

Comparative study of Windows, Linux and Mac Operating System based on User experience, Usability, Learnability and Desirability

Niti Rajendra Patel¹, Uday Joshi², Nirmala Shinde³

¹Niti Rajendra Patel, Student, K.J.Somaiya College of Engineering

²Uday Joshi, Guide, K.J.Somaiya College of Engineering

³Nirmala Shinde, Co-Guide, K.J.Somaiya College of Engineering

Abstract -This report abstractly introduces the relevant technologies about usability, effectiveness, Learning, User interface satisfaction, Desirability of operating systems like Windows, Linux and MAC Operating System. The paper also summarizes the results of all the 3 operating system based on the above mentioned criteria. A survey was conducted by preparing a questionnaire using google forms. Every version of all the operating system has different features which can be either easy or sometimes challenging for the user to understand and remarked. The struggle is often elicited that because of Human-Computer Interaction faults are not only because of the design but are often due to the overview of a mental model. Hidden functions and modified features of updated versions contribute significantly to the predicaments of the users in performing basic tasks. This data can then be utilized by the developers to evaluate the extent of the problems and later scrutiny in resolving them. Our study can play a major role in ensuring prompt satisfaction of the users, achieving good user experience, usability and Learnability

Key Words: Windows OS, Linux OS, MAC OS, User interface, usability, effectiveness, Learning, User interface

satisfaction, Desirability evaluation, Human Computer Interaction

1. INTRODUCTION

During latest years the topic of operating systems has received much consideration in the computer literature. This is not unforeseen, that operating systems are the backbone of computer systems, and understanding of operating systems issues is closely tied to our comprehension of computer science in general. However, most of the available literature deals with theory or with specific implementations. Treatments providing a comparative discussion and analysis of commercial operating system designs are essentially nonexistent. And yet, there is much to be learned from such efforts. It is precisely this observation that motivated this special issue of Computer. Operating systems have evolved from simple standalone and command line programs like MSDOS to distributed multi-user systems like windows and Linux, which support graphical user interface. Every new version of the operating system tries to address the hidden loopholes and to improve the efficiency, user experience and usability. Windows has also evolved a long way from 16 bit OS to 32-bit operating system. Linux being an open source system is evolving at a wilder pace. MAC OS has been known over the years for its simplicity, aesthetic interface, advanced technologies, applications,

security and accessibility options. A comparative study of these three operating systems in context of the important features like usability, effectiveness, Learning, User interface satisfaction, Desirability implementation would help us discern the similarities and differences between them. Windows is a GUI operating system, which uses a standard display mode for the desktop. Linux by default was a text based (command line) operating system but now users can choose from a variety of graphical user interfaces Two of the common interfaces being the GNOME, KDE[1][2][3][4]. The KDE has a comprehensive office suit web browser and text editor. The configurability of these interfaces is what differentiates Linux from windows allowing for highly customizable desktop environments. Apple Macintosh series of computers were introduced in 1984, it is a graphical user interface (GUI) based OS. Mac OS is considered the pioneer of GUI based operating systems.

The study in the report uncovers many issues by comparing the results of analysis based on the feedbacks and reviews based on their personal experience. The user feedbacks and analyzed to provide thorough result required for thorough results required for our study. Each issue related to mentioned criteria would need to be identified and prioritized to suggest ways to improve the interface.

2. LITERATURE SURVEY

The literature survey specifies the work done by other others, this survey is refers various literatures to understand the types of operating systems and its different uses of the global era.

Author 1 has compared windows, Android and iOS operating system based on user interface, Learnability and operations and test cases based on Interface

aesthetics, coordination testing and user interface based on questionnaire survey as shown in Fig(1)below.

No.	1	2	3	4
Test Item	Friendliness of UI	Easy to learn	Easy to operate	Abundant on-line assistance
Description	How about simplicity	whether need extra ability for learning.	Whether difficult for operating	Accuracy and all sidedness of on-line assistance for web program
Test Outcome	Windows	succinct	There is navigation and users have related industry background; easy to learn	Easy to operate
	Android			
	ios			
				There is "system service" button at first-level navigation to offer Q&A service.; effective in some extent

Fig(1) Comparison of Windows,Android and iOS

Author 2 compares the different versions of windows operating system based on user interface, learnability, operations, assistant and Navigation and user satisfaction as shown in Fig(2) given below.[3]

		Windows 7 users		Windows 8 users	
		N	%	N	%
I Think I would like to use this system.	Strongly Agree	0	0%	3	60%
	Agree	0	0%	2	40%
	Neutral	3	60%	0	0%
	Disagree	2	40%	0	0%
	Strongly Disagree	0	0%	0	0%
I Found that system unnecessarily complex.	Strongly Agree	3	60%	0	0%
	Agree	1	20%	1	20%
	Neutral	1	20%	4	80%
	Disagree	0	0%	0	0%
	Strongly Disagree	0	0%	0	0%
I thought the system was easy to use.	Strongly Agree	0	0%	0	0%
	Agree	2	40%	3	60%
	Neutral	1	20%	2	40%
	Disagree	1	20%	0	0%

Fig(2) Questionnaire Analysis on different versions of windows Operating system.

2.1 METHODOLOGY

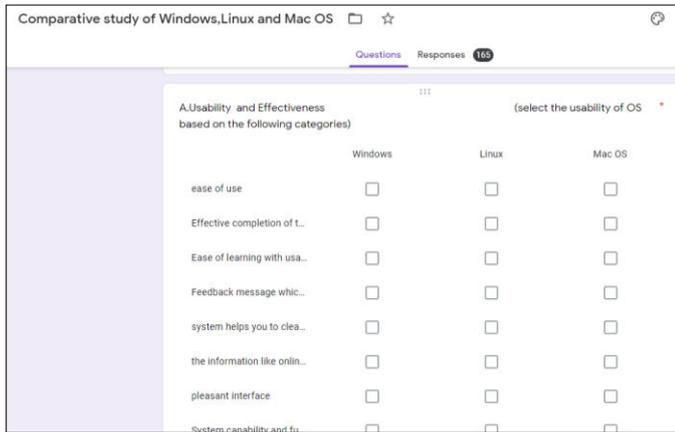
The Methodology discussed in this paper contains a questionnaire prepared using google form which includes questions that covers 2 objectives:-

1. Associating effectiveness in terms of usability, learnability and desirability.
2. Analysis the efficiency based on uniformity and user interface satisfaction.

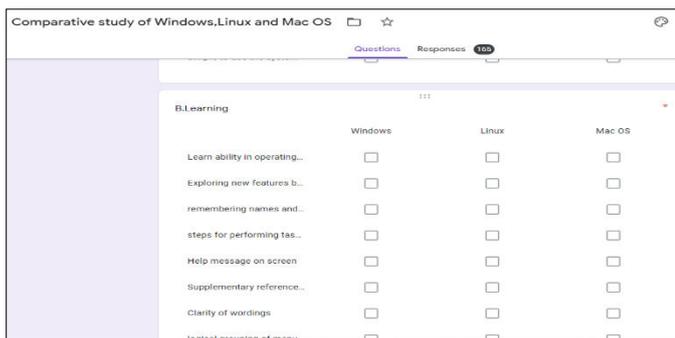
The survey also completes by giving the analysis based on the above objectives received from user satisfaction

under different age group and identifying the result under each criteria.

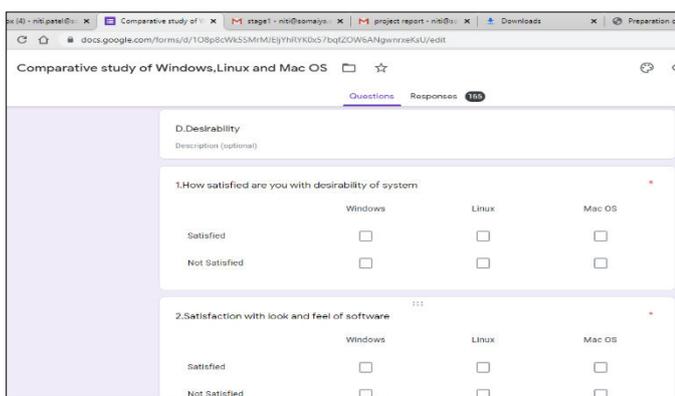
The following Fig (3,4,5) shows the Google form based on each comparative criteria.



Fig(3)Google Form for Usability and effectiveness of Windows, Linux and Mac Operating System.



Fig(4)Google Form for Learnability of Windows, Linux and Mac Operating System.



Fig(5)Google Form for Desirability of Windows, Linux and Mac Operating System.

2.2 ANALYSIS AND RESULTS

This section includes the survey questionnaire with the analysis received from participants based on effectiveness, usability, learnability and desirability and UI satisfaction of Windows, Mac and Linux Operating Systems.

2.2.1 Usability and Effectiveness:

Usability is part of “user experience” and refers to the ease of access or use of a product. Usability is a quality characteristic that assesses how easy user interfaces are to use. The word "usability" also refers to methods for improving ease-of-use during the design process.

2.2.1.1 Ease of use:

The ease of use defines how easy the finished product is to use by its intended users. Following analysis shows the ease of use for all three OS as shown in Fig (6) below

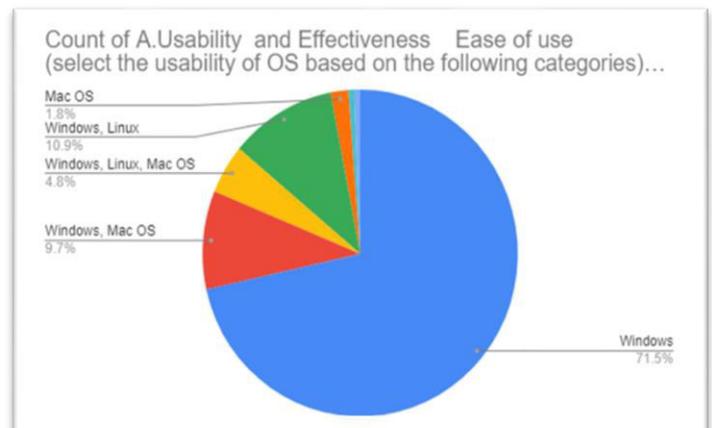


Fig 6-Analysis of 3 OS based on ease of use

2.2.1.2 Effective Completion Of The Work Using The System:

It specifies how effectively the user can complete any given task using any application for the OS. The analysis is shown in Fig (7) below

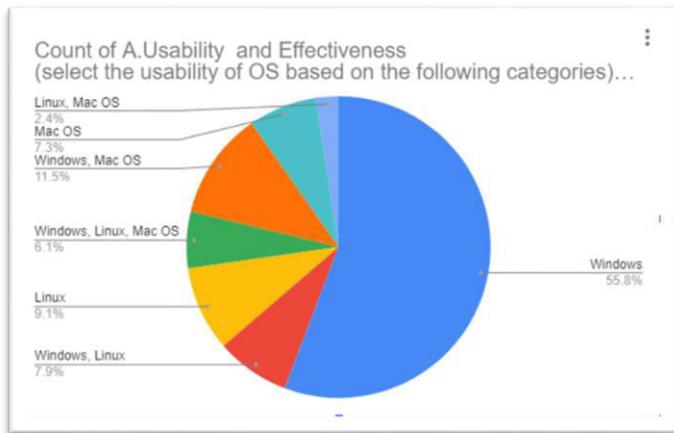


Fig 7-Analysis Effective completion of the work using the system of 3 OS

2.2.1.3. Feedback message which clearly tells how to fix the problems: This specifies how the system gives feedback which allows the user to fix the problem for all 3 OS as shown in fig(8) below.

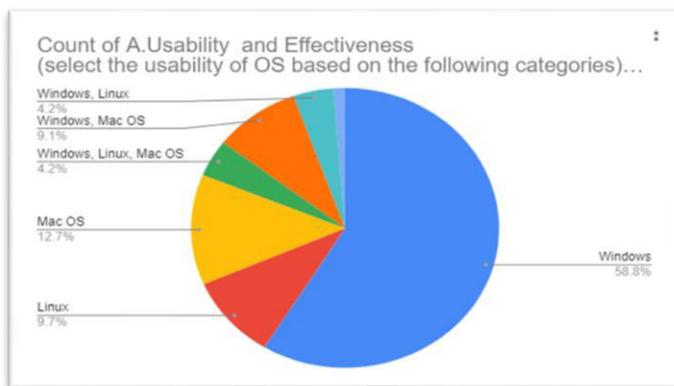


Fig:8 Analysis of Feedback message which clearly tells how to fix the problems of 3 OS.

2.2.1.4. Pleasant interface: A good interface makes it easy for users to tell the computer what they want to do, for the computer to request information from the users, and for the computer to present understandable information. Clear communication between the user and the computer is the working premise of good UI design. The analysis of all 3 OS is shown in Fig (9) below.

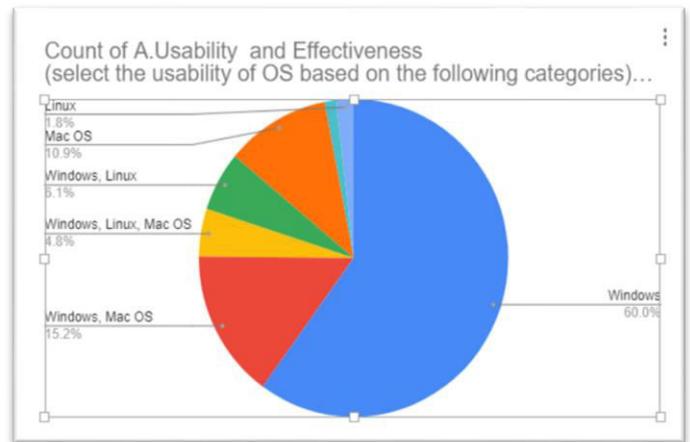


Fig 9-Analysis Pleasant interface of 3 OS

2.2.1.5 System reliability: The probability that a system, including all hardware, firmware, and software, will satisfactorily perform the task for which it was designed or intended, for a specified time and in a specified environment.

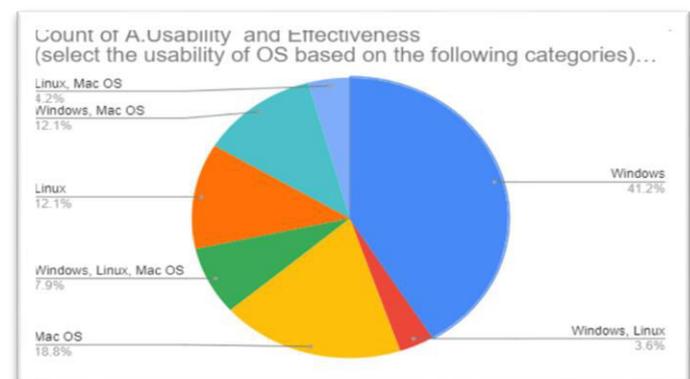


Fig 10-Analysis System reliability of 3 OS

2.2.1.6 Effectiveness of the system: It measures of the ability of a system to achieve a set of specific mission requirements

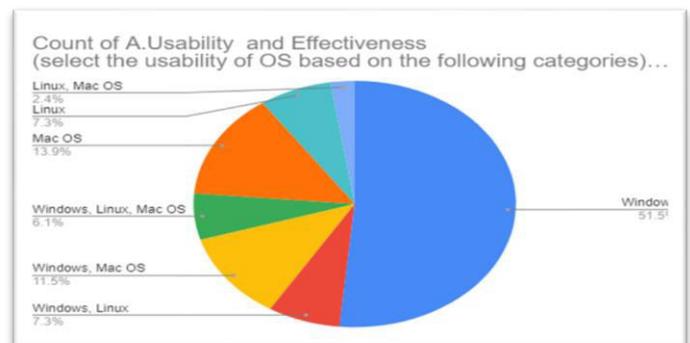


Fig 11-Analysis Effectiveness of the system of 3 OS

2.2.1.7 Clear interaction with system: It specifies how easy and clearly the system can interact with user and vice versa by using all the 3 OS

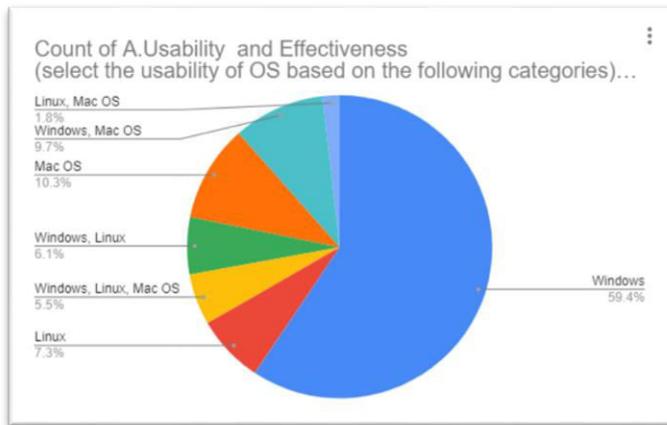


Fig 12-Analysis Clear interaction with system of 3 OS

2.2.2 Learning

2.2.2.1. Learning ability in operating system: it is a quality of products and interfaces that allows users to quickly become familiar with them and able to make good use of all their features and capabilities.

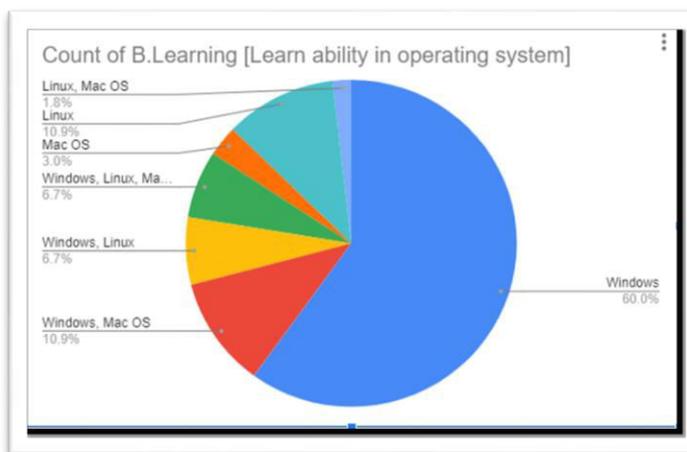


Fig 13-Analysis Learning ability of 3 OS

2.2.2.2. Remembering names and using commands:

This specifies how easy you can remember the commands in any OS for performing the task

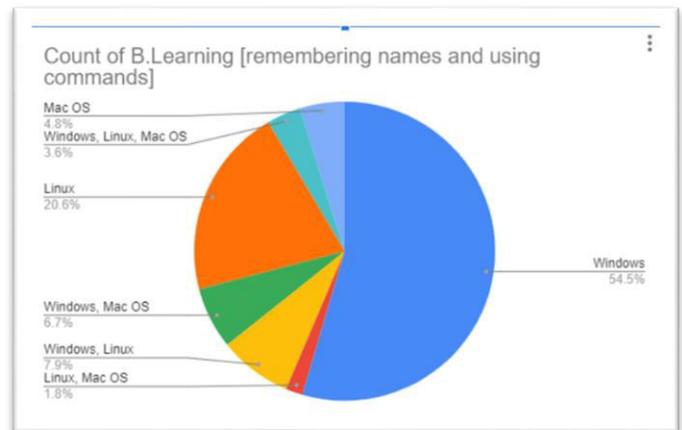


Fig 14-Analysis remembering names and using commands of 3 OS

2.2.2.3 Exploring new features by trial and error:

This states how easily can you explore new features by using trial and error method for all 3 OS

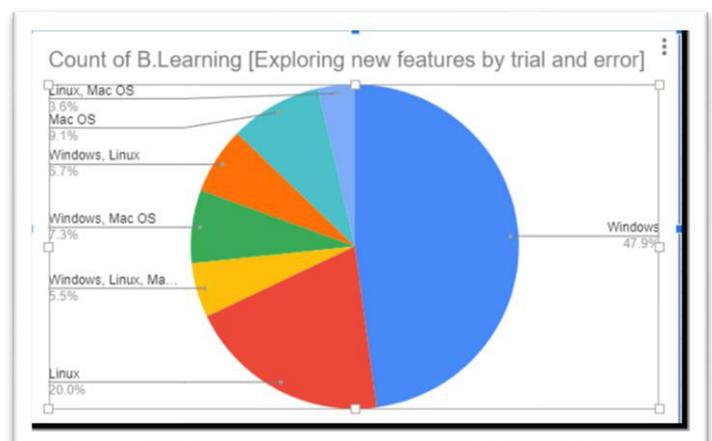


Fig 15-Analysis exploring new features by trial and error of 3 OS

2.2.3 User Interface Satisfaction

2.2.3.1. Screen-Reading character on screen: this specifies the size of font available and reading of that character for all 3 OS

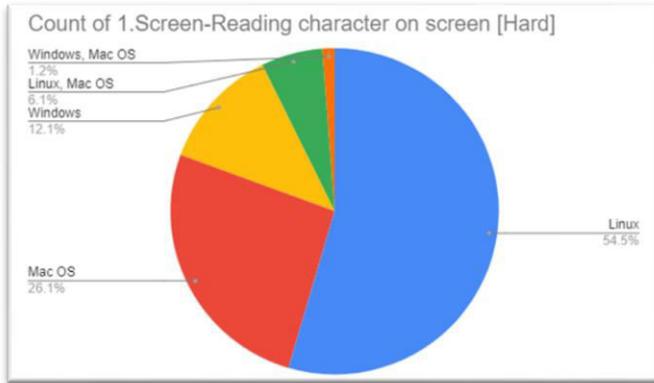


Fig 16-Analysis Screen-Reading character on screen of 3 OS

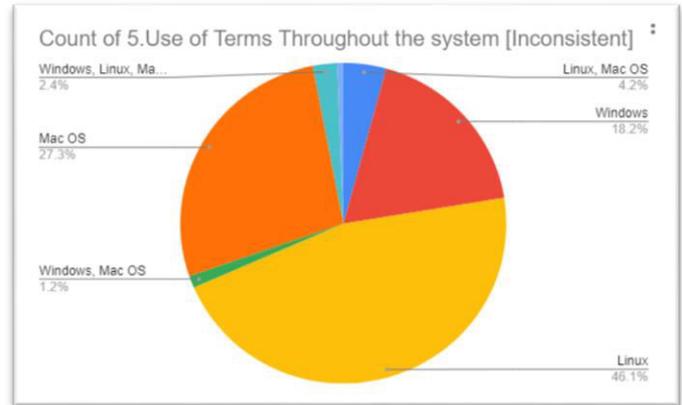


Fig 19-Analysis Use of Terms Throughout the system (inconsistent) of 3 OS

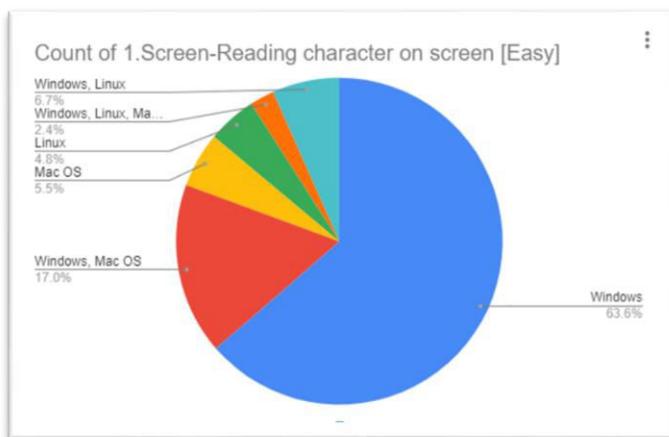


Fig 17- Analysis Screen-Reading character on screen of 3 OS

2.2.3.2 Use of Terms Throughout the system: this specifies the use of language and terms for all OS which should give clear understanding to user

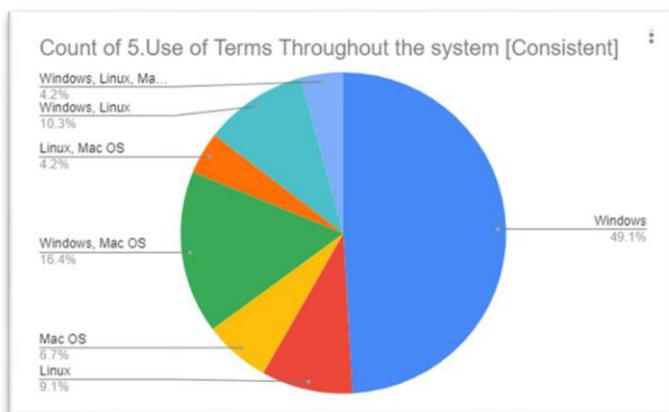


Fig 18-Analysis Use of Terms Throughout the system (Consistent) of 3 OS

2.2.4.Desirability

2.2.4.1 How satisfied are you with desirability of system: it is defined as a product or system's potential to motivate a user to approach, obtain or interact with it.

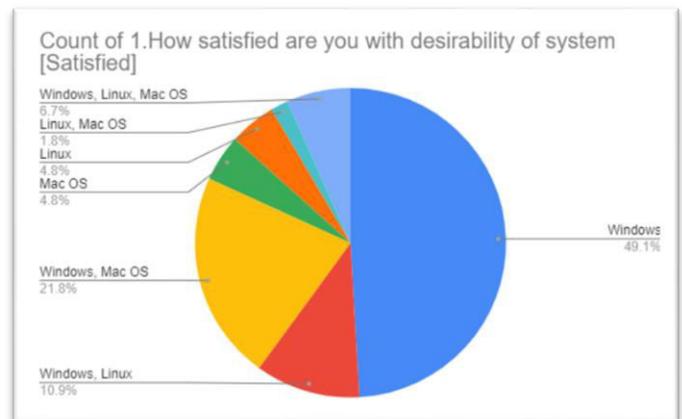


Fig 20-Analysis of satisfaction with desirability of 3 OS

2.2.4.2. Satisfaction with look and feel of software:it provides branding, helping to identify a set of products and also it increases ease of use, since users will become familiar with how one product functions

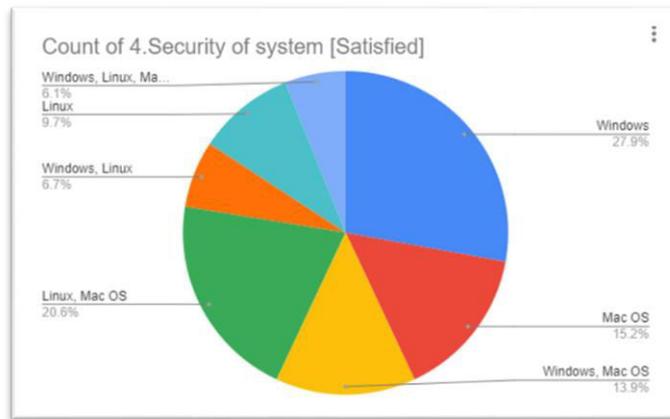
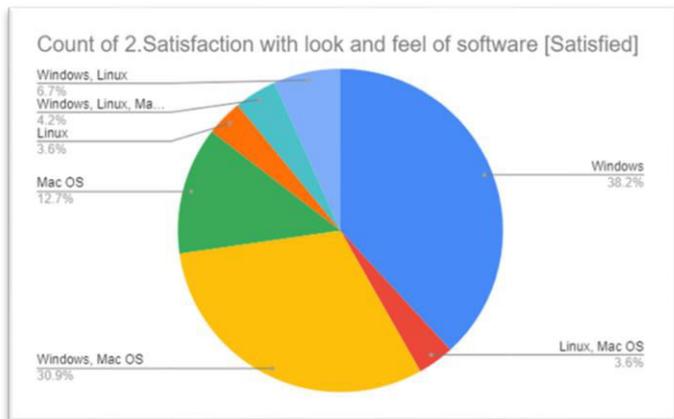


Fig 21-Analysis Satisfaction with look and feel of software of 3 OS

Fig 23-Analysis Security of system of 3 OS

2.2.4.3. Desirability with interaction: refers to all the ways the user can communicate or otherwise interact with the computer system for all the OS

3. CONCLUSIONS

We conclude that amongst all the operating system the Windows is easy to understand, simple and has excellent user experience. It is user-friendly and explorer friendly whereas it has more security features and adds an extra twist and extra compatibility to Windows. Moving towards other operating systems, Ubuntu is a mixture of Windows and Macintosh. It looks like Mac but shortcut keys is similar to Windows. Macintosh is one of the easiest operating system to learn for a complete beginner (although switching from windows has a slight learning curve). It is ideal for the everyday user but Linux is better than Ubuntu. Linux is very similar to other operating systems, such as Windows and OS X. Linux is already successful on many different kinds of devices, but there are also many technological areas where Linux is moving towards, even as desktop and server development continues to grow faster than any other operating system today. But from the survey the most popularly used OS is Windows OS due to the higher curve in terms of user satisfaction, usability, learning and desirability.[3][4]

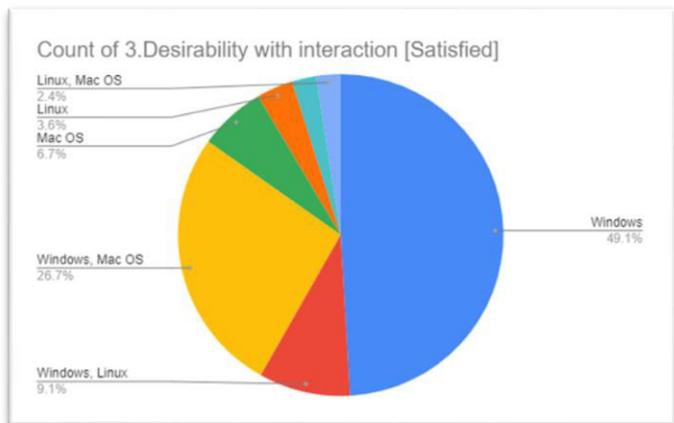


Fig 22-Analysis Desirability with interaction of 3 OS

2.2.4.4. Security of system:Refers to the processes and methodologies involved with keeping information confidential, available, and assuring its integrity with respect to all OS

ACKNOWLEDGEMENT

I would like to acknowledge my Guide Uday Joshi Sir and Co-Guide Nirmala Shinde Madam for their constant Guidance would also like to thank all the users you filled the survey forms and gave there feedback on same.

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[5] <https://garyperlman.com/quest/quest.cgi?form=PUTQ-Usability>

[6]<https://garyperlman.com/quest/quest.cgi?form=USE-Satisfaction>, usefulness

[7]<https://garyperlman.com/quest/quest.cgi?form=QUIS-Userinteraction> Satisfaction