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Affective Enterprise Resource Planning Tools in Academic Management

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Abstract: In this thesis on Enterprise Resource Planning Tools Management in Private Higher Education in South Africa, the study utilized multiple sources of data collection in a mixed manner, namely; use of interviews and focus groups (in-depth interviews) in qualitative investigations and questionnaires in a quantitative study in order to determine critical issues influencing the adoption of Enterprise Resource Planning (ERP) tools in academic management in Private Higher Education Institutions (PHEIs) in South Africa. A mixed methods (qualitative and quantitative) research methodology was used pragmatically in the study paradigm to triangulate the results of the research from an interpretive position. The research analyzed and reported on subjective and quantitative data to ascertain knowledge about the participants' recognition of critical issues affecting adoption of ERP tools in academic management in Private Higher Education Institutions (PHEIs) in South Africa. In this study, the following groups of participants were purposefully sampled: students, lecturers and management staff working in the three PHEIs in Gauteng. The study found that academic attainment in PHEIs could be enhanced through effective ERP tools management in ICT integration. In light of the research outcomes, the study highlighted students' personal interactions through online conference tools, a practice that may be backed up and carry the same weight and recognition as physical learning contact hours. The qualitative and quantitative data analysis raised a debate that HE ERP systems must or may integrate all those particular factors that coordinate and interact as changes made in one factor should also reflect in another factor or module. ERP tools security features should be instituted at all levels of the main tools. Issues of integration in the selection of any robust, dynamic PHEI tools may call for an organization's financial readiness and company-wide consultations with potential users of the system. Bringing in such a discussion in preparation to single out tools that may be selected over time may be an issue that is seldom shared by top HE executives, as other decisions in the ERP tools selection may seem to be imposed upon departments. HE ERP that does not have a student portal, without integrated online issues of applications, checking of results, enhancement of teaching and learning but partly integrating one or two departments in isolation to others, may not be considered fit or robust as a higher educational ERP tool.

Keywords: Private Higher Education Institutions (PHEIs), Enterprise Resource Planning (ERP) tools, Information and Communication Technology (ICT); Factor analysis, Higher Education (HE). Nvivo qualitative data analysis, Reliability statistics, SPSS version 25 (Statistical Package for the Social Sciences).

1. Introduction

According to Tabbara (2016), DeLone and McLean's model within the Information System success models, was used in United Arab Emirates HEIs ERP systems in the construction of a post-ERP measurement framework, identifying and measuring the value of ERP systems in higher education. A critical study of this case confirmed that problems exist in both system and service quality.

Recent studies have highlighted the need for South African Higher Education Institutions to take into consideration the user experience in ERP tools as a prerequisite to user perceptions, in the acceptance of technology and to apply post-implementation measurement frameworks. In the fusion of technologies to learning management systems, enterprise resource planning software tools was shown to be at the heart of Information Communications Technology (ICT), within a guided framework (Stoltenkamp and Siebrits, 2015).

1.1. Theoretical Background

In this research, the theoretical framework underpinning the study contained hypotheses or speculations that controlled the reasoning with respect to how to comprehend and design the exploration

of the study. This incorporated ideas and definitions from the hypotheses that were pertinent to this research.

In this exploration, DeLone and McLean's Model was utilized as hypotheses supporting the investigation, apart from other Data Framework general speculations in ERP tools administration. DeLone and McLean's hypothesis was produced in 1992 and had been broadly utilised as the standard for the legitimisation of ward factors in Data Framework or Information Systems Achievement (IS). DeLone and McLean's hypothetical system clarified critical issues under examination by looking at integrated elements that have an effect on ERP Administration. Six expansive regions supporting the hypotheses were delivered, ordered as: Framework quality; Data quality; Utilise; Client fulfilment; Singular effect; and Authoritative effect. DeLone and McLean's hypothesis on Dispersion of Innovation meant to recognise an interrelated arrangement of maintainability factors on an officially settled ERP framework (post execution) and further promoted that the round of questioning of supportability factors helped in expanding ERP client esteem, being a focal centre of administration, inside the Technological Hierarchical Condition also known as the Technological Organisational Environment (TOE). The TOE was seen as an idea of Data Frameworks, by and large, in understanding the ERP's post usage factors and the difficulties around clients' points of view and authoritative execution.

From DeLone and McLean's Model, there is a linkage or derivative of Basic Achievement Elements (Critical Success Factors) Structure within it, incorporating other IS hypotheses that may fill in as rules for following the ERP tools administration and business change hones in meeting partners' necessities; in managing gaps or inadequacies in the ERP framework; and further streamlining the techniques for ERP tools management as the establishment required in the commencement, selection and change of the ERP instrument's administration.

The derived conceptual framework from DeLone and McLean's Model and IS general speculations connected to DeLone and McLean's model may fill in as a focal point in comprehending things under investigation, and might for the most part be valuable when it coordinated significant hypotheses which catch diverse perspectives of the study, and may not simply be an arrangement of hypothetical modules and thoughts. Yet additionally, some sort of intelligibility to the related pieces that are being united are applied to the structure that is grounded on important hypothetical survey of writing, and experimental discoveries of past research, concentrating on researcher's own knowledge, duties, qualities and convictions.

This study on affective ERP tools in academic management indicates how the created structure, the conceptual framework and the rationale for the research area, got its underlying foundations from DeLone and McLean's Model as theory supporting the exploration inside Information System general theories in ERP tools organisation (Grant and Osanloo, 2014; Lotfy, 2015; Nizamani *et al.*, 2014).

1.2. Rationale for the Research Area

Looking at critical issues regarding managing ERP tools for integrated management systems in academic ERP could reveal what was actually happening within ERP integration and would help formulate a clearer picture through which conclusions can be drawn and recommendations made. The study could suggest a framework for effectively managing service quality and system deficiencies. It was believed that academic attainment in PHEIs could be enhanced through ERP tools management in ICT integration as published in the "Policy for the Provision of Distance Education in South African Universities, in the context of an Integrated Post-school System as set out in the Schedule as policy in terms of section 3 of the Higher Education Act, 101 of 1997" (Saide, 2014).

1.3. Learning and Information Exchange

In respect of the above, it may arguably be seen that PHEIs had a lot of work to re-look into their internal cultures. As explained by Kasemsap (2018) in the study about "*The Role of Knowledge Transfer in Modern Organisations*", there was a disclosure review of learning exchange; information exchange, work portability and work assorted variety; learning exchange and backup points of view; hindrances to information exchange; information exchange and absorptive limit; learning exchange and information securing; learning exchange and virtual groups; and the propelled issues of learning moves in current associations. The way towards exchanging information was a continuous movement of picking up, modifying and making strides. At the authoritative level, information exchange shows itself through changes in the learning of a unit. Best learning exchange endeavours effectively include both the wellspring of the information and its recipients. Setting up execution desires for the individuals who will utilise the learning, further evaluates the estimation of the exchange. Institutions considering or utilising

information exchange forms ought to persistently assess their web-based life status. The advantages of information exchange for working environments incorporates the increments in efficiency, speed, readiness, benefits and development.

This study looks at ERP tools management in PHE in South Africa: critical issues affecting ERP tools in academic management.

Business organisations tend to have centralised continuous improvement operations. Quality teams work directly with business units to help implement standard practices around competency, processes and procedures. Quality is expressed as an ever-changing state associated with people, processes, services and products in an environment that seeks to meet customers' needs and expectations for superior value-add (Goetsch and Davis, 2014).

As reported by Ahmer *et al.* (2016), Higher Education Institutions (HEIs) in Pakistan realised the "challenges of continuously improving the quality of higher education, stimulating growth and the use of innovation, leading to educational developers increasingly opting for Enterprise Resource Planning systems (ERPs) to reduce operational costs, enhance effectiveness and gain a competitive advantage. Countries where ERPs have been implemented and studied include Belgium, Columbia, France, Switzerland, Jordan, Australia, Slovenia, United Kingdom and the United States of America. The past few years have recorded significant growth in the use of ERPs in the Higher Education sector globally. The aforementioned authors in corroboration, showed a gap in that there have been many implementation studies on ERPs in different areas, but few had been conducted exploring issues influencing the managing of systems in academic management in private higher education institutions.

According to Ben and Wan (2013), regarding contingency modelling in the enterprisation of operations, ERP was viewed as a software platform with software tools that connect information from all the main areas of the institution in the sense that it is an Information Communications Technology enabler that harnesses the technological power in organisational systems literacy by using computers in the management of information. ERP tools cut across the different parts of the organization with the purpose of continuous improvement in decision-making. Laudon and Laudon (2012) agreed with Ben and Wan (2013) and Swink *et al.* (2014) in that all core business areas (customer, supplier and employee relationships) are digitally enabled.

2. Research Methodology

A convergent mixed methods design was used", which is a type of design in which qualitative and quantitative data are collected" simultaneously and analysed separately, and then merged to provide an analysis of the research problem (Creswell, 2015;2018).

In this study, quantitative data using the survey method was used to test the proposed framework, predicting that ERP Critical Success Factors (CSF*)* within the Technological Organizational Environment (TOE) positively or negatively influenced users' perceptions within the cross impact analysis of the ERP systems at the selected Private Higher Education Institutions in Gauteng.

The data collection instruments were administered to students, academic staff and management as ERP users.

Qualitative data was collected by making use of focus groups and in-depth interviews that explored critical ERP management issues impacting the ERP tools in the selected PHEIs. Quantitative data was collected by making use of a survey that included a sample selected from the population under research study.

The reason behind gathering both quantitative and subjective data was to triangulate the results, allowing for an in-depth understanding of ERP tools management towards better recommendations for continuous improvement.

Within the strategy of research that portrayed the mixed methods approach, the quantitative research technique was deemed suitable in leading the investigation in accomplishing its targets. The exploration was directed at indigenous habitats where study respondents participated in the study willingly. The poll, the information inquiry about the instrument, was adjusted to the chosen quantitative strategy in the accumulation, gathering and investigation of information in influencing utilisation of Likert-type rating scale. The categories in the survey were planned in such a way that pointed to issues raised in the review of literature. The survey that filled in as strategy instrument for essential information accumulation was conveyed to members through messages. A Google investigation was of important use for a programmed gathering of information by graphical and numerical examination besides SPSS.

3. Findings
Findings from the Primary Research (Statistics)
3.1. Factor Analysis
With SPSS version 25 (Statistical Package for the Social Sciences) (2019), the raw data on factor analysis was displayed as annexures within the appendices section of the study. Factor analyses of results were interpreted by variables which were coded in the variable view window, given short descriptions and matched to full names. In this study, 58 participants took part in the study which had 31 items on the Likert-rating type of scale with the following number of participants per centre: PTA: 42, Braamfontein: 9 and Menlyn: 7.

All the items that were ordinal by selection were selected to measure the Factor analysis of the scale output. The items to the scale were loaded together in the SPSS software with no idea in mind as to how they could form or be divided up. This was an exploratory task that saw how the items came flowing together. The Factor analysis selection in the SPSS software package followed the order as depicted below:

The researcher clicked analyse button: went to dimension reduction, then chose factor where responses with individual variables were chosen or loaded. On descriptives, the initial solution was selected with the four correlation matrices; coefficients, significance levels, determinant and KMO and Bartlet's test of spherecity. The stage that followed was the extraction window. The researcher added scree plot to the default selection which had eigenvalues greater than 1 whereby factors would be selected with eigenvalues that exceeded one.

The rotational block after the extraction window had two types presented, the orthogonal and direct /oblimin. Orthogonal could be chosen if items were not correlated within these selections; varimax, quatrimax, equanax and promax. For purposes of this study, direct correlation was chosen with the belief that the items were correlated or related. The next window was the scores which were left by default and the last selection was the options window which was by default and no cases were excluded as all the data was populated.

The Factor analysis was run and the following deductions could be made: too high correlations could suggest that the items shared the same thing. With determinant, it got to be more than .00001. If it is below .00001, it shows that items were too unrelated showing that there are too low correlations. KMO above .5 is very acceptable. The higher the value that is above .5 is considered to be better. Bartlet's test of spherecity that was .000 suggested that the p value or the probability value is less than .001. Eigenvalues in connection to the scree plot: The values that are above the eigenvalue of 1 are considered very acceptable matched to the cumulative variance that is above 50. Pattern matrix: The pattern matrix explained how the items loaded together. In this study, by default; SPSS loaded 10 items that converged, other items were excluded.

The input to the Cronbach alpha and Factor analysis was collected by making use of google analytics with an online survey.

3.2. Reliability Statistics
With SPSS version 25 (Statistical Package for the Social Sciences) (2019) Reliability statistics were interpreted by variables which were coded in the variable view window, given short descriptions and matched to full names. In this study, 58 participants took part in the study which had 31 items on the Likert-rating type of scale with the following number of participants per centre: PTA: 42, Braamfontein: 9 and Menlyn: 7. The test of reliability that measured the validity of the scale was run in SPSS as follows: clicked analyse tab, selected scale then reliability statistics, items, , alpha selected and proceeded to Statistics tab where the following tabs were chosen; item, scale, scale if item deleted and correlations under Means.

The Cronbach alpha that is above .65 is considered good. When the Cronbach alpha is way above .65 close to 1 is considered better. The difference between the Cronbach value found and 1 represents the error in the designed instrument. The goal is to achieve a 100 percent error free instrument but above .65 is very acceptable.

In this study, the following Cronbach alpha's were output in the SPSS per centre:
PTA: .832
Braamfontein: .864
Menlyn: .714

3.3. Findings from Literature and Theory

Several studies as shown by Moonsamy and Singh (2012), Eid (2017), Spathis (2013), Hitt *et al.* (2017), Lotfy (2015); Maas *et al.* (2016) reported on the formulation of an integrated framework and development of appropriate strategies, as revolutionary tools besides existing quality models in management systems. As indicated by the above mentioned authors, the study results provided a direction for future research for more effective integration in ERP management. It is this gap that this study intended to exploit as additional elements within integration, such as management of the ERP tools; as the ERP system gets punctuated in meeting the current needs of the firm.

4. Conclusions

The study recommends that there may be a need for HE departments that are stakeholders or those that assist PHEIs to help in formulation of a standardised HE ERP architectural system that may meet most needs of the PHE ERP tools. ERPs that are found in the market as already configured Learning Management Systems (LMS), may be expensive to buy and manage by many PHEIs. A standardised system may be easy to manage and supervise within a certain policy. The standardised ERP is not to be enforced upon PHEIs, but should be a matter of choice in adopting it or not.

Private higher education institutions may integrate or have their own parallel ERP systems to the standardised one.

Having education ERP tools with a vibrant website may be considered a competitive bid by many potential customers or students, a place to enroll with. Vibrant PHEI ERP tools with a dynamic HE website may be perceived as the online university of the moment by numerous potential clients.

It is recommended to PHEIs to maintain and go above the current level of ERP tools robustness which at present has been revealed to be easier and efficient to use. In the event that there is an addition to the tools, tools managers should ensure that systems integration does not bring about a downgrade of the present versatility of the tools.

References

Ahmer, Z., Demir, E., Tofallis, C. and Asad, H. (2016). Usage of Enterprise Resource Planning Systems in Higher Education Institutions in Pakistan. Available at: http://uhra.herts.ac.uk/bitstream/handle (Accessed 20 June 2017).

Ben, C. and Wan, Y. (2013). Managing enterprises and ERP systems; a contingency model for the enterprisation of operations. *International Journal of Operations & Production Management, 11(12): 1458-89.*

Creswell, W. J. (2015). Research Design. Qualitative, Quantitative, and Mixed Methods Approaches. 4th Edition. London: Sage Publications.

Creswell, W. J. (2018). Research Design. Quantitative, Qualitative, and Mixed Method Approaches. Michigan: Sage Publications.

Eid, M. I. M. (2017). User adaptation and ERP benefits: moderation analysis of user experience With ERP. *Kybernetes, 46(3): 530-49.*

Goetsch, D. L. and Davis, S. B. (2014). Quality management for organizational excellence. 6th Edition. Pearson. Available at: http://abufara.com/abufara.net (Accessed 18 June 2017).

Grant, C. and Osanloo, A. (2014). Understanding, Selecting, and Integrating a Theoretical Framework in Dissertation Research: Creating the Blueprint for Your "House. *Administrative Issues Journal, 4(2): 12-26.*

Hitt, M. L., Wu, J. D. and Zhou, X. (2017). Investment in Enterprise Resource Planning: Business Impact and Productivity Measures. *Journal of Management Information Systems, 19(1): 71-98.*

Kasemsap, K. (2018). The Role of Knowledge Transfer in Modern Organisations. Rajabhat: IGI Global.

Laudon, K., C. and Laudon, J., P. (2012). Management Information Systems. Managing a Digital Firm. 12th Edition. New York: Prentice Hall.

Lotfy, M. A. M. B. (2015). Sustainability of enterprise resource planning (ERP) benefits post implementation: An individual user perspective (Order No. 3716715). Available: https://search.proquest.com/docview/1709468828?accountid=10612 (Accessed 11 May 2017).

Maas, B. J., Fenema, V. C. P. and Soeters, J. (2016). ERP as an organizational innovation: key users and cross-boundary knowledge management. *Journal of Knowledge Management, 20(3): 557-77.*

Moonsamy, V. and Singh, S. (2012). Full Length Research Paper A 21st Century framework for quality management. *African Journal of Business Management, 6(45): 11231-42.*

Nizamani, S., Khoumbati, K., Ismaili, I. A. and Nizamani, S. (2014). A Conceptual Framework for ERP Evaluation in Universities of Pakistan. Available at: https://arxiv.org/abs/1402.0116 (Accessed 12 May 2017).

Saide (2014). Government notice. Government gazette, 535(37811): 3 - 20. Available at: www.saide.org.za (Accessed 20 March 2018).

Spathis, C. (2013). The usefulness of ERP systems for effective Management. Available at: https://scholar.google.co.za (Accessed 25 April 2017).

SPSS version 25 (Statistical Package for the Social Sciences) (2019). IBM International. IBM.

Stoltenkamp, J. and Siebrits, A. (2015). The infusion of emerging technologies in complex higher education. Available at: https://www.semanticscholar.org/ (Accessed 25 April 2017).

Swink, M., Melnyk, A., S., Cooper, B. M. and Hartley, L. J. (2014). Managing Operations Across the Supply Chain. 2nd Edition. New York: McGraw-Hill Irwin.

Tabbara, A. (2016). The use of ERP systems in higher education institutions in the U.A.E (Order No. 10130167). Available at: https://search.proquest.com/docview/1816212966?accountid=10612 (Accessed 11 May 2017).