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Analysis on User Interface Aspects of Software Used by Commercial Banks in India

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Abstract: The computerized banking services demand trained and efficient human involvement. With the introduction of the core banking systems this requirement became even more critical to the smooth operations. These employees are largely involved in information retrieval from the computer database, coding and decoding of information from online, verbal or printed instructions, maintaining customer data, doing transactions, interacting with the customers, by using the specific software provided by the bank. Therefore, human computer interaction and interface issues play a crucial role with respect to productivity of these employees and eventually achieving smooth and efficient functioning of the banks.

This pilot study aimed at finding out the constraints of user interface of the banking software package used by different commercial banks in India. A quantitative research design was used in order to fulfill the objectives of the study. The principal components analysis determined the components structure of user interface issues of the banking software used by the employees (N=79) in commercial banks in India. To analyse the user interface issues related to ease of operation, flexibility & ease of learning of the software, 8 checkpoints (e.g., the compatibility, consistency, flexibility, learnability, minimal action, memory load, perceptual limitations, and provided user guidance) of various categories were identified and included in the study. The principal component analysis revealed that two components (PC 1 and PC2), explaining 73% of total variance, turned out to be the most critical components included in the study. Among all of the variance the users felt strongly about user guidance ambiguity, and high memory load; therefore these usability aspects could be viewed as a measure of the perceived quality and usability of the software. The other variances (usability checkpoints) like (i) compatibility, (ii) consistency, (iii) flexibility, (iv) learnability, (v) minimal action and (vi) perceptual limitations explained had substantial effect on the user interface issues subsequently performance of the banking employees & therefore banking institutions.

Interestingly, men and women responded differently on various user interface aspects like compatibility, consistency, learnability and user-guidance. As user guidance and memory load strongly correlated with PC1 and PC2 respectively, these two usability characteristics could be considered as most important usability aspects. Therefore, the component loading of the user interface stressors might prioritize the options of user interface (re)design in the core banking activities.

Keywords: banking software, HCI, mental load, user interface

1. Introduction

The financial services industry has experienced major changes in recent years, including globalization, deregulation, disintermediation, technological advancements, and new competitive structures. In the light of these changes, banks are trying to simultaneously achieve higher operational efficiency and flexibility by digitalization and standardization of core operational business activities such as the introduction of standard software packages (Esteves and Pastor 2001) similar to other industries. The word CORE refers to Centralized Online Real Time Exchange; this basically means that all the branches of a particular bank access applications from centralized database center (Manjushree 2014). This kind of major changes have had a noticeable impact on the financial services in recent years.Banks started focusing on improving the efficiency of their operational business while maintaining or even extending the flexibility necessary to stay competitive in the market. Measures to implement these efforts include the transaction banking (Schirenbeck, 2003) as well as the foundation of an information technology infrastructure based on open or industry standards (Vaciago, 2000). One of these technological advancements is possible due to the availability of standard software packages for core banking process.

There are several new software packages for banks' core business functions has emerged in the market, but little is known about their introduction's success factors. It has been claimed that these core banking solutions are a comprehensive,

integrated yet modular business solution that effectively addresses the strategic and day-to-day challenges faced by banks. However, in reality the scenario is bit different as these softwares are not always very user friendly and take lots of time to learn and maneuver. As a result the bank employees face lots of difficulties when serving the customers. Different studies have shown that modification of design of interface of the softwares would help to reduce the error rate and increase production rate (Wo et al.2006, Chan et.al. 2009). Banking is the industry which deals with highly confidential data, that depends highly on information technology. All the products, service, marketing and distribution are carried through by information system. Furthermore, the most obvious characteristic different from manufacturing is that banking is a service trade and dispense with manufacture process. It is said that the most important resource of banking is customers. Banking commercial pattern is to provide finance service for customers and achieve profits from it. Therefore, usability of the banking software for the banking is crucial aspect to banking than many other traditional trades (Xiaoyu Li et al., 2004).

Some of the studies measured the influence of satisfaction and website usability in developing customer loyalty and positive word of mouth in the e-banking business (Luis et al 2008) but few studies were found on usability of core banking software from the banking employee perspective. The overall design of work calls for a distinctive approach on the user interface constraints to learn and use the core banking software with respect to employees in different banking services. Therefore this study focuses in finding out the constraints of user interface and explores the design scope of the banking software packages used by different commercial banks in India.

2. Methods

A quantitative research design was used in order to fulfill the objectives of the study. At the beginning questionnaire has been distributed among 100 bank employees working in 3 different commercial public sector banks. Finally seventy nine bank employees age ranging from 25 to 55 yrs (41.89 ± 6.49 years) (45 men and 34 women) (Table1) participated in the study. These employees were involved in various activities like maintaining customer data, doing transactions, interacting with the customers, compiling data, sending the data files to the head office by using the specific software provided by the bank.

Initially the interview and observational study was done to understand the process. Based on that observational study questionnaire was developed. A multi-method ergonomics review technique (MMERT), originally presented in ILO Occupational Health and Safety Encyclopedia (Nag, 1998) as work systems checklist, was administered for feedback analysis of the bank employees. To analyze the user interface issues related to ease of operation, flexibility & ease of learning of the software, 8 checkpoints of various categories were identified and included in the study. The checkpoints included the compatibility of the software, consistency & flexibility of using the software, learnability, actions required, memory load of the user, perceptual limitations and user guidance provided. The checkpoint entries were responded by a single digit score on five-point Likert's attitude scale (1932), referred to as strong disagreement (1) to strong agreement (5) to a given checkpoint; the low score is the positive indicator of the perception of a problem. The agreement and disagreement responses to a particular checkpoint was also converted to percentage to compare if there is any gender variation on the perception of user interface issues. The variables grouped under 8 categories as usability checkpoints are described in Table 2. Independent samples test (Levene's Test for Equality of Variance) of the test measures were performed. The components structures of the checkpoints were determined from the principal components analysis using a varimax rotation (Kaiser Normalization). The analysis allowed grouping of variables into subscales of components, elucidating the stressors of usability aspects of banking software of the bank professionals.

3. Results

The bankers participated in the study had the job experience of at least 5 years or more (Table 1), as reflected from their age range, which varied from 25 to 55 years. All participants who are included in the study worked in a fixed day time shift.

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Table 1. Description of the bank employees included in the study

Personality characteristics		**Number (%)**
Years of experience	<10yrs	12 (15.1)
	>10yrs & <20yrs	41 (52.0)
	>20 yrs	26 (32.9)
Age group	<40 yrs	20 (25.3)
	>40 & <50 yrs	49 (62.0)
	>50 &<60 yrs	10 (12.7)
Shift	Permanent day shift	

Table 2. Multi-method ergonomics checkpoints

Usability checkpoints	**Areas of checkpoints**
Compatibility	cursor compatibility, user expectations, user skill, conventions, wording
Consistency	color coding, display coding & menu options, cursor placement, display format, feedback, format, labelling, label format & location, display orientation, required user actions, display orientation, wording, data display, symbol, wording,
Flexibility	Menu selection, data entry, display, control, user guidance, training options, command, user selection
Learnability	Wording clarity, command language, command names, grouping, menu options
Minimal action	Data entry, control options, search options, menu selection
Memory load	Abbreviation and acronym, hierarchy, guidance, index, menu structure, codes, data partitioning, icons
Perceptual limitations	Coding, display, abbreviation, user guidance, commands, pairing, information
User guidance	System feedback, help, redundancy

Based on the analysis of the feedback of the participants it is found that the overall user interface of the software packages were not matched with the users expectations. Relative agreement scores of different test measures (mean ± SD) are presented in Figure1.The stresses related to flexibility (e.g. data entry) and user guidance (e.g. help) were perceived higher while operating the software. The principal components analysis allowed grouping of 8 usability checkpoints (variables), which were clustered over 2 components PC1 and PC2 (as shown in Table 3). The analysis revealed that two components PC1 and PC2 explaining 73% of total variance. PC1 (i.e., the first component) explained 58.2% of the total variance, as shown in Table 3 turned out to be the most critical components included in the study. The other component PC2 explained

14.9% of total variance. As PC1 and PC 2 explained most of the variance, these two components could be considered as most important usability aspects.

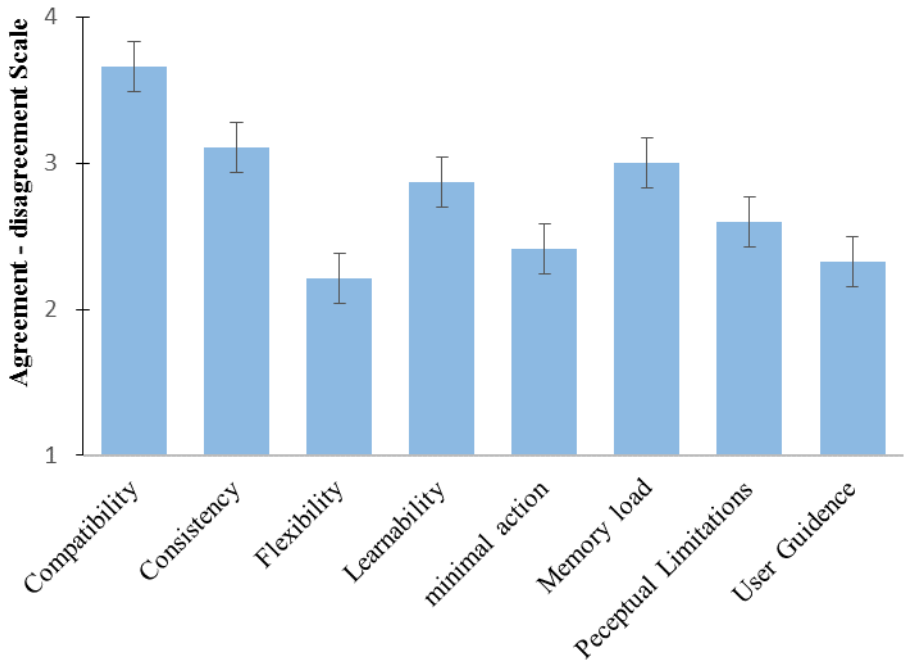

Figure 1. Relative agreement scores of different user interface aspects

Table 3. Principal components loading of different usability checkpoints of banking professionals

Check points	PC1	PC2
Compatibility	0.648	
Consistency	0.736	
Flexibility	0.862	
Learnability	0.676	0.602
Minimal Action	0.883	
Memory load		-0.961
Perceptual Limitations	0.817	
User Guidance	0.928	
Variance explained (%)	**58.22**	**14.9**

The statistics showed that the first principal component (PC1) is strongly correlated with seven of the original variables (check points) (Table 3). PC1 increases with the perceived scores of user interface issues related to user guidance (such as system feedback), minimal action (e.g. menu selection), flexibility, perceptual limitation (e.g. coding), consistency, learnability and compatibility of the software users in the banks. This suggests that these seven checkpoints vary together. If one increases, then the remaining ones tend to as well. This component can be viewed as a measure of the perceived quality and usability of the software. Furthermore, we see that the first principal component correlates most strongly with user guidance. In fact, we could state that based on the correlation of 0.928 that this principal component is primarily a measure of the user guidance. The other highly correlated check points are Minimal action (0.883), Flexibility (0.862), Perceptual

limitations (0.817) and Consistency (0.736). Learnability (0.676) and compatibility (0.648) also show fairly strong correlation with PC1.

The second component (PC2) increases with two of the values, Memory load (e.g. Abbreviation and acronym) (-0.961) and Learnability (0.602). This component can be viewed as a measure of memory load in terms of hierarchy, guidance, index, menu structure, codes, data partitioning, icons etc. with respect to perceived usability of the software.

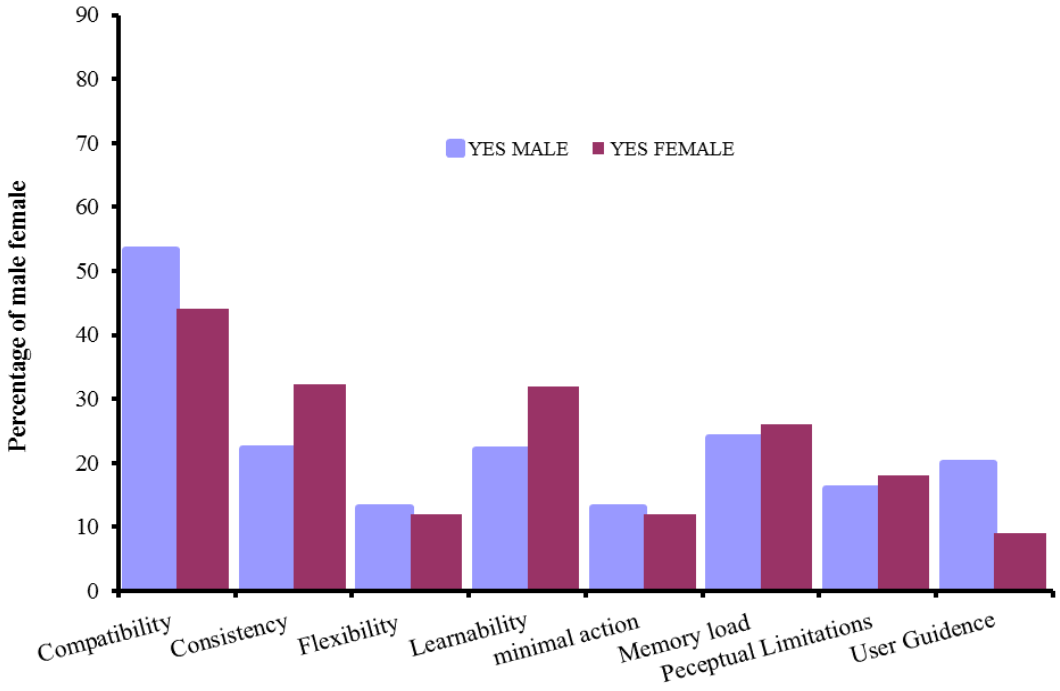

Figure 2. comparison of male-female response of agreemnet over the usability issues of the software (N=79)

The comparison of male female agreement response is presented in the Fig. 1. It is shown that few aspects they agreed similarly but in various aspects the response was not similar among men and women. In case of compatibility of the software package more that 50% of male users found the commands used to operate the software were compatible with the users' expectation on the other hand only little more than 40 % of women professional found it was compatible (Fig 1). The consistency of the commands and color code used was maintained throughout the design was supported by only 20% of male users however, more than 30% women agreed to the fact.

4. Discussions

As societies increasingly embrace pervasive immersive technologies the study aimed at finding out the constraints of user interface and the design scope of the banking software package used by different commercial banks in India from the perspective of bank employees. The analysis of user interface aspects of the software successfully identified most important usability constraints which might be considered for redesigning the software for more efficient banking operations.

It has been found from the study that the software package which has been designed for fulfilling the purpose of core banking and generate revenue for the financial organization was not perceived that usable by the bank employees. The employees complained about the user guidance options and flexibility to modify various commands provided by the software package. Users were allowed less flexibility in the software may be because of the security issues considering the banking scenario. However, minimum level of flexibility may be provided so that the operators can fix few less sensitive issues related to account of the customers and reduce the ineffective time. In the existing scenario, if entry error happened user

could not rectify the same; it has to be some other senior employee from the bank to be brought in, to authorize the system. Sometimes it required so many actions to get a simple work done leading towards repetitive task, loss of time and reduced productivity.

Men women overall agreed on the constraints of user interface aspects of the software, however more men (>50%) perceived that the commands used to operate the software were compatible with the users' expectation on the other hand less women (40%) professionals found it was compatible. The less number of male users thought consistency of the commands and color code used was maintained throughout the design. Similarly more women found the software learnability was alright however fewer women thought user guidance which was been provided by the software was not enough. The analysis brings out that in apparently similar working conditions and surroundings of the employees, the women responded differently due to the nature and characteristics of the tasks performed therefore using different set of commands.

The elucidation of the user interface stressors among bank employees was possible from the principal component analysis that revealed two principal components (PC1 and PC2), which explained 73% of the total variance. The employees had predominant user interface issues related to user guidance (such as system feedback), memory load (e.g. Abbreviation and acronym), minimal action (e.g. menu selection), flexibility, perceptual limitation (e.g. coding), consistency, learnability and compatibility of the software. As statistics revealed that these checkpoints vary together, design intervention of the following aspects has to be considered for better performance and smooth operations. Among all of the variance the users felt strongly about user guidance ambiguity, and high memory load; therefore these usability aspects could be viewed as a measure of the perceived quality and usability of the software. The research suggests that usability as an objective is synonymous with quality of use (Bevan 1995). On the other hand Garvin (1984), observed that Perceptions of quality can be as subjective as assessments of aesthetics, however in this case user perception mostly focusing towards user guidance (which includes help, systems feedback) and memory load (due to numerosity of abbreviation and acronym used, hierarchy etc.) is beyond look and feel of the product.

Problem related to consistency and compatibility of the command led to various ambiguity. For example different command was used for acquiring same help in different work windows. Human tend to rely on the most valid single cue that discriminates options while making decisions (Gigerenzer, 2001, Patterson, 2017), as a result in this case users had to remember heterogeneous commands resulting in higher memory load. It was also reported that software had several such diverse unfamiliar options which was not even known by the users and training material did not cover that elaborately. Resultantly, if one individual got transferred or assigned to a different job, there was a series of learning and unlearning of codes and commands happened for similar actions. It may be a combined problem of inconsistent commands and user guidance throughout the package as well as quality of training provided to the user. Standardizing commands and color coding trough out the software interface would not only help to reduce ambiguity but also reduce error rate and ineffective time during operation. Design of help section should be such that it is intuitive (Patterson, 2017), easily understood by the users at the same time commands should have higher recall value incorporating users' mental model (Gray, 1990, Held et al. 2006).

Based on the critical analysis the study could establish that there is a need to reconsider the design of user interface aspects of the banking software. Therefore, it brings out the need to focus especially in to two interface aspects; user guidance and memory load along with other aspects to make this software package more efficient and user friendly.

5. Conclusion

The areas identified through this research are mainly based on the responses of the existing user who were surveyed. More detailed study on bigger scale and sample size would help understanding and predicting the solution effectively. As there very limited evidence on any scientific and design oriented work into this area has been found, this pilot study attempted to identify the problems faced by the employees while interacting with such software at financial services institutions. This knowledge will influence researchers to design large scale studies for financial organizations for better understanding of usability criteria and incorporate them into design modifications in future.

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