Subjective Norms and Information Systems Implementation: A Case of Higher Education Institutions in a developing country

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Abstract: ***The implementation of Information Systems (IS) raises important challenges to organizations. One of the constructs of the implementation context in the process is subjective norms. A study of selected Higher Education Institutions (HEIs) in Kenya focuses on subjective norms to validate its relationship with Information Systems (IS) implementation process. In this study, data was collected from identified respondents in some selected HEIs that have implemented IS or are in the implementation process, analyzed and the outcomes presented, thereby validating relationships in an adopted framework. Judgmental and convenience sampling design was used to select HEIs. A questionnaire based on a seven point Likert scale was administered to different participants of IS implementation in selected HEIs in Kenya and confirmatory factor analysis (CFA) used to determine regression coefficients between constructs of interest. The Chi-square goodness-of-fit test was used to test model adequacy together with other goodness of fit statistics. To test the hypothesis, correlation coefficients were found, hypothesis tested and coefficient of determination calculated for explanation purposes. The paper illustrates that the relationship between subjective norms and implementation process is valid as indicated on the Organizational Implementation of Information Systems Innovations (OIISI) framework.***

Keywords: Subjective norms, Implementation Context, Higher Education Institutions (HEIs)

1. Introduction

As the complexity and dynamics of the business context and markets increase, the need for accurate, pertinent and immediate information will continue to grow (Shuliang Li, 2004). This supports the need for a continued use of Information Systems (IS) to support planning, decision-making, operations and management. Farrell (2007) notes that Kenya has placed considerable emphasis on the importance of ICT in its Education Sector Support Programme as evidenced in the promulgation of the National ICT Strategy for Education and Training. Farrell (2007) continues to note that the Ministry of Education has taken steps to support the implementation of the strategy either by direct action or through the various institutions and agencies with which it works. In addition, there are many other organizations not involved directly with the Ministry of Education that continue to be active in implementing and supporting projects involving ICT in education. Most institutions of higher learning in Kenya have started computerizing. That is, there is rapid technological evolution. The government through the Ministry of Education is also educating government institution's stakeholders like Board of Governors (BOGs), Heads of Departments (HODs), Principals, Registrars and other stakeholders through workshops to ensure that they appreciate the role of IS in the much anticipated growth of knowledge economy and their use in management of the institutions.

The organizational context within which an information system is implemented forms an integral part of that system. According to Hardon et al., (2001) in Indeje (2010) ideas, practices, organizational arrangements, roles and statuses in the information system reflect the wider socio-cultural and political economic context in which they occur and are influenced by that context. Wausi (2009) developed OIISI framework guided by a modification of Gallivan's framework [Gallivan 2001]. This framework identifies implementation context as consisting of the following constructs: Managerial Interventions; Subjective Norms; Facilitating Conditions and Others. The focus of this paper is Subjective Norms.

The Theory of Reasoned Action (TRA) signals that attitude and subjective norm can explain people's behavioral intention and further predict their actual action. According to Chi et. Al., (2012), Subjective norm includes normative belief and motivation to comply. Normative belief refers to perceived expectations of specific individuals or groups, and motivation to comply is the willingness to comply to specific individuals' or groups' opinions.

Magutu et al., (2010) observed that despite numerous methodologies having been proposed, Kenyan parastatals still fail to effectively deal with IS implementation and related challenges. Magutu et al., (2010) further observed that, IS implementation in parastatals is significantly influenced by cultural, political and power behavioral situations within parastatals. Many HEIs in Kenya like parastatals face numerous challenges in the implementation

of IS. The main challenge is the lack of an appropriate framework of implementing IS in such organizations. Wausi (2009) suggested a framework that can resolve this problem.

Within industry, there is a growing awareness of and concern about the complexity of introducing new information technology (IT) in organizations. Experience shows that it is not so much technical issues that complicate matters, but rather organizational, social and psychological issues (Steven, 2003).

The main aim of this paper is to interpret the subjective norms construct following a study that tested the OIISI framework for the implementation of IS in Higher Education Institutions (HEIs). The paper is based on the null hypothesis that can be stated as follows: H_0: There is no relationship between subjective norms and the implementation process.

2. Theoretical Framework

Wausi (2009), Organizational Implementation of Information Systems Innovations (OIISI) Framework

Wausi (2009) developed a framework for IS implementation in HEIs (see figure 3.1 below)

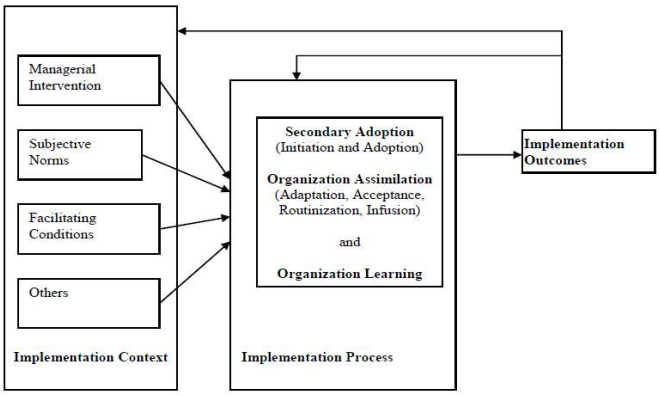

Figure 1: Hybrid theoretical framework - Implementation Context, Process and Outcomes

Source: Wausi (2009): Organizational Implementation of Information Systems Innovations

Wausi(2009) conceptualizes a theoretical framework for the organizational implementation process as consisting of a secondary adoption process , an organizational assimilation process and a continuous organizational learning process requiring continuous change management interventions.

Wausi (2009) further suggests that organizational implementation process happens in an organizational context and that the context influences the process. The notion of implementation contexts for IS concerns an identification of various systems and structures in an organization that influence the implementation process [Walsham 1993 in Wausi and Waema 2010].

According to this framework, Organizational implementation of information systems is a product of: Implementation Context; Implementation Process and Implementation Outcomes. Implementation context includes managerial interventions, subjective norms, facilitating conditions and others.

Subjective Norms

Subjective norm is defined as an individual's perception of whether people important to the individual think a behavior should be performed. The contribution of the opinion of any given referent is weighted by the motivation that an individual has to comply with the wishes of that referent. Hence, overall subjective norm can be expressed as the sum of the individual perception x motivation assessments for all relevant referents.

According to Wausi (2009), the social influence of the organization context is identified to have influence to the actions of people in organizations. Institutional departments do not exist in isolation; hence what happens in one unit may have some influence on other units.

We focus on Subjective Norms and Implementation Process in this paper and provide operational definitions as extracted from Wausi (2009). These definitions were used to construct the research instrument.

Table 1: Subjective Norms Construct

Construct	*Explanation*	*Operational Definitions*
Subjective Norms	The social influence to adopting computerized application systems	Perceived beliefs of users about peers, supervisors, clients and subordinates concerning their behavior

Table 2: Implementation Process Construct

Construct Categories	*Explanation*	*Operational Definitions*
Secondary Adoption	Events at the unit level that lead to the adoption of the computer application system	Activities and actions that indicate the initiation and decisions to adopt and use the computer application system at the unit level
Organizational assimilation	The degree of the penetration and use of the IS in the various units within an organization	Activities and events that leads to adaption, acceptance, routinization and use of computer application system; they include • Actions to install/customize IS innovation, train members and facilitate use of IS innovation Actions that point to inducing user to commit to use IS innovation Indication of routine use • Continued and emergent use to increase effectiveness

Organizational Learning	Key experiences of the implementation process that inform the process and the context of implementation	Reflection of experiences from process that lead to • Alternative and/or modifications of the implementation context such as policies, procedures, capabilities and structures to improve performance of computer application system

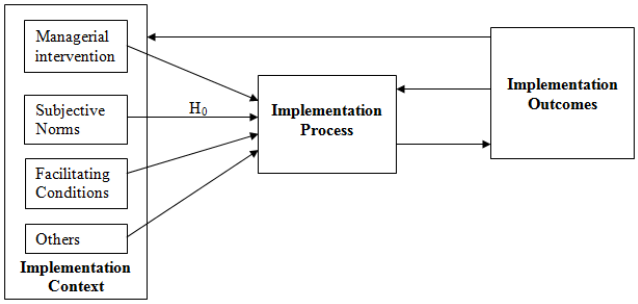

Figure 2: Conceptual Framework [Wambugu, 2012]

3. Methodology

The methodology of this study designed a questionnaire with each question representing a component of the research model. Virtually all the constructs in the research model were operationalized using standard scales from the literature. Prior to the distribution of the actual survey, a pilot study involving a sample of 8 people was conducted to validate the content of the questionnaire in terms of relevance, accuracy and wording. The lessons learned from the pilot suggested some changes with respect to the instrument. The appropriate changes were made to the final questionnaire. Individuals were asked to indicate the extent of agreement or disagreement with various statements concerning implementation of information systems in HEIs on a seven-point Likerttype scale ranging from (1) strongly disagree to (7) strongly agree. The respondents' scores for each construct were obtained by summing across all the item scores of the individual variables. The hypothesized relationships among the study variables depicted in the model were tested using correlation coefficients and path analyses.

This methodology was adopted for this study since the Organizational Implementation of Information Systems Innovations framework involved qualitative relations who are best tested using a quantitative approach.

The total population consisted of registered HEIs in Kenya. The target population included IS implementation representatives and practitioners in selected HEIs within Kenya that have undertaken implementation of IS. The source of data was the key personnel in management, In charge of implementation, Head of ICT, Specialists in the implementation process, Technicians and System users.

Judgmental sampling was used to obtain HEIs which have adopted IS and have finished implementation process or are in the process to consist elements in the sample. The researcher established an informal relationship with key personnel to establish if the HEI had started or completed IS implementation and decided therefore whether to include the HEI in the sample or not. Convenient sampling was used in the study to obtain easily accessible samples.

A Likert-type scale was preferred because it is easy to construct in comparison to Thurstone-type scale and can be performed without a panel of judges. Likert type is also considered more reliable because the respondents answer all indicated questions. It requires less time to construct and time was of essence here.

An interview schedule was used to personally interview senior management staff to gather qualitative data on opinions and to explain *others* variable in the Wausi (2009) framework. It was also used to confirm responses from the questionnaire. This ensured reliability and validity of collected data.

The hypothesized relationships among the study variables depicted in the framework were tested using confirmatory factor analysis (CFA) and correlation coefficients. The primary objective of a CFA is to determine the ability of a predefined factor model to fit an observed set of data, DeCoster (1998). CFA was used since the study involved validating an existing framework. It was used to determine regression coefficients which were interpreted accordingly. Correlation coefficients were used to determine the strength of the relationships hence test the hypothesis of the study and to calculate coefficient of determination which is used in statistical model analysis to assess how well a model explains and predicts future outcomes.

For purposes of research design, data presentation and data analysis, the following coding for variables was used:
SN - Subjective Norms
SN.i - Subjective Norms ith factor, where i=1,2 for SN.
IP - Implementation Process
IP.i - Implementation Process ith factor, where i=1, 2, 3, 4,5,6,7 for IP.

4. Results

Confirmatory Factor Analysis was used to determine if the number of factors and the loadings of measured (indicator) variables on them conform to what is expected on the basis of the framework being tested. Apriori analysis was used to fit the data in the model/construct and interpret the results of the path coefficients.

To accomplish this task, a number of fit indices were used to give the goodness-of-fit indices of the model that best fits the data. The goodness of fit tests helps to determine if the model being tested should be accepted or rejected. The overall fit tests do not establish if particular paths within the model are significant. While there are no golden rules for assessment of model fit, reporting a variety of indices is necessary (Crowley and Fan 1997) because different indices reflect a different aspect of model fit. There is no single evaluation rule on which everyone agrees, Jeremy and Hun (2009). Hu and Bentler (1999) provide rules of thumb for

deciding which statistics to report and choosing cut-off values for declaring significance. Jaccard and Wan (1996 87) recommend use of at least three fit tests. Suki and Ramayah (2011) in their paper titled Modeling Customer's Attitude Towards E-Government Services and available at http://www.waset.org/journals/ijhss/v6/v6-1-4.pdf on page 20 and 21 identifies the benchmark criteria for model fit summary statistics as follows:

Table 3: Model Fit Summary for Research Model

Fit Indices	*Recommended Value*
Absolute fit measures	
CMIN (χ2)/DF	< 3
GFI (Goodness of Fit Index)	> 0.9
RMSEA (Root Mean Square Error of Approximation)	<= 0.08
Incremental fit measures	
AGFI (Adjusted Goodness of Fit Index)	> 0.80
NFI (Normed Fit Index)	>= 0.90
CFI (Comparative Fit Index)	> 0.90
IFI (Incremental Fit Index)	> 0.90
RFI (Relative Fit Index)	0.90
Parsimony fit measures	
PCFI (Parsimony Comparative of Fit Index)	0.50
PNFI (Parsimony Normed Fit Index)	0.50

Below is a discussion of the goodness of fit statistics used to validate the indices obtained from the model.

Model Chi-Square, (CMIN)

This is also called the Discrepancy or the discrepancy function. The chi-square should not be significant if there is a good model fit, while the reverse is true. Relative chi-square is the chi-square fit index divided by the degrees of freedom i.e CMIN/DF. (Carmines and McIver, 1981; 80), state that the relative chi-square should be in the 2:1 or 3:1 for an acceptable model. (Kline, 1998) says 3 or less is acceptable

Goodness-of-fit Index, GFI

This deals with the error in reproducing the variance-covariance matrix. By convention, GFI should be greater or equal to 0.80 to accept a model.

Comparative Fit Index, CFI

This is also known as the Bentler Comparative fit Index. This compares the existing model fit with the null model which assumes that the latent variables in the model are uncorrelated.

Conventionally, CFI should be equal to or greater than 0.80 to accept the model, indicating that 80% of the co variation in the data can be reproduced by the given model.

Root Mean Square Error of Approximation, RMSEA

This is the discrepancy per degree of freedom. By convention, there is good model if RMSEA is less than or equal to 0.05. There is adequate fit if the RMSEA is less than or equal to 0.8. (Hu and Bentler 1999) have suggested RMSEA <=0.6 as the cutoff for a good model fit.

RMSEA does not require comparison with null model and thus does not require the author to posit as plausible a model in which there is complete independence of the latent variables as does, CFI.

Fully Identified Model (FIM)

To simplify the diagram from AMOS (v.18) for easier readability, a design diagram was adopted and only paths of interest indicated. The diagram below shows the standardized regression coefficient between Subjective Norms and Implementation process.

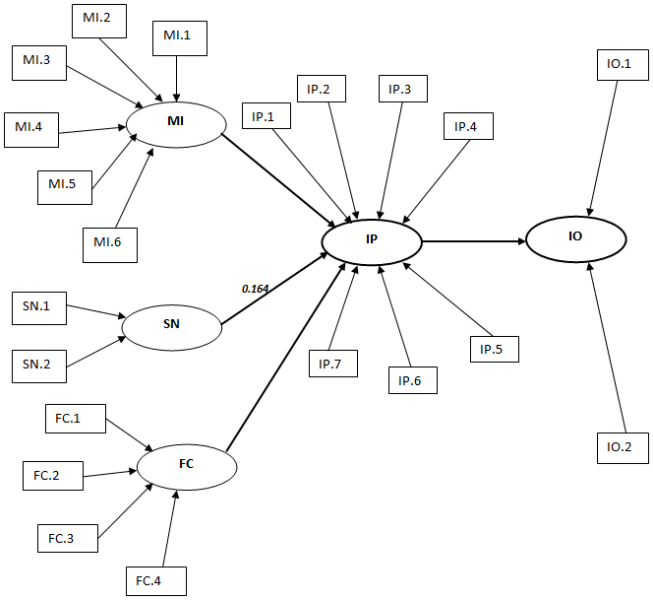

Figure 3: Standardized Regression Coefficient for the FIM [Source: Wambugu, 2012]

Table 4: Model fit Summary for the fully identified model

Fit Indices	*Recommended Value*	*Model Results*
Absolute fit measures		
CMIN		214.057
DF		162
P Value		0.004
CMIN (χ2)/DF	< 3	1.321
GFI (Goodness of Fit Index)	> 0.9	0.732
RMSEA (Root Mean Square Error of Approximation)	<= 0.10	0.08
Incremental fit measures		
AGFI (Adjusted Goodness of Fit Index)	> 0.80	0.618
NFI (Normed Fit Index)	>= 0.90	0.683
CFI (Comparative Fit Index)	>= 0.90	0.888 = 0.9 (2 dp)
IFI (Incremental Fit Index)	>= 0.90	0.899 = 0.9 (2 dp)
RFI (Relative Fit Index)	>= 0.90	0.589
Parsimony fit measures		
PCFI (Parsimony Comparative of Fit Index)	>= 0.50	0.685
PNFI (Parsimony Normed Fit Index)	>= 0.50	0.527

The X^2 =214.06 which evaluated through 162 degrees of freedom is significant with a p-value=0.004, thus we do not reject the null hypothesis that the above construct will fit the data.

The Modification Indices showed that no further co variances (for the residual terms/errors), no further variances and regression weights within observed variables.

Correlation Coefficient and Coefficient of determination

Correlation Coefficient is one of the most common and most useful statistics. A correlation is a single number that describes the degree of relationship between two variables and is used for purposes of testing hypothesis in this study.

The results of Pearson's Correlation coefficient as obtained from SPSS (v11.5) between SN and IP with SN as the independent variable is 0.5. It follows that the coefficient of determination is 0.25.

5. Analysis and Interpretation

Assuming a perfect linear regression, the CFA findings can be interpreted as follows:

$$IP = 0.164SN + b_0$$

That is $\frac{dIP}{dSN} = 0.164$

This means that a unit change in the independent variable (SN) causes a change of 0.164 in the dependent variable (IP).

Interpretation of Correlation Coefficients

The value of r is such that $-1 \leq r \leq +1$. The + and – signs are used for positive linear correlations and negative linear correlations, respectively.

Positive correlation: If *x* and *y* have a strong positive linear correlation, *r* is close to +1. An *r* value of exactly +1 indicates a perfect positive fit. Positive values indicate a relationship between *x* and *y* variables such that as values for *x* increases, values for *y* also increase.

Negative correlation: If *x* and *y* have a strong negative linear correlation, *r* is close to -1. An *r* value of exactly -1 indicates a perfect negative fit. Negative values indicate a relationship between *x* and *y* such that as values for *x* increase, values for *y* decrease. *No correlation:* If there is no linear correlation or a weak linear correlation, *r* is close to 0. A value near zero means that there is a random, nonlinear relationship between the two variables. We also note that *r* is a dimensionless quantity; that is, it does not depend on the units employed. A *perfect* correlation of ± 1 occurs only when the data points all lie exactly on a straight line. If *r* = +1, the slope of this line is positive. If *r* = -1, the slope of this line is negative.

This criterion can be summarized in the table below:

Table 5: Interpretation of Correlation Coefficients

Range of coefficient(r)	*Interpretation*
1.0	Perfect positive correlation
0.5 < r < 1.0	High positive correlation
0 < r < 0.5	Low positive correlation
0	No correlation
0 > r > - 0.5	Low negative correlation
-0.5 > r > -1.0	High negative correlation
-1.0	Perfect negative correlation

Interpretation of Coefficient of determination

Coefficient of determination is a measure used in statistical model analysis to assess how well a model explains and predicts future outcomes. It is indicative of the level of explained variability in a model. The measure gives the proportion of the variance (fluctuation) of one variable that is predictable from the other variable. It is a measure that allows us to determine how certain one can be in making predictions from a certain model/graph. The coefficient of determination is the ratio of the explained variation to the total variation. The coefficient of determination is such that $0 < r^2 < 1$, and denotes the strength of the linear association between x and y.

The results above indicate that the coefficient of determination between SN and IP is 0.25. This means that 25% of the variation in Implementation Process can be explained by Subjective Norms.

Results of Hypothesis Test

From the values of correlation coefficients, results are as follows:

H1: The results indicate a Correlation coefficient of 0.5 between Subjective Norms and Implementation Process which is positive and significant at the 0.01 level. We therefore reject the null hypothesis that there is no relationship between Subjective Norms and Implementation Process.

6. Conclusion

The results indicate that a relationship exists between SN and IP according to the constructs of the OIISI framework. The relationship has been described in the study by use of standardized regression coefficient, Pearson's correlation coefficient and the coefficient of determination as follows: That a unit change in SN causes a change of 0.25 in IP, a Correlation coefficient of 0.5 between Subjective Norms and Implementation Process which is positive and significant at the 0.01 level enables us to reject the null hypothesis that there is no relationship between Subjective Norms and Implementation Process and 25% of the variation in

Implementation Process can be explained by Subjective Norms. The construct therefore is an important component of the framework.

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