A CONCEPTUAL MODEL OF USER SATISFACTION FOR ELECTRONIC HUMAN RESOURCE MANAGEMENT PORTAL

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ABSTRACT

Automation of Human Resource Management is the current trend in the business world. The implementation of the HR automation need to be researched to help the HR professionals to reap the benefits. However one of the critical dimension, namely the user satisfaction with portal technology, specifically the business-to-employee (b2e) portal that enable Electronic Human Resource Management (eHRM) implementation potential has not been studied adequately in prior research. In this paper, we propose a conceptual model for eHRM portal user satisfaction, which was derived from an extensive literature review of existing user satisfaction instruments and the eHRM portal. Nine dimensions of the eHRM portal user satisfaction were identified: Information Content, Ease of Use, Convenience of Access, Timeliness, Efficiency, Security, Confidentiality, Communication, and Layout. This model has been checked using users of a large organisation currently implementing the eHRM concepts to automate a few Human Resource Management activities and is found to be significant and valid.

Keyword: Conceptual model, user satisfaction, eHRM portals, employee portals

INTRODUCTION

The usage of the Internet into all business activities within organisations has profoundly altered the business process between organisation and its employees. For many years, the web-based Intranet had been a well used tool of many organisations for building a more committed work force (Azzone & Bianchi, 2000).

These portals enable the Human Resource (HR) professionals to offer the benefit of a quick implementation of the electronic HR management as compared to other options of creating software for each need separately. While easy to implement, we also need to take in to account the user's satisfaction, namely the employee's satisfaction at the time of implementation so as to make sure the implementation takes care of the requirements of user satisfaction early on in the project. This study aims to find those user requirements in general.

Even though HR portals have provided benefits for many organisations, these intranets have a number of limitations such as lack of personalisation, lack of a consistent approach and poor navigation (HR Focus, 2004 and Ryley, 2001). Furthermore, the web-based Intranet does not provide centralised information which means that finding relevant and accurate information is often time-consuming. As a consequence, organisations lose a lot of productive employee time (Turban, King, Lee, Warkentin, Chung, 2002).

One way to overcome this problem is through the implementation of the Electronic Human Resource Management (eHRM) using the business to employee (b2e) portal technology.

The eHRM portal represents a single web browser interface which contains customized and personalized information, resources, applications, and e-commerce options that become a primary tool by which employees perform their work (Ransdell, 2000). Through the Internet connection, employees are able to access a range of internal and external information from their desktops, notebooks, or mobile devices. They are provided with relevant proprietary information displayed in the password-protected portals. While reducing the information overload, the eHRM portal also provides a number of benefits to both organizations and employees, such as reducing organizational costs, improving corporate communication, and improving employee productivity (see Tojib, 2003 for detail).

Moreover, the eHRM portal integrates four key zones of employee interactions (Teuke, 2001). The first is the employee-to-enterprise zone, which mostly covers traditional HR functions such as updating personal files and scheduling leaves. This is achieved through the integration of the Employee Self Service (Broad Vision White Paper, 2001) and/or the Manager Self Service (Oracle, 2012). The second is employee-to-employee zone which facilitates collaboration among employees. The portal integrates group-ware applications which enable employees to share information and ideas with colleagues and to collaborate through email, chat, or discussion threads (Sugianto & Tojib, 2005). The third is employee-to-task, where the portal offers tools and applications specific to each employee's job function (Hewlett Packard, 2004). For instance, sales staff may have access to pricing information, the amount of stock held in the warehouse; finance staff might have access to the organisation financial report. The last zone is employee-to-life. The portal links employees to a range of internal and external information, such as staff travel information, employee financial planning, or weather news (Hewlett Packard, 2004). By accessing the portal, employees are able to perform not only their allocated responsibilities but also their administrative and other personal tasks.

REVIEW OF LITERATURE

The nature of an eHRM is understood from the works of Lepak and Snell 1998 who had defined the eHRM as the usage of Information Technology in the Human Resource management function so as to let the employees themselves perform their HR needs such as Employee benefits on their own.

However for such HR technology is to be considered successful, it must change the work performed by the Human Resources Personnel by dramatically improving their level of service, allowing more time for work of higher value and reducing their costs (Walker 2011).

The eHRM portal development has received fairly extensive attention in the business literature (for example, BEA white paper, 2002; Cruz, 2000; Deimler & Hansen, 2001; Geib, 2013; Oracle, 2012). Several organisations including Boeing Co, Shell International, General Motor, and Ford Motor Company have invested a large amount of resources to develop and introduce such portal to their employees (Bannan, 2002). However, very little attention has been paid to measuring the effectiveness of eHRM portal in delivering their intended benefits. Among the myriad forms of assessment of IS

effectiveness, end user satisfaction is one of the most widely used measures (DeLone & McLean, 1992). Furthermore, as the success of eHRM portals is determined by the extent to which they satisfy the portal users' requirements (Musgreave and Porter, 2002), examining user satisfaction with eHRM portal is an important area of research.

Our review of the user satisfaction literature shows that there is no study specifically aiming to examine user satisfaction with the eHRM portal. The existing user satisfaction instruments in the IS field are considered inappropriate for eHRM portals for the following reasons: first, embedded within the eHRM portal are technologies with functionalities that are distinct from those employed within the end user computing or traditional data processing environment (that is, search and retrieval processes, work flow systems, online self service applications, and collaboration tools) (Tojib, 2003); second, past studies in the information system literature scarcely touch on the patterns or processes by which users collaborate with each other (Ong & Lai, 2004), an important function which can be facilitated by the eHRM portal.

The purpose of this paper is to address this gap in the literature and explore the development of a conceptual model of user satisfaction with the eHRM portal. The organisation of the paper is as follows. The next section describes a review of past user satisfaction studies. In the section that follows, the model identification of user satisfaction with the eHRM b2e portal construct is discussed. Finally, we report on the progress of this research study and our future plans, followed by conclusions.

USER SATISFACTION WITH eHRM B2E PORTAL

Definition of user satisfaction

The definition of user satisfaction has evolved with changes in the Information Science (IS) environment (Simmers and Anandarajan, 2001). Early research on user satisfaction was conducted in the Traditional Data Processing (TDP) environment (for example, Bailey & Pearson, 1983; Ives, Olson, Baroudi, 1983), in which users interact with the computer indirectly with the assistance of an analyst or a programmer (Ong and Lai, 2004). User satisfaction has been defined as 'the extent to which users believe that the information system available to them meets their information requirement' (Ives, Olson, Baroudi, 1983: 785). Later research on user satisfaction has been conducted in the End User Computing (EUC) environment (e.g., Doll and Torkzadeh, 1988), in which users interact with the computer directly, through application software, to enter information or produce reports (Wu, Wang, Chien, and Tai, 2002). User satisfaction has been defined as 'an affective attitude towards a specific computer application by someone who interacts with the application directly' (Doll and Torkzadeh, 1988: 261).

The eHRM portal is very commonly operated in a web-based environment. However, the way the users interact with it is similar to how they interact with computer applications in the EUC environment. Once the users successfully access the portal, they can perform their work- related or personal tasks without needing to consult with Information Technology (IT) support persons unless technical problems occur. In other words, they interact with the portal directly. In this study, we adapt the Doll and Torkzadeh (1988) definition and define user satisfaction with eHRM portal as an 'affective attitude towards the eHRM portal by employee who interacts with the portal directly'.

User Satisfaction Studies

As user satisfaction has been top of the IS research agenda for almost twenty years (Haga & Zviram, 1994), it is one of the most widely researched topics in the IS field (Harrison & Rainer, 1996). Therefore, it is not surprising that, since the 1980s, considerable conceptual and empirical studies have been devoted to establish a standard user satisfaction instrument. A thorough review of the past user satisfaction studies has identified three broad streams of research. The first group measures user satisfaction with the overall IS/IT systems (for example, Bailey and Pearson, 1983; Ives, Olson, Baroudi, 1983). The second group focuses on end user satisfaction with a certain type of IT application (for instance, Doll & Torkzadeh, 1988). The third group focuses on end user satisfaction with web-based information system (for example, Muylle, Moenaert, Despontin, 2004; Otto, Najdawi, and Caron, 2000).

User satisfaction with overall IS systems

Bailey and Pearson (1983) first attempted to develop a semantic differential instrument to measure user satisfaction with general IS in TDP environment. Thirty nine items contributing to user satisfaction were identified based on a review of twenty two studies of the computer/user interface (Bailey & Pearson, 1983). In follow-up research, Ives, Olson, and Baroudi (1983) tested the Bailey and Pearson (1983) instrument for its reliability and validity. Their findings suggested retaining thirty three items for evaluating user information satisfaction (see appendix 1). Furthermore, they attempted to produce a shorter version of this instrument through the application of factor analysis. The results showed that the short version consisted of three factors: EDP Staff and Services, Information Product, and Knowledge and Involvement. These factors are measured by thirteen items (refer to the

paper for the items). Later, Baroudi and Orlikowsky (1988) reaffirmed the reliability and validity of the Ives, Olson, Baroudi (1983) short-form instrument through a psychometric evaluation. Since then, many other researchers used Bailey and Pearson (1983) and Ives, Olson, Baroudi (1983) instruments when measuring user satisfaction with overall IS systems. Some researchers adopted those two instruments (for example, Mahmood & Becker, 1985; Raymond, 1987; Montazemi, 1988; Foley & Newman, 1988; Bergeron & Berube, 1988; Anderson, 1989; Iivari & Karjalainen, 1989; Iivari & Ervasti, 1994) while the others adapted them (for example, Khalil & Elkordy, 1999) depending on their purpose of research. Very few researchers in IS (for example, Baronas & Louis, 1988; Nath (1988) developed their own scales to measure user satisfaction.

User satisfaction with specific IT application
The emergence of low cost desktop Personal Computers (PCs), the decentralisation of IT development policy, and the availability of user-friendly software applications in the late 1980s and early 1990s have led to the proliferation of the EUC environment (Powell & Moore, 2002 ; Downey, 2004). Recognising the changes in the IT environment, researchers argue that the available user satisfaction instruments are inappropriate for the EUC environment in which end users develop and/or interact directly with specific applications (Doll and Torkzadeh, 1988). Doll and Torkzadeh (1988) were the pioneers in developing and validating the first EUC satisfaction instrument which focused on measuring user satisfaction with a certain type of IT application. This instrument is based on a factor model consisting of 5 first order factors (that is, content, accuracy, format, ease of use, and timeliness) measured by 12 items. Following the publication of Doll and Torkzadeh (1988), a large number of

researchers adapted or adopted their measuring user satisfaction with certain type of IT application (for example, Glorfeld & Cronan, 1992; Seddon & Yip, 1992; Palvia, 1996; McHaney & Cronan, 1998; Downing, 1999; McHaney, Hightower, & Pearson, 2002; Zviran, Pliskin, & Levin, 2005). Furthermore, those who developed new instruments had also considered Bailey and Pearson (1983), Ives, Olson, & Baroudi (1983) works as their reference instruments (for instance, Barki & Huff, 1985; Wan & Wah, 1990; Igbaria & Nachman, 1990; Seddon & Yip, 1992; Lawrence & Low, 1993).

User satisfaction with web-based IS

During the 1990s, there were significant changes in IT, especially with the rapid growth of the Internet. In this period, an increasing number of organisations exploited and created business opportunities on the Internet (Liao & Cheung, 2001). Furthermore, the widespread use of internet technology enabled the development of web-based information systems. In the field of user satisfaction, some researchers attempted to develop new instruments or used or adapted available instruments to measure user satisfaction with web-based applications. Those who developed new instruments are Ho & Wu (1999), Cho & Park (2001), Huang, Jin, Yang, & Chiu (2004), Muylle, Moenaert, Despontin, 2004. Doll & Torkzadeh (1988) instrument seems to be still in favour to measure user satisfaction with web-based IS (for example, Otto, Najdawi, & Caron, 2000; Simmers & Anandarajan, 2001; Xiao & Dasgupta, 2002; Abdinnour-Helm, Chaparro, & Farmer, 2005).

CONCEPTUAL MODEL

Heeks (2009) identifies correctly that over 80% of the Information Technology (IT) projects in developing countries fail. Given that in our country the adoption of IT in the HR area is at the initial stages the HR person who is interested in making his job easier by making IT enabled HR to take care of the manual work has to be vigilant in ensuring the success of such IT projects in his area.

As Nah, Lah and Kuang(2011) identify user satisfaction to be a key determinant in the adoption of IT projects, it is important that we explore the determinants of user satisfaction to make future implementation of eHRM a success.

Domain Identification

Based on the survey of literature in the recent past we find that currently we do not have any established theoretical framework for measuring user satisfaction with the eHRM portal. A theoretically grounded model of user satisfaction with the eHRM portal necessitates a careful review of the existing general user satisfaction instruments and extant literature. The aim of this review is to identify the domains of user satisfaction with the eHRM portal.

Two widely accepted instruments for measuring user satisfaction in IS research, Bailey and Pearson's (1983) and Doll and Torkzadeh's (1988) scales, were examined. In addition, six other instruments measuring user satisfaction with specific IT applications such as data warehouse (Chen et al., 2000), eHRM benefit systems (Huang et al., 2004), asynchronous learning system (Wang, 2003), internet shopping (Cho and Park, 2001), knowledge management systems (Ong and Lai, 2004), and website (Muylle, Moenaert, & Despontin, 2004) were also considered for domain identification purposes. Finally, since the interface medium of the eHRM portal is typically a website, three other scales measuring website quality (Loiacono, Watson, Goodhue, 2002),

internet shopping site quality (Yoo and Donthu, 2001), and web portals service quality (Yang et al., 2005) were examined to explore the extent to which they are related to the domain in question.

A study on those instruments identified a range of dimensions contributing to user satisfaction with general IS, certain type of IT applications as well as end user perception of quality of websites and web portals. These dimensions were then grouped into three main categories: information quality, system quality, and system design quality. Information quality and system quality are two major perspectives that have been widely examined by a large number of IS researchers when developing research model of end user satisfaction (eg. Bailey & Pearson, 1983; Doll & Torkzadeh, 1988; Yang, et.al, 2005). System design quality is another perspective that is increasingly being examined when developing research model of user satisfaction with websites (eg. Yoo and Donthu, 2001). As portal's interface is generally take in the form similar to websites, it is important to investigate the system design quality when developing a model of user satisfaction with the eHRM portals. Other factors which do not fall into these three categories were excluded from further investigation.

Observation of the wide range of dimensions reveal that naming dimensions contributing to user satisfaction might be quite challenging. Some researchers use different dimension names but they essentially have identical meanings. For instance, factor 'Ease of use' (Doll & Torkzadeh, 1988; Cho & Park, 2001; Muylle, Moenaert, & Despontin, 2004; Yoo & Donthu, 2001) is similar in meaning to factor 'Learner interface' (Wang, 2003) as well as factor 'Usability' (Chin, Diehl, &

Norman, 1988; Yang, et.al, 2005). Thus, the next step was to group dimensions that are different in name but similar in meanings (shown in Appendix) and created a common name for each grouped dimension.

To review the dimensions two broad criteria were employed. First, the dimensions must be used in most measures of user satisfaction with various type of IS and IT applications. We believe that dimensions which have conceptual and empirical relevance to most general user satisfaction scales can be appropriately included in the eHRM portal user satisfaction domain. Second, the dimensions must be theoretically associated with the eHRM portal environment. While the features and content of eHRM portal may vary from one organisation to another, its primary characteristics are the same regardless of their applications in the portals. As can be seen in the portal packages offered by vendors, both large (for example, mySAP, Hummingbird, Oracle, and PeopleSoft) and small portal vendors (for instance, Workscape and ProAct) offer eHRM portal solutions with identical characteristics (that is, the portal must be accessible any time whenever there is an Internet connection, must incorporate a single log-on procedure, provide role-based content to each employee, enable employees to do more tasks electronically with the integration of self service applications, and act as a medium of communication between the organisation and its employees as well as employees with their colleagues). Thus, these major characteristics were considered when investigating dimensions of the eHRM portal user satisfaction.

Careful examination of the above criteria and characteristics resulted in the identification of nine dimensions of the eHRM portal user satisfaction: (Information) Content, Ease of Use, Convenience of Access, Timeliness (currency of information), Efficiency, Security, Confidentiality, Communication, and Layout. Each of these nine dimensions is discussed in the following paragraphs.
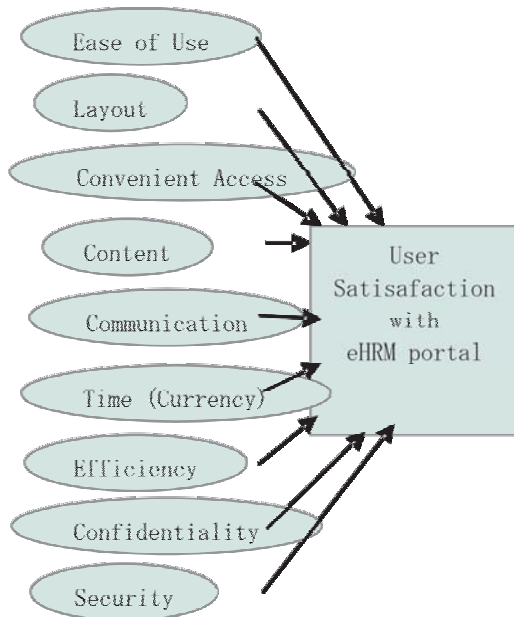

Figure 1. Conceptual Model of User Satisfaction with eHRM EHRM Portal

EHRM Portal User Satisfaction Dimensions

Content (Information content): This dimension was derived from Information Content dimension which has been typically measured in previous studies in terms of its accuracy, relevancy, currency, reliability (eg. Doll & Torkzadeh, 1988; Bailey & Pearson, 1983; Ong and Lai, 2004; Yang et al., 2005; Chen et al., 2000; Muylle, Moenaert, & Despontin, 2004). In this study, Information Content is referred to as the relevancy, accuracy, currency, and reliability of information presented to each employee

based on his/her role in organisation.

Convenience of access. Employees must be able to access the portals regardless of time and location as long as Internet connection is available (Melville, 2004). The eHRM portal clearly provides convenience for employees, particularly those who spend more time out of office during working hours or those who work remotely from home. They could remain updated with the organisational news and at the same time perform their work-related and personal tasks by accessing the portal. Thus, in this study, Convenience of Access is referred to as the ability of the portal to be accessed any time and anywhere through intranet, internet, or even mobile devices.

Ease of use. The ease of use dimension is an important dimension for portal users, given that employees are traditionally not required to use eHRM portal in their day to day activities. This view is also supported by Dias (2001) who stated that portal users should easily locate and access the right information, with minimum training. In this study, Ease of Use is referred to as the extent to which the portal is perceived to be user friendly. This includes ease of navigation, training issue, feels of being in control, and learnability.

Timeliness (Currency of information). Portal users require information on-demand fairly quickly or the information becomes obsolete (Rushinek and Rushinek, 1985). As lengthy response time may cause lower user satisfaction and poor productivity (Hoxmeier and DiCesare, 2000), it is very important to ensure that the portal users are satisfied with the portal's response time. Thus, the existence of timeliness will increase satisfaction and the absent of timeliness will decrease satisfaction with the eHRM portal. In this study, Timeliness is referred to as the ability of the portal to deliver requested information in a reasonable response time before it becomes obsolete.

Efficiency. End user satisfaction with the system is likely to increase if they believe that using the system will increase their performance and productivity (Mawhinney and Lederer, 1990; Vlahos and Ferratt, 1995). In other words, end users believe that if the system could assist them in improving their performance and productivity at work, the system is useful to them. Perceived usefulness has the strongest impact on end user satisfaction (Calisir and Calisir, 2004). In this study, Efficiency is referred to as the ability of the portal to assist employees in performing their tasks better and faster, streamlining work processes, and, hence, improving their productivity.

Confidentiality. In the case of the eHRM b2e portal, many of the Employee Self Service (ESS) applications enable employees to submit or retrieve their personal information electronically. Hence, privacy/confidentiality issues have been a serious concern in the online eHRM portal environment (Vernon, 2002; Yang et al., 2005). The ability of the portal to maintain the confidentiality of employees' personal information is likely to be associated with user satisfaction. The dimension Confidentiality is defined as the ability of the portal to provide a sense of assurance that any personal information retrieved or submitted from and through the portal will not be misused by authorised people.

Security. The Security dimension in this study was intended to tap a more encompassing aspect, namely the ability of the portal to provide a secure access to all applications and facilities provided. Hence, this dimension includes issues relating to the security breach of the portal, such as data theft, which will increase in proportion to the number of organisations storing their personnel files electronically (MHRIS, 2002).

Communication. Ong & Lai (2004), Wang (2003), and Yang et al. (2005) found that the ability of the system to enable system users to interact with others influence user satisfaction. In the eHRM portal context, the portal acts as a medium of communication between organization and their employees as well as employees with other colleagues (London Financial Times, 2002). Thus, the ability of the portal to act as a communication medium among employees may be an important indicator for user satisfaction with the eHRM portal. In this study, Communication is referred to as the extent to which the portal could mediate interaction (i.e., information sharing and collaboration) between employees and the organisations as well as employees and their colleagues.

Layout. This dimension was derived from Chin, Diehl, and Norman (1988), Cho and Park (2001), Huang et al. (2004), Loiacono, Watson, & Goodhue (2002). They have confirmed the importance of system design quality in measuring user satisfaction with IT applications. Given the role a portal plays as the interface between the employees and the organization, effective portal design must be seen as a prerequisite for successfully implementing eHRM initiative. This view is supported by Muylle, Moenaert, and Despontin (2004) who stated that effective website design is needed to ensure the success of instituting an e-commerce initiative. Thus, an attractive and aesthetic portal design may be an indicator of user satisfaction with the eHRM portal. In this study, Layout is referred to as the design of the interface and display of the information.

VALIDATION OF THE MODEL

The authors are engaged in a long-term research study to develop a reliable and valid tool for measuring user satisfaction with the eHRM applications. The instrument has since been constructed for a b2e portal serving as an eHRM tool, based on the conceptual model described above. A pilot study has been performed to understand the relative importance of the identified factors for user satisfaction with the eHRM portal in an educational institution practicing eHRM.

Based on the empirical pilot study made on a large educational organisation with over 2000 employees and who are also users of a eHRM portal managing part of the HR functions, the identified factors leading to employee satisfaction was tested to find the most important ones as follows.

The empirical study had focussed on using all the nine variables identified from the literature survey as above in measuring the employee's perception about the current eHRM b2e portal and their level of satisfaction as well.

During the pre-testing of the questionnaire we found that the dimensions on Security and Confidentiality were not at all recognised as a factor by the employees and was hence dropped from the questionnaire as the question might confuse the respondents. Communication also had to be dropped as this aspect of b2e had not been implemented by the eHRM portal yet.

On further analysis we found that the employees perceived the intranet environment where the application had been deployed is likely to be more secure as compared to an internet based application where there is a possibility of data theft and the resultant risks to them. We need to explore further if this perception is unique to this organisation or will it hold to other organisations practicing eHRM in the intranet as well.

Finally the questionnaire that was administered had questions that concerned both satisfaction about the eHRM b2e portal as well as the following dimensions
i. Ease of Navigation
ii. Efficiency in finding information relevant for the user-consumer
iii. Clarity of the available information (another facet of information efficiency)
iv. Layout and visual aesthetics of the portal
v. Currency of the information
vi. Ease of entering and exit from the portal for the user-consumer

based on the employee's perception about the intra-net and the level of awareness, we found that it is possible to create a model using the multiple regression to predict the level of user satisfaction given the attention given to the following dimensions of the eHRM b2e portal in the order of heir relevance.
1. Currency of information
2. Clarity of information
3. Efficiency in finding relevant information
4. Ease of Navigation

The other two factors, namely layout and visual aesthetics as well as ease of entry in to (log-in) and exit (log-out) from the application had very low level of significance in predicting portal use satisfaction. They had a significance score of 0.0002 and 0.0003 respectively and hence with a sample size of about 80 employees, these two factors had not been included in the regression model.

It is needed to study further on why the other dimensions like security and confidentiality were not taken seriously by the employees of this organisation. The authors how ever do not plan to drop these three dimensions (security, confidentiality and communication) in their future validation studies for the model.

Future plans of this study include collection of data through questionnaires for the purpose of conducting confirmatory study and establishing construct validity, which includes discriminant validity, convergent validity and nomological validity across a wider variety of organisations including other sectors.

At the time of these validations it is also proposed to test the linkages among the variables as well with the model to be constructed using Structural Equation Model.

CONCLUSION

This paper presents a conceptual model that formulates few dimensions which belong to the domain of user satisfaction with the eHRM b2e portal. The model forms the basis on which a new instrument to measure user satisfaction with such portals has been developed.

The model has been validated in a limited fashion with an organisation practising eHRM application based on an intra-net based eHRM portal and has been found be having a good predictive ability for user satisfaction.

It has thus laid the groundwork for expanding research on user satisfaction studies within web-based eHRM environment using the same model across other organisations.

The findings of this pilot study are limited by the very nature of the sample organization chosen, namely the nature of educational institution where the eHRM solution has been implemented and studied. Generalization of the study has to incorporate similar studies in varied industries and sizes of organisation with respect to number of employees. The scope of further research will focus on these gaps from the current study so as to validate the proposed model to enable future implementation of eHRM applications to be well prepared on these factors to be successful.

Appendix

A. Dimensions of User Satisfaction Conceptual Model

	Group	Factor	Source
No	**INFORMATION QUALITY**		
1	Information Content	Content	Doll & Torkzadeh (1988)
		Knowledge content	Ong & Lai (2004)
		Usefulness of content	Yang, et.al (2005)
		Adequacy of information	Yang, et.al (2005)
		System output	Nath (1989)
		Accuracy, for mat, preciseness	Chen, et.al. (2000)
		Information	Huang, et.al. (2004) Bailey & Pearson (1983)
		Reliability	Bailey & Pearson (1983)
		Currency	Bailey & Pearson (1983)
		Completeness	Bailey & Pearson (1983)
		Information comprehensiveness	Muylle, et.al. (2004)
		Relevancy	Bailey & Pearson (1983)
		Information relevancy	Muylle, et.al. (2004)
		Information comprehensibility	Muylle, et.al. (2004)
2	Format of output	Format of output	Bailey & Pearson (1983)
		Format	Doll & Torkzadeh (1988)
3	Volume of output	Volume of output	Bailey & Pearson (1983)
	SYSTEM QUALITY		
4	System accuracy	Accuracy	Huang, et.al. (2004) Bailey & Pearson (1983) Doll & Torkzadeh (1988)
5	Timeliness	Timeliness of content	Doll & Torkzadeh (1988) Bailey & Pearson (1983)
		Response/turnaround time	Bailey & Pearson (1983)
		Website speed	Muylle, et.al. (2004)
		Processing speed	Yoo & Donthu (2001)
		Response time	Loiacono, et.al (2002)

			Doll & Torkzadeh (1988) Cho & Park (2001)
		Ease of use	
		Ease of use	Muylle, et.al. (2004)
		Ease of use	Yoo & Donthu (2001)
	Ease of use Ease of use	Learner interface	Wang (2003)
		Ease of understanding	Loiacono, et.al (2002)
		Intuitive operation	Loiacono, et.al (2002)
		Usability	Chin, et.al (1988)
		Usability	Yang, et.al (2005)
6		Knowledge manipulation	Ong & Lai (2004)
7	Flexibility	Flexibility	Bailey & Pearson (1983)
8	Usefulness	Information fit to task	Loiacono, et.al (2002)
		Perceived utility	Bailey & Pearson (1983)
		Fulfillment of end users needs	Chen, et.al. (2000)
9	Convenience	Convenience	Huang, et.al. (2004)
		Convenience of access	Bailey & Pearson (1983)
		Accessibility	Yang, et.al (2005)
10	Security	Security	Huang, et.al. (2004)
		Security of data	Bailey & Pearson (1983)
		Security	Yoo & Donthu (2001)
		Trust	Loiacono, et.al (2002)
11	System efficiency	System efficiency	Nath (1989)
12	System capabilities	System capabilities	Chin, et.al (1988)
		System characteristics	Nath (1989)
13	Personalisation	Personalisation	Wang (2003), Ong & Lai (2004)
14	Knowledge map	Knowledge map	Ong & Lai (2004)
15	Communication	Learner community	Wang (2003)
		Knowledge community	Ong & Lai (2004)
		Interaction	Yang, et.al (2005)
16	Hyperlink connotation	Hyperlink connotation	Muylle, et.al. (2004)
17	Language customisation	Language customisation	Muylle, et.al. (2004)
18	Tailored communication	Tailored communications	Loiacono, et.al (2002)
	SYSTEM DESIGN QUALITY		

		Interface	Huang, et.al. (2004)
		Screen	Chin, et.al (1988)
		Site design	Cho & Park (2001)
		Entry guidance	Muylle, et.al. (2004)
		Website structure	Muylle, et.al. (2004)
		Layout	Muylle, et.al. (2004)
	Layout	Aesthetic design	Yoo & Donthu (2001)
1		Visual appeal	Loiacono, et.al (2002)
2	Innovativeness	Innovativeness	Loiacono, et.al (2002)

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