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Heuristic Evaluation of Stock Exchange Mobile Application in Malaysia

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Abstract

In recent years, heuristic evaluation has focused to improving the efficiency and effectiveness of applications. This technique is considered as the most effective tool that is used in human-computer interaction studies to test the usability of information systems. Moreover, this technique is widely adopted to analyze the usability of applications as it is inexpensive and quick. The objective of this study is to use the heuristic evaluation principals to assess the effectiveness of the stock exchange mobile application in Malaysia. Questionnaire survey method was used and data were collected by 25 participants from Kuala Lumpur Stock Exchange (KLSE). The heuristic evaluation was conducted by 25 experts to examine the usefulness of stock exchange mobile application.
The results revealed that stock exchange application is an effective and useful application that has all required features. Meanwhile, findings also postulated that most of the users show agreeableness regarding the applications of principals of heuristics evaluation in this application. These heuristic principals can further used to avoid the usability gaps in this stock exchange application. This study also gives guidelines to designers for taking corrective measures during the designing of the applications for the stock exchange. Additionally, these guidelines help to provide solutions in the future that how designers may improve the user interface of these stock exchange applications that may improve the experience of users.

Keywords: *Heuristic Evaluation, Kuala Lumpur Stock Exchange*

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1. Introduction

Since the invention of mobile devices in the 1980s, its usage has tremendously increased which allow users to perform various tasks in a mobile application, the increase in usage of mobile devices is as a result of the usability of these devices (Wang, 2017). In the recent time there have been some improvements in the mobile technology which enhance a wide range of applications to be developed that can be used by many people anywhere and anytime (Lee & Lee, 2015; Strauss & Frost, 2016).
Smartphones are the most popular gadget in the world and tablets and smartphones are becoming most selling products in this era of technology. Due to the rapid growth in mobile technology, most of the people use these devices for entertainment, social and investment purpose. Usually, people also use these applications for selling and purchasing purpose. There is a need for better applications and designers are trying to create visually richer and ironic mobile applications to provide an effective user experience. Moreover, user experience and usability both are crucial factors that purely related to the effectiveness of mobile applications. There are different usability evaluation techniques that are used to assess the effectiveness of mobile applications(Hussain & Ferneley, 4380). Additionally, Heuristic evaluation is deemed as one of the most broadly used methods to evaluate the user interfaces. “Heuristic evaluation (HE) is an inspection

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method based on evaluation over real system or prototype, conducted by experts. The term 'expert' is used as opposed to users but in many cases, evaluators do not need to be usability experts". However, heuristic evaluation is considered as the most usable technique to assess any system and application during its development or after realizing this application. This approach tries to assess the interface design against a pre-defined set of the principals.

The main purpose of this study is to use heuristic evaluation principals by Nielsen (1994) to check the usefulness of the stock exchange mobile application in Malaysia. (KLSE). It provides guidelines to designers to take corrective measures while designing the applications for the stock exchange. Additionally, these guidelines helpful to provide solutions in the future that how designers may improve the user interface of these stock exchange applications that may improve the experience of customers. However, one of the few studies that used heuristic evaluation to evaluating the stock exchange applications in the context of Malaysia. In Malaysia, several literatures exist concerning heuristic evaluation of library and social media applications, but few studies and little knowledge exist on heuristic evaluation of mobile stock exchange application. It is essential to evaluate the stock exchange application because of its usefulness in the day to day activities in the market.

Another importance of evaluation of stock exchange application is that Malaysia stock exchange leads to improvement in economic growth. It is important to evaluate applications which can be used by potential investors to improve the economic growth in Malaysia context (Nordin, Nordin, & Shahimi, 2016). Although, previous studies focused on the evaluation of different applications but most of these studies did not use the orientation of heuristic evaluation. Therefore, this study is one of the few attempts to examine the effectiveness of stock exchange application by using the principals of heuristic evaluation (Daramola, Oladipupo, Afolabi, & Olopade, 2017).

2. Background of Study

The use of mobile application has increased tremendously since the launch of Android and apple application. Mobile applications have been used by stockbrokers and customers in viewing and trying to decide as regards the value of their stock in the stock exchange market. Mobile application tends to provide a user-friendly environment to their users in terms of operation, ease of use, usability, accessibility, etc. the low prices of Android phones in the market have led to an increase in using it to perform daily activities by users. There has been a rise in the number of mobile applications which are used by the stock exchange in daily activities and operation in the last few years (Harrison, Flood, & Duce, 2013). Most of the mobile applications which can be found on Apple play store or Play store of Android phones had faced so many challenges before it was launched and that is why we have so many applications which can be used about the stock exchange market. The user just downloads the particular mobile application which meets his basic needs and requirements in terms of its interface, ease of use, design.

The immense growth of these mobile applications in the Google Play and Apple store has challenged developers and programmers to develop good quality applications which fit into the apps competitive market (Williamson, Chan, & Wood, 2016) and (Hussain, Mkpojiogu, Musa, & Mortada, 2017). The study of Sarkar, Gourley, Lyles, Tieu, Clarity, Newmark, and Bates, (2016) revealed that mobile apps quality is in different aspects and the most significant one is usability. That is users consider the usability and the ease of use of the application before using it. However, according to Kortum & Sorber(2015) there has been an issue in the evaluation of the mobile apps because these apps were previously run on laptops and desktops but are now run using smartphones technologies. Meanwhile, Zapata, Fernández-Alemán, Idri, & Toval (2015) and Gómez, Caballero, & Sevillano, (2014) found that there are several usability evaluation techniques to carry out the evaluation which are conducted by experts also known as inspection methods thus divided into testing methods and inquiry methods depending on the adopted methodology. Heuristic evolution is a key method of inspection of analytical evaluation of information systems (Preece, Rogers, & Sharp, 2015). It is the one of the best inspection techniques that performs a systematic evaluation of the user-interface and usually this evaluation is performed by the expert evaluators (Nielsen, 1994). In addition, it is the cheaper alternative for full scale assessment by involving actual users. This method does not required heavy investment for implementation and it is potent to dig the issues in applications (Daramola, Oladipupo, Afolabi, & Olopade, 2017).

Heuristics evaluation is a usability technique which is centered on the evaluation of prototype or real system which is conducted by experts (Carry et al., 2016). According to Paz & Pow-Sang (2016), heuristics evaluation is performed manually due to its nature which enables users to check the accomplishment of heuristics checklist given. Heuristics evaluation assessment comprises of ten principals that are "visibility of system status, match between system and the real world, user control and freedom, consistency and standards, error prevention, recognition rather than recall, the flexibility and efficiency of use, aesthetic and minimalist design, help users recognize, diagnose, and recover from errors and help and documentation". The study focuses on heuristic evaluation principles because it is more exhaustive than the usual usability testing. As stated earlier, heuristic evaluation uses the ten principles of evaluation technique, unlike usability that only makes use of five or four criteria during evaluation which has been justified with the study of Yau et al. (2018).

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In the present study, the researcher tends to focus on the heuristic evaluation of stock exchange mobile application. The mobile stock exchange application refers to the use of wireless technology in securities trading which enable investors to trade from telephones instead of the traditional trading methods. This technology allows smartphone users to access easily and manages their portfolios when away from a laptop or desktop.

3. Literature Review

3.1 Usability Evaluation

Usability evaluation refers to product, object, service or system that can be used by humans which have the possibility for solving usability issues and requires to be subjected to usability engineering (Nielsen, 1993). Usability evaluation involves several techniques which include over real systems or prototypes, the best substitutes are evaluations carried out by experts (inspection methods) or conducted by users while the predictive technique is replaced with analytical modeling and simulation as shown in Figure 1, (Yáñez Gómez et al., 2014). In the same view, Preece, Rogers, and Sharp (2002) stated that usability evaluation has three methods which include usability inspection, usability inquiry and usability testing. The usability testing and usability inquiry consist of real users while usability inspection does not. In addition, each technique has its strong point and restrictions. According to Othman, Sulaiman, and Aman (2018), the technique for usability evaluation is conducted in the course of implementation of a specific system to ensure that the system allows users to attain their goals effectively. Usability testing is described as real users who execute the real operation using the interface in an organized setting. This technique is the most general method in website usability evaluation (Preece et al., 2002; Abdul Rahman, 2012). The aim of usability testing is to update design by data gathering from which usability problems existing in systems will be identified and rectified.

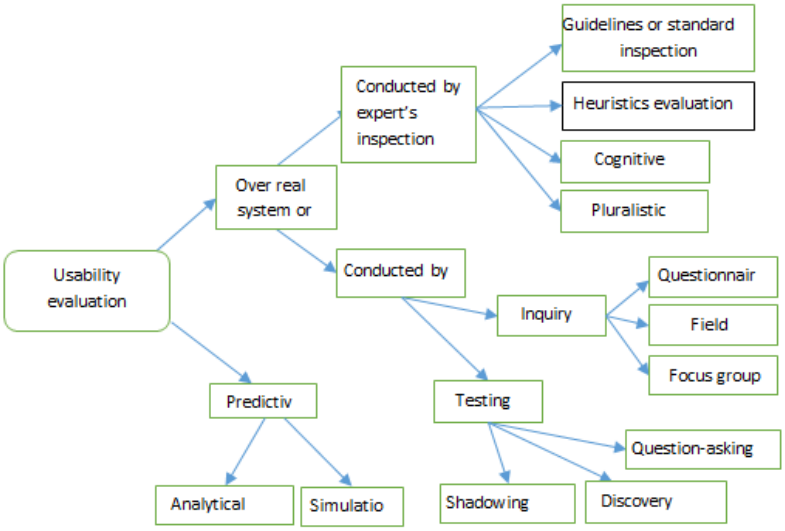

Figure 1: Classification of some usability evaluation techniques

3.2 Usability Methods

There are different techniques for usability evaluation that were introduced and explored while designing the applications and websites. In recent years, two most emerging and famous methods are 'user testing' and 'heuristic evaluation (HE)'. Heuristic evaluation is a type of methods that examines and evaluates an interface regarding to usability (Tan, Liu, & Bishu, 2009). Moreover, evaluators use different techniques to assess the effectiveness of usability. There are no uniform methods that are accepted by all evaluators for usability because each evaluator uses different techniques, methods and approaches about the usability evaluation. Following are the three specific types of usability assessment methods (Adelman, & Riedel, 2012).

- Heuristic
- Empirical
- Subjective

i) Heuristics Evaluation

Heuristic evaluation is a popular and classical evaluation method in human interaction (Nielsen & Molich, 1990). This approach is an effective evaluation method for mobile applications, smartphone and computer software that facilitates to assess the usability issues for an interface design. In this method, we ask from evaluators with relevant expertise regarding the designing and using applications. Moreover, this technique performs quickly

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and efficiently without involvement of end users (Tanaka, Bim, & Rocha, 2005).

In this method, evaluators try to assess the interface design against a set of principles and these principles help to evaluators to understand the interface design (Nielsen & Molich, 1990). In addition, Nielsen' method of evaluation (HE) is considered as most comprehensive ad effective instrument in order to determine the usability of any application. This is the widely acceptable cheaper assessment method to diagnose the potential issues about usability in user-interface (Nielsen & Landauer, 1993). Meanwhile, a study by Mack and Nielsen (1994) elaborated that HE is a specific interface inspection process in which evaluators check the interface and recognize its compatibility with heuristics principals of usability (Nielsen, & Molich, 1990). Additionally, evaluators explain the issues, severity of the problems and suggestions to resolve these matters in a bug report where the non-compliant features are captured.

Meanwhile, previous studies reported that this technique has number of advantages such as conciseness, speed and cost effectiveness (Law & Hvannberg, 2002; Paddison & Englefield, 2003; Ji, Park, Lee, & Yun, 2006). One of the recent studies also identified that heuristic evaluation provided guidelines to evaluate the systems that facilitate designers to upgrade systems (Salazar, Lacerda, Nunes, & Wangenheim, 2013). This approach is documented in excellent manner due to which non-practitioners can also perform it effectively (Baker et al., 2002). Due to these benefits, this study used heuristic evaluation approach to assess the effectiveness of KLS mobile application.

Heuristic evaluation technique is a suitable technique for usability evaluation while the digital doorway provides direct ease of access support. Results indicate that heuristics set can act as procedures for the developers of digital doorway software in order to develop the usability acceptability of the applications. Jakob Nielsen's 10 general principles for interaction design. They are called "heuristics" because they are broad rules of thumb and not specific usability guidelines that show Table 1.

Table 1: Heuristics Evaluation Principles

Heuristics	Descriptions
Visibility of system status (Feedback)	"The system should always keep users informed about what is going on, through appropriate feedback within reasonable time."
Match between system and the real world (METAPHOR)	"The system should speak the users' language, with words, phrases, and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order."
User control and freedom (NAVIGATION)	"Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo."
Consistency and standards (Consistency)	"Users should not have to wonder whether different words, situations, or actions mean the same thing."
Error prevention (prevention)	"Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action."
Recognition rather than recall (MEMORY)	"Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for the use of the system should be visible or easily retrievable whenever appropriate."
Flexibility and efficiency of use (efficiency)	"Accelerators — unseen by the novice user — may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions."
Aesthetic and minimalist design (design)	"Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility."
Help users recognize, diagnose, & recover from errors (recovery)	"Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution."
Help and documentation (Help)	"Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be accessible to search, focused on the user's task, list concrete steps to be carried out, and not be too large."

Usage of Mobile Phone

A recent report published by the GSMA in 2018 indicated that by the end of 2018, 5.1 billion people around the world subscribed to mobile services, accounting for 67% of the global population. A total of 1 billion new subscribers have been added in the four years since 2013 (representing an average annual growth rate of 5%), but the speed of growth is slowing. An average

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annual growth rate of 1.9% between 2018 and 2025 will bring the total number of mobile subscribers to 5.8 billion (71% of the population). Of the 710 million people expected to subscribe to mobile services for the first time over the next seven years, half will come from the Asia Pacific region and just under a quarter will come from Sub-Saharan Africa.

Meanwhile, mobile continues to make a significant contribution to socioeconomic development around the world. In 2018, mobile technologies and services generated $3.9 trillion of economic value (4.6% of GDP) globally, a contribution that will reach $4.8 trillion (4.8% of GDP) by 2023 as countries increasingly benefit from the improvements in productivity and efficiency brought about by increased take-up of mobile services. Further ahead, 5G technologies are expected to contribute $2.2 trillion to the global economy over the next 15 years (GSMA, 2018).

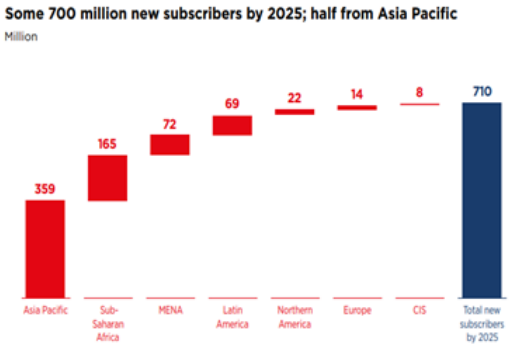

Figure 2: Mobile phone Subscribers (All over the World)

Mobile services and technologies contributed 4.6% of global GDP in 2018 that contribution is $3.9trillian of economic value added. Moreover, contribution of mobile services in GD will reach 4.8% ($ 4.8 trillion) in GDP globally because countries all over the world are trying to gain benefits from the efficiency brought by the effective mobile phone services. Mobile applications play a key role to boost up the businesses and stock market is a place where these mobile applications are used frequently. Stock markets of Malaysia are providing new opportunities for investors. Generally, stock markets significantly contribute in economic growth. (Reisen & Soto, 2001) and mobile applications are play great role of contribute to enhance the performance of stock markets

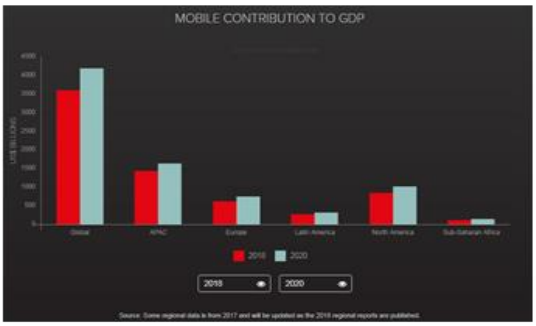

Figure 3: Mobile Contribution to GDP

The Malaysian Stock Exchange

In the world of business today, some mobile applications are linked to m-commerce which include mobile banking and advertising application. These applications help to develop business electronic items by enabling people to have access to online and other business transactions at any point in time with their phones. Also, mobile device manufacturers aim to device their own usability limits. An example is the Apple iOS human interface guidelines which stated that the display area of iOS features must be considered during development of application. Besides, application of Apple reviews presented in the App store and the center of acceptance relies on conformity as defined in the guideline (Behler& Lush, 2010; Hussian et al., 2017).

The Malaysian stock exchange plays a key role to boost up the economic growth as it is one of the main drivers that contributes significantly to a country's economic growth (Nordin, Nordin, & Shahimi, 2016). Moreover, the capitalization of Malaysian stock markets was MYR 4.3 billion in 2014 (Bursa Malaysia, 2015) and

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that indicates the crucial role of stock markets to increase the investments and fundraising opportunities.

Malaysian stock markets are the comfort place to operate the long ternamd medium financial assets. Previous studies recommended that further studies should focus on these stock markets due to its great importance in Malaysia (Jaiyeoba &Haron, 2016). Additionally, in Malaysia, stock exchange is one the major contributors in the economic development (Lee, Cheng & Chong, 2016). Stock exchange mobile application is the recent development in mobile market of Malaysia. These mobile phone applications has play great role of improve the quality of stock market process and bring efficiency in the stock markets. Therefore, this study selected mobile application of Kuala Lumpur stock exchange market (KLSE) and use heuristic evaluation by Neilsen (1999) to evaluate the usefulness of this application. Following Figure 5 shows the screenshots of mobile application used by KLSE to understand the features of this application.

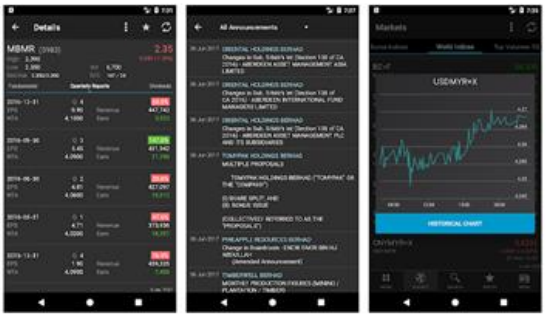

Figure 4: Malaysian Stock Exchange Application

4. Methodology

This section facilitates in justifying and describing the procedure and methods adopted to achieve research objectives and to answer the research questions. It presents a suitable methodology for this empirical study. The current study is based on a deductive approach as it following the philosophy and characteristics of this approach.

This study employed heuristic evaluation to empirically examine the usability of stock exchange mobile application. It followed the guidelines by Nielsen (1994) and ten principles were used to evaluate this application as that illustrated in Figure2. The current study is descriptive, quantitative and cross-sectional in nature because it focused and used quantitative data through using survey technique with a view to use heuristic evaluation of stock exchange mobile application in Malaysia. Questionnaire survey research procedure has been adopted to obtain responses with a view to gain meaningful and expected conclusion, the current study employs collecting numeric data and uses descriptive analysis in SPSS.

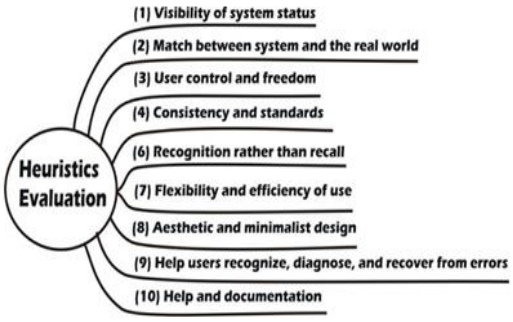

Figure 5: Nielsen's Principal s of Heuristic Evaluation

Data Collection Procedures

The target population was the brokers with plenty of experience of using this stock exchange application. The respondents of this study are people who work in Bursa of Malaysia in Kuala Lumpur, and this study used 25 participants to apply tasks of stock exchange mobile application. In this study, experts (12 males and 13 females) acted as evaluators and tested the stock exchange mobile application (KLSE) against 10-usability principles for User Interface (UI) design. The stock exchange mobile application was tested by the respondents in the stock exchange office in Kuala Lumpur. These evaluators were brokers and amateurs

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with relevant experience of using these apps. Survey was conducted to collect information regarding the heuristic evaluation of stock exchange mobile application. The questionnaire was designed with logical, chronological structure to ensure that the respondents can easily understand the statements. The questionnaire design for this research comprises two sections; demographic information of respondents is the first section, and the heuristic evaluation of stock exchange mobile application is the second part. All the scales were adapted from the previous studies.

5. Findings

Demographic Analysis

This part deals with demographic information covered by survey. Descriptive statistics includes frequency distribution of all demographic variables as gender, age, nationality, experience, level of expertise and frequency of usage. Table 2 indicates the distribution of respondents with respect to age. Survey accounted for 36.4% (40) respondents who had their age up to 20 years. Moreover, 60.9% (67) respondents were between the age group 21 to 39, 0.9% (1) respondents were between the age group 30 to 39 and remaining 1.8% (3) respondents were between 40 to 49. Results signify that the majority of respondents are between the age group of 21 29. Results also demonstrate the demographic characteristics of survey participants in terms of their nationality. It is evident from Table 2 that 76% (19) of the respondents are Malaysian and 24% (9) participants are International. Moreover, It is evident from results that 56% (14) of the respondents are expert in using stock exchange related applications, while 32% (8) participants are a novice and remaining 12% (3) of the respondents are fall in 'others' category.

Additionally, Table 2 is about the experience to use the applications of the stock exchange. Survey accounted 16% (4) respondents had less than one-year experience, 20% (5) respondents had 1-2 years of experience, 20% (5) respondents have 2-3 years of experience of using these applications. Moreover, the remaining 44% (11) respondents had more than three years of experience to use the stock exchange applications. Results also identified the frequency of using these applications. Results enlightened that 52% (13) respondents use these applications on a daily basis, whereas 24% (6) participants use these types of apps on a weekly basis. Moreover, 4% (1) respondents use these applications on a monthly basis. According to results, 20% (5) respondents sometimes use these applications.

Table 2: Demographics

Demographic Variables	Categories	Frequency	Percentage
Gender	Male	12	48
	Female	13	52
Age	21-29	6	24
	30-39	12	48
	40-49	4	16
	50& over	3	12
Nationality	Malaysian	19	76
	International	6	24
Level of Expertise	Novice	8	32
	Experts	14	56
	Others	3	12
Level of Expertise	Less than a year	4	16
	1-2 year	5	20
	2-3 year	5	20
	More than 3 years	11	44
Frequency of Usage	Daily	13	52
	Weekly	6	24
	Monthly	1	4
	Sometimes	5	20

Reliability Analysis

Reliability analysis was conducted to check the inter-item consistency between the items of all constructs. Cronbach's Alpha was used to assess the reliability with the following details. A reliable instrument is that which provide the same measurement when we measure the unchanged object repeatedly. Reliability implies inter-item consistency of scale. Reliability of instruments assessed by calculating the alpha coefficients and inter-

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item correlation of understudy variables. Table 3 indicates the reliability analysis by using Cronbach's alpha coefficients. This reliability is corresponding to set up reputation and eminence of the used scales. These values explained that scales are properly premeditated. Reliability analysis for the instruments included in current study shows that scales used in this study are highly reliable as all the constructs and alpha values fulfilled the criteria of the minimum acceptance level of the alpha score that was 0.70.

Table 3: Reliability Analysis

Sr.#	Constructs	Items	Alpha
1	Visibility of System Status	6	.854
2	Match Between System and the Real World	5	874
3	User Control and Freedom	4	.772
4	Consistency and Standards	6	846
5	Help Users to Recognize, Diagnose, and Recover from Error	4	.716
6	Error Prevention	5	.826
7	Recognition Rather Than Recall	4	920
8	Flexibility and Minimalist Design	6	.882
9	Aesthetic and Minimalist Design	6	.893
10	Help and Documentation	5	.785

Descriptive Analysis

Descriptive analyses are used to describe the basic characteristics and features of the data. It gives summary about the responses of participants. Table 4 presents the descriptive statistics of the study variables. It shows the mean values and standard deviations of all under study variables with an acceptable range of skewness and kurtosis. The range for a mean of all constructs is 3.80 to 4.01 that indicate that overall respondents agreed on given statements for all constructs. Results also demonstrate skewness and kurtosis values which are in acceptable range.

Data normality was examined through skewness, kurtosis, and histograms (Munro, 2005). Scores of visibility of system status, match between system and the real world, user control and freedom, consistency, and standards, help users to recognize, diagnose, and recover from error, error prevention, recognition rather than recall, flexibility and minimalist design, aesthetic and minimalist design, help and documentation were normally distributed and were well in range -2 to +2 more over z scores of both skewness and kurtosis were well in the range of +1.96 and -1.96 hence findings indicated normality of the data. As George and Mallery (2010) proposed that values for skewness and kurtosis between -2 to +2 are acceptable to prove the normal distribution.

Table 4: Descriptive Analysis and Data Normality

Constructs	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Visibility of System Status	3.93	.433	-.077	.464	1.390	.902
Match Between System and the Real World	3.96	.547	-.593	.464	.782	.902
User Control and Freedom	3.84	.483	.193	.464	.175	.902
Consistency and Standards	4.01	.458	-.130	.464	1.096	.902
Help Users to Recognize, Diagnose, and Recover from Error	3.88	.479	-.322	.464	1.029	.902
Error Prevention	3.80	.509	-.213	.464	-.739	.902
Recognition Rather Than Recall	3.95	.657	-.541	.464	1.044	.902
Flexibility and Minimalist Design	3.98	.477	-.078	.464	.291	.902
Aesthetic and Minimalist Design	3.98	.515	-.322	.464	.092	.902
Help and Documentation	3.88	.391	-.245	.464	.290	.902

Correlation Analysis

Correlation tells us about the relationship between variables. It further tells us the strength and direction of the relationship between understudy constructs. Table 5 signifies the correlation between under study variables.

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This correlation matrix identifies that most of the understudy constructs are positively and significantly correlated with each other. Results highlighted that 'help users to recognize, diagnose, and recover from error' is highly correlated with error prevention (r= 0.673, p<.05). Table 5 also shows the existence of discriminant validity. It enlightened that most of the constructs significantly correlated well below proposed criteria by (Dimovski, 1994; Leech et al., 2005; Garson, 2009). This criterion described that significant values between r > 0.55 and r < 0.70 ensure discriminant validity. These results show that constructs differ from each other and holds independent reality moreover the direction of the relationship was as same as proposed by theoretical and empirical evidence.

Table 5. Correlation Matrix

	VSS	MBSRW	UCF	CAS	RDRE	EP	RRTR	FMD	AMD	HAD
VSS	1									
MBSRW	.621**	1								
UCF	.503**	.172	1							
CAS	.488**	.417*	.613*	1						
RDRE	.010	-.075	.442*	.426*	1					
EP	.132	-.066	.600*	.368*	.673**	1				
RRTR	.195	.058	.457*	.422*	.443*	.242	1			
FMD	.173	.188	.309	.461*	.642**	.257	.534**	1		
AMD	.426*	.539**	.590*	.622*	.471**	.359*	.525**	.512**	1	
HAD	.339*	.188	.583*	.403*	.424*	.350*	.398*	.411*	.418*	1

*P<0.05; **P<0.01

6. Discussion and Conclusion

The purpose of this study was to assess the effectiveness and usefulness of stock exchange mobile application by using Nielsen' principles of heuristic evaluation. here were 25 participants from KLSE who evaluated this application. This study proved that heuristic evaluation play a crucial role to assess the usefulness of stock exchange mobile applications, and it aimed to check that these applications are able to meet the user requirements. It also signified that stock exchange application is an effective application that has all required features. Most of the users show agreeableness regarding the applications of principals of heuristics evaluation in this application. These heuristic principals can further be used to avoid the usability gaps in this stock exchange application. Heuristic evaluation technique is deemed as the most effective tool that is used in human-computer interaction studies to check the effectiveness of information systems. This technique is widely adopted to analyze the usability of applications as it is inexpensive and quick. This study also highlighted the importance of Nielsen's principles that can be used to avoid the usability gaps in these stock exchange applications.

It is based on ten heuristics evaluation factors that are adopted from the previous studies. The method is carried out by heuristics evaluation principles of stock exchange mobile application KLSE in Malaysia. Meanwhile, this study provides guidelines to designers and developers to take corrective measures while designing the applications for the stock exchange. Additionally, these guidelines help to provide solutions in the future that how designers may improve the user interface of these stock exchange applications that may improve the experience of customers. Respondents show the positive behavior and express their agreeableness towards all the constructs of heuristic evaluation named as; "visibility of system status, match between system and the real world, user control and freedom, consistency, and standards, help users to recognize, diagnose, and recover from error, error prevention, recognition rather than recall, flexibility and minimalist design, aesthetic & minimalist design and help and documentation". The Findings have shown that the majority of respondents are stated that the application works properly and they are not facing any problems while working with it.

Based on the findings, this study revealed that the stock exchange application of KLSE has effective and good features based on the assessment of usability heuristics. This study used the heuristic evaluation method to evaluate the usability of the mobile application of KLSE stock exchange. The assessment shows that mobile application has good performance in all ten usability heuristics including i) "visibility of system status; ii) match between system and the real world; iii) user control and freedom; iv) consistency and standards; v) help users to recognize, diagnose, and recover from error; vi) error prevention; vii) recognition rather than recall; viii) flexibility and minimalist design; ix) aesthetic & minimalist design; x) help and documentation".

7. Limitations and Future Direction

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Along with the theoretical contribution and practical implications, this study also has few limitations. The respondents were the expert people in Bursa and brokers, and the sample was small and not representative. Future studies should use a large sample size with different groups of people to generalize the findings.

Moreover, this study only selected Kuala Lumpur stock exchange (KLSE) for data collected from brokers and people who were familiars with the use of stock exchange mobile application. Further studies may select multiple stock exchanges located in different cities Malaysia. The comparative study may also a future avenue in which researchers compare the effectiveness of mobile application in different stock exchange offices. We only employed survey questionnaire method to collect the responses from the participants, future studies may use multiple methods for data collection i.e. interviews, focus group discussion with experts and observations. This study only focused on Malaysian stock exchange thus, the scope of the study is limited to Malaysia. In the future, a cross-cultural comparison between two countries may also give insight understanding regarding the usage of the heuristic approach. Lastly, this research only focused on stock exchange application to evaluate by principles of heuristic evaluation. Future studies may use different applications to assess the effectiveness of mobile applications with the help of heuristic evaluation technique.

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