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Article · April 2022

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The Influence of Management Quality on Monitoring, Evaluation, Accountability and Learning Information Systems Success: Extension of DeLone and McLean Model

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Abstract

As focus has shifted from continuum to contiguum approach of humanitarian response, organizations have invested in Information Systems (IS) to support their Monitoring and Evaluation (M&E), Accountability and Learning (MEAL) functions. Although IS researchers and M&E practitioners acknowledge the multidimensional and complex social aspects associated with IS few researchers have investigated the role of the project/program managers in the success of IS as they struggle to ascertain the success of the M&E/MEAL Information Systems (MEALIS) adopted in various organizations. Motivated by this lacuna, the purpose of this study was to evaluate the influence of management quality on MEALIS performance using the widely acclaimed DeLone and McLean (D&M) Model of IS Success (ISS) as the theoretical basis. A cross-sectional research design with mixed approach skewed towards descriptive/quantitative method was adopted for the study. A total of 263 respondents submitted responses to the questionnaire and 3 interviews were conducted. IBM SPSS Statistics was used for descriptive and correlation data analysis and hypothesis testing using Partial Least Squares – Structural Equation Modelling (PLS-SEM) technique using SmartPLS 3 software.
The findings of correlation analysis indicated that Pearson's coefficient (with 1-tailed sig. value of 0.000) was 0.634** for management quality construct and R squared value of 0.539 suggesting significant positive relationship between the independent variable (management quality) and the indicators of successful MEALIS performance. The hypothesis testing results using PLS-SEM technique revealed that management quality (MAQ) was found to be positively related with MEALIS performance with path coefficient, β, of 0.227 ($p>0.05$). The study concluded that management quality is positively related and significantly impacts on MEALIS success and therefore, an important determinant of MEALIS success. Therefore, system developers and M&E practitioners are recommended to keenly consider/involve managers in designing, developing and implementing MEALIS. Although methodologically limited by leaning toward quantitative method, this research has nevertheless, filled the lacuna in IS and MEAL literature and contributed theoretical knowledge in the field of IS and M&E by not only extending the D&M model to MEAL sector in humanitarian context but also introducing management quality as one of the independent variables. It has provided managers, M&E practitioners, researchers and academia with important framework to evaluate the effectiveness of their MEALIS, justify their investments in strengthening their M&E systems, and opportunity to validate or replicate the research findings in different contexts as further research should be done in such areas.

Key words: Management Quality; Monitoring, Evaluation, Accountability and Learning Information Systems Success, DeLone and McLean Model; Uganda

Introduction

Considered as a model country for humanitarian operations in the world because of its open-door refugee policy, Uganda is home to over 1.4 million refugees making it the second highest refugee hosting country in Africa, and third highest in the world (Office of the Prime Minister et al., 2020). The increased influx of refugees since December 2013 mainly from South Sudan has attracted hundreds of international and national humanitarians to provide both emergency and development-oriented interventions. These humanitarian organizations have come up with various kinds of Information Systems (IS) to perform Monitoring, Evaluation, Accountability and Learning functions.

Overall, non-governmental organizations (NGOs), more so, humanitarian actors have increased their emphases on measuring and assessing their contributions to economic development alongside the emergency relief work. Increasingly, emphasis is being placed on contiguum approach other than the traditional continuum approach (Carbonnier, 2018; Mosel & Levine, 2014; Ramet, 2012). Overall, their Monitoring and Evaluation (M&E) systems are becoming better equipped to inform decision making for greater development impact. Additionally, the functions of M&E have integrated the aspects of accountability and learning which initially have been treated rather passively. This has necessitated the adoption of different Monitoring, Evaluation, Accountability and Learning Information Systems (MEALIS) also simply known as M&E IS.

Although IS researchers acknowledge the multidimensional and complex social aspects associated with IS (DeLone & McLean, 1992, 2003, 2016; Petter et al., 2013, 2018), few researchers have investigated the role of the project/program managers in the success of IS in different contexts (Zaied, 2012). Zaied (2012) measured management support of IS through management's reassurance about the system, resource provision to support the system, openness in discussion of problems associated with the IS, appreciating the optimal use of the IS, and having adequate knowledge of the system. He found out that management support has a strong influence on IS success (Zaied, 2012).

Meanwhile, Kaniawati & Kaniawati (2018) urged that management support should be added as an independent variable. They found out that management support is one of key factors influencing the using of the Global Talent Management System (Kaniawati & Kaniawati, 2018). In her study, Namakula (2013) found that all the independent variables of management support, user involvement in IS development, resource supply, education and training are positively related to the dependent variable of intention to use information systems (Namakula, 2013).

This study was thus designed to establish the relationship between management quality and performance of M&E/MEALIS in humanitarian organizations in Uganda. This study used the widely acclaimed DeLone and McLean Model of IS Success (DeLone & McLean, 2003) as the theoretical framework.

Methods

Study Design and Settings

Prabhat & Meenu (2015) define research design as the overall strategy to choose to integrate the different components of a study in a clear and logical way to ensure the research problem is effectively addressed. It consists of the plan for collection, measurement, and analysis of data (Prabhat & Meenu, 2015).

For this study, cross-sectional study design was employed which was used to gather data from different respondents at one point in time (Macdonald & Headlam, 2008) in relation to the usage of a MEALIS in work organizations. This design has been suggested as effective for IS success measurement in different contexts (Mohamad & Deraman, 2020).

On the other hand, this descriptive study adopted a combination of quantitative and qualitative research methods. Macdonald et al. (2008) argue that choosing a research method should depend on the purpose of the

research, questions being investigated and the available resources. For this study, quantitative research methods were used for unbiassed measurements, statistical, mathematical and numerical analysis of data collected through questionnaire and qualitative methods for the interviews and documentary reviews.

The descriptive method helped to provide answers to the questions of 'who', 'what', 'when', 'where', and 'how' associated with M&E IS in humanitarian organizations operating in West Nile (Etyang, 2018). This design was used to obtain information concerning the status of the M&E IS and to describe "what exists" with respect to the variables tested in this study. Similar design was used by Al-Fraihat et al., (2020) to evaluate e-learning system success in a University in United Kingdom (UK).

Sample Size and Study Variables

A sample is a sub-set of some pre-determined size from a population of interest (Etyang, 2018) so that by studying the sample, results may be generalised back to the population from which they were chosen. An adequate sample size reduces the likelihood of sampling error and the optimal size for a study may be estimated from several parameters (Glenn, 2003). The population for this study consists of about 1,000 M&E/IT practitioners, Programs staff and Managers performing various functions in West Nile (Office of the Prime Minister et al., 2020).
The sample of this research will be calculated by using Taro Yamane formula (Yamane, 1967) with 95% confidence level and 5% margin of error (precision). The calculated sample size was 278 respondents. This sample size is considered also acceptable for Structural Equation Modelling (SEM) technique (Choi, 2017; Wong, 2019) employed for this study.

The content scope of this study was limited to information systems (IS) that are deployed and used to support M&E/MEAL functions in the humanitarian organizations. These functions include data collection, storage (databases), analysis, visualization, reporting, mapping, accountability, participation of stakeholders, learning, tools, surveys, platforms and other technologies to support M&E/MEAL activities.

In this study, management quality was conceptualized as the independent variable and MEALIS success/performance as dependent variable. Management quality construct was measured in terms of management functions such as resource allocation, alignment of processes and structures to suite the MEALIS, and other supports provided among others. The dependent variable was measured in terms of system net benefits at individual level such as enhanced decision making, effectiveness, efficiency, enhanced learning and accountability, among others.

Data Analysis

Quantitative data of this study was analysed by computer software – IBM SPSS Statistics. These were used for producing descriptive statistics, correlation analysis, among others. SmartPLS 3 was used for PLS-SEM for hypothesis testing (Choi, 2017; Ringle et al., 2015, 2020; Wong, 2019). However, prior to analysis, Microsoft Excel was used for data collation and cleaning. Correlation analysis techniques was used to measure relation between variables. Five-point Likert scales were used for the items under each variable to measure respondents' level agreement or disagreement with the statements to denote optimal conditions of the indicators/factors/items.

In this study, partial least squares structural equation modelling (PLS-SEM) was used a technique to examine the research hypothesis. This technique has been preferred instead of regression analysis because of the following reasons: (i) PLS-SEM is better where the theory is not well developed (Hair et al., 2014) which fits this study since D&M ISS theoretical model has been extended and explored to find out whether additional constructs (i.e. MAQ) are valuable for extending the theory being tested rather than validating it (Hair et al., 2016). (ii) PLS-SEM is suitable for exploring relationships between variables and testing the hypotheses. (iii) PLS-SEM is also ideal for predicting or explaining the target constructs since this study seeks to predict the key determinant factors for success of MEALIS (Choi, 2017). (iv) PLS-SEM is ideal where number of constructs and indicators is big (Hair et al., 2014; Wong, 2019). Since this study has 36 indicators and 5 constructs, PLS-SEM fits well. (v) Lastly, PLS-SEM has been widely used in information systems research which will ease

comparison with other similar studies (e.g. Al-Fraihat, 2020). SmartPLS version 3.3.2 software (Ringle et al., 2015) has been utilized for the data analysis to test the research hypotheses.

Reliability

Table 1 Reliability statistics of study variables

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.948	.949	7

Reliability refers to the consistency of measure of a concept. Researchers usually refer to three factors when considering a measurement is reliable or not. These factors are stability (which considers whether a measure is stable over time or not), internal reliability (which considers whether the indicator that make up the scale are consistent or not) and inter-observer consistency (which refers to the subjective judgement where more than one observers are involved in activities which may produce lack of consistency in their decisions/responses).

For this study, internal reliability was adopted since it has multiple indicator/item measures where individual answers to each question are combined to form an overall score. One of the best ways to test internal reliability is the Cronbach's Alpha.

The reliability analysis results have revealed that all the constructs in the study have Cronbach's Alpha coefficient value of above 0.90. This, hence, represents high reliability for all the constructs thereby highlighting internal consistency of the scales.

Results

Demographic Characteristics

Table 2 Demographic Characteristics of the Respondents

Characteristics	Categories	Frequency	Percent
Gender	Female	24	9.2
	Male	236	90.8
Age range	18-35 years	178	68.5
	36-45 years	74	28.5
	46-59 years	8	3.1
Level of education	Certificate	2	.8
	Diploma	6	2.3
	Bachelor's Degree	100	38.5
	Postgraduate Diploma	56	21.5
	Master's Degree	92	35.4
	PhD	4	1.5
Level of experience	0-2 years	76	29.2
	3-5 years	92	35.4
	6-10 years	70	26.9
	Over 10 years	22	8.5
Category of organization	Private Sector	44	16.9
	NGO and Aid Agencies	190	73.1
	Public Sector	6	2.3
	Education and Research)	8	3.1
	Others	12	4.6
Level of interaction with system/user role	M&E/MEAL Practitioner	216	83.1%
	IT/ICT/IS/ICT4D Practitioner	40	15.4%
	Data Practitioner	112	43.1%

Characteristics	Categories	Frequency	Percent
	Education (Teaching/Lecturing)	22	8.5%
	Programs Staff	48	18.5%
	Management)	44	16.9%
	Consultant/System Developer	24	9.2%
	Beneficiary/System User	14	5.4%
	Other (unspecified)	4	1.5%

Source: Primary Data (2020)

From the demographic characteristics of the study respondents, 90% of the respondents were males and 10% female, 69% of the respondents were aged between 18 and 35 years, 28% and 3% were aged between 36 and 45 years, and 46 years or older respectively. With education, 38% of the respondents had bachelor's degree, 35% had master's degrees, 21% had postgraduate diplomas, 2% were PhD holders, 2% and 1% of the respondents had undergraduate diplomas and certificates respectively. About 62% of respondents has between three- and 10-years' experience in using their MEALIS, 29% and 9% had experiences with their MEALIS of less than two years and over 10 years respectively. Regarding organization category, 73% of the respondents were from NGOs, 17% were from the private sector, 3% and 2% were from the public sector and education/research institutions respectively. Others (5%) never stated their organization category. Three interviews were also conducted three informants (1 female, 2 male).

In relation to system characteristics, 43% of the respondents had interacted with the MEALIS as data practitioner, 19% as program/project staff, 17% as management, 15% as Information Technology (IT) practitioner, 9% as consultant/system developer, 8% as education/learning and 5% as beneficiary/system user. Typical uses of the MEALIS were monitoring and evaluation (88%), program/project MIS (58%), learning and knowledge management (48%), and accountability and stakeholder engagement (45%).

Key Findings

The objective of this study was to establish the relationship between management quality and performance of MEALIS in humanitarian organizations. The mean score from descriptive statistics of management quality indicators using IBM SPSS Statistics version 22 ranged from 3.60 with standard deviation of 1.102 (for resource allocation) to 3.77 with standard deviation of 1.021 (for strategy alignment). Internal reliability testing for the items of management quality found Cronbach's Alpha value to be 0.948.
Descriptive Statistics

Management quality construct was used in this study to get respondents' opinions and perceptions about the critical roles and influences of the managers and supervisors in relation to adoption and/or utilization of systems. Seven indicators were used to gauge such management related factors, and these included the following: resource allocation/provision, alignment of organization structure to MEALIS, provision of capacity building opportunities for staff, attitude toward MEALIS usage, overall support provided, alignment of organization strategy and processes to promote the usage of the MEALIS.

Descriptive statistics of the study variables have been presented. The scale of measurement used in the study questionnaire was a five-point Likert scale as: 1=Strongly Disagree, 2=Disagree, 3=Neutral/not sure, 4=Agree, 5=Strongly Agree. The sample size achieved for the survey after data cleaning was 260 respondents. To effectively describe the data in terms of measures of central tendency and dispersion, mean and standard deviation are the main statistical indicators used respectively. Generally, the mean and standard deviation values indicate a positive response to the variables used in this study.

Descriptive statistics of indicators of MAQ has shown that the mean values of the items/factors range from 3.60 with standard deviation of 1.102 (for resource allocation) to 3.77 with standard deviation of 1.021 (for strategy alignment). These results also indicate a positive opinion/perception towards management quality.

Table 3 Descriptive Statistics of Management Quality (MAQ)

Item statements	Factor/ Indicator	N	Mean	Std. Deviation
MAQ4.1: Management always allocates or provides the resources that are needed to operationalize the M&E/MEALIS	Resource allocation	260	3.60	1.102
MAQ4.2: Our organization structure allows smooth operationalization of our M&E/MEALIS	Structure	260	3.62	1.035
MAQ4.3: Management supports capacity building on the use of our M&E/MEALIS	Capacity building	260	3.64	1.025
MAQ4.4: Management has a positive attitude towards the M&E/MEALIS	Attitude to system	260	3.72	1.119
MAQ4.5: Management supports the operationalization of the M&E/MEALIS	Support provided	260	3.71	.966
MAQ4.6: Our organization strategy aligns with the implementation of the M&E/MEALIS	Strategy	260	3.77	1.021
MAQ4.7: Our organization's internal processes and procedures emphasize the use of the M&E/MEALIS	Processes	260	3.70	1.052
Valid N (listwise)		**260**		

Source: Primary Data (2020)

The correlation analysis between management quality and MEALIS performance is shown in Table 4.

Table 4 Correlation analysis between management quality and MEALIS performance

		MEALISS Performance	Management Quality
MEALISS Performance	Pearson Correlation	1	.734**
	Sig. (1-tailed)		.000
	N	260	260
Management Quality	Pearson Correlation	.734**	1
	Sig. (1-tailed)	.000	
	N	260	260

**. Correlation is significant at the 0.01 level (1-tailed).

Source: Primary Data (2020)

Additional empirical data analysis using correlation technique in IBM SPSS Statistics version 22 found that all the seven factors of management quality were found to be significantly and positively correlated with the nine indicators of MEALIS performance under study. The Pearson's correlation coefficients 0.734** with 1-tailed significance of 0.000. This also suggested a moderately positive relationship between the management quality and MEALIS performance. The results of regression analysis indicated R squared value of 0.539.

PLS-SEM technique using SmartPLS version 3.3.2 software was used for testing the underlying hypothesis under this objective. Thus, it was hypothesised that management quality positively affects success of M&E/MEAL IS in organizations. The relation between management quality and MEALIS performance has a path coefficient of 0.270 with p-value of 0.000 and standard deviation of 0.074. This suggests a moderately positive relation between management quality and MEALIS performance implying that 27% of MEALIS performance can be influenced by or attributed to management quality factors. Hence, the hypothesis that management quality positively influences success of MEALIS in humanitarian organizations was supported.

Discussions

Management quality refers to the critical roles and influences of the managers and supervisors in relation to adoption and/or utilization of MEAL systems. It was, therefore, hypothesised that management quality positively affects MEALIS performance. The empirical findings from the study revealed that management quality positively impacts on MEALIS performance. Although usually not prioritized during M&E system development, management plays critical roles that positively affect MEALIS performance. Key factors identified include structural and process alignment, and overall support/backstopping which greatly affect MEALIS performance.

These findings are supported by study findings of Zaied (2012) who found that 72.5% of study participants agreed with management support as an important factor in information systems in the public sectors. Other studies (Jannat, 2013; Kaniawati & Kaniawati, 2018) also support this finding although in different contexts.

Conclusion

Management quality positively affects MEALIS performance. This implies that as long as there is management buy-in for a MEALIS deployed, it will lead to improved overall performance and vice versa. This is because managers perform critical tasks such as resource allocation and provide strategic direction of an institution/organization/company.

Recommendations

MEAL practitioners and system developers need to ensure that managers and other key decision makers within the organization are involved right from system design through to implementation. This will ensure that the manager understand all the features and strategic objectives of deploying the system. Otherwise, it will lead to cognitive and organizational inertia hence system failure.

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