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Influence of Task Complexity in a Banking Technology Project on Knowledge Transfer among Kenyan Commercial Banks

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Abstract:
Effective knowledge management enhances sustainable competitive advantage of organisations. Influence of task characteristics on task-based knowledge transfer has not received adequate attention from academic researchers. The objective of this study was to investigate the influence of task complexity on knowledge transfer in banking technology projects among commercial banks in Kenya. The indicators of task complexity construct used in the study include decision making complexity, sensitivity to changes, task variability, task overlap complexity, uncertainty in resource requirement, and misapplication of knowledge complexity. The target population comprised of the 43 commercial banks which are licensed by the Central Bank of Kenya (CBK) under the Banking Act (Cap. 488). A quantitative research methodology involving explanatory survey was used in the study to achieve the study objectives. Using census, all the 43 commercial banks were surveyed. Stratified sampling technique was used to target 240 respondents from the 43 commercial banks' management employees. The target respondents were management employees who have participated in a project to implement any kind of banking technology. According to CBK (2015), there were 10,310 management employees in Kenyan Commercial Banks in the year 2015. Quantitative data was collected from the 126 respondents, sampled from all the registered commercial banks. Quantitative data analysis techniques such as descriptive statistics, inferential analysis, linear regression and multiple regression modelling were applied to the quantitative data using IBM SPSS Statistics 2015. To test the hypothesis and measure the strength of linear or multiple association of study variables, the Pearson Coefficient was be used to test the significance of the predictor variable to the dependent variable at 95% level of confidence. The t-test was applied on the regression model at 95% level of confidence. The decision to reject or fail to reject the null hypothesis was based on the significance of coefficients ($p < 0.05$) of the predictor variable in the fitted regression model. The study findings show that there is a strong, positive, direct and significant relationship between task complexity and knowledge transfer in banking technology projects among Kenyan Commercial Banks. Therefore, this study concludes that task complexity is good measures of knowledge transfer in banking technology projects among Kenyan Commercial Banks. The study recommends that in the banking technology projects, complexity of banking technology project tasks should be addressed by managers by way reducing by having complex tasks split into smaller simpler tasks, availing experts during task performance, identifying knowledge sources that would simplify complex tasks, enhance collaboration, codification of task-based knowledge of complex tasks etc. This recommendation was directed to all commercial banks in Kenya as they continue to implement various banking technology and innovations aimed at enhancing their competitiveness in the banking industry. The study suggests further research on other task characteristics variables such as task structure, task interdependence, task significance etc in varying environment or context to assess their relationship with knowledge transfer towards their inclusion in the task-based knowledge management theories and practice.

Keywords: *Task complexity, banking technology, banking technology projects, task-based knowledge management, knowledge transfer*

1. Introductions

In the recent years, research in the field of knowledge management has concentrated its attention to exploring the effect of knowledge management on organisation performance; organisational learning, innovation and organisational core competence in acquiring and sustaining competitive advantage (Stonehouse & Pemberton, 2005). Indeed, the paradigm for

knowledge management governs the generation of new ideas and corporate learning (Nonaka, 2007), knowledge creation (Nonaka, 2007) and innovation thinking (Schilling, 2005). This has been influenced by the emergence of knowledge economy in which knowledge is identified as the most critical resource for any organisation overtaking the traditional resources of labour, materials, land, and capital. Knowledge transfer capability is a critical component of knowledge management strategy and knowledge management practice. Effective knowledge management practice is generally identified as a key strategic differentiator for modern organisations (Alavi & Leidner, 2001). The existing literature primarily reflects knowledge transfer focus as an enabler to business gaining competitive advantage through the enhancement of organisational learning, organisational core competence, intellectual capital and innovations.

According to Senaji and Nyaboga (2011), despite the competitive necessity of becoming a knowledge-based organisation, senior managers have found it difficult to transform their firms through programs of knowledge management practices such as knowledge transfer. Senaji and Nyaboga (2011) posit that it is necessary that organisations increase their capacity to successfully implement knowledge management processes such as knowledge transfer and leverage on knowledge assets for sustainable competitive advantage.

Banking technology projects, like any other strategic projects are implemented by people (who are characterised by their knowledge capability i.e. knowledge, experience, skills and talents, behaviour) using defined processes, methodologies and tools (characterised by their technical strength and limitations or constraints), the ability to transfer task-based knowledge, while working effectively on a series of project tasks (each task may have unique characteristics) is critical to a better outcome of any strategic project. A review of knowledge transfer literature suggests that the effects of task complexity on knowledge transfer capability in under-researched.

1.1. Literature Review

1.1.1. Knowledge Transfer

There are two basic questions that bother organisations with respect to knowledge transfer, how can the critical knowledge resource that exists in the organisation namely tacit and explicit be disseminated within the organisation to improve organisation's competitive advantage, strategic positioning and long term superior performance? And how can new knowledge acquired during new product development or innovative services redesigning to increase the value and demand of these products or services and lead to sustainable competitive advantage?

An investigation of knowledge transfer in banking technology projects among commercial banks aims at answering the second question. This is because, one of the strategic objectives of banking technology in commercial banks is to create innovative banking products or service that increase customer value and experience thereby enhancing sustainable competitive advantage.

Banking technology projects aim at delivering of new banking products and services through innovations. The success of banking product and services innovation initiatives is dependent on knowledge transfer capability. Effective knowledge transfer capability positively influences innovations within organisations, increases intellectual capital and, enhances organisational learning and core competencies (Schilling, 2005).

By the way (2015) identifies key knowledge areas that are critical to knowledge transfer capability in a banking technology project. These includes knowledge on strategy content on banking technology, knowledge on business model for commercial banks, knowledge of banking processes and operations, knowledge on commercial bank's strategic need, and the overall commercial banks corporate strategy. These knowledge assets should be supported by knowledge on capability of the banking technology that is fit for purpose. Effective knowledge transfer in a technology project occurs when users of the banking technology find it easy to use the technology as suggested by (DeLone & McLean, 2016), Davis (1989) and Davies (1993).

1.1.2. Task Complexity

Task complexity is composed of two constructs, task difficulty and task variability (Haerem, Pentland & Miller, 2015). Task complexity refers to the degree of difficulty of the decision-making process, and task variability refers to the numbers and types of exceptional cases to perform the task that require different work procedures, both of which increase the variability of costs and benefits (Sicotte & Beland, 2001). The available literature suggests that task complexity is a function not only of objective characteristics of a task, but also of how individuals subjectively mentally model the task i.e. cognitive processing requirements of the individual. Anderson and Sedatole (2000) define task complexity for technology integration as driven by uncertainty about resource requirements and whether technology integration meet specifications, and Haerem, Pentland and Miller (2015) develops a measure of task complexity that encompasses task difficulty, task variability, and environmental uncertainty.

Other literature on task complexity within banking technology projects tasks divides the constructs into two; task complexity by differentiation and task complexity by interdependency (Anderson & Sedatole, 2000). Other school of thought within the task complexity literature view complexity of tasks in technology projects as involving high innovativeness, different interacting new technologies, many interrelated parts and sub-systems, a high fraction of newly designed system

parts, and directed to a poorly understood business requirements making the project carry high levels of risk (Tatikonda & Montoya-Weiss 2001, Anderson & Sedatole, 2000).

2. Purpose of the Study

The purpose of the study was to investigate the influence of task complexity on knowledge transfer in banking technology projects among Kenyan commercial banks.

3. Research Methodology

Given the objectives of this study, quantitative research methodology using an explanatory survey was found to be the most appropriate. Cooper and Schindler (2003) posit that the quantitative explanatory research design seeks to establish a casual relationship between variables using quantitative data. According to Babbie (2009), quantitative research method provides superior research results because the causal relationships between variables are easy to interpret.

In this study, the investigation is on the causal relationship between task complexity and knowledge transfer in banking technology projects among Kenyan commercial banks. Cooper and Schindler (2003) also urge that explanatory study goes beyond description of observed data, and attempts to explain the reasons for the phenomenon that the descriptive study only observed. Whereas a descriptive study would look at what is going on, an explanatory study seeks to explain why it is going on (Sekaran, 2013). The available literature on knowledge transfer research showed that quantitative research methodology using an explanatory survey is the most preferred research method. Structured questionnaires using a 5-point Likert scale as a tool of data collection was deemed to be the most appropriate and therefore was used. The use of structured questionnaires using a 5-point Likert scale as a tool of data collection was guided by the fact it is the most appropriate measurement scale for quantitative research in social sciences (Babbie, 2009). Also, most of the studies on task complexity and knowledge transfer variables available in the literature have used the 5-point Likert scale. The structured questionnaire was used to measure the responses of the respondents concerning the influence of task complexity on knowledge transfer in banking technology project among commercial banks in Kenya.

The questions (items) in the questionnaire measured the responses on various indicators of the variables in the study. These are indicators of the task complexity and knowledge transfer variables which have been used previously, by other researchers of task-based knowledge management and researchers of task complexity in the available literature.

The knowledge transfer variable was measured using Easy of Banking Technology Use as an indicator, adapted from DeLone & McLean (2016) and Davis (1989). DeLone & McLean (2016) and Davis (1989) report that their scales have a higher internal consistency and highly correlated with technology usability.

The predictor variable, task complexity, was measured by a scale modified from various task complexity literature sources such as Campbell (1988), Woods (1988), and Williams (1999). Task-Based Knowledge Management Framework (TbKM) proposed by Burstein & Linger, 2011) was also used as a source in developing the task complexity measures. The TbKM has been extensively used in measuring task-based knowledge management studies. The TbKM framework uses task construct indicators which set the foundation for the development of any knowledge management practice related to a task knowledge or knowledge work. The TbKM framework focuses on a task's ability to stimulate employee motivation to certain behaviors like engaging in knowledge or information seeking, knowledge sharing, and knowledge application.

4. Results

4.1. Response Rate

Questionnaires	Frequency	Percentage
Questionnaire administered	240	100
Questionnaires returned	126	52.5

Table 1: Response Rate

Out of the 240 questionnaires administered, 126 were completed and returned, which represents 52.5% response rate. As Mugenda and Mugenda (2003) observed, a 50% response rate is adequate, 60% is good, while 70% is rated very good. This agrees with Bailey (2000) who asserts that a response rate of 50% is adequate, while a response rate greater than 70% is very good. Based on Mugenda & Mugenda (2003) and Bailey (2000) suggestions, the response rate of 52.5% for this study was considered adequate and satisfactory to make conclusions for the study. The response rate of 52.5% was possible because, the banking industry in Kenya has always been responsive to requests for research from scholars (CBK, 2015). Indeed, Kenya Banker Association (KBA) encourages members to collaborate with researchers to stimulate informed discussion that influences critical banking industry debates and banking sector policies (KBA, 2016).

4.2. Reliability Test Results

For overall analysis on reliability and validity for this study, Cronbach"s alpha (α) was computed since it is the most common reliability coefficient which estimates internal consistency by determining how all variables on a test relate to all

other variables. The Cronbach's alpha reliability coefficient normally ranges between 0.1 and 1.0. The closer the coefficient is to 1.0, the greater is the internal consistency of the variables in the scale. The higher the coefficient, the more reliable is the reliability test. The reliability of an instrument refers to its ability to produce consistent and stable measurements. The rule of George and Mallery, (2003), follows that if α >0.9 (Excellent), α >0.8 (Good), α >0.7 (Acceptable), α >0.6 (Questionable), α >0.5 (Poor and Unacceptable).

Independent Variable	No. of Items	Cronbach's alpha	Comments
Task Complexity (TC)	6	0.7685	Reliable
Knowledge Transfer	6	0.7657	Reliable

Table 2: Reliability Test

4.3. Correlation Matrix between Task Complexity and Knowledge Transfer Variables

The study sought to determine whether significant relationships exist between easy of banking technology use as a sub-variable of knowledge transfer, and task complexity sub-variables. Pearson correlation analysis was used to explore the relationships that exist between the study variables. The correlation matrix on table 3 was used to demonstrate the linear relationships and lack of auto-correlation among the predictor sub-variables.

Pearson Correlation		DMC	STC	TVA	TOC	RRU	KMA	EBTU
DMC	Pearson Sign (2 tailed)	1 0.000						
STC	Pearson Sign (2 tailed)	0.052* 0.001	1 0.000					
TVA	Pearson Sign (2 tailed)	-0.010* 0.000	0.046* 0.000	1				
TOC	Pearson Sign (2 tailed)	0.054* 0.000	0.450* 0.000	0.213* 0.000	1			
RRU	Pearson Sign (2 tailed)	0.051* 0.000	0.044* 0.000	0.149* 0.000	0.046* 0.000	1		
KMA	Pearson Sign (2 tailed)	0.108* 0.005	0.080* 0.000	0.049* 0.000	0.108* 0.000	0.033* 0.000	1	
EBTU	Pearson Sign (2 tailed)	0.353* 0.000	0.421* 0.000	0.404* 0.000	0.604* 0.000	0.275* 0.000	0.316* 0.000	1 0.000

Table 3: Correlation Matrix

*** Correlation Is Significant at the 0.01 Level (2-Tailed)*

4.3.1. Sub-variables (items) of Task Complexity

- DMC: Decision Making Complexity
- STC: Sensitivity to Change
- TVA: Task Variability
- TOC: Tasks Overlap Complexity
- RRU: Resource Requirement Uncertainty
- KMC: Knowledge Misapplications Complexity

4.3.2. Sub-variable of Knowledge Transfer

- EBTU: Ease of Banking Technology Use

Table 3 presents the correlation coefficients for the study variables. It can be seen that from the correlation matrix, all the task complexity sub-variables are strongly correlated with knowledge transfer sub-variable. Decision Making Complexity-DMC ($r=0.353$, $p<0.05$), Sensitivity to Change-STC ($r=0.421$, $p<0.05$), Task Variability-TVA ($r=0.404$, $p<0.05$), Task Overlap Complexity-TOC ($r=0.604$, $p<0.05$), Resource Requirement Uncertainty-RRU ($r=0.275$, $p<0.05$), and Knowledge Misapplications Complexity-KMC ($r=0.316$, $p<0.05$) all are strongly correlated to Ease of Banking Technology Use.

Although, there were some significant inter-correlations between predictor sub-variables, all the inter-correlation coefficients are below the level considered undesirable, which is generally 0.80 or higher. Therefore, the inter-correlations between the study independent variables were less than the starting point (0.80) that is considered problematic and significant at 0.01. Consequently, there was no presence of autocorrelation among the predictor sub-variables.

The findings are in line with (Hærem, & Rau, 2007) who posits that task complexity motivates organizational learning through knowledge acquisition from external sources. An individual who is exposed to a complex task for the first time may need to consult subject matter experts (internal or external) through various channel of knowledge sharing such as face to face engagement, community of practice etc. Indeed, Wood (1988), who is among the first researchers to conceptualise task complexity as a variable in organisation behaviour, argue that task complexity defines behaviours of task doers and information processing requirements of the task doers. During task performance, each task complexity dimension generates information that may be required by other task doers to successfully complete the other tasks.

In the context of knowledge management, task complexity emphasizes on the need to capture organisational (explicit) knowledge and expert (tacit) knowledge related to the task and creating a formally defined knowledge repository (codification of knowledge) for the performance of related futures tasks (Schreiber, Welinger & Breuker, 1993).

4.4. Relationship between Task Complexity and Knowledge Transfer

The hypothesis (H_{01}) statement: Task complexity does not influence knowledge transfer in banking technology projects among Kenyan commercial banks.

Simple regression analysis was conducted to investigate the statistical significant relationship between task complexity and knowledge transfer sub-variables of easy of banking technology use.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.788	0.621	0.618	0.299

Table 4: Linear Regression Model of Task Complexity and Easy Banking Technology Use
Predictor: Task Complexity
Dependent Variable: Easy of Banking Technology Use

The correlation coefficient R which is the measure of the strength of the prediction of the dependent variable (Easy of Banking Technology Use) by predictor variable (Task Complexity) depicts a value of R=0.788, which indicates a high and a good level of prediction. The coefficient of determination R2 is the proportion of variance in the dependent variable that is explained or accounted for by the predictor variable. As can be seen from the value of R2=0.621, the predictor variable (task complexity) explains 62.1% of the variability of the dependent variable (easy of banking technology use). The remaining 37.9% is explained by other factors and variables other than task complexity. The Adjusted R2=0.618 did not change the results substantially as it reduced the explanatory behaviour of the predictor from 62.1% to 61.8%. Therefore, task complexity has a positive influence on knowledge transfer in banking technology projects among Kenyan commercial banks.

Model		Sum of Squares	Df	Mean Square	F	Sig
1	Regression	18.01276	1	18.01276	201.6493	0.000
	Residual	10.98724	123	0.089327		
	Total	29.00000	124			

Table 5: ANOVA Results for Task Complexity and Easy of Banking Technology Use
Predictor: Task Complexity
Dependent Variable: Easy of Banking Technology Use

Table 5 shows the Analysis of Variance (ANOVA) of the influence of task complexity on ease of technology use in a banking technology project among Kenyan Commercial Banks. The results with a p-value of 0.000 indicated that the linear model was highly statistically significant in explaining the influence of task complexity on knowledge transfer sub-variable ease of banking technology use. The F statistic of F (1, 123) = 201.64 at p=000<0.05 confirms that the model is statistically significant. Therefore, the hypothesis that there is no significant relationship between task complexity and knowledge transfer in a banking technology project among Kenyan Commercial Banks is rejected. Test shows that there is a significant relationship between task complexity and knowledge transfer sub-variable of ease of banking technology use in a banking technology project among Kenyan Commercial Banks.

		Unstandardized Coefficients			T	Sig.
Model		Beta	Std Error			
1	Constant	0.594	0.227		2.616	0.010
	Task Complexity (TC)	0.821	0.0578		14.200	0.000

Table 6: Beta Coefficients of Task Complexity on Easy of Banking Technology Use

Table 6 shows the bivariate equation model that shows the relationship between predicator variable (tasks complexity) and dependent sub-variable (easy of banking technology use) $Y=\beta_0+\beta_1X$ => 0.594+0.821*TC. The results in the coefficient table 6 indicated that there is significant relationship between task complexity and knowledge transfer sub-variable of easy of technology use in banking technology projects among Kenyan Commercial Banks since β_1=0.821, t=14.200 p<0.05 at 95% confidence interval.

5. Discussions and Conclusion

The study objective was to determine the influence of task complexity on knowledge transfer in banking technology projects among Kenyan commercial banks. The results show that task complexity influences knowledge transfer in banking technology projects among Kenyan commercial banks as the correlation coefficient of the single regression model indicated a linear, positive and significant relationship between task complexity and knowledge transfer sub-variable of easy of banking technology use (R=0.788 and R2= 62.1% at p=0.000<0.05).

The Beta (β) coefficient of task complexity on the knowledge transfer sub-variable of easy of banking technology use (β=0.821 at P=0.000<0.05) indicates a strong linear relationship. The correlation matrix coefficients of task complexity sub-variables against knowledge transfer sub-variable, easy of banking technology use from the test of correlation matrix indicated a strong relationship namely Decision Making Complexity (r=0.353, p<0.05), Sensitivity to Change (r=0.421, p<0.05), Task Variability (r=0.404, p<0.05), Task Overlap Complexity (r=0.604, p<0.05), Resource Requirement Uncertainty (r=0.275, p<0.05), and Knowledge Misapplications Complexity (r=0.316, p<0.05).

These finding agrees with Robinson (2001), who argued that task complexity motivates cognitive thinking, reasoning, and other information seeking behaviours. When an individual who has limited knowledge on a complex task is exposed to a complex task, it demands the individual to seek knowledge from the knowledge domain of the task. This calls for consultations and information seeking to understand the task knowledge domain. Indeed, in his study Bonner's (1994) suggests that a complex task invokes two dimensions of knowledge seeking behaviour: the amount of knowledge require (task knowledge base) to perform the task and where to get such knowledge (knowledge source). Example of knowledge source for a complex task is an expert who has superior knowledge, may be consulted through the various knowledge transfer channels such as community of practice. The task performer would therefore acquire knowledge from the experts and apply the knowledge on the complex task. In short, task complexity sets in motion, the cycle of knowledge seeking, knowledge acquisition, knowledge application as demonstrated in SECI model of Nonaka and Takeuchi (1995). A complex task places high cognitive demands on the task performer (Campbell, 1988) which improves personal knowledge capability (knowledge, skills and behaviour).

6. Recommendations

The study suggests that task complexity influences knowledge transfer commercial banks in Kenya and therefore managers should pay attention on complexity of the project tasks while undertaking banking technology projects.

It is recommended that manager should have subject matter experts in banking technology projects, to enhance knowledge transfer to those who may have less expertise on complex task in the banking technology project. In the absence of subject matter expertise in banking technology project, simplification of complex task would be a challenge which would then create further chaos for such projects. Experts are a source of knowledge for complex task. Identification of knowledge sources (experts, documents etc), for complex task in a project is also recommended to facilitate knowledge acquisition. Since complex tasks demand a higher degree of cognitive thinking, manager may find it wise to engage employees with intellectual capability is such projects. Employees with intellectual capability tend to have a higher degree of personal knowledge capability because of a higher mental frame which is a critical dimension in knowledge acquisition and retention.

7. Theoretical Implications

The theoretical implication of this study is that it empirically support and extends the Task-Based Knowledge Management (TBKM) framework proposed by Burstein & Linger, (2011) and the SECI model of knowledge transfer developed by Nonaka & Takeuchi (1995). The TbKM framework focuses on both pragmatic (task doing) knowledge outputs and conceptual (task thinking) knowledge outputs, with the two nested interrelated layers explicitly documenting task knowledge related to thinking and doing (Linger et al., 2013). The TbKM model allows the knowledge worker to cognitively process task knowledge in a way that is shareable with other actors performing similar task.

This study also integrates the concept of task complexity with the material context of knowledge transfer by proposing a generalised way on how task complexity motivates individuals to seek knowledge, internalise the knowledge and applying the knowledge. By extending the concept of task complexity to include empirical observations on its effect on knowledge transfer, it provides the basis for operationalisation, developing and testing of other theories about task complexity as a dependent variable, a moderating variable or a mediating variable.

8. Areas for Further Research

The study focused on the banking technology project organisations among Kenyan commercial banks and therefore there is an opportunity to study other knowledge intensive sectors. There is an opportunity for other scholars to investigate the influence of intervening variables or moderating variables such personal knowledge capability, trust, organisational

culture, leadership on the effect of task complexity on knowledge transfer in banking technology projects among Kenyan commercial banks.

Lastly, although study collected data on task complexity and knowledge transfer sub-variables from the commercial banks managers by explanatory survey, most data collected were from the respondents' self-reporting. This methodology might limit the validity of the results because of common method bias. Accordingly, in further research, a longitudinal design could be employed. In this way, common method bias could be reduced, and conclusions on causal order could be drawn properly.

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