Usability Study of Online Human Resource Information Systems at Fiji National University: A Case Study

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Abstract: Human Resource Information Systems (HRIS) are increasingly being implemented by universities in order to streamline processes and improve quality. Usability plays a very important role in improving the effectiveness of these systems. This study reports on an in-depth usability study of online human resource information system at Fiji National University. The study was carried out using sixty users who examined the system for usefulness, satisfaction and ease of use. The data gathered was subjected to reliability analysis followed by a comprehensive evaluation based on the specified usability criteria. The results portrayed that the usability problems were few and minor thus recommendations were derived to further improve the HRIS. Findings of this research can be applied to develop a set of guidelines to support the future design of online HRIS.

Key words: Usability, HRIS, usefulness, satisfaction, ease of use

INTRODUCTION

In today's globalized and knowledge based economy, access to accurate and timely information is of significance to successful organizations. They need to manage human resources effectively in order to gain competitive advantage in the market accessing vital employee information and this can be aided with the use of computer technology (Panayotopoulou *et al.*, 2007). Thus, development of Human Resource Information Systems (HRIS) over the years has led to greater human resource information access, analysis and application.

Kassim *et al.* (2012) defines HRIS as "a system used to acquire, store, manipulate, analyze, retrieve and distribute pertinent information about an organization's human resource management". The purpose has been to assist HR personnel and in particular managers to facilitate decision making. Organizations are becoming more and more dependent on HRIS for a number of management functions, namely storing information on employee details, payroll, leaves update and to more advanced applications such as recruitment and selection and human resource planning and evaluation (Kavanagh *et al.*, 2012).

This study focuses on the usability evaluation of a business critical HRIS System at Fiji National University (FNU). Based in the south pacific, FNU is one of the largest universities in the region with regards to student numbers and programs of study. In early 2012 FNU

implemented web based HRIS. The purpose of this system is to manage staff information throughout key human resource activities that is recruitment and selection, HR communication, performance appraisal and development. This is a large centralized computer based system that can be accessed online by all staff members of the University. In response to the dissatisfaction expressed by some staff members from across the organization and their reluctance to adopt the system, we carried an in-depth usability study of this substantial IT system.

This study aims to elicit users' perceptions and overall attitude towards human resource information system. It has been recognized in the literature that user information satisfaction significantly affects the success or failure of any information system (Granic *et al.*, 2008). We also specified three elements relevant to the assessment of this system: ease of use, usefulness and satisfaction. Data was collected through a three-part questionnaire with mostly closed questions. A comprehensive evaluation was then constructed by examining the individual scores, the free responses and the respondents' profile. The sample included a wide variety of users across the university who were then grouped into three types: service, academic and administration staff. Analysis was performed on the whole sample as well as on each of the groupings, yielding some interesting comparisons.

This study is organized as follows: we reviewed the literature on usability study, since no substantial body of

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knowledge existed on web based HRIS evaluation; we then expanded scope on website usability because their basic operations are same. Next we established a usability framework composed of three categories: ease of use, usefulness and satisfaction. We finally administered the usability test with sixty participants and analyzed the results leading to proposed means of improving the system usability.

Motivation: Usability testing of online systems is more difficult than testing traditional desktop applications for two main reasons; the users are located over different demographic settings and access applications concurrently and secondly they use different types of hardware and software in order to access the online applications. The usability of web-based systems has a great impact on users on a daily basis users are unlikely to re-visit a site if they encounter difficulties in using the site in case where alternatives are available.

Research background: The concept of usability has been in existence since 1980's, it has its roots in Human Computer Interaction (HCI) which examines the way users interact with the computer technology and looks at making this interaction effective. HCI is the study of how people design, implement and use interactive computer systems and how computers affect individuals, organizations and societies (Myers *et al.*, 1996). HCI involves a detailed study of the users' tasks, goals and behaviors when using computer systems and interfaces. Currently one of the most researched topics in HCI is the usability of web enabled systems (Ardito *et al.*, 2006).

Usability evaluation consists of methodologies for measuring the usability aspects of a system and identifying specific problems (Downing and Liu, 2009; Nielsen, 1993). Many researchers over time have identified various methods for usability evaluation. Nielsen (1993) categorized the methods into two groups: usability testing and usability inspection while Kim and Kim (2008) classified usability evaluation methods into three main categories: inquiry, inspection and testing.

We selected four studies on the usability evaluation of web based applications in order to review methods and purposes of evaluation research.

Ardito *et al.* (2006) used a Systematic Usability Evaluation (SUE) methodology for evaluating e-Learning applications. A SUE methodology is a general framework of usability evaluation which is a combination of two usability evaluation techniques; novel inspection technique and user testing. The researchers adapted the SUE methodology by refining the abstract tasks to suit that of an e-Learning environment. The abstract tasks

were derived by the researchers through the "experience in e-Learning application; the study of literature and a user study".

Lecerof and Paterno (1998) proposed to evaluate user interface using task models. The proposed model integrated an automatic tool which gives the designer information useful to evaluate and improve the user interface. This model was used to evaluate the Movie Guide application. The proposed model was used to measure the learnability, efficiency and relevance of the system. The task model included a set of temporal relationship between basic tasks and user actions. This was then tested on users to find the problems the users had encountered in completing the tasks and hence to identify the parts of the user interface that needs improvement.

Pribeanu *et al.* (2010) performed a formative usability evaluation of four municipal websites. The methodology consisted of two main components: a usability inspection method; heuristic evaluation and a user testing method; think aloud protocol. The heuristics used were based on six ergonomic criteria; user guidance, work load, adaptability and control, error management, consistency and standards and compatibility. A set of 24 heuristics was created by the integration of the ergonomic criteria proposed by Hewett *et al.* (1992) (Pribeanu *et al.*, 2010), with ten heuristics proposed by Nielsen (2003) (Pribeanu *et al.*, 2010). The study concluded that the "usability evaluation results depend mainly on testing the user interface with a set of tasks having a clearly defined goal and less on the set of heuristics used" (Pribeanu *et al.*, 2010).

Granic *et al.* (2008) designed a discount methodology for evaluating the usability of broad-reach web portals. The evaluation procedure consisted of the following steps: task-based end user testing, usability satisfaction questionnaire, semi-structured interview and guideline-based inspection (Granic *et al.*, 2008). The task-based end user testing involved a scenario-guided task assessment whereby the user's ability to complete the task was used to test the efficiency and effectiveness of the web portal. The user's satisfaction with the interaction aspects of the portal was measured using the System Usability Scale (SUS) questionnaire. Head (1999) argued that a SUS questionnaire yields the most reliable results across sample sizes. The study reported that the chosen research instruments, measures and methods for user evaluation produced consistent results.

We conclude the literature review by defining usability as a discipline that applies observation and measurements as well as design principles to the creation and maintenance of information systems.

Human resource information systems: Human Resource Information System (HRIS) provides a method by which an organization can collect, maintain, analyze and generate report (Kavanagh *et al.*, 2012). FNU implemented web based HRIS in 2012 to manage its employee information called PayGlobal HRSS. It allows users to easily access and manage employee personal details, payroll, leave and other administrative information online using a standard web browser.

This software is customized to provide following functions employee details, leave and recruitment and selection. Employee details feature allows the employee to manage and update their details. This feature provides details such as employee personal information, qualifications, contract, remuneration and job history. My leave feature allows the employee to view their leave balances, submit new leave requests, edit or delete their leave request and view their leave history. The new leave requests are forwarded to their immediate supervisor for approval. Payroll feature allows employees to view their pay slips. The two of the most widely used features of FNU-HRSS is employee details and my leave.

Employee details: Employees can update any active field in the details section, simply by editing the field and submit changes to the database. Managers may also have access to this information and be able to view and update selected fields. To change any of employee details, employees can click on respective tab and fill the required entries and click submit button, manager approval is not required and the data is updated immediately.

My leave: Using the my leave feature employees can view leave balances, request leave, edit or delete their leave request and view their leave history. The leave balances page displays balances for the leave types that employees are entitled to. Users can also update the leave requests they have submitted and this feature also allows them to view leave history. Using these features, users can also make new leave requests. The employee is required to complete online leave request form and submit it for approval. The leave request is then forwarded to the immediate supervisor for approval. Using these features, users can also make new leave requests. The employee is required to complete online leave request form and submit it for approval. The leave request is then forwarded to the immediate supervisor for approval.

Usability testing: Usability is a multidimensional construct that can be examined from various perspectives. Based on the requirements of our HRIS System we identified three categories for usability criteria: ease of use, usefulness and satisfaction appropriate to carry out evaluation for HRIS. Ease of use will measure how easily users can use the system, usefulness will measure the extent to which systems or services provides needed benefits while in use and satisfaction will measure the extent to which users believe that HRIS systems meets their requirement (Hornbaek, 2005). There are various methods for usability evaluation. Model/metrics based method uses model of tool to generate usability measure. Inquiry based method communicates with users to gain insights into usability problems. Inspection method reviews the user interface and tries it out to find problems. Testing method collects data to be analyzed while a user uses the system (Bury and Oud, 2006). The most fundamental usability method to acquire direct information on how people use technology and the challenges faced is testing method (Nielsen, 1993).

MATERIALS AND METHODS

Task and procedure: The tasks were identified as part of the study. The tasks included each evaluator going through the web based HRIS and performing a number of different activities such as updating personal details, applying for leaves, printing salary advice slip, etc. The academic and service staffs went through similar tasks whereas administration staffs were given additional tasks which they usually carry out daily such as approving leaves for academic and service staff.

Documentation and design: The documentation for the usability testing was prepared and instructions were given to participants to read prior to the actual testing. The instruction provides the aim of the research and the steps the participants will go through as part of testing session. The participants were asked to provide the background information such as age, level of computer literacy, etc. Then, the participants were given specific instructions to be followed as part of the experiment. For this research, the questionnaire was administered to a sample of 60 users. Since, the number of items was 12, the number of participants was four times the number of questions, the subject to item ratio was 5:1. The data collected did not contain the names of these participants. Figure 1 shows a sample question from the questionnaire.

Q8. Overall I am satisfied with the system				
0	1	2	3	4

Fig. 1: Sample questionnaire item

Reliability tests were performed using Cronbach's alpha coefficient to estimate consistency of the questionnaire.

Participants: The participants were recruited from FNU to perform the usability test. The participants consisted of service staff, academic staff and administration staff of FNU. It was voluntary for participants to take part in the study. Participants were required at the beginning of the questionnaire to identify which user group they belonged to and also indicate if they belonged to multiple groups.

Testing: The testing was carried out with 60 evaluators in a lab. All the participants were allocated an individual PC with internet connection. Since, there are a number of tasks to be performed the users were prescribed with different task order so learning curve is evenly distributed in the course of this evaluation. The evaluators went over the tasks number of times before filling the questionnaire.

Reliability and validity: Reliability is the correlation of an item, scale or instrument with a hypothetical one which truly measures what it is supposed to, Cronbach's alpha is a measure of the inter correlation of items. If alpha is ≥0.6 then the items are considered uni dimensional and may be combined in an index or scale. Cronbach's alpha is the most common form of internal consistency reliability coefficient. Alpha equals zero when the true score is not measured at all and there is only an error component. We carried out validity and reliability check on the data. All measures obtained from 60 individuals were subjected to reliability analysis to assess the dimensionality of the measurement scale. Only items with a high factor loading and no cross loading >0.70 were retained. Scale reliability was assessed in term of items to total correlation and

Cronbach's alpha to determine the internal consistency of the measurement scale. Table 1 shows the measurement test using Cronbach's alpha to measure the reliability of the questionnaire.

The results confirm that all measurements exhibited high reliability with coefficient alpha ranging from 0.83-0.95 exceeding or approaching the acceptable level of 0.70.

RESULTS AND DISCUSSION

The results obtained are very useful, all the evaluators applied themselves diligently to the prescribed tasks and provided excellent feedback documenting their experiences and opinion on many different aspects of usability as they interacted with the HRIS. As mentioned earlier, the evaluation was carried out by 60 employees, they were divided into three groups of users' namely academic staff, service and support staff and finally administration staff. The first and the third group of users were considered to be an experienced user group whilst the second user group was considered as inexperienced users. The analysis was conducted on closed-ended and free responses administered to all sixty respondents. Additionally, the research team attempted to ascertain the divergence between the experienced and inexperienced users' responses. We calculated the mean score and standard deviation, Table 2 provides the details of these results. The standard deviation around the mean was computed as an indicative measure of the user's consensus of the system. Correlation, a statistical technique was utilized in the analysis of experienced to inexperienced users of FNU-HRIS to determine the association or relationship between the two sets of data. Usability testing of the HRIS resulted in following findings.

We analyzed the results based on three usability criteria that we have sat usefulness, satisfaction and ease of use. The questions 1-4 were based on usefulness, 5-8

Table 1: Correlation coeeficient of mean

Measure	No. of items	Cronbach's alpha
Ease of use	4	0.83
Usefulness	4	0.85
Satisfaction	5	0.92

Table 2: Distribution of mean and standard deviation

Academic				Service and support				Administration staff			
Mean	SDEV	Min.	Max.	Mean	SDEV	Min.	Max.	Mean	SDEV	Min.	Max.
3.8	0.45	2	4	1.3	0.58	1	2	3.6	0.86	3	5
3.6	0.55	3	4	2.0	1.00	1	3	3.5	0.41	3	4
3.2	0.84	2	4	1.3	0.58	1	2	3.6	0.80	3	5
3.6	0.55	3	4	2.3	1.00	2	3	4.1	0.85	3	5
3.6	0.55	3	4	2.8	1.00	3	5	3.8	0.57	3	5
3.4	0.89	2	4	2.6	1.15	3	4	4.1	0.44	1	5
3.2	0.84	2	4	2.8	1.53	1	4	4.0	1.52	3	5
4.2	2.07	3	5	3.6	0.53	1	5	4.2	0.45	3	5
3.2	0.84	2	4	2.8	0.58	1	4	3.8	0.53	2	5
3.0	0.71	2	4	2.7	0.57	1	4	3.3	0.51	2	5
3.2	0.84	2	4	2.3	0.58	2	3	3.5	0.50	3	5
3.3	0.76	2	4	2.8	0.55	1	4	3.6	0.55	2	5

on satisfaction and 9-12 on ease of use. In the next study, we provide recommendations to improve the shortcomings that we have highlighted in the HRIS System.

Usefulness: In order to understand the usefulness of HRIS System, the three user groups mean rating was between 1.3-3.6, indicative that the user being either unable to carry out tasks to moderate application or neutral to the to the task assigned. The lowest rating was furnished by the service and support group which is understandable since they fall in the category of inexperienced users. The other two groups obtained similar rating of 3.6-3.8 which indicates either being neutral or unaffected how easy it was to perform tasks. In addition, researchers determined a standard deviation; for the first and second user groups (academic and admin staff) value ranged from 0.45-0.55, a low standard deviation indicating a consensus among the experienced user respondents. The third user group (service and support staff), showed in two scenarios SD of 0.58 and in other cases yielded a value of 1 which indicated differing views of the respondents. Finally, correlation coefficient of -0.7 was established between admin user group and service and support user group, this was contributed to the fact that admin group are experienced whilst the service and support group are occasional users.

The second question of the usability testing was to discover if worker performance has been impacted. Once again the respondents' ratings were between 1 and 3.6 with SD of 0.5 indicative of a neutral to strongly disagreeing opinion. There is a consistency in the ratings given by the first two groups, the academic and the administration staff. The explanation for lower rating is particularly due to the third group, the service and support members. Furthermore in the free responses users have indicated a need for the system to upload documents while applications are made on the HRIS. This has been the drawback of the current system.

With regard to the question: "Does using HRIS improve overall productivity", rating has been between 1.3 and 3.6 with SD of 0.84 suggesting a strongly disagree to neutral perception. Many respondents mentioned that they had to get documents scanned in another location and then email to HR department, this was unnecessary waste of time. Despite respondents neutral responses to usability based questions, they in particular stated that improvement in the system was needed in the area of time taken to fill out the application online. A number of staff member mentioned that at times the system would give a "time out" message and they would have to start the whole process all over again.

Satisfaction: To gauge the satisfaction of the HRIS System the three groups of users have provided mean scores ranging from 3.2-4.5, this indicates that user's views are generally from being neutral to agree. Subsequently standard deviation ranging from 0.5-1.5. A high standard deviation indicative of skill set of the different users. Finally, correlation coefficient of 0.76 between admin and academic users, strong positive associations portraying both groups have similar views on satisfaction.

The questions addressed the simplicity of the system where all groups of users have indicated that the system is simple to use however users have rated very poorly for the interface of the system. The results contributed to mean ranging from 2-3 and SD 0.5-0.8, portraying a consensus view of the users. Although, the system has good visual appearance but there are few concerns with how the controls are organized on different pages. The submit buttons on some pages are hard to find and clear buttons are not provided. There are also too many contents provided in each of the form. To complete a simple task of applying for any leave the users have to go through series of three to four interfaces. All three groups of users have agreed that the system provides adequate instructions to use the system but these instructions are not provided using simple user jargons thus these instructions are difficult to follow.

Ease of use: To analyze the third criteria, researchers tested the ease of use for the HRIS System. It can be seen that the mean rating given by the respondents was a maximum of 4.6 and a minimum of 3, SD ranging from 0.4-0.9. This generally indicates that views are neutral to agree. Looking at the analysis, it can be realized that the three groups of staff have different views on the ease of use of the system, hence, the yielding correlation coefficient -0.9. It is evident the academic staff have the lowest mean thus the reasons furnished under the free responses by staff are that the HRIS is very slow in processing leave requests. This is due to the fact that leave requests goes into the pending queue and wait for the approval from the immediate supervisor who needs to log into the system to endorse. In case, the immediate supervisor is not available, the leave application does not automatically move to the next level for approval.

The academic staff also stated that little help is provided by the system/application itself and that in case of errors they have to seek help from the ICT department. Overall the academic staffs have stated that they are able to use the system efficiently to complete their task. The Service and Supports staff purported that only some of all the information they need is available on HRIS. As for some, staff has to go back to the personal file to get more
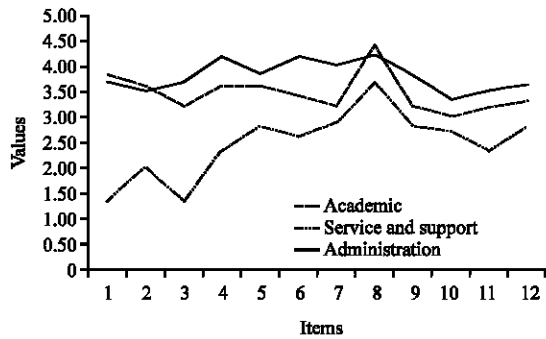
Fig. 2: Sample questionnaire item

information. On the other hand, the admin staffs taking the highest average have generally agreed that the HRIS is very comfortable to use and that they are able to complete all tasks efficiently.

Key findings: In this study, we performed an analysis on overall sample for all the user groups based on the mean score attained. This yielded some interesting comparisons. Figure 2 portrays the graph of mean scores determined by all groups based on the three usability criteria specified.

Figure 2 shows the three usability criteria tested on x-axis where questions 1-4 indicating usefulness, questions 5-8 indicating satisfaction and questions 9-12 showing ease of use. In general view the questions on usefulness of HRIS System shows that academic and administration staff have similar views on all four of these questions because the mean gap is quite small and this is treated as insignificant. The mean gap is larger between service and support as compared to academic and administration staff. As mentioned earlier, the service and support are inexperienced groups of users. For the second usability criteria satisfaction, the employees have given they view as very close to agreeing and the mean gap is also very small for question 8 which asks the users on overall satisfaction shows that all three graphs are on the peak this indicates that users have compared this system with the manual system that was in place before the implementation of web based HRIS. Since, the system is available online that can be accessed anywhere anytime would have affected their ratings. For the third usability criteria on ease of use all three groups have provided lower mean scores ranging from 2.4-3.6, there are few issues that users have highlighted in free responses the administration group has provided very favorable mean since they use the system daily in the recommendations section we have provided the ways in which we can improve the system.

Challenges and lessons learned: Based on our experience with the usability evaluation study conducted on the

users of FNU, the team congregated valuable lessons which we believe can be utilized whilst evaluating usability of HRIS or in similar large institutions.

The evaluation team was confronted with two major challenges during the conduct of the usability evaluation study. One such challenge faced by the team was due to the involvement of multiple users with different level of skill and work background. Training was conducted to overcome this challenge and facilitate user knowledge in managing each task.

Reliability of the data collected was another issue that the evaluation team encountered. There was a need to determine whether the same set of questions would portray the same responses if the questionnaires were re-administered to the same set of respondents hence, a need to conduct a validity and reliability test. The team decided to apply the Cronbach's alpha which is one of the most popular reliability statistics in use these days, we, therefore, believe is well suited to the needs of this research.

CONCLUSION

This case study presented here demonstrates that usability is an important tool in improving the system. As part of this study we carried out an in depth usability evaluation of web based HRIS. In order to evaluate the system, we established usability evaluation criteria usefulness, satisfaction and ease of use that can be utilized for formal usability testing. Our research team administrated the testing with 60 users who were divided into three broad categories academic, service and support and administration. The use of usability evaluation has some limitations, lessons learned for reducing the impact of these limitations were presented. These lessons can serve as a guide to others applying this method to evaluate other HR Software. The results showed that usability problems were very few and minor. Based on the evaluation results we proposed ways to improve system usability by improving upload document feature, online video tutorials, improving user interface, additional SMS notification feature and comprehensive user instructions. This case study demonstrates that there is a need to conduct usability evaluation for HRIS. Future research is needed to further refine the usability evaluation methodologies for HRIS applications however this study serves as an incremental step in the right direction.

RECOMMENDATIONS

To improve HRIS System usability we used the data gathered and its analysis in previous phases. The following describes ways to improve the system in terms of usefulness, satisfaction and ease of use.

Upload document feature: The system should include a feature whereby the user may scan and upload documents such as medical sick sheet, travel documents, etc. in order for the leave processing to commence, therefore reducing turnaround time. With the current system users have been scanning documents and transmitting via a separate email to authorities concerned followed by dispatching the original via courier.

Online video tutorials: To address the issue of inexperienced users or even new users, the system ought to provide online video tutorials, this would be a step by step user guide to carry out tasks such as application of leave, update details and print pay slip.

User navigation: In order to improve the user navigation, the number of forms required a single task should be reduced from averagely three to one. All the forms should have controls such as submit and reset buttons which should be clearly marked and labeled. In addition the colors used are too monotonous and dark, thus it is difficult for the user to view the text. Therefore, it is proposed that the system should employ appropriate color combination to assist in distinguishing text on the label.

SMS notification: An additional feature should be implemented in the system which would send SMS notifications to the immediate supervisor for any new leave request that has been pending for their approval. Furthermore, the system should include a second feature whereby unattended leave applications are automatically forwarded to the next level after the lapse of three working days.

Comprehensive user instruction: As a final point the system should provide a comprehensive user instruction that is as a user clicks on a text box, concurrently a message pops up providing instructions. It is extremely important that this feature in the HRIS is improved. The system must be upgraded so that the processing is faster while serving all employee requests. Moreover, all information about the employee must be readily available in the HRIS System database so that staff can easily find all the required information.

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