster. Its motive was to connect the friends and to connect the friend of friend with each other. It enabled the user to search the people and have relationship between them. The quantity of social networking sites has been dramatically increased since last 15 years. However, these social sites impacted the capabilities of students. Authors [6] surveyed on and Facebook and academic performance in Nigeria University. According to them we 2.0 is a latest tool for enhancing the user's communication chan-

nels that enables to discover different clusters of the data to refine new information. Authors [7] found that the information and communication technology has been widely used in the field education by using web 2.0 services. According to the authors. The teachers as well as the students are taking part in the collaborative thinking skills. Authors in [8] found that the excessive usage of social network sites on of dangerous for the young generation today. Though social networking sites has been created for the battement of genal public but most of the students are spending their time on Social site that results in very negative. The authors in [9]–[11] conducted research on social media. According to the authors, the social network sites has adopted to address the online activity challenges that engaged the students’ body. Authors in [12]–[14] proposed that the Facebook facilitates the teachers as well as students to publish their several learning activities like the material of class, assignments, syllabus, notes. According to the authors, the social network sites opened the new doors of learning and encouraged the students to learn collaboratively. The social website such as twitter, Facebook and Myspace and so on are mostly used for two basic purposes such as entertainment and communication. Due to this reason, there is no healthy environment for the children and ultimately children suffer from several problems. Furthermore, the children are switching to the restricted content.

III. METHODOLOGY

A. Research Design

This research is totally based on quantities research. Moreover, this research is a no excremental and theoretical in nature. This research based on a survey for finding the relationship between dependent as well as independent variables. The survey has been conducted on the students of two big Universities of Sindh Province i-e University of Sindh. In order to validate the findings, the secondary data has been gathered from renowned Journals, Research Articles as we as from different textbooks. The quantitative collection of data has been taken from huge samples using the methodology based in survey. This research may be known as research of field as the investigator is collecting the data from the actual subjects in a quantitative method. The data in this research has been collected and converted in the numerical for of the data, therefore the research can be able to identify the statistical relationship between different factors.

B. Population and Sample Design

The number of populations is based on 800 students from Sindh and 700 Students from University of Sindh Jams-horo. For getting the size of population, strata have been used from a book. The sample is shown through a sample of students enrolled in the universities. The following mathematical equation is used through which makes this study easier for finding the accurate number of questioner distribution.

$$\text{Formula of Sample size } (n) = \frac{\text{students enrolled in each university}}{\text{sum of all enrolled in universites } (N)} \times 375$$

Table No. 02: Sample size Distribution.

Name of University	Sample Size
Sindh Agriculture University Tandojam	700
University of Sindh Jamshoro	800
Total	1500

C. Research Questionnaire: The questionnaire of the research has been created is basically based on the literature as well as current survey and previous studies. The questions are designed by Likert scale (5 scales), interval decisions and questions based on yes or no questions. For validate the findings, the distribution of the Questionnaire has been divided in four different concerned to the information of the variable.

D. Data Analysis: The data has been kept in the spreadsheet of MS Excel initially with the help of SPSS. Furthermore, the SPSS was implemented for performing the analysis of data in the survey. The Descriptive data as well as inferential data has been implemented for determining the results. The questions of the research have been tested by using Pearson correlation coefficient. Variables are statistically tested to determine positive or negative correlation exists between the variables or not.

E. Results: Based on the methodology a comprehensive set of data has been collected. A careful consideration has been given to the way data has been collected. Especially, focus was kept on quality rather than quantity of the data. A few of data sets of subjects have been removed which were incomplete and or subjective responses were un unclear. We thought of removing that data sets which were creating ambiguity for the readers. Additionally, complementary things/gifts were also distributed among all the subjects who participated in this research work. Articles which were distributed among all subjects included ball point pens, ink pens, year calendars, book stickers, chocolates, tin pack cold drinks, small size books/diaries etc. Furthermore, results have been carefully evaluated and statistically analyzed before presenting them in this thesis work. Some careful considerations have been kept while developing graphs and every detail has be double checked before incorporating them into this research thesis work.

Next chapter contains detailed result along with the possible explanations as required to interpret the data properly.

IV. RESULTS AND DISCUSSIONS

This section presents results, under different subheads which are self-explanatory.

A. Descriptive statistics and analysis of research questions

Presentation of demographic data analysis of research questions:

This presentation shows the Distribution of sample N=1500 respondents from the selected Universities. It is important to convey that out of 1000 students/subjects from Sindh University Jamshoro 800 subjects participated in this research study. Furthermore, out of 1000 students from Sindh only 700 Students participated. Following table presents the consolidated results.

Table No. 3 Presentation of Demographic Characteristics.

Demographic Characteristics	Sample Size	Result In Percentage
Male	N = 1500	73.33%
Female	400	26.67%
Age Group		
Less than or equal to 18 Years	980	65.33%
Old		
19-21 years	119	7.93%
22-24years	96	6.4%
25 years or above	305	20.33%
Undergraduate Level		
Class	Sample Size	%
	N =1500	

First Year	800	53.3%
Second Year	400	26.6%
Third Year	200	13.3%
Fourth Year	100	6.6%
GPA-wise Participants		
1.5 - 2.0 CGPA	101	6.73%
2.1 -2.5 CGPA	478	31.86%
2.6 - 3.0 CGPA	456	30.4
3.1 - 3.5 CGPA	435	29
3.6 - 4.0 CGPA	30	1.4

B. Facebook users in universities

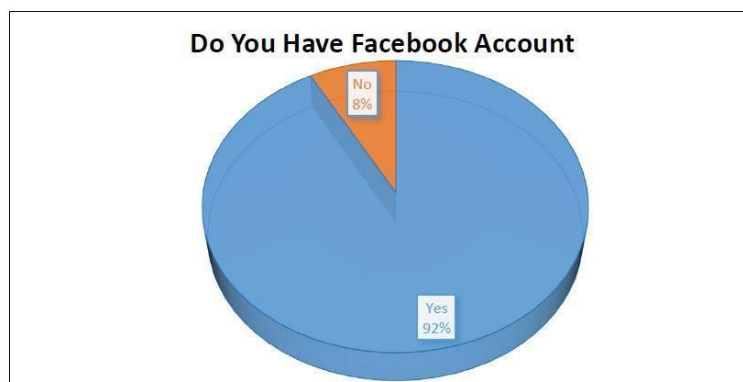


Fig 2 Facebook User

According to survey results, nearly 92% of students are using Facebook. Whereas 8% of students have no Facebook accounts due to unavailability of the Internet and personal computer.

C. Multiple Facebook account holder user:

According to university survey results, many students have more than one Facebook accounts. During the initial survey it was found out that there any instances where one person was using multiple Facebook accounts. Therefore, it was thought to encompass this detail with the questionnaire.

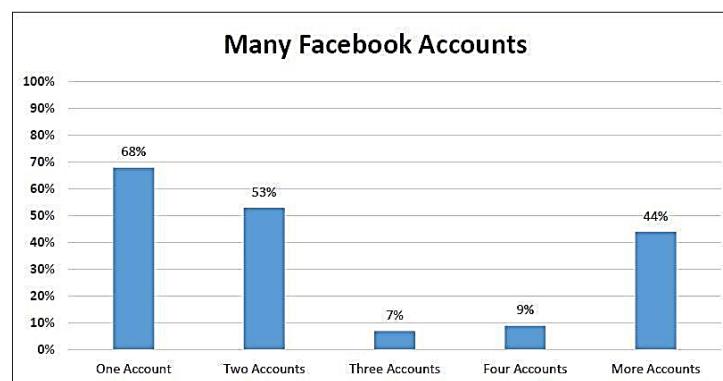


Fig 3: Multiple Facebook Account

D. Facebook affects study timing

Academic performance is independent variable of this study. As per literature survey, Facebook affects study timings. Additionally, relevant result shows that (68%) of the students shown a positive response. According to them, the Facebook is affecting the study timing. On the other hand (32%) of respondents showed negative responses which clearly shows that there is no any significant impact of use of Facebook on their study timings.

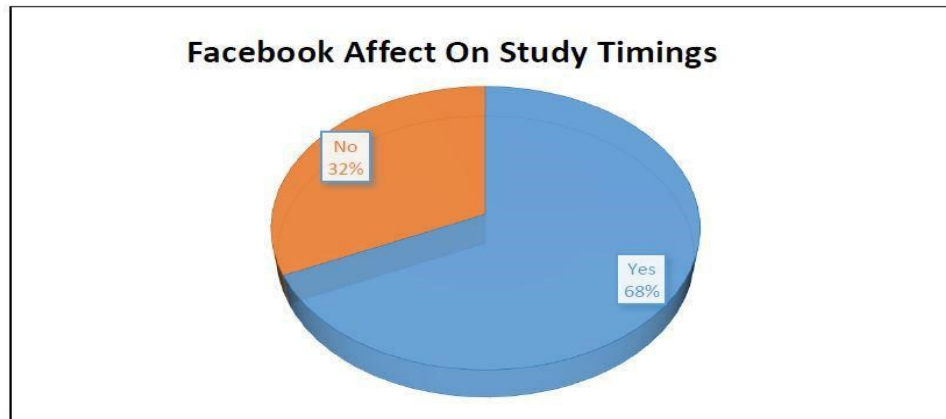


Fig 4: Facebook affects study Timing

As per results obtained through questionnaire, 64% of students communicate with teachers on Facebook for their academic purpose. On the other hand, 36% of respondents communicated that they do not contact their teachers through Facebook.

There is a question in the survey form that whether Facebook is useful for enhancing the academic performance of students. As per results obtained, nearly 58% students responded that Facebook is not useful for the performance of students while 42% students responded that Facebook is useful for the uplifting the performance of students.

The results were collected on the basis of daily usage. Here are some interesting results. According to collected results, 12% of the students are using Facebook less than one hour while 16% of the students reported that they are using Facebook between 1 to 3 hours in a day. (10%) of respondents declared that they use Facebook 3 to 6 hours per day, (7%) of students are using Facebook 6 to 14 hours per day, moreover, (51%) of students declared that using Facebook 14 + hours per day and (9%) do not use Facebook in a day. The details results are presented in the following graph.

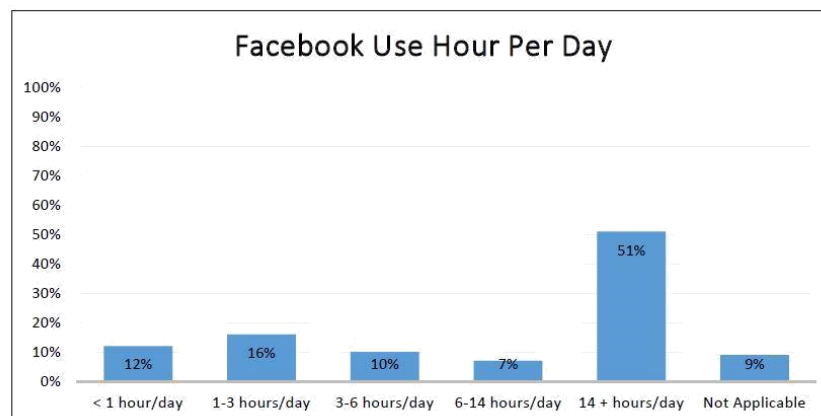


Fig 5: Facebook usage Hours Per day

The usage of computer or mobile maybe harmful for the eyes, it may create headache or some other health issues. In order to find the effects of Facebook on the health of university students, a question related to the health of students was included in the questioner. According the 71% of students, the Facebook does not affect on the health while 29% students agreed that Facebook affects the health of user.

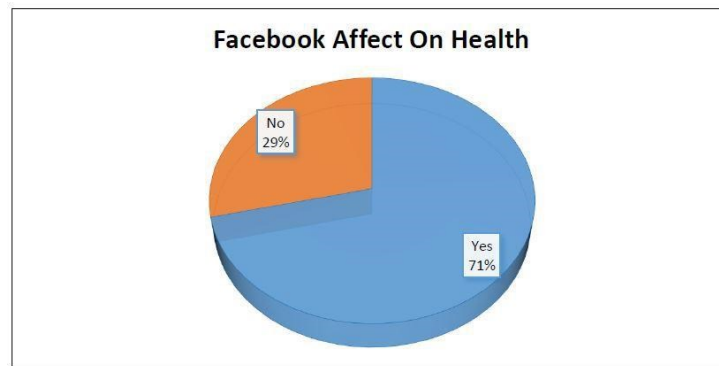


Fig 6: Effects of Facebook on health

It is important to find out how Facebook affects health. It was noted that some health issues maybe faced by the students in the case of using Facebook in access. According to the collected results from university students, (47%) of students reported that their eyesight is suffered due to excessive usage of Facebook. While (13%) of students reported that Headache issue is common while using Facebook, (10%) of respondents has Stress, (2%) students are facing depression issues and (28%) of students have sleeping disorder due to excessive usage of Facebook. The result is shown in the form of graph as below.

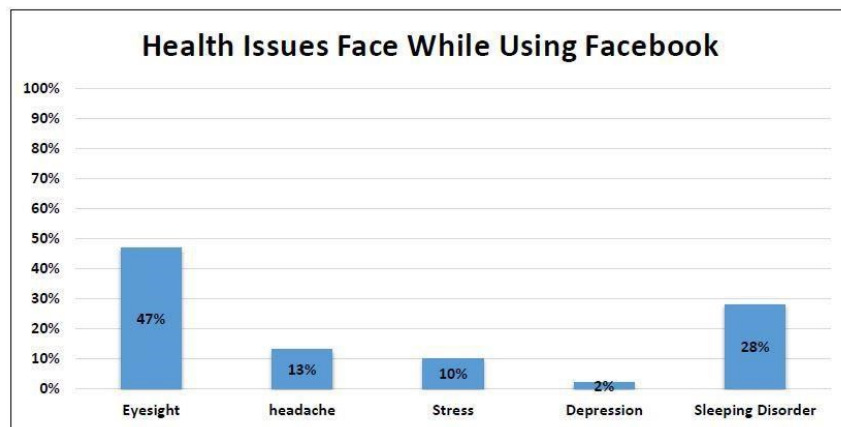


Fig 7: Effects of Facebook on health

Majority of students responded that they often forget to do homework while they use the Facebook extensively. According to the collected results, 72% of students miss/ignore their assignments, on the other hand 28% students responded that their assignment does not suffer due to the usage of Facebook. Following Figure shows the result.

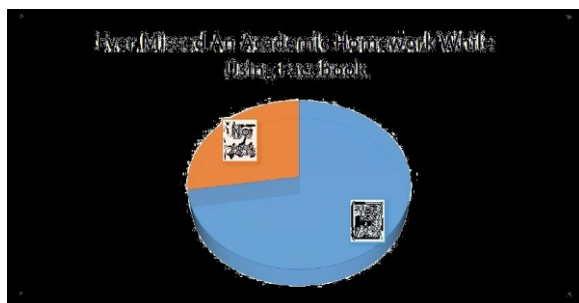


Fig 8: Assignment Missing Problems due to Facebook usage

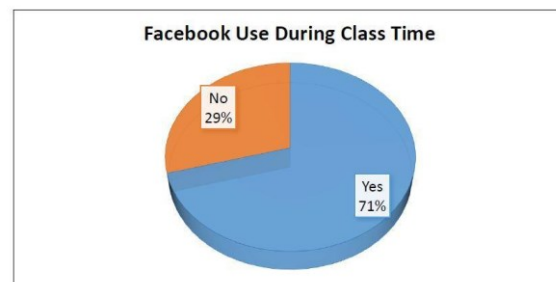


Fig 9: Facebook usage during class timing

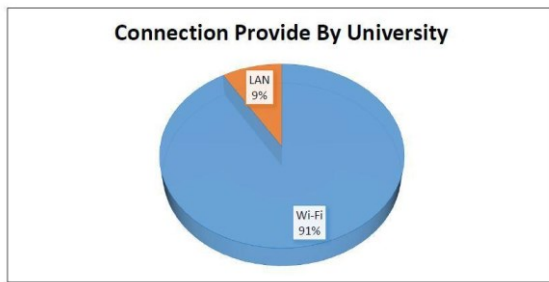


Fig 10: Internet Connection provided by Universities

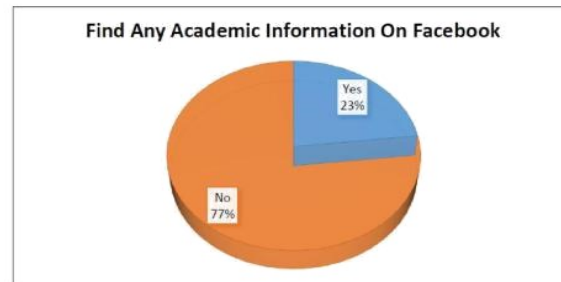


Figure 11: Academic Information on Facebook

During the class timings some students use Facebook. The Percentage of such users is given in Figure 9. It was also surveyed that the university is providing the Wi-Fi internet connectivity to the students. The %age of internet connections provided by the University is (91%) and (9%) of connections are provided on Local Area Network by using ethernet. While comparing the activities of Facebook usage in class, most of the students indicated that they are using Facebook in the class timings. The %age of those student was (71%) and (29%) of students reported that they are not using Facebook in the class timings. According to the respondents, (77%) responded that they did not find any information related with academic interest on Facebook and (23%) responded positively. The Facebook is being used by students for different purposes like finding the friends, chatting, sharing the posts like images, videos, or any other data, discussing in the groups and playing the games. The following figure shows the activities performed in Facebook.

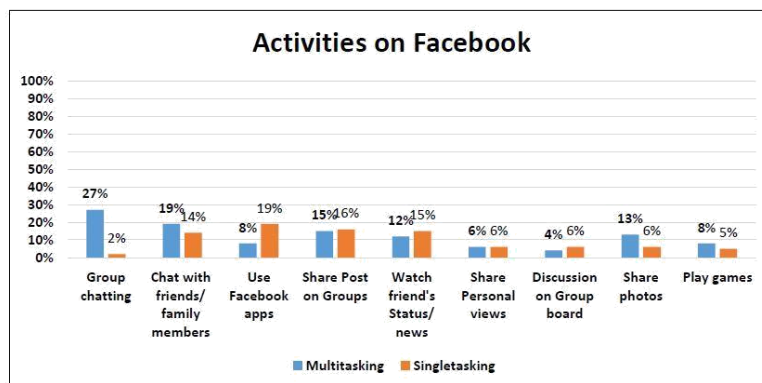


Fig 12: Activities of Students on Facebook

There are different activities performed by students on Facebook. Figure 12 presents the Facebook activities. It is very important to analyze the correlation among the independent as well as dependent variable. The current study has used the correlation method known as Bivariate method. This technique is implemented for finding the hypothesis among the relationships.

The correlation displays the Pearson correlation (p) that is leveled at 0.01 while another correlation Pearson is based on the method known as tailed Test Method that is used in SPSS for finding the relationship among two variables. The value r is the Pearson's coefficient. The current research displays the relationship among the variables having the value (R,P) where the r is identified with the positive or negatives ranging from (+1 to -1). If the value of r is 0.5 to .1 or from -0.5 to -0.1 that shows the strongest relationship among the two variables. If the value of is 0.8 to 0.5 or -0.3 to -0.5 then it shows an average relationship. On the other hand, if the value of is 0.1 to 0.3 or -.1 to -0.3 then it will be considered as much more weak or low relationship.

H0- Means that there is no relationship among the performance of students and the usage of Facebook.

H1- Means that there is a relationship among the performance of students and the usage of Facebook. When the relationship among Facebook and the academic performance is computed, the results (-0.417**) in the negative is shown that is indirectly proportional exists when the autonomous variable increase indirectly other dependent variable much decrease. The decrease as well as increase in the variables is a nature of students. In such case (**RQ1:** For checking out that what is the relationship among the Facebook and the academic performance of the student is? The results of the survey revealed that the relationship among the Facebook and the academic performance of the university student is examined on the student's nature. However, the usage of the Facebook by the students at university knockout the inverse effects on the performance of their academic side.

Facebook correlation with Health: HO- Means that it's no relationship among the students who are using Facebook and their health.

H1- Means that it's a relationship among the University student and health. Furthermore, research workout RQ2: to determine that how Facebook is impacting the academic performance of a student? The factor of the health may cause the academic performance of student measuring the health factor in relationship among the Facebook results are working out. On the relationship among independent as well as dependent variable outcomes (**0.200****) which is significantly negative correlation among the result of those two variables and that is showing that it is a very low correlation which pointed out the dependent variable increase and the decrease in independent variable. It means that the Facebook can affect the health of university students.

Regression Analysis and Analysis of Research Questions: The current research work is very simple as well as based on linear regression model that has been made in SPSS that uses the standard multiple linear regression for analyzing the independent variables at same time into the model. The analysis in this survey is implemented by using standardized coefficient beta as well R Squares for providing the transparency in dependent and independent variables are correlated according to relationship. Moreover, the current study is totally based on linear the analysis of multiple regression analysis for predicting the values of dependent variable through independent variables. The following give table represents the results in the form of summary.

Summary of Results: This study was conducted to survey a (convenience) random sample of $n=1500$, students as gender (Male=73.33%, Female=26.67%) took part in research study from selected universities considering only undergraduate students. Participating students' age was ranging from (18-20) years. Within that range, majority (65.33%) of subjects were ranging from (19-21 years of age). Furthermore, (7.93%) students were of age group 22-24, (6.4%) students were 25 years age and (20.33) students were above 25 years of age. Out of this distribution (71%) students are Facebook users; it is significant usage and most popular site among all students in their social lives. The findings of the current study represent that majority of students are addicted of using Facebook as social networking website. Out of 100%, 92% students in universities have the account of Facebook and only 8% of students has no Facebook account due to unavailability of internet and computer or smart phone. According to this survey 67% of students have only one account while 15% of students reported that they two accounts and 13% of students reported that they have more than two Facebook accounts. The current research has presented that 68% of students are using Facebook more than 14 Hours in day and night. Moreover, the Facebook is used by the students for several purposes such as 27% of students said that they are using Facebook for chatting while 19% of students said that they are using Facebook for finding the new friends. On the other hand, 6% of students are using Facebook for discussion in groups, 8% of students are using Facebook for playing games and 13% of students are using Facebook for sharing the posts like images, videos, and other data. Nowadays, social media has been very important of the students' daily life that proves that students are significantly influenced by using social media and on students' academic performance. According to [2], The University students are always busy in using the social media. The observation has proved that students are using Facebook in the academic areas such class and libraries. It has been concluded in this research that the academic performance of the University students has been badly affected. According to the study conducted by [15] on the usage of Facebook in the Punjab University the students were compared the Facebook usage pattern with the levels of education of the undergraduate and postgraduate level. The Facebook is being used in our routine live and it has been observed that the Male students are more engaged in using Facebook than Female students. The Male students has been seen to create the relationship with the stingers.

V. CONCLUSION AND RECOMMENDATIONS

A. Conclusion

After the findings of the research regarding the usage of Facebook, it is clear to conclude that the that social media has been a need of everyone today in the society. The current study investigates the positive as well as the negative impacts of using Facebook on the academic performance of University Students. The Facebook plays a significant part in the uplifting the academic career and it makes a distraction among the University Students. On the other hand, many students are unknown from the disadvantages of using Facebook, the usage of Facebook in access impacts the academic performance on the university students. It does not only affect the academic performance of students but also very harmful for the health. The motive of this study was to bring the awareness among the University Students and to advise the students to manage the proper usage of Facebook specially in study timings. The current research total focused on the dependent variable that shown the results with the independent variables such as the multitasking, health, and the academic performance of students. The social networking site such as Facebook has a significant role in creating the relationships positively or negatively. The current study examined the relationship among the academic performance of university student with connection to Facebook. According to the collected results, 51% of students are passing their 14 hours on Facebook for different activities such as creating the relationships, sharing, and viewing the posts, liking the others posts, chatting, group discussion, playing games and much more, obviously it will affect the health as well as the academic performance of those students. On the other hand, the current study has proved that there is also a positive relationship of social media with students. The percentage of the students who are using Facebook positively is 44.7%. These students are using Facebook for their academic purpose such as viewing the education related videos, discussion on any academic related topic and much more. However, the disadvantages of using Facebook are more than the advantages of using Facebook. Finally, it is concluded that the usage of Facebook in excess effects the education system badly, it also affects the health of the students. One of the major limitations in the current study is that the design of current research is to identify the correlations among the usage of Facebook and the students. Statistically, Findings of the present study presents with ($p < 0.5$) significant level.

B. Recommendation

Based on this research study, following are some recommendations: Excessive usage of Facebook causes very low academic performance as well as health problems specially for eyesight. The students at the University must avoid such type of social media like Facebook at libraries, classrooms, departments and in the premises of Computer labs. The majority of university students are using Facebook while the timings of the class or during the study timings and in the result, they are not able to pay the attention towards their studies and they cannot concentrate in the lecture and finally their results are badly affected. The students of undergraduate level must pay attention towards their studies during the study timings with full dedication as needed by the students and they should not give the preference to the Facebook over study. It is strongly suggested to those students who are using Facebook in excess that they should reduce the usage of Facebook during the academic timings. They should decrease it as low as possible.

Based on this research study, following are important future work aspects. Future research may contain qualitative elements to present study for mixed methods.

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DEVELOPING A SYSTEMIC APPROACH TO CONFLICT MANAGEMENT IN PROJECT RISK MANAGEMENT: AN ANALYSIS OF CONTRIBUTING FACTORS AND THEIR MANAGEMENT

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Abstract: To achieve successful outcomes, project managers must effectively resolve conflict situations during project management. In this study, we focus on developing a systemic approach to conflict management in project risk management and analyzing various factors contributing to conflict situations. Using a structured questionnaire, we collected data from 200 risk analysts working in the software industry under the project management domain. The data were analyzed using probabilistic methods and statistical analysis to develop a systemic approach to conflict management. The questionnaire was designed to capture information on various factors that contribute to conflicts during project risk management, including the extent of exposure and multiple exposures. The study's findings reveal that a systemic approach to conflict management in project risk management is effective in minimizing the negative impacts of conflicts. Our analysis identified several contributing factors to conflicts, including poor communication, insufficient risk assessment, and unclear project goals. We propose a systemic approach to conflict management that involves identifying the contributing factors, assessing their severity, and developing appropriate conflict management strategies. The study's contributions include developing a systemic approach to conflict management in project risk management, identifying contributing factors to conflicts, and proposing effective conflict management strategies. Research results have significant implications for project managers seeking to achieve successful project outcomes while minimizing the negative effects of conflict.

Keywords: Risk management, project management, software development, conflict management

I. INTRODUCTION

One of the difficult but essential duties in project risk management is addressing conflicts. Limiting and mitigating the detrimental effects of conflict that arises during project management is the goal of conflict management. One of the most crucial phases of software development is risk management. It entails the recognition, preparation, analysis, monitoring, management, and communication of risks. [1] The visibility of threats to the project's success is a key component of risk assessment. Future dangers could potentially result in significant development issues that would have an impact on every area of expertise in software project management. Analysis of potential conflicts and risk assessment follow. Whenever a project is being planned and developed, this is typically seen as a crucial concern. Conflicts that arise throughout the risk assessment process must be resolved, according to the project management. In IT in general, and in software development, in particular, the risks can be significant and the consequences can be severe. By conducting rigorous and proper risk assessment analysis, organizations can identify potential risks and develop strategies to mitigate or manage them. This can help to minimize the impact of risks on project timelines, budgets, and outcomes, and improve the overall effectiveness and performance of the organization. However, it's important to note that creating software with the least amount of risk is not always possible. Some risks may be inherent in the software development process, while others may be external factors

that are beyond the organization's control. In these cases, the focus should be on identifying and mitigating the most significant risks, rather than trying to eliminate all risks entirely. Overall, effective risk assessment analysis can help organizations to make more informed decisions and manage their projects more efficiently, ultimately leading to improved performance and outcomes. There is a need for a more effective approach to risk assessment in project management, particularly with regard to the systemic analysis of contributing and leading factors. The current approach may not be sufficiently comprehensive or rigorous and may result in a lower success rate in managing and mitigating risks. By focusing on the systemic analysis of various contributing and leading factors, the paper aims to provide a more holistic approach to risk assessment that considers the complexity and interdependence of different factors. This approach may help to identify risks that might otherwise be overlooked and to develop more effective strategies for managing those risks. Ultimately, the goal of this paper is to improve the success rate of risk assessment and management in project management and to ensure that projects are completed on time, within budget, and with the expected outcomes. 200 completed questionnaires from risk analysts in the software sector working in the field of project management are analyzed. These 200 completed questionnaires are then analyzed statistically and their answers evaluated using probabilistic analysis.

This article focuses on how systemic analysis of various project management contributing and leading elements can be done successfully and with a greater success rate (e.g., extension of the exposure, numerous exposures). Also, each knowledge area's risk impact is examined, and their relevance to conflicts is considered.

A survey has been conducted in which risk assessment awareness and the relationship between risk and conflicts in each knowledge area have been studied. The results of this survey prove that risk assessment and conflicts are strongly related and they play a significant role in successful project development.

The survey's findings are based on replies from several organizations. These responses are confidentially examined and combined without mentioning any sources or organizations.

On the basis of eleven software project management knowledge domains, the questionnaire is organized into various sections. There are a few questions in each section of the questionnaire designed to examine how risks are perceived in relation to that knowledge area. For each question, we have given different instructions, and based on those instructions, we have divided the participants into groups and examined their responses. This research made it easier to understand how crucial risk assessment is to project success and how it relates to issues that arise during project development.

The survey is carried out at businesses with an emphasis on IT. We have concentrated on those software companies whose commitment to their objectives and apparent adherence to best practices in project development caught our attention. These are the businesses that fall between software houses with medium to high ratings.

II. SURVEY OF RELEVANT WORK

The three main procedures that go into a software risk assessment (SRA) are risk identification, analysis, and prioritization. Creating risk mitigation techniques is a key component of risk analysis in project development. [2]

Around 50 civil officials and the Department of Defense (DoD) have used SRA since it began its evolutionary development at SEI in 1992 [3]. The question of why risk assessment or risk management is crucial arises. This question's obvious solution is discovered. Every endeavor or undertaking carries some level of risk. [4] Any aspect, including scope management, integration management, cost management, human resource management, communication management, etc., may be at risk. Understanding risks and their corresponding aims is therefore crucial to the project's progress. It enables stakeholders to create a backup plan that will help them to better plan while accepting, relocating, and minimizing risks. The systematic and ongoing process of risk management was outlined by the SEI risk management paradigm. There are six different paradigms for risk management:

- **Identify:** Exploring and locating risks before time.
- **Analyze:** Build decision-making information from each risk, and Study its impact, time frame, and probability. It also includes the classification and prioritization of risks.
- **Plan:** Transforming risk information into decisions and actions, then implementing those actions.
- **Track:** Risk indicators are monitored and reduction actions are fully observed.
- **Control:** Changes in the mitigation plan are handled.
- **Communicate:** This is the process that throughout all the functions kept going. It includes information and feedback internal and external to the project about risk activities, current risks, and emerging risks.[5]



Figure 1: Paradigms of risk management

A few models are also published to help with risk assessment. Risk drivers are the next step in identifying and reducing software risks, after US Air Forces. Cost risk, support risk, performance risk, schedule risk, etc., are significant risk components. [6] This model doesn't have process-related risk, making it more appropriate for acquisition than software development. Technical risk, cost risk, and scheduling risk are the three primary risk components of the Engineering Risk Model (SERIM). This paradigm has the flaw of not accounting for the intricate problems with any software. The suggested article does not analyze the hazards associated with requirements; these risks are taken into consideration. [6]

III. CONFLICTS HANDLING AND RISK ASSESSMENT

Conflicts are inevitable and guaranteed when managing a project. Because of the diversity of perspectives, experiences, and orientations that can be linked to project skills or other circumstances, conflicts are frequently highly likely to arise in development projects. [7]

Most of the time, it's easy to forecast the type of the fight. Differences in values, needs, finances, attitudes, expectations, and personalities, among other factors, may be the cause.

The likelihood of loss or uncertainty is now essentially the risk. In project management, risk plays a significant role. It's regarded as one of the major obstacles to effective project development. Risk is typically what makes a project successful or unsuccessful [8]. Chances of failure exist whenever there is uncertainty. Risk assessment is done as part of project planning to lower the possibility of failure and raise the likelihood of success. Identification, analysis, and prioritizing of risks are all part of the risk assessment process.

Yet today, a drawback of this strategy is that conflicts arise while evaluating the risks. This is due to the fact that various people desire various risk assessment implementations. The project manager has a responsibility to manage the circumstance [9].

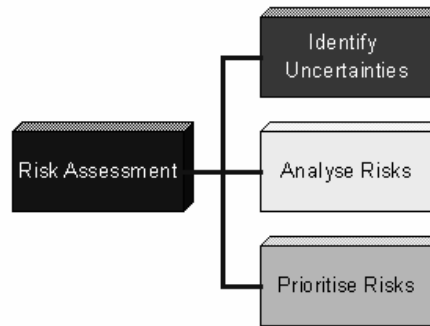


Figure 2: Elements of Risk Assessment

Finding risks related to the management of software development is the first and most crucial phase in the risk assessment process. The objective is to locate dangers without evaluating them just yet. Finding risks related to the management of software development is the first and most crucial phase in the risk assessment process. The objective is to locate dangers without evaluating them just yet. [10] To begin a risk assessment, first determine the potential risks in a project that are connected to project management and organization or project operations. The management should convene a brainstorming session with all relevant project stakeholders in order to appropriately assess the risk. All 10 of the software project management knowledge areas contain risk identification. There are a number of risks in every region that can lead to disputes. The costing area, for instance, lacks proper contracts, subsequent payments, and cost estimation for uncertain certainties.

Once project hazards have been identified, the project manager goes over the list to eliminate any that overlap or contradict.

Go on to risk assessment after identifying the danger. Risks are assessed against two dimensions: probability and impact. Probability is the feature of a risk's likelihood of happening. Risk should only occur in one of three situations: High: risk occurs frequently. Risk is medium: it typically happens. [13] Low: risks are less common.

The risk assessment component known as "impact" examines how a risk may affect a project or organization. One of three categories correspond to the effect of risk. [14] High impact: Due to the devastating consequence, the project manager was forced to stop all efforts. Medium: The project manager will continue to handle this risk, but performance may be impacted. Low: This danger will have little effect and is easily manageable. Following risk assessment, the figure displays risk prioritisation based on likelihood and impact, as well as a risk classification chart. [12] Regular hazards are ones that are highly probable but have little consequence. This kind of error can be fixed during ordinary project or organizational operations. Examples of minor human errors are delivery processes or procedures [15]. Risks with a low probability and a modest impact are considered low-importance risks [16]. Lesser-level management is in charge of these risks. Risks that are difficult are those that are unlikely to materialize but would have a significant impact on the project [17]. Critical risks are those that have a high probability of occurring and a high impact on a project or organization [18].

IV. METHODOLOGY

Conducting a survey-based methodology is a common and effective way to gather information on risks in software project management. By surveying a diverse group of risk analysts from the software industry, you can obtain a range of perspectives on different risks and their potential impact. Using statistical analysis to interpret the results of the survey can help to identify trends and patterns in the data, as well as to quantify the relative importance of different risks. This can help project managers to prioritize their risk management efforts and to focus on those risks that are most likely to have a significant impact on the project. Overall, a survey-based methodology can be a useful tool for identifying and prioritizing risks in software project management. However, it's important to ensure that the survey is well-designed and that the sample size is large enough to provide meaningful results. Additionally, the interpretation of the results should be done carefully and with appropriate statistical analysis to ensure that the findings are accurate and reliable. Ten knowledge areas of software project management have been taken into consideration when creating the questionnaire. Risk assessment and conflict relationships, as well as how they affect project success, are examined under each knowledge domain. On the basis of this study, inquiries have been made. All the ten software project management knowledge domains are detailed out in Fig 3. For each knowledge domain, the connection between conflicts and dangers has been examined. Their impact and likelihood of occurrence have both been carefully evaluated. [20]

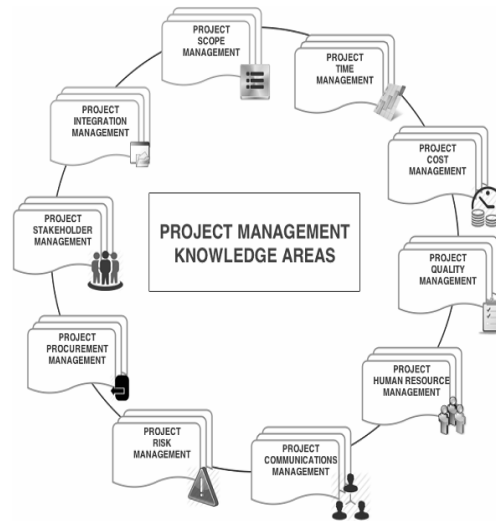


Figure 3: Project management knowledge cycle.

V. RESULTS AND DISCUSSION

The results, to get better understanding of risk in project management, are obtained and those are in alignment with the knowledge areas in order to get a better understanding of risk assessment.

We have collected data from different groups of people. The responses are studied and analyzed to see what the impact of each risk is and how heavily it can affect the success rate of a project. “Awareness of the importance of risk assessment in software project development.”[19]

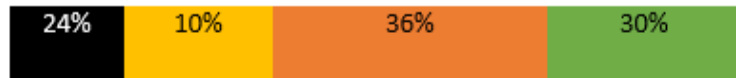
	Low
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	Medium
	High
	Don't Know

A) Project Integration Management

Delay in providing hardware /software or development environment.

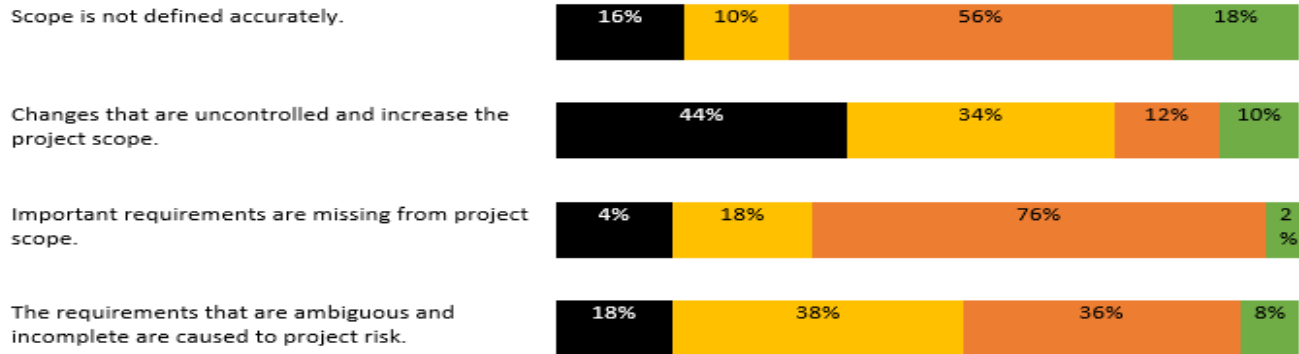


Fail to integrate with existing system.



The study has found that failing to integrate with the system has the highest impact on project success, it suggests that this is a critical risk factor that needs to be carefully managed and mitigated. Integration is a critical aspect of software development, and failure to integrate effectively can lead to delays, errors, and other issues that can have a significant impact on project success. By identifying this risk factor as a high priority, the study can help project managers to focus their attention and resources on developing effective strategies for managing and mitigating this risk. This may include implementing robust testing and quality assurance processes, ensuring clear communication and collaboration among team members, and using appropriate tools and technologies to support integration. Overall, the study's findings can provide valuable insights into the most critical risk factors in project management and can help organizations to develop more effective strategies for managing those risks and improving project success

B) Project Scope Management:

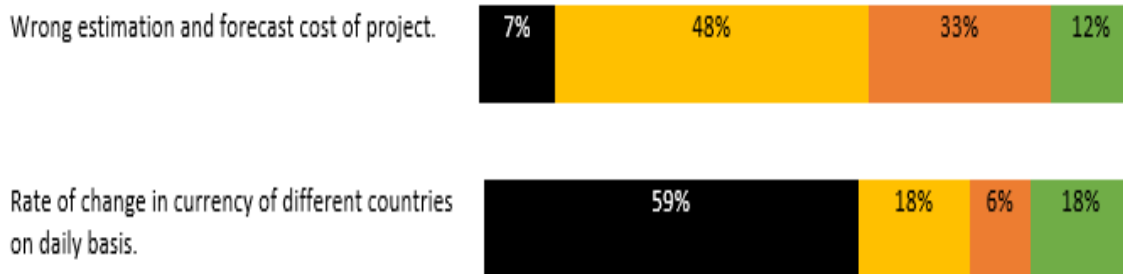


If important requirements are missing from the project scope, it can have a significant impact on the success of the project. Requirements are the foundation of any software development project, and they define what the project aims to achieve and how it will be implemented. If important requirements are missing, it can lead to confusion, delays, and even failure to meet the project's goals. Missing requirements can result in a number of problems, such as:

- Misaligned expectations: If important requirements are not included in the project scope, it can lead to misaligned expectations between stakeholders and the development team. This can result in a lack of clarity and misunderstandings about what the project is supposed to achieve.
- Increased risk: Missing requirements can increase the risk of errors and omissions in the final product. This can lead to delays and additional costs as the team works to fix issues that could have been avoided if the requirements were properly defined and included in the scope.
- Reduced quality: Missing requirements can also lead to a final product that does not meet the required quality standards. This can impact the project's success and the organization's reputation.

Overall, it is important to ensure that all important requirements are included in the project scope to minimize the risk of project failure and ensure the success of the project.

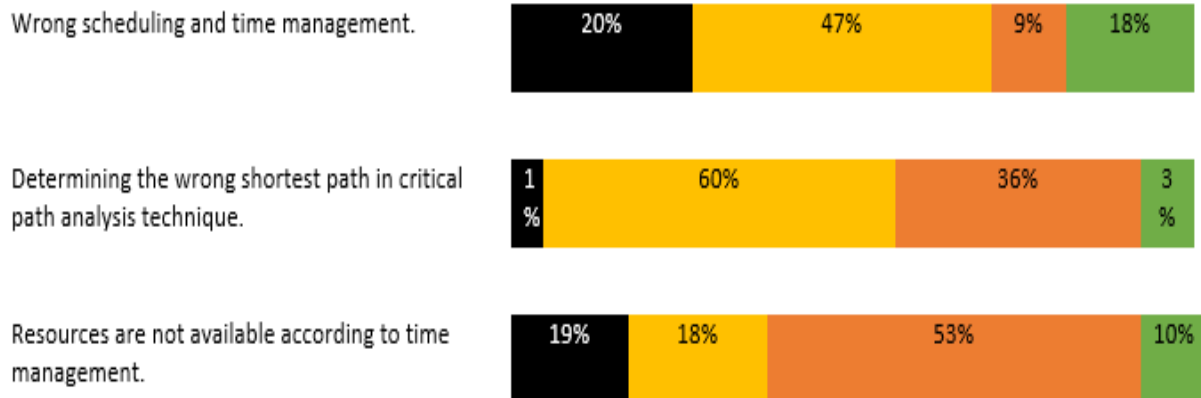
C) Project Cost Management:



It is difficult to make a definitive statement about the impact of currency fluctuations on the success of a project without more context. Currency fluctuations can have a range of impacts on a project depending on various factors such as the type of project, the industry it operates in, and the location of the project. For example, a project that

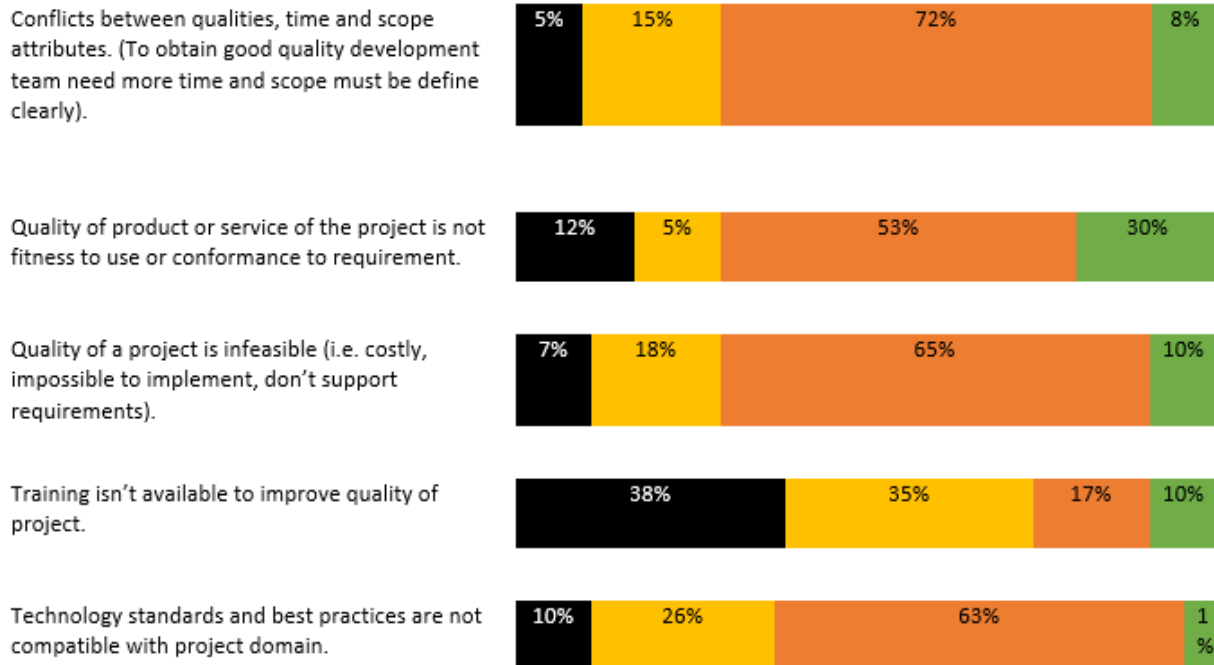
involves importing or exporting goods may be significantly affected by currency fluctuations as changes in exchange rates can impact the cost of materials and shipping. Similarly, a project that involves working with foreign partners may be impacted by changes in currency exchange rates. On the other hand, a project that is entirely domestic and not reliant on international trade may not be as affected by currency fluctuations. Additionally, the degree of impact can vary depending on the magnitude of the currency fluctuation and the duration of the project. Overall, it is important to consider the potential impact of currency fluctuations on a project and develop strategies to mitigate any negative effects. This may involve implementing contingency plans or financial hedging strategies to minimize the impact of currency fluctuations on project success.

D) Project Time Management



Correctly identifying the critical path is an important aspect of project management as it helps to ensure that the project is completed within the planned timeframe. If the wrong shortest path is identified, it can result in delays and impact the overall success of the project. Therefore, it is important to properly analyze the project and determine the correct critical path. As the study shows, 60% of people agree that determining the wrong shortest path in the critical path analysis technique will moderately affect the project. While this may not have a catastrophic impact on the project, it can still result in delays and additional costs. Therefore, it is important to carefully analyze the project and use accurate data to determine the critical path. It may also be helpful to perform sensitivity analysis to identify potential changes to the critical path and develop contingency plans in case any delays occur. Overall, while determining the wrong shortest path may not be a high-priority risk, it should still be taken seriously and addressed appropriately to minimize the impact on the success of the project.

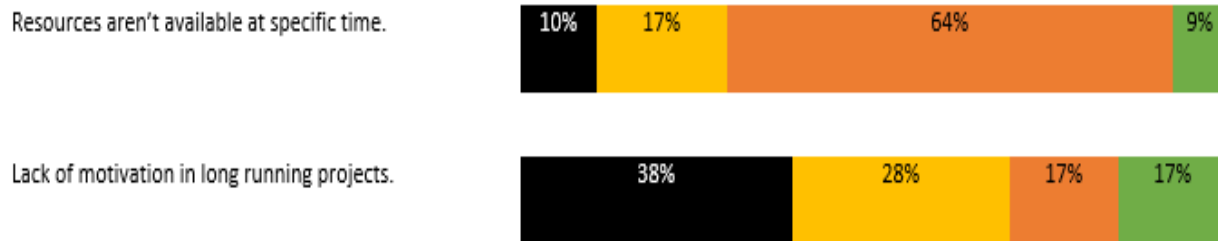
E) Project Quality Management



It is true that conflicts between project qualities, time, and scope can have a significant impact on the project development process. These conflicts can arise when there are competing priorities or limited resources, which can make it difficult to achieve all project objectives within the planned timeframe. As the results show, many respondents agree that conflicts between project qualities, time, and scope can have a high impact on the success of the project. This highlights the importance of properly managing these conflicts and making trade-offs where necessary to ensure that project objectives are met within the available resources. One approach to managing conflicts between project qualities, time, and scope is to prioritize project objectives based on their importance to the overall success of the project. This can help to ensure that the most critical objectives are achieved even if there are constraints on time or resources.

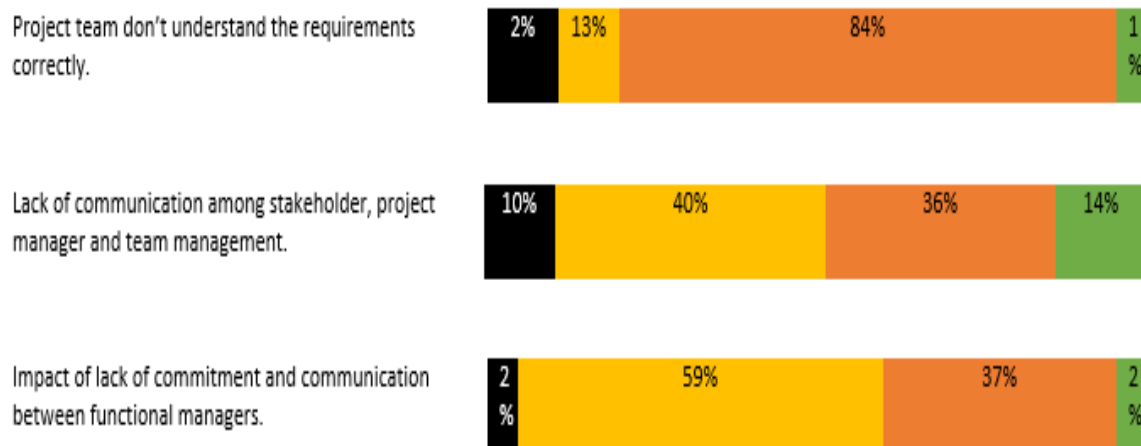
In addition, effective communication and collaboration among project stakeholders can help to identify potential conflicts early on and develop strategies to address them. This can help to minimize the impact of conflicts on the project development process and ensure that the project is completed successfully. Overall, it is important to recognize the potential for conflicts between project qualities, time, and scope and take steps to manage them effectively to ensure the success of the project.

F) Project Human Resource Management



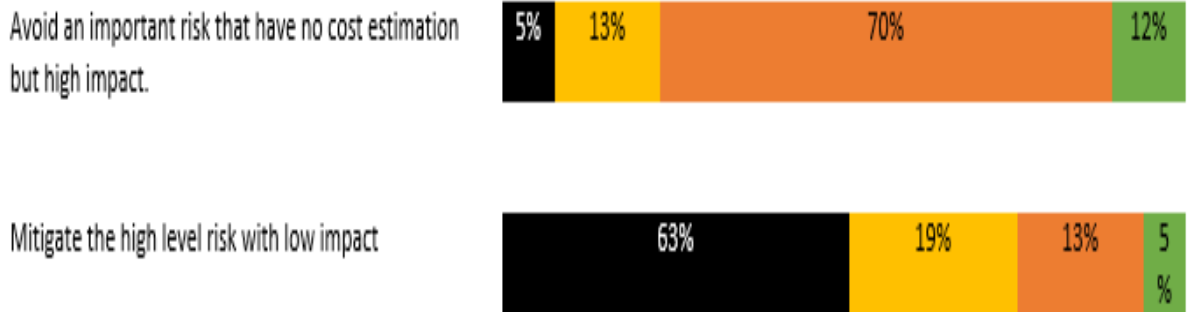
The research shows that a lack of resources can have a significant impact on the development process of a project. This can include a shortage of funding, materials, equipment, or personnel needed to complete project tasks. When resources are not available at the time needed, it can cause delays in the project timeline and potentially impact the quality of the final product. In some cases, it may also lead to increased costs if additional resources need to be brought in or if the project needs to be reworked due to resource constraints. Effective resource management is therefore crucial for the success of any project. This includes identifying resource needs early on in the planning process, allocating resources appropriately, and continuously monitoring and adjusting resource usage throughout the project lifecycle. In situations where resources are not available as needed, project managers may need to make trade-offs or prioritize certain tasks over others to ensure that critical project objectives are met. This can involve re-sequencing project tasks, revising timelines, or adjusting project scope to accommodate resource limitations. Overall, managing resources effectively is a critical aspect of project management and can have a significant impact on the success of a project.

G) Project Communication Management



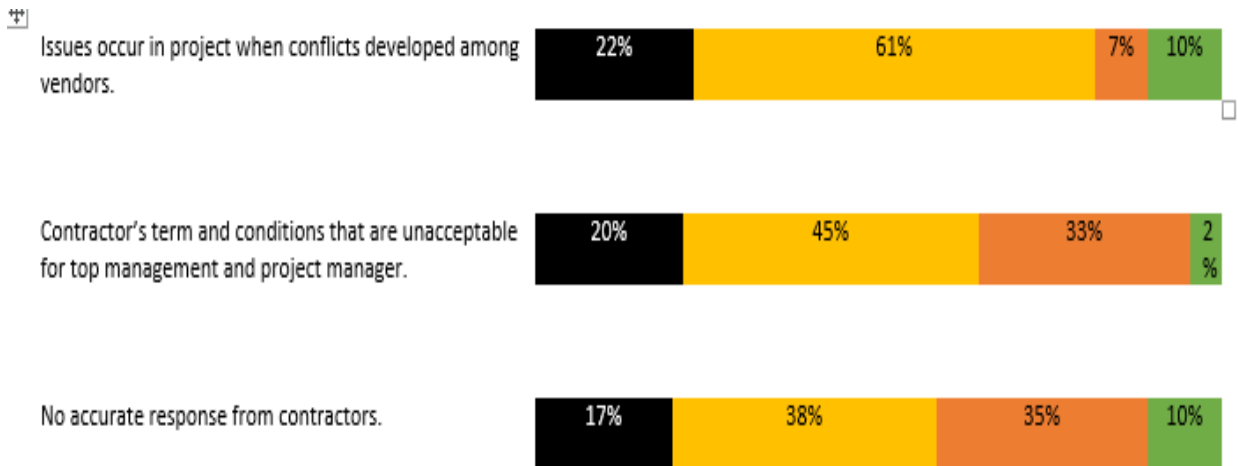
The risk of a lack of understanding of the requirement usually creates major problems. This is the result we have extracted from analyzing the responses of the people. It is important to have a clear understanding of project requirements in order to avoid potential risks and ensure successful project development.

H) Project Risk Management



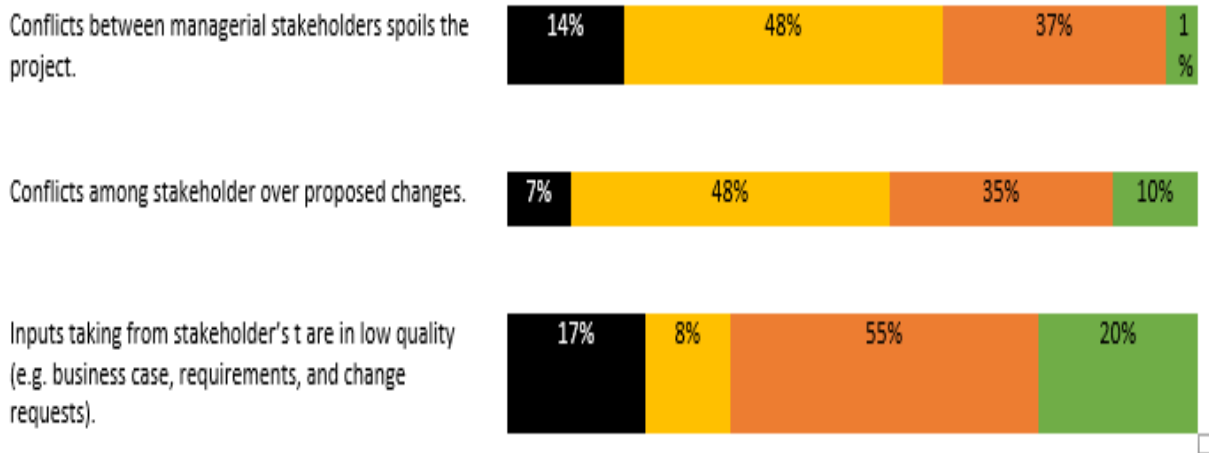
It is important to consider risks with high impact, even if there is no clear cost estimation, as ignoring them can have significant negative effects on project development. This highlights the importance of properly assessing and prioritizing risks in project management. 70% of people have said that in risk management if we ignore a risk with no cost estimation but high impact then it has the highest effect on the development of the project.

I) Project Procurement Management



It is important to manage conflicts effectively in order to avoid negative impacts on project development. While conflicts among vendors may have a medium effect, it is still important to address them and find solutions to minimize their impact on the project.. When there occur conflicts among vendors then it will have a medium effect and 61% of people agree with this as shown in the above table.

J) Project Stakeholders Management:



If the inputs from stakeholders are of low quality, it can negatively impact the project development process and ultimately the success of the project. It is important to have clear and accurate inputs from stakeholders in order to ensure the project meets their expectations and requirements. Therefore, it is essential to prioritize and address this risk in order to mitigate its impact on the project's success. This study shows that most people agree on the thing that inputs from stakeholders are of low quality has the highest impact on project success.

Risk Assessment Matrix

A risk assessment matrix is a tool used in risk management to prioritize risks based on their likelihood and potential impact. It is often used in conjunction with a risk register, which lists identified risks and their corresponding risk response plans. The risk assessment matrix is a useful tool for project managers to prioritize risks and determine the appropriate risk response plans. It allows for a systematic approach to risk management and helps to ensure that resources are allocated appropriately to address the most critical risks

Knowledge Area	Risk Description	Probability	Impact
Integration	Delay in providing hardware /software or development environment.	Medium	High
Integration	Fail to integrate with the existing system.	Low	High
Scope	Scope is not defined accurately.	High	High
Scope	Changes that are uncontrolled and increase the project scope.	Medium	Low
Scope	Important requirements are missing from the project scope.	Low	High
Scope	The requirements that are ambiguous and incomplete are caused project risk.	High	Medium
Cost	Wrong estimation and forecast cost of the project.	Low	Medium
Cost	Rate of change in the currency of different countries on daily basis.	Low	Low

Time	Wrong scheduling and time management.	High	Medium
Time	Determining the wrong shortest path in critical path analysis technique.	Low	Medium
Time	Resources are not available according to time management.	Medium	High
Quality	Conflicts between qualities, time, and scope attributes. (To obtain a good quality development team need more time and the scope must be defined clearly).	High	High
Quality	The quality of the product or service of the project is not fitness to use or conformance to requirements.	Medium	High
Quality	The quality of a project is infeasible (i.e. costly, impossible to implement, doesn't support requirements).	Low	High
Quality	Training isn't available to improve the quality of the project.	Low	Low
Quality	Technology standards and best practices are not compatible with the project domain.	Medium	High
Human Resource	Resources aren't available at a specific time.	Medium	High
Human Resource	Lack of motivation in long-running projects.	High	Low
Communication	The project team doesn't understand the requirements correctly.	High	High
Communication	Lack of communication among stakeholders, project manager and team management.	High	Medium
Communication	Impact of lack of commitment and communication between functional managers.	Medium	Medium
Risk	Avoid an important risk that has no cost estimation but a high impact.	Low	High
Risk	Mitigate the high-level risk with low impact	Low	Low
Procurement	Issues occur in the project when conflicts developed among vendors.	High	Medium
Procurement	The contractor's terms and conditions are unacceptable to top management and the project manager.	Medium	Medium
Procurement	No accurate response from contractors.	Low	Medium
Stakeholders	Conflicts between managerial stakeholders spoil the project.	Medium	Medium
Stakeholders	Conflicts among stakeholders over proposed changes.	High	Medium
Stakeholders	Inputs taken from stakeholder's are of low quality (e.g. business case, requirements, and change requests).	Low	High

VI. PRIORITIZATION OF RISKS:

A) High Probability, High Impact

Risks with high priority and high impact must be addressed first because they have the potential to significantly impact the project's success or failure. These risks are typically those that have a high probability of occurring and could cause significant damage if they do. By prioritizing these risks and addressing them proactively, project managers can minimize the chances of failure and increase the project's chances of success. It is important to have a risk management plan in place to identify and mitigate risks throughout the project lifecycle. Risk management should be an ongoing process throughout the project, with risks continually reassessed and prioritized as necessary. By addressing high-priority and high-impact risks early in the project, project managers can reduce the likelihood of significant problems occurring later in the project, which can save time, money, and resources.[21]

B) High Probability, Medium Impact

Risks with high probability and medium impact should be the second priority after the risks with high priority and high impact. These risks are important because they have a high likelihood of occurring and can have a significant impact on the project, although not as severe as those with high priority and high impact. It's essential to address these risks in a timely manner to prevent them from escalating into more significant problems that could affect the project's success. These risks can be managed by implementing mitigation strategies to reduce their likelihood or developing contingency plans to minimize their impact if they occur. Project managers should have a risk management plan in place that outlines how to identify, assess, and respond to risks throughout the project lifecycle. By doing so, they can ensure that risks with high probability and medium impact are identified and addressed appropriately.[22]

C) Medium Probability, High Impact

The risks with high probability and medium impact should not be ignored and should be addressed as the second priority in a risk management plan. Doing so can help project managers minimize the likelihood of these risks occurring and reduce their impact. Risks with medium probability and high impact should be the third priority in a risk management plan, after the risks with high priority and high impact, and those with high probability and medium impact. These risks are important because although their probability of occurring is not as high as the risks with high priority, their potential impact on the project is significant. Therefore, project managers should not ignore them and must address them proactively. To manage these risks, project managers should assess the likelihood of the risk occurring and its potential impact on the project. Mitigation strategies should be developed to reduce the likelihood of the risk occurring, and contingency plans should be created to minimize its impact if it does occur. It's important to note that a risk management plan should be a living document that is regularly updated and adjusted as the project progresses. Risks with medium probability and high impact that were previously considered lower priority may need to be addressed more urgently if the situation changes.

D) Medium Probability, Medium Impact

Risks with medium probability and medium impact should be the fourth priority in a risk management plan, after the risks with high priority and high impact, those with high probability and medium impact, and those with medium probability and high impact. While risks with medium probability and medium impact may not pose an immediate threat to the project's success, they are still important and should not be ignored. These risks could still have a negative impact on the project if they are not managed properly. To manage these risks, project managers should assess their potential impact on the project and develop mitigation strategies to reduce their likelihood of occurring. Additionally, contingency plans should be created to minimize their impact if they do occur. It's important to note that while risks with medium probability and medium impact are not as high a priority as the risks mentioned above, they still need to be considered and addressed as part of a comprehensive risk management plan. By doing so, project managers can minimize the likelihood of these risks occurring and reduce their impact if they do. In summary, risks with medium probability and medium impact should be addressed as the fourth priority in a risk management plan. By doing so, project managers can ensure that all risks, regardless of their likelihood or impact, are considered and managed appropriately.

VII. CONCLUSION

Careful risk assessment is a critical aspect of software project management. The assessment should be done in accordance with all ten knowledge areas to ensure that all risks are identified and addressed appropriately. The survey conducted in this scenario is an example of such risk assessment. It helped in making distinctions between various risks related to conflicts and prioritizing them based on their probability and impact. The methodology used in the survey was implemented honestly and is under complete consideration. The survey questionnaire was sent to a diverse group of people, and sampling was done keenly to ensure accurate results. The results obtained will help in improving the software under each knowledge area of software project management. Overall, a

comprehensive risk management plan that considers all possible risks and addresses them appropriately can help in ensuring the success of software projects.

Future Work: Once risks have been identified and prioritized, it's important to develop mitigation strategies to reduce the likelihood of those risks occurring and to minimize their impact if they do occur. After implementing these mitigation strategies, it's important to evaluate their effectiveness. This evaluation should consider whether the strategies effectively reduced the likelihood of the risks occurring and whether they effectively minimized their impact if they did occur. Based on the results of the evaluation, new solutions can be proposed or previously defined solutions can be modified to improve their effectiveness. This iterative process of identifying risks, developing mitigation strategies, and evaluating their effectiveness can help in continuously improving software project management and reducing the likelihood of project failure. Overall, future work in this area should focus on developing and refining risk management strategies to ensure that software projects are completed successfully and deliver the expected value to stakeholders.

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EVALUATION OF UAE E-COMMERCE WEBSITES – MYGROCERY AS A CASE STUDY

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Abstract- The MyGrocery Website is mainly used at the store, which is mostly random use or when the customer is at home. Understand how users can scan and know where the barcode is. Make sure they are using it properly and coordinate with what is at home. Let's pretend you're stuck in the supermarket, unable to move. Check to see whether you have any tomato paste on hand. You spend the most of your time thinking about the fantastic handmade spaghetti meal you'll cook after a 12-hour workweek. To go to the grocery store, you'll have to struggle through heavy traffic and wait for 20 minutes in the corridor. If you don't have any tomato paste on hand, you'll either must pay extra money or keep it in your closet. While it is hardly a life-changing decision, we make it every time we go grocery shopping. Saving money by repurchasing items you already have might pile up quickly at the end of the month. The MyGrocery store Website eliminates the mental upheavals that must be dealt with in the five corridors. There's no need to construct a shopping list. Let's assume you go to the grocery because you need milk, bread, and wheat flakes. The supermarket website scans the barcode of your grocery shop and adds newly acquired milk, bread, and wheat to all of your kitchen's ongoing lists. Scan the barcode on your grocery receipt or use the Website to scan the barcode and record your whole purchase. After you've done eating your brown grass, you'll be ready to go on to the next step.

Keywords - Usability, E-Commerce Websites, UAE, MyGrocery.

I. INTRODUCTION

So, for this paper, we select many websites in the UAE to check their usability evaluations of the MyGrocery Store website. The online MyGrocery Store Website market is a form of e-commerce that allows consumers to buy food directly like Food, Bakery & Pastry, Drinks, Health & Beauty, and General Products. The online MyGrocery store develops the physical similarity of buying products just like in the local market. The largest online retailing corporations in the UAE are TROLLEY.AE, EL GROCER. These huge online shops can connect their sales over time with the ability to sell fresh food and other household products through the internet [1,2,3,4,5].

The Website will have these main services:

- User Registration: Users can register themselves by creating the account of MyGrocery Store to get all the features of the Website [8].
- Catalog and Cart: Original product catalogs and online shop carts. Users will browse and add products categorized by category and desired ones to the cart. In catalogs, products can be promoted in various ways: through special value propositions ("Old price" has been exceeded and replaced with "new price") [6,7].
- Browse Products: Users can select items from the list of categories easily, also a detailed description of the product also given.
- Easy Search: It has various filters and sorting so that the user can find the exact product.
- Different Payment Modes: Customers can pay whatever they want through various payments cash on delivery, bank transfer, credit card.

- Re-Order: While the order history is saved in the database, customers can easily reorder the previous product. This saves search time. When placing an order, the customer chooses one of the delivery methods (mail, courier, store) [9].
- Order Tracking: Customers can easily track their orders and also get a separate notification for the status of their orders.
- Offers and Discounts: The Website also gives discounts for first-time customers and regular buyers.
- Feedback: User can tell their like and dislike about the product. This feedback also helps maintain a regular relationship with your customers.

II. PROBLEM DEFINITION

So, this is the MyGrocery Website. Let's assume you are standing in the grocery store, unable to move. Consider whether you already have tomato paste on hand. After a 12-hour workweek, you spend most of your time dreaming about the amazing homemade spaghetti dinner you will prepare [10,11,12]. You will fight heavy traffic to get to the grocery shop and stand in the corridor for 20 minutes. If you do not have any tomato paste, you may need to spend more money or store it in your closet. While this is not a life-altering decision, it is one we make every time we go grocery shopping. Saving money by repurchasing things you already own might rapidly add up at the end of the month.

The mental upheavals that must be dealt with in the five corridors are fully eliminated by the MyGrocery shop Website. You do not even need to make a grocery list. Let us say you need milk, bread, and wheat flakes and you head to the supermarket. The supermarket Website reads your grocery store's barcode and adds newly purchased milk, bread, and wheat to all your kitchen's continuing lists [13]. If your supermarket receipt has a barcode, scan it, you can use the Website to scan the barcode and register your whole transaction [14]. After you have finished eating your brown grass, you will be able to open the Website, delete it from your home inventory, and add goods to your grocery list.

III. RESEARCH OBJECTIVES

Users of this MyGrocery Website can be mainly from middle age to gender distribution Be a little more accommodating to women as they are likely to make large amounts of groceries shopping. It has been suggested from most grocery stores that most consumers are older than the legal driving age the shops are within driving distance. Consumers have a moderate and high socioeconomic background as they need to own a mobile device or laptop to access basic technology along with the MyGrocery Website [15]. Users just need a basic understanding of the English to scan barcodes and use the Website and the Website is user-friendly, Suitable for those with impairments who only have a basic understanding of computers.

Due to the older audience in our target market, most people in their 30s and older maintaining their homes, our goal is to make it simple for them to see and read this software. The icons on the Website are large and have images corresponding to the buttons. An example is an image of a refrigerator, which takes the user to their fridge list [16,17]. Also, we have a plan to use one of the "Mobile Safe" fonts like Ariel, Helvetica, and Verdana [53,54,55,56].

This system is simple to use and requires only a basic understanding of technical capabilities. It necessitates the use of a mobile device, tablet, or laptop. Its user-friendliness makes it accessible to practically everyone.

The grocery Website is mainly used at the stores, which is mostly random use or when the customer is at home [19,20]. Understand how users can scan and know where the barcode is Make sure they are using it properly and coordinate with what is at home [57,58].

IV. COMPETITORS ANALYSIS:

The main problem arising while developing the MyGrocery Store Website is our competitors. Because our competitors are located nearby, and they offer authentic price in Website. And the main problem is that our competitors are well established and experienced [21,22]. So, by understanding our competitors, our website position understands the user and creates value propositions, with 5-star reviews and a marketing strategy that goes above and beyond the competition [23].

The following features which distinguish us from others are:

- High-quality product at low cost in Website with fast delivery of the product.
- Attractive discount packages for regular buyers.

A. TROLLEY.AE

UAE has another grocery delivery website that offers a lot of areas and offers free delivery to orders over AED 100. Customers can find all items that are usually found in supermarkets. If you want your groceries on the same day, you must order the Website by 07:00.

Trolley.AE also hides customer privacy and understands the value of customers in today's world, so the Policy dictates how the collects, and uses, and protects any personal information of customers received from the users of the website [24,25].

- Customer: As customers use this website, users will agree to collect and use the information by this policy. From there, Trolley.AE is committed to ensuring that your privacy is protected. If Trolley asks the customers for personal information to improve their knowledge of the Website, the Company promises to use it only by this policy.
- Marketing: The marketing policy is, so users are encouraged to update their Privacy Policy from time to time. Trolley. ae also reserves the right to modify their website any time, modify, update, add, or delete this Privacy Policy for any reason. If any changes will be posted will take effect as long as there are changes posted.

B. INSTASHOP DUBAI

So this website is launched in 2015, Instashop is a grocery delivery Website in Dubai that first covers a portion of the Dubai Marina, but has slowly spread to all of Dubai, Abu Dhabi, and Sharjah, so this makes it one of the most popular supermarkets in Dubai.

- Customer: The Instashop Dubai Website are very easy to use, the user just has to enter the address, and then Website will provide several supermarkets close to the location. The Instashop Dubai Website also shows the user how long your purchase takes, usually up to an hour, which we think is the smallest price to pay in a car and do not stand in queue with a trolley.
- Marketing: Our goal is to give people like you the opportunity to deliver your groceries without any hassle. Our goal is to get a supermarket at home. The company is based in Dubai and is part of the Jabbar Internet Group. There is a minimum order for AED 20 free delivery, and you can pay in advance with cash or card delivery or online. An easy way to buy your food and bring it to your door for an average of 30 or 60 minutes depending on where you are.

EL GROCER

So, this is third another intermediary Website, El Grocery, selects the nearest partner supermarket, allowing you to select your item from the online option [26,27,28]. Groceries will be delivered to the customer door within an hour depending on availability. There is no delivery fee, but El Grocery Dubai receives a commission on any items you purchase. The Website is also available in Arabic, making it one of the best groceries Websites for all audiences in Dubai [29,30,31,32].

- Customer: They welcome to the new user to improved delivery service in the UAE. Started El GROCER because I was frustrated with customer delivery services. Low delivery times, rude customer service and quality of products led to quality deliveries [33,34,35,36,37].
- Marketing: We gave El Grocer something different, to be better, the grocery delivery service works for the customer, not against it. The customer service staff are trained to deal with the user at the store. Stores based on your wishes and promoted overlap, so you always have a choice, also they constantly update your product listings, so you don't have to compromise with your grandmother's favorite recipes [38,39].

V. SOLUTION SUGGESTED

So, for MyGrocery Website there a lot of phases to complete this Website but our recommendation to the [40,41,42,43] vice president about the developments are in some phases which are as follows:

Firstly, to create the most effective product possible, design phase will employ the user needs analysis. This phase will concentrate on the Grocery Website's unique features and how to make it as user-friendly as possible while also increasing its efficiency. During this stage, it is critical that all target demographics are able to effectively use the Website [44,45,46,47].

The Website will be implemented and developed throughout this period. Because the importance of having the list with you while running errands will be emphasized, the system will be designed to be mostly utilized on a person's mobile device. To update the Website, you will need to connect to the internet via cellular data or a wireless network. Testing will take place following the development process [49,50].

The Grocery Website will be thoroughly tested throughout this phase for a variety of difficulties. Bugs, user usability, and efficiency must all be tested before the Website is released. Obtaining the best prototype possible is critical. This may necessitate the utilization of a focus group, or the client may wish to conduct a staff test [51,52]

There are a lot of barriers in the development process so my review on this Website will only work on mobile devices (phones and tablets), therefore those who are familiar with them should be OK. Those who are not used to utilizing these devices will have a steep learning curve in terms of both the gadget and the Website.

VI. METHODOLOGY

In this paper the methodology is select for this is The Task Walkthrough. Each walkthrough report is preceded by a description of the MyGrocery Website, i.e., which job description and interface are being assessed for reporting purposes. The table itself tells the story, as it records the job walkthrough algorithm's step-by-step findings (see table 1).

VII. DISCUSSION

When it comes to the target demographic, the progression through MyGrocery Store is constant, starting with one device and progressing to the next. For the major stages, as well as the numerous devices with other UAE Websites like Trolley, there is a local website. I had to deal with odd replacements for a long time until they finally produced a work area Website, Ae, El Grocer.

Users are safeguarded against potentially fatal mistakes such as losing all their data or having personal information such as credit card numbers stolen. Consumer protection refers to a person's capacity to recover from a mistake. A relevant objective is to achieve security at a cheap cost. Preventing the Delete Button from Being Used Before the Save Button is an example of a security feature. Another example allows users to correct problems in a few methods, such as reverting to a priority status or restoring normalcy to the system. The author can correct typos in a word processor by hitting Control-Z, pushing the back button, or pressing again. "What kind of customer errors do they make, and how can they learn from them?"

According to Roger, Pierce and Sharp are the following major customer experience goals are as following:

- Motivation
- Fun
- Enjoying
- Support Society
- Network Support Network

A plausible model of an Website is one that the architects want their clients to understand. Clients build a mental picture of how to use the Website by using it, chatting to other clients, and reading the instructions, as well as by using the auto-night mode, auto pickup, and delivery, and sharing their location. In an ideal world, the model that clients

create in their heads is like the one that the creators intended. If the planners have explicitly planned a suitable calculated model as a critical component of their development cycle, this expectation has a better chance of being realized.

TABLE 1 . From Login the MyGrocery Website to the Menu.

Task step	Knowledge? Believable? Motivated?	Comments/solutions.
a Sign in	ok	Website access
b Show the menu	Ok Our menu is accessible via the button, and it includes all of the icons that will lead the user to the Website's intended location?	The main menu button is on the far left, the user logs in, and the grocery list is on the far right, where user can see what groceries are on their shopping list.
c Feature is the inventory	Ok	The feature is the inventory, which allows users to add and remove products they may need to purchase. The log out button is located on the far right and allows the user to exit the system and return to login screen. It is going that way since most users operate from left to right.
d Check in Grocery List	Modest problem	We utilized a checklist icon to go to the grocery list so that the user might associate it with their own list. Because consumers go to the store with shopping lists, this image will serve as a reminder of the list they would have made if the Website had not been available.

We opted to stick to the Website interface and avoid the web interface due to time restrictions and a lack of resources. More people will be able for "download" Website rather than use of mobile website. For final prototype, the team will find a method to bring more color to the Website, but we will skip the photographs. What the system will be used for in the future

- Sign into the Website and access your customized grocery and kitchen lists. Families can use the software on several devices, allowing everyone in the family to swap between lists and create new ones.
- Only mobile devices are supported by the Website.
- Only smart devices with cameras may scan receipts or item barcodes for input, and the Website does not require anything other than an email address and a password, any personal information. The UPC codes are scanned by the camera's scanner.
- Your customized grocery list can be organized either by food category (vegetables, whole grains, pasta) or by purchase date.
- Once the shopping is finished, the user can quickly erase it from the list by searching for it in the list. This is a pop-up screen that asks the user if they want to add an item to their grocery inventory.
- Customers can add things to their grocery list by hand.

VIII. CONCLUSIONS

A conclusion of research of the theory to explain to the user what actions were done and what was

accomplished. Visual design, touch, sound, and other factors all come into play when it comes to collaborative development. The aim is to produce an experience in which the user is unable to recall their actions and effects. We've created a variety of design models to deliver client input, and when new communication methods arise, these sorts of feedback will continue to proliferate. To be effective in doing so However, after analyzing the data, UX designers must go beyond designing for consistent use and transparency to create a multidimensional client experience. A public culture refers to the value differences that exist between countries or regions. Each culture, like its audience, places a different value on certain plan components. Because of these societal points of view, they also maintain content in diverse ways.

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EVOLUTION OF CLOUD COMPUTING NETWORKING & PRINCIPLES

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Abstract: This is a review paper on the idea of cloud computing which is evolved from the era of internetworking. Subsequently the highlight includes classification of cloud computing, comparison of public versus private cloud infrastructure. We further the concept of SaaS and PaaS where we set in note for future work. We finally conclude with some of the salient characteristics of networks on the cloud.

Keywords: Cloud computing; Networking; IoT

I. INTRODUCTION

In the last decade the style of computing has been changed and transformed into different form, one of which is “cloud computing”. In this transformation the data and computation are operated somewhere in the cloud. And these clouds are being maintained by the third party which own the data center where all the cloud data is stored. There are many types of computing which rely on **internet-based** computing one of which is cloud computing. Within the cloud computing **computer processing resources** are being shared to the computers and different kind of device as it is demanded. Cloud computing is responsible to provide the hardware, software and application delivered as a service over the internet layer. There are many benefits of cloud computing to the individual. The major benefit of cloud computing is the user will not require any complex form of computer data base.

By connecting the broadband, user can connect to the World Wide Web which is basically a cloud, it is refer to as the **point of contact** with the larger network. By using this point of contact, user who are using the cloud computing from the entire world can get the benefits of the larger processing power with just less amount of knowledge about computing.

A. State of the art:

In [1] authors have proposed an efficient framework for mobile edge-cloud computing networks that allows the edge and cloud to share computing resources via wholesale and buyback. To optimize the computing resource sharing process, we formulate computing resource management problems for the edge servers to manage their wholesale and buyback schemes, as well as the cloud to determine the wholesale price and local computing resources. In a cloud computing environment, data transmission and retrieval are typically handled by storage device providers or physical storage units leased by third parties [2]. In [3] authors have addressed the data duplication problem in this study by developing two dynamic models with two variant architectures to investigate the strengths and weaknesses of architectures in Big Data Cloud Computing Networks. Each model will thoroughly discuss the issues associated with the data duplication process. In [4] authors have proposed a computation offloading approach based on edge computing for addressing privacy conflicts computational tasks for the internet of connected vehicles. The privacy conflicts between the computational tasks were first formally investigated. The route vehicles from the origin vehicle to the destination vehicle were then obtained. Finally, to reduce the execution delay and energy consumption of edge computing devices, an efficient non-dominated sorting genetic algorithm was used. In [5] a reverse auction-based incentive was developed as an integer optimization problem with the goal of maximizing mobile network operator revenue under delay constraints. Deep learning algorithms are now widely used in a variety of applications, including natural language processing, gaming, IoT, computer vision, and speech recognition [6]. Reinforcement learning, in particular, has been used in a few recent studies of vehicular edge computing systems [7] to empirically deal with large-scale complex problems. In [8] investigated spectrum allocation as well as computing and storage resources for

a multi-access edge computing-based vehicular network, with two mobile edge computing architectures formulated as multi-dimensional optimization problems.

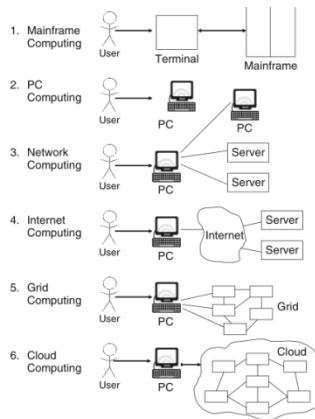
B. History of Cloud Computing

Before we get into what the cloud computing is and how does it work we need to understand many aspects that lead to cloud computing. There is a history behind cloud computing which is chronically started from the time since computing started. People find the need to connect with each other in order to share information and data with each other in order to enhance productivity.

By advancing the technology and bandwidth power is made possible the concept of cloud computing. In the earlier days the speed in previous networks connection was less dynamic and very slow amount of bandwidth was provided so it make it difficult to upload and downloads over the internet.

C. Evolution of cloud Computing

The first evolution that has been started was from the mainframe computing. It was a data processing system used mainly in big organizations for different applications, which includes the data processing and control and many other related task. As the processing need changes, it grows to the internet computing, which lead to grid computing and then recently transformed into cloud computing. The different phases that took place in the evolution of cloud computing is further categorized in the following manner.



i. The main frame computing

Main frame computer are known for their fast performance and computational power. Main frame computer the dummy terminals are employed as user terminal devices.

ii. Network computing

In the network computing, the client/server architecture are used.

D. Types of clouds

For different preferences the cloud has different shapes and sizes. There are three types of cloud namely:

i. Public cloud

The most common form of cloud computing is the public cloud which can also be referred to as **external cloud**. Public cloud are being managed by the third parties. Different costumer run different application which gets mix together on the cloud's server, storage systems and network. The costumer, or any individual user or enterprises can access the services of the cloud computing by the third-party provider who are capable of sharing multiple resources of computing with their user. Some of the most well renowned public cloud providers are the following:

- Amazon

- Microsoft
- Google

These are the *IT* giants who has setup their data centers in the large amount, which can enable users to freely and easily manage their provided resources with relatively less cost and require very low management. Dom of the important concerns with these clouds are the data governance and security.

ii. Private cloud

Private cloud is also known as internal cloud which is refer to as cloud computing in the private network. These cloud are being organized specifically for the individual client. This individual client has that complete control on the data storage, quality of service and the security. These cloud can be built by any company in a support with the Information technological organization.

iii. Hybrid cloud

This cloud are the combination of public and private cloud. It combines multiple public and private cloud models.it has the capability of managing the complexity of determining how the application should be distribute across both private and public network. They are reliable and most widely used.

E. major difference between public and private cloud

	Public	Private
Network	It works over the Internet	PRIVATE NETWORK
SERVER AND DATA CENTER LOCATION	Global	In company
Costing	By usage or free	Internal mechanism often by capacity and processor
Tenancy	Multiple	Single
Cost	Lower cost	Higher cost: <u>which required cooling, space, energy consumption and hardware cost.</u>
Performance	Unpredictable multi-tenant environment cause lots of problems in order to achieve the guaranteed performance.	Insured performance

II. TECHNOLOGIES INVOLVE IN CLOUD COMPUTING

Arguably the most powerful service that made the cloud computing possible will be briefly mention in this part;

- Web service also known as service-oriented architecture
- Service flows and work flows
- Web 2.0 mashup
- Virtualization

i. VIRTUALIZATION

Some of the main advantage of the cloud computing is it has the ability to virtualize, and different resources can be easily shared among the different application with the major objective for the optimum server utilization. Virtual machine techniques are used in virtualization technologies which are namely **VMware** (virtual machine ware) and Xen. Virtual private network is also the technique of virtualization. These virtual private network supports user by providing the customizable network environment which enable user to access cloud resources.

ii. SERVICE FLOWS

Service based cloud activities provided in clouds. Service flows has become one of the important area of research in the field of data base and it systems.

iii. WEB 2.0

This concept is apparently the new concept that is refer to the use of web technologies and web design, information sharing and also the purpose of the collaboration with the other user. In the other way, web 2.0 is the web application that has the ability of combining data from more than one sources into the unified integrated storage tool. Both of these technologies are very important for the cloud computing.

A. Service models

Cloud computing has the multiple services and they are categorized in the form of different layers. These layers are assign to perform the different task. Some of the main characteristic that made cloud computing different from other computing is the focus on service delivery. There are three main types of service models that are the following.

i. Software as a service (SaaS)

It is a hosted application which can be found over the “World Wide Web” using the internet browser. It is also known as **on demand software**. In this service the solution of hardware and software is manipulated by the vendor. There are many characteristic of SaaS some of them are the following.

- Software available over the internet.
- People are encouraged to collaborate with each other.
- Every user have same software version.
- Software are scalable.
- Maintenance related cost will be reduced.

SaaS has the services like drop box, google services, Prezi.

ii. Platform as a Service (Pass)

One of the main cause of platform as a service is to provide the software execute environment on which the application services are functional. Platform, as a service use as a managed environment in cloud where the complex application are develop, and tested. For supporting the cloud computing development the provider supplies the specially designed software and hardware. The some of the PaaS are the following

- Java
- Google App Engine
- Google web toolkit
- Microsoft Azure
- Force.com
- Cloud Foundry

Service type	Platform as a service (PaaS)	Software as a service (SaaS)
Service customization	Logic resource template	Application template
Service monitoring	Logic resource monitoring	Application monitoring
Service resource optimization	Large scale	Multi-tenancy
Service measurement	Logic resource usage metering	Business resource usage metering
Service integration and combination service security	SOA	SOA, Mashup

ii. SERVER STRUCTURE

The most important part that play in cloud computing is the **server structure**. The main purpose of implementing this concept because it is the brain of the overall **processing environment**. It is not necessary to have to have high end hardware for cloud computing.

B. Main features of cloud computing

Cloud computing has numerous functionality over the other computing paradigm.

i. SCALABILITY

Cloud computing provides the scalability on resources and services for users on demand. These resources has the ability if scaling over the numerous data centers.

Scalability is provided in three manners:

- o Load scalability
- o Space scalability
- o Structural scalability
- o Vertical and horizontal scalability

ii. QUALITY OF SERVICE

In terms of hardware and pc performance, bandwidth and capacity of the memory; the quality of service is guaranteed to be deliver to their users.

iii. COST EFFECTIVE

They are not required to be paid for the huge amount of money in the installation and other complexities. Instead users are only need to pay for the amount of storage they are going to use for their personal need and the services they want to use.

III. DISCUSSION

Almost all organization is willing to save money on operational cost. By implementing the cloud computing within the company or organization, one can solve the issue by saving huge capital investment out of the equation.

One to the biggest issues that's come in a way of cloud computing is the security issues. Because the cloud computing use virtualized machine, that has important application and vulnerable data on to the cloud computing environment. For that reason the potential cloud computing users are concerned about some of the main issues which are highlighted in the following.

- Do the user have the control over security?
- Is there any proved evidence that the system that is providing the cloud computing is save and fulfilling the requirement of the SLAs?

iv. HOW MUCH DO THE USER HAVE TO PAY FOR CLOUD COMPUTING?

The main expenditure of the cloud computing is categorized in the three main ways:

i. Storage

Storages are available over cloud and the user can select the etiquette amount of storage as per their need and pay for the storage. These storage can be subscribe monthly while other services provide the unlimited storage over some specific services that a user can avail free of cost.

ii. Bandwidth

Bandwidth is another key expenditure in the environment of cloud computing, as the technology is growing. The bandwidth is increasing over time and to cost over bandwidth is decreasing.

C. RELIABILITY

Cloud computing still have some of the reliability issues. There were lots of cases in which the services of the cloud computing has took several hours of outage. But in the near future we are expecting to see many more cloud computing service providers, a lot of new features and the optimum service, well establish standards

IV. CONCLUSION

In today's era the internet provide the content to it users in the form of pictures and videos, Electronic-Emails, and the different form of information and data are accessible through the web pages. In the upcoming era, cloud computing will have the drastic change in which the user can rents the cloud services from the virtualize store in order to build the virtual data center: these services includes the computational power, storage, memory. Cloud computing is the new form of computing that allows user to do business and other it services.

Other than this flexibility, scalability and the lesser maintenance, it has still a little doubt about the about its threats which arises by this computing environment. There still persist the privacy concern, and it also required the good connectivity. Despite all of that, cloud computing is provide the easiest way to access the virtualize environment and utilize its resources.

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PERFORMANCE OF MODIFIED PROGRESSIVE MEAN CONTROL CHART WITH DIFFERENT CONSTANT VALUE

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Abstract: Any manufacturing process cannot produce exactly identical items. In all kinds of processes, a certain amount of variability is present, which causes such kind of variations in the products. A modified progressive mean (MPM) control chart has recently been proposed plotting the statistic which uses the present data as well as the past data. We used the modified progressive mean (MPM) control chart with a different value of constant K_0 . The results showed an improved performance of the proposed chart for smaller, moderated and larger shifts in terms of power.

Keywords: Run length, FIR, Progressive mean.

I. INTRODUCTION

Quality has turned out to be a standout amongst the most imperative consumer judgment factors that choices within the conflicting issues. Manufacturing processes suffers from the problem of variability in the products. The variations are of two types: natural and unnatural variations. The natural variations are built-in random variations and a permanent part of the process which are due to equipment used, machinery operator and resources type etc. The other types of variations are called un-natural variations. The factors causing these types of variations can be detected and identified. These factors are non-random and large in magnitude. The process working under both natural and un-natural variations are said to be statistically out-of-control (Russell and Taylor, 1998).

The process can be controlled by continuous monitoring. This is done by taking samples on a fixed interval of time from the process and then checking them by some statistical tools. Statistical Process Control (SPC) is a famous collection of tools that are particularly used for process monitoring. It contains seven tools known to be magnificent seven and these are the cause and effect diagram, check sheet, Pareto chart, defect concentration diagram, Histogram, scatter diagram and control charts. Collectively, they are called SPC-tool kit. These seven control charts are the most famous and widely used to monitor the changes in location and distribution of the process. Control charts are basically the graphs which visually show that weather a process is in control or not. To know how we can decide process is in-control or not by just looking at the graph we have to take a look on design structure of the control charts. Generally, control charts have three parameters; Upper Control limit (UCL), Centre Line (CL) and Lower Control limit (LCL).

The average run length (ARL) is most famous measure of the performance of control charts. It is defined as an average number of samples we have to wait until a shift in the process mean, variance or any other parameter of interest is detected. Other performance measures are also based on ARL (i.e. Power and ATS etc.). In Shewhart-type control charts (\bar{X}, S, S^2) the distribution of ARL is geometric. So, if “ p ” is the probability of detecting a shift then the mean of geometric distribution is given by $1/p$.

But in the case of memory control charts, an assumption regarding a geometric random variable is violated which states that every event should be independent. So, in the case of these charts Run Length (RL) distribution is not geometric. We find the distribution of RL and then compute the ARL for memory control charts. ARL_0 represents the

in control ARL and ARL_1 represents the out-of-control ARL. In control charts, for a prefixed ARL_0 , we try to minimize ARL_1 as much as possible using different techniques. There are two types of control charts: memoryless control charts and memory control charts. Memoryless control charts (Shewhart Type) are effective in detecting large shifts.

The two effective techniques: Cumulative Sum (CUSUM) and Exponentially Weighted Moving Average (EWMA) control chart are memoryless control charts used in the process of small shifts. These techniques are detailed below.

The Cumulative Sum (CUSUM) Control Chart: The CUSUM control chart was first introduced by [1] which is more efficient in detecting small shifts in the mean of the process. The (CUSUM) chart includes directly all the information with the cumulative sum of the deviation with the sequence of sample values from the target value are plotted. The (CUSUM) chart monitors the process average that the supported samples are taken from the process at given hours, days, weeks, months and etc.

Assume that the samples of sizes $n \geq 1$ are collected, and the j th sample average is \bar{X} and μ_0 is the target for the process mean, the cumulative sum control chart is defined as;"

$$C_i = \sum_{j=1}^i (\bar{X} - \mu_0)$$

Where the C_i and i are the sample numbers are called the cumulative sum of all samples that are included. From several samples, they combine the information. Let x_t be the j th value on the process and follow a normal distribution having mean μ_0 and standard deviation σ_0 if the process is in the control, also assume that the σ_0 is known or a reliable estimate is presented.

In the applications of SPC, these assumptions are very consistent, in which situation the CUSUM is most useful.

The upper and lower limits are computed as:

$$C_i^+ = \max[0, x_i - (\mu_0 + k) C_{i-1}^+]$$

$$C_i^- = \max[0, (\mu_0 - k) - x_i + C_{i-1}^-]$$

Where the Initial value $C_0^+ = C_0^- = 0$

Where μ_0 represents the target mean and k is reference/slack value that is taken as partial of the shift we want to detect.

Exponentially Weighted Moving Average (EWMA) Control Chart: Similar to the CUSUM chart, the EWMA chart is useful in detecting small shifts in the process mean [2]. These charts are used to monitor the mean of a process based on samples taken from the process at given times (hours, shifts, days, weeks, months, etc.). EWMA chart gives exponentially subsiding weights in observations. This means that one can notice a decrease in weight with more remote observation. This control chart is also called a Geometric Moving Average (GMA). In the time series modeling and forecasting the EWMA chart is extensively used.

This control chart is defined as:

$$Z_t = \lambda X_t + (1 - \lambda)Z_{t-1} \quad 0 \leq \lambda \leq 1$$

"The λ is constant, which can define the distance memory of EWMA weighting factor. The initial value requires for the first sample at $t = 1$, is the process mean, $Z_0 = 0$. In some Problems, the starting value of the EWMA is the mean of initial data are also used, then $Z_0 = \bar{X}$. The corresponding factor λ , in the calculation of EWMA statistic gives the rate when the older data are entered. A large value of λ provides less weight to old data and extra weight to current data; The small value of λ provides extra weight to old data, when $\lambda = 1$, then EWMA reduces to Shewhart chart indicating that only the most recent observations control the EWMA."

Let X_t are i.i.d. having common variance σ^2 then the variance of the control statistic Z_t is define as:

$$\sigma^2 = [\{1 - (1 - \lambda)^{2t}\} \lambda / (2 - \lambda)]. \sigma x^2$$

The variance rapidly is to converge its asymptotic value,

$$\sigma z t^2 = \left\{ \frac{\lambda}{(2-\lambda)} \right\}. \sigma x^2.$$

If λ is small. The EWMA control limits are,

$$LCL = Z_0 + L_{\sigma z t}$$

$$CL = Z_0$$

$$UCL = Z_0 - L_{\sigma z t}$$

The value of factor L is chosen from tables of [3]. Assumed that the process data are independently and normally distributed. According to other control techniques, the EWMA control techniques depends on the record of a quantities that are the representative of the procedure. When t becomes larger than the term $1 - (1 - \lambda)^{2t}$ gets closer to the unity. This means that, after some phases of time the control limits will become stable through the time i.e., parallel to the center line. The parameters of the EWMA chart are the multiple of σ , denoted by L in the control limits and the weighting factor λ . For ARL performance of this control chart it is possible to choose these parameters.

Many modifications in EWMA and CUSUM control charts have been suggested to improve their detection methods.

The authors [4], [5] express that the Cumulative Sum control chart is considerably more effective than the Shewhart control charts, worried to little varieties in the normal. The authors [6] and [3], displayed the “EWMA” control charts as a decent decision to distinguish changes in little expansion in the process norm. [5] gave the idea about the “FIR” feature in CUSUM charts. Also, several procedures have been developed for the EWMA chart to increase its efficiency of quick detection of small shifts for different situations by different researchers including [7] [8] [10] etc.

Authors [9] presented a strategy for envisioning quality control diagrams dependent on their truthful execution over demonstrated in control and insane regions of parameter regard. Various amendments are available in literature of EWMA and CUSUM charts.

Some notable work on detection performance of EWMA chart can be found in [12], [13] . Some have also used technique of distinct samples. Whereas, few have also used the run-rule technique [14]–[16]..

All these modifications of the EWMA chart are based on current observations and do not consider the past observations. To address these limitations, another modification to EWMA was proposed which uses a progressive mean [17]. However, in this modification, the control limits become wider as the time increases and hence the chance of detecting the out of control signals decreases.

The progressive mean control chart was proposed by [18], [19]. We executed the modified control chart in R to fix the value of Average Run Length (ARL₀) and then find the values of value of Average Run Length ARL₁ for this prefixed value of ARL₀. As ARL₀ were very big in this case, so we reduced the limits by using a time function and searched a constant which not only fixed ARL₀ to a specific value but helped minimizing ARL₁. We used many functions and constants and then selected the optimum combination such that ARL₀ fixed to a particular value and ARL₁ minimized.

II. METHODOLOGY

Let have a particular quality variable to be monitored, say Y . assume that Y follows Normal distribution with target parameter $a_0 + \gamma b_0$, spread parameter b_0 and shift parameter γ . Let Y_t be the value of variable observed at each time period and $t = 1, 2, 3, \dots, m$. Let we have sample of size 1 i.e. $n = 1$. In this study from the normal distribution individual observations are taken. The Progressive Mean statistic is defined as

$$P_t = \frac{\sum_{i=1}^t Y_i}{t}$$

The PM statistic accumulates, each upcoming observation and averages each time. P_t is an unbiased estimator a_0 , that is the population mean and $\frac{b_0^2}{t}$, is variance. Where a_0 and b_0^2 are the mean and variance respectively, for in-control process. Three sigma control limits are defined as

$$UCL = \text{Statistic} + K \times \text{Variance}(\text{Statistics})$$

$$LCL = \text{Statistic} - K \times \text{Variance}(\text{Statistics})$$

$$UCL = a_0 + \frac{3b_0}{\sqrt{n}}$$

$$LCL = a_0 - \frac{3b_0}{\sqrt{n}}$$

$$\text{If } n=1$$

$$UCL = a_0 + 3b_0$$

$$LCL = a_0 - 3b_0$$

limits can be defined as for the progressive statistics

$$LCL_t = a_0 - 3 \frac{b_0}{\sqrt{t}}, \quad CL = \mu_0, \quad UCL_t = a_0 + 3 \frac{b_0}{\sqrt{t}}$$

From above equation we can see that the limits vary over time as the time increases. This control chart uses all the information contained in the samples and hence the chance of detecting an out of control sample is zero with conventional control limits. So, we have some solutions. Either we change constant K of limits, or we change only function of time or else we can change both. Final one is the better solution for this problem. We can first change the function of time to have a finite Average Run Length. Then we change constant to settle limits to certain level to achieve desired ARL. The modified limits are as follows:

$$LCL_t = a_0 - 3 \frac{b_0}{\sqrt{t}} \left(\frac{k_0}{f(t)} \right), \quad CL = \mu_0, \quad UCL_t = a_0 + 3 \frac{b_0}{\sqrt{t}} \left(\frac{k_0}{f(t)} \right)$$

Where $f(t)$ an function of t , and k_0 is controlling-constant the ARLs. ARLs are frequently used to measure in control charts, so is done in this study. The ARL distribution was calculated using Monte Carlo simulations. After finding distribution, we can easily calculate average of Run Lengths. For in control situations we have assumed $a_0 = 0$ and $b_0 = 1$, i.e. is standard normal distribution. The shift parameters is Δ . If $\Delta = 0$, its mean that process is in control, otherwise out of control. In this study we will try to enhance the performance and power of PM control chart using FIR. In this research study, we have done 10,000 simulation runs to evaluate different run length properties.

For the modified control limits, we used different options of $f(t)$ and search a suitable value to “ k_0 ” and $t^{0.20}$ is found to be suitable value for $f(t)$ in terms of optimizing the RL properties. For this optimal choice of $f(t)$ we have checked different values of constant k_0 which help fixing ARL_0 . The ARL_0 is the average number of samples, we have to wait until a shift is detected for in control process. It is inversely proportional to α

$$ARL_0 = \frac{1}{\alpha}$$

The ARL_1 for the out of control process is the average number of samples, we have to wait until a shift is detected. It is inversely proportional to $1 - \beta$

$$ARL_1 = \frac{1}{1 - \beta}$$

III. RESULTS & DISCUSSION

The following results are obtained from above equations define in section (2.0) by using the method of monte Carlo simulation method:

Table 4.1. ARL_0 for the modified PM control chart with constant values of k_0 for the control limits

ARL_0	168	200	370	400	500
k_0	1.000	1.042	1.186	1.211	1.265

Table 4.2. Values of ARL of the proposed PM chart of different shifts

Prefixed ARL_0	γ									
	0	0.25	0.5	0.75	1	1.5	2	3	4	5
500	488.14	45.2251	17.029	10.1454	7.444	4.4204	3.114	1.8803	1.3847	1.1166
400	402.938	43.463	15.761	09.313	7.158	4.161	2.775	1.776	1.255	1.0647
370	370	15.441	09.055	09.144	7.0631	4.084	2.6931	1.621	1.1835	1.035
200	202.82	32.7144	13.5813	8.337	5.7804	3.4896	2.4914	1.5114	1.1570	1.0288
168	172.33	30.0684	11.1368	8.1221	5.351	3.3086	2.3436	1.4433	1.0987	1.0172

Table 4.3. Values of Standard deviation of Run Length (SDRL) for the proposed chart of different shifts

ARL_0	γ									
	0	0.25	0.5	0.75	1	1.5	2	3	4	5
500	977.233	36.891	11.858	6.0454	3.581	1.889	1.176	0.650	0.5062	0.3099
400	737.2564	35.771	11.443	5.7014	3.492	1.821	1.128	0.638	0.481	0.2771
200	388.5543	30.654	9.834	5.167	3.206	1.648	1.049	0.611	0.387	0.168
168	244.31	30.09	9.671	4.886	3.075	1.596	1.0287	0.587	0.354	0.154

Table 4.4. Percentiles (Q_j) using various shifts

ARL_0	Percentile	γ									
		0	0.25	0.5	0.75	1	1.5	2	3	4	5
500	P_{10}	23	10	6	4	3	2	1	1	1	1
	P_{25}	58.75	21	9	6	4	6	2	2	1	1
	P_{50}	175	36	13	9	6	5	3	2	2	1
	P_{75}	511	61	21	13	9	4	4	1	1	1
	P_{90}	1268.1	95	32	18	11	6	6	3	2	2

400	P_{10}	20.1	9	5	3	3	2	2	2	1	1
	P_{25}	49	18	8	5	4	3	2	1	2	1
	P_{50}	149	31	11	8	6	5	3	1	1	1
	P_{75}	430.25	59	21	12	8	3	4	2	2	1
	P_{90}	1038.1	89	31	16	10	7	3	3	2	1
200	P_{10}	10	6	3	3	2	2	1	2	1	1
	P_{25}	25	11	5	5	4	2	3	1	2	1
	P_{50}	70	24	10	6	5	4	2	2	1	1
	P_{75}	210	43	18	10	7	5	3	1	1	1
	P_{90}	499	75	27	15	8	6	4	2	2	1
168	P_{10}	10	4	4	2	2	1	2	1	1	1
	P_{25}	25	1	7	3	3	3	1	2	2	1
	P_{50}	59	21	10	6	5	3	2	1	1	1
	P_{75}	179	42	17	10	6	4	3	2	1	1
	P_{90}	422	70	28	14	11	5	4	1	2	1

Following the inspiration of Palm (1990), “ Shmueli and Cohen (2003), [20]Antzoulakos and Rakitzis (2008), Riaz et al. (2010) and [16]Abbas *et al.*, (2010), we have additionally reportable the standard deviations and percentile points of the Run Lengths to own a transparent plan concerning distribution of Run Length. The standard Deviations of Run Length (SDRL) and also the percentiles of run lengths (Q_i for $i=10, 25, 50, 75, 90$) are given in Tables 4.3 and 4.4 correspondingly.

The similar results for different ARL_0 can be obtained simply. The standard errors for the results of Tables 4.1 – 4.4 remain less than 1.3%.

The important findings for our proposed PM chart as observed in the above investigation are given as:

- 1) The Modified Progressive Mean Control chart is admittedly sensible at smaller and moderate shift detection and additionally occupies an attractive place for detection of large shifts within the family of memory control charts (Table 4.2);
- 2) For fixed γ , the $SDRL$ value of the proposed control chart increases with the increase in ARL_0 (Table 4.3);
- 3) The distribution of Run length (RL) of control chart is right skewed. (Table 4.4);
- 4) With an increase in γ ARL_1 decreases swiftly (Tables 4.1 & 4.2);
- 5) If we apply the same design structure on \bar{X} control chart with sample $n > 1$ then the performance of the proposed control chart becomes more attractive;
- 6) The proposed control chart is easy in terms of design structure and straightforward to implement than the present ones (like CUSUM and EWMA);
- 7) For consequences with higher powers of t (i.e. 0.5 and 0.75), ARL_1 performance of our proposed control chart becomes relatively poor;

A. Comparisons

The performance of our modified control chart with a number of its equivalents are compared, in terms of ARL. We executed the proposed control chart and compared the results with the existing structures of memory control chart such as the classical CUSUM, classical EWMA, and the FIR EWMA and etc.

The ARL_0 value for the proposed chart was fixed at 168, 200, 370, 400 and 500 for the effective comparisons with each of the existing chart. The comparisons of the modified PM control chart with each CUSUM and EWMA are given in the following subsections.

Proposed vs the classical CUSUM:

The classical CUSUM by [1] has been explained in Section 1.1. The *ARL* values of classical CUSUM specified by [4] are shows in Table 4.5. The comparison of the classical CUSUM with the modified PM control chart demonstrates that the proposed control chart for all intents and purposes overperform the classical CUSUM for all values of γ (Table 4.2 versus Table 4.5).

Table 4.5. The classical CUSUM scheme ARL values with $k=0.5$

γ	0	0.25	0.5	0.75	1	1.5	2	2.5	3
$h=4$	168	74.2	26.6	13.3	8.38	4.75	3.34	2.62	2.19
$h=5$	465	139	38	17	10.4	5.75	4.01	3.11	2.57

Proposed vs FIR EWMA:

The evaluation of FIR EWMA i.e. for head-start 25%, execution of the proposed control chart is better than FIR EWMA for each choice of λ . However, for head-start 50% the execution of FIR EWMA turns out to be superior to the proposed control chart for the larger shift with $\lambda=0.1$

Table 4.6. ARL values for the FIR EWMA scheme:

γ	% Head start	$\lambda=0.1$ $L=2.814$	$\lambda=0.25$ $L=2.998$	$\lambda=0.5$ $L=3.071$	$\lambda=0.75$ $L=3.087$
0	25	487	491	497	498
	50	468	483	487	496
0.5	25	28.3	46.5	87.8	140
	50	24.2	43.6	86.1	139
1	25	8.75	10.1	16.9	30.2
	50	6.87	8.79	15.9	29.7
2	25	3.57	3.11	3.29	4.33
	2.72	50	2.5	2.87	4.09

B. Simulated Study:

This section presents the application strategy of the proposed control chart. Moreover, the EWMA and CUSUM charts are incorporated into the illustrative precedent to verify the prevalence of proposed approach applicable over these

existing structures. For this reason, we generated two datasets each of 50 observations. In dataset I, starting 30 observations are generated from $N(0,1)$ for in-control circumstance, and rest of the 20 from $N(0.5,1)$ for wild circumstance having shift 0.25σ (small shift). Similarly, in dataset II initial 30 observations were created from $N(0,1)$ for in-control situation and rest of 20 from $N(1.5,1)$ for out of control situation having shift 1.5σ (moderate shifts). EWMA statistic $\lambda = 0.25$ and CUSUM statistic C^+ with $k = 0.5$ are calculated. “To fix the ARL_0 at 500. We used $k_0=1.267$ for modified PM control chart, $L=2.998$ for classical EWMA and $h=5.09$ for classical CUSUM. The graphical presentation of the proposed PM, EWMA”, and CUSUM charts are exhibited in Figures 4.1, 4.2 and 4.3, respectively for dataset 1, and in Figures 4.4, 4.5 and 4.5, respectively for dataset II .

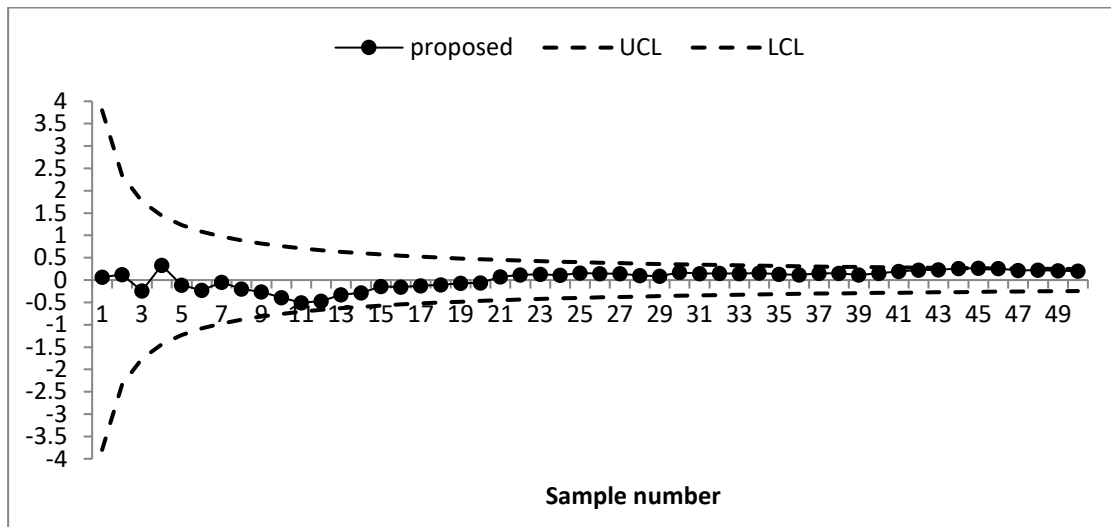


Figure 4.1. Graphical Presentation of the Modified PM Control Chart for Dataset I:

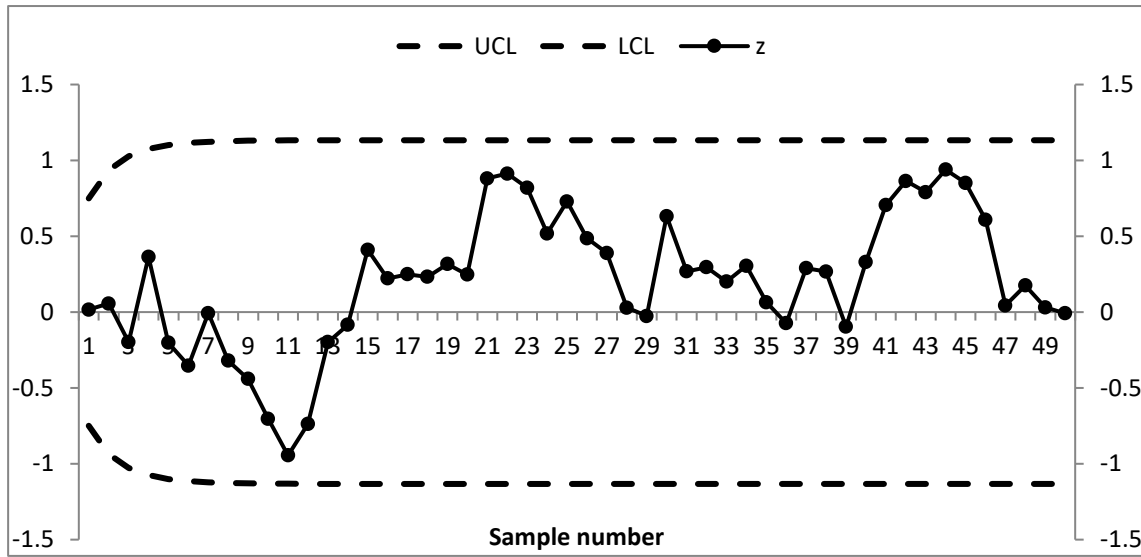


Figure 4.2. Graphical Presentation of the “Classical EWMA Chart” for Dataset- I:

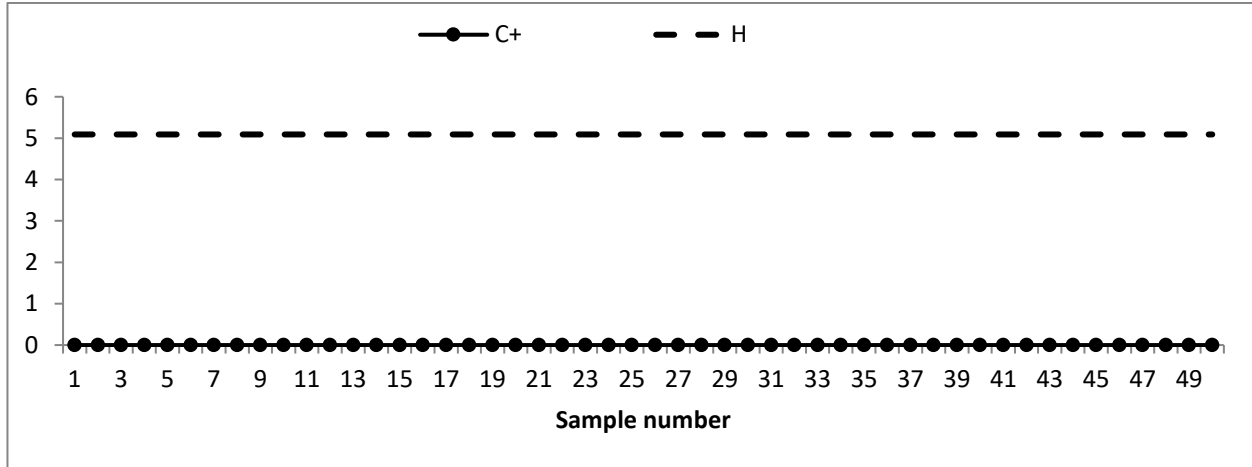


Figure 4.3. Graphical Presentation of the Classical CUSUM for Dataset I:

The modified control chart provides indications for an out of control process at sample # 43, 44, 45, 46, 47, 48, 49 and 50 as shown in Figure 4.1. It gives a total of 24 signals out of control. Figure 4.2 demonstrates that the classical EWMA control chart provides the out of control signal just at sample # 42, giving only 1 signal. Figure 4.3 portrays that the “classical CUSUM control chart gives none of the out of control signals”. An upward shift happened after sample #20 that is recognized by the proposed chart rapidly before EWMA and CUSUM demonstrating the capacity of the modified control chart to rapidly distinguish smaller shifts in the whole process.

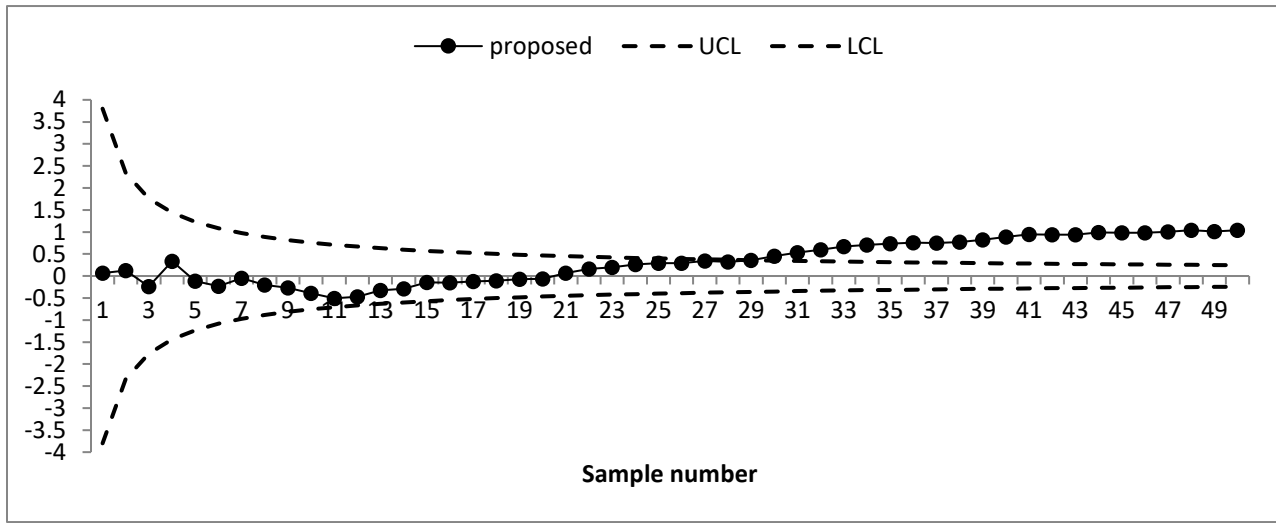


Figure 4.4. Graphical picture of the Modified PM Chart for Dataset II

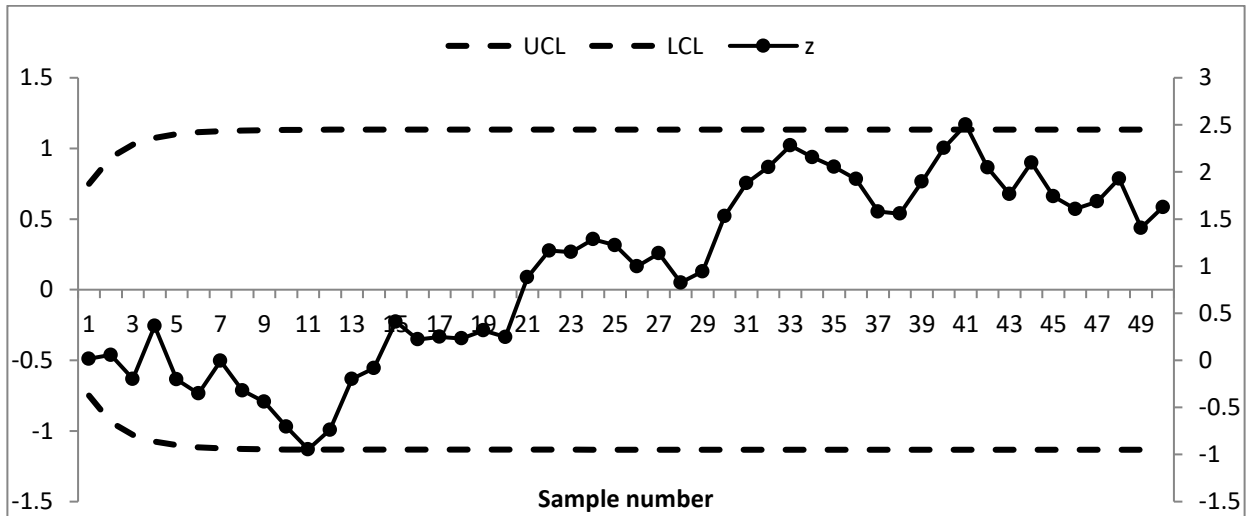


Figure 4.5. Graphical Presentation of the Classical EWMA for Dataset II

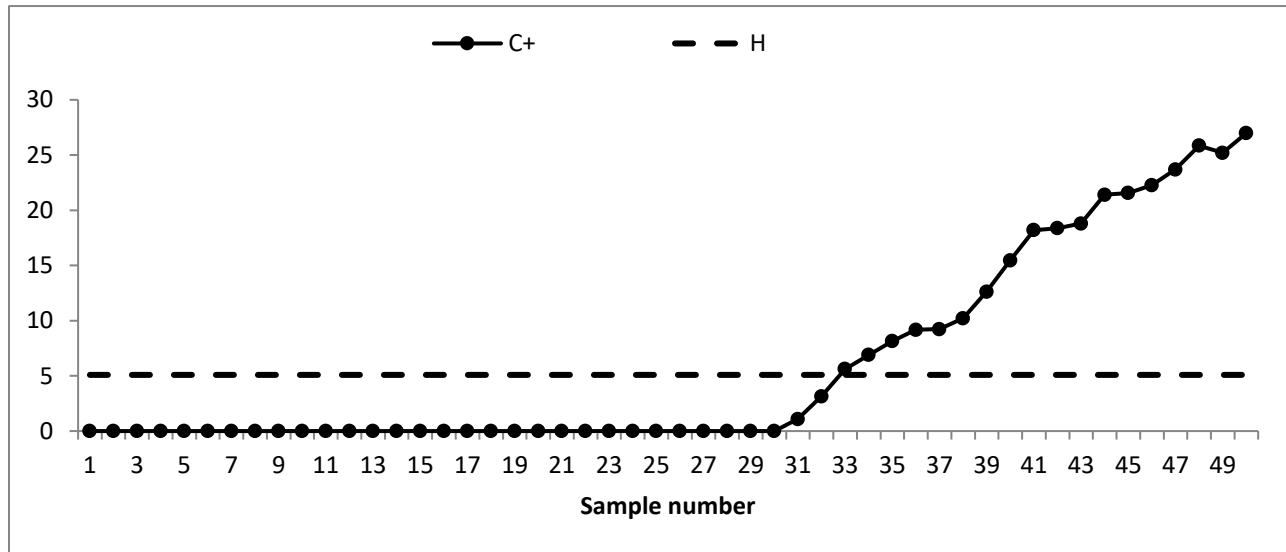


Figure 4.6. Graphical Picture of the Classical CUSUM for Dataset II

The situation is not massively different in dataset II where the proposed MPM chart recognizes the shift at sample # 27, 28, 29, 30, 31, 32, 33... 50 giving 24 an out of control signals (Figure 4.4). Classical EWMA identified the shift at sample # 27, 28, 29 and 30 giving 4 out of control signals (Figure 4.5) whereas classical CUSUM and EWMA chart signaled at the same points (Figure 4.6). In both smaller and larger shifts, we have seen that the suggested control chart identifies the shift rapidly before the others. In addition, the quantity of signals given by modified control chart, is likewise more prominent than the exemplary ones.

IV. CONCLUSIONS

In this we executed the Modified control chart with the different constant values. The results show a higher power for small, moderated, and larger shifts than the existing charts However, for a higher power of t (time period), ARL_1 performance of our proposed control chart becomes relatively poor than the existing structures.

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CHIEF EDITOR'S NOTE

Dear Readers,

On behalf of the Board of PJETS and editors, I am glad to present the Volume 10, Issue 1 of the journal. The journal, established in September 2011, has now published 19 issues; two issues in a year. The journal is now getting indexed in many research and academic indexes.

The mission of PJETS is to provide a platform to the researchers, faculty and students to spread their findings. The main goal is to link authors from different professions, for example academia and non-academia in particular and encourage them to share their research. We fortunately succeeded in developing a new editorial review board comprising of reputed scholars and researchers national and international level, from academia and non-academia.

I take this opportunity to thank the authors for sending their manuscripts for review and publications in PJETS. The reviewers contribution to publish quality research in PJETS is very much appreciated. We are expanding our editorial board for addressing the gaps and further enriching this journal.

Dr. Muhammad Abbas