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# ASSESSMENT OF EFFECTIVENESS OF ELECTRONIC CERTIFICATION SYSTEM PROJECT FOR EXPORTS AT KENYA PLANT HEALTH INSPECTORATE SERVICE

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**Abstract**

*The main purpose of the study was to assess the effectiveness of the electronic certification system project for exports at the Kenya Plant Health Inspectorate Service. The population of interest was 105 users of this electronic certification system. The sample size comprised of 100 users of the system. The study adopted a descriptive research design. Primary data was obtained from the sample by use of questionnaires. The collected data was processed through SPSS and multiple regression analysis method was used to analyze and test the hypotheses. The findings showed that information quality and service quality of the electronic certification system were positively related to its effectiveness while system quality was not positively related. Thus study concludes that information quality and service quality of e-government system are significant factors to create satisfaction amongst users.*

*Keywords: E-government, Electronic Certification System (ECS), Quality, Kenya*

## INTRODUCTION

The horticultural industry in Kenya has shown tremendous growth over the last three decades and has become one of the main foreign exchange earners by supporting livelihood of about 4.5 million people directly and indirectly. The export process of horticultural industry requires phytosanitary certification by KEPHIS. Phytosanitary certificates act as a passport for export of

the products that accompany an export consignment to the port of entry of the importing country which would eliminate unacceptable and illegal products export to different countries.

KEPHIS was using paper driven process to issue about 109,000 phytosanitary certificates annually. One of the major limitations of this process was that it involved manual procedure of attestation by competent inspectors representing guarantee to the importing countries' competent authorities. KEPHIS wished to implement an electronic certificate issuance system that would automate issuance of all phytosanitary certificates for export of products to different countries from Kenya. KEPHIS lacked an efficient and dynamic system to take care of phytosanitary certificate issuance. As the certificate issuance process was being done manually that was prone to several challenges like errors in data entry, loss of significant data, fraud and large amounts of time spent by phytosanitary inspectors in manually writing and signing the certificates every year.

To overcome these challenges, KEPHIS contracted Techno Brain, a software firm to carryout this electronic certification project which was officially launched in 2011.Techno Brain implemented an Electronic Certification System at KEPHIS with an ability to automate the major function of issuing phytosanitary certificates for export of products to various countries across the globe. In order to monitor and support the issuance of certificates, Electronic Certification System was set up as a centralized system with database and applications at KEPHIS headquarters which can be accessed by KEPHIS offices located across Kenya and by exporters and their shipping agents through a web-based software application.

**Statement of the Problem**

KEPHIS was using paper driven process to issue about 109,000 phytosanitary certificates annually. It wished to implement an electronic certificate issuance system that would automate issuance of all phytosanitary certificates for export of products to different countries from Kenya. To overcome these challenges, KEPHIS contracted Techno Brain, a software firm to carry out this electronic certification project which was officially launched in 2011. Electronic Certification System was set up as a centralized system with database and applications at KEPHIS headquarters which can be accessed by KEPHIS offices located across Kenya and by exporters and their shipping agents through a web-based software application. Despite these perceived advantages being enjoyed with the introduction of this new innovation, no study has been conducted since its inception to assess its effectiveness both to KEPHIS and its users. This urge has necessitated this study which will assess whether a wise decision was made by KEPHIS management and the accompanying financial implications involved.

**Justification and Significance of the Study**

The emergence of the Internet and parallel developments in processing capacity and data storage over the 1990s have significantly altered the environment for ICT use across society and in government. OECD member country governments have issued e-government strategies, set targets and established e-government co-ordination bodies. In a number of countries, e-government is the specific responsibility of a minister; in others, it is part of the information society or other ministerial responsibilities. A good example is seen in the Kenyan government ministries, where the Ministry of Information, Communication and Technology was formed by the Jubilee coalition to oversee the issues related with ICT in Kenya. These responses suggest that, primarily owing to the emergence of the Internet, there has been a qualitative shift in the role governments assign to ICTs. This parallels similar responses in the broader economy, where the Internet's potential had led to the information society and e-commerce policies, initiatives and coordinating structures.

KEPHIS like other government agencies needs new mechanisms for estimating, measuring and benchmarking demand and value to ensure their investment in e-government satisfies real needs, stimulate further uptake of online services and deliver benefit to all stakeholders. The findings of this study is intended to be used to provide input to future evidence-based policy formulation, to determine the benefit/cost ratio and return on investments for e-government programs and to develop demand and evaluation methods for use by government agencies. This study will seek to investigate whether the web based service is of convenience, to the citizens of Kenya by bringing the public services within their reach. It will investigate whether customer satisfaction needs have been met by the electronic service through lowering the cost of doing business, improving efficiency, accountability and transparency. It will also establish whether clients are able to access information they require at the right time.

The research findings for this study will be useful to the Kenya Plant Health Inspectorate Service (KEPHIS), other government policy makers, exporters and farmers to understand and appreciate in-depth the effectiveness of the web based Electronic Certification System which is part of the wider e-government initiative that may be replicated to other relevant sectors of the economy.

**General Research Objective**

To assess effectiveness of electronic certification system project for exports by the Kenya Plant Health Inspectorate Service (KEPHIS).

**Specific Research Objectives**

i. To establish whether information quality of the Electronic Certification System is positively related to its effectiveness.
ii. To establish whether the service quality of the Electronic Certification System is positively related to its effectiveness.
iii. To assess whether the system quality of the Electronic Certification System is positively related to its effectiveness.

## LITERATURE REVIEW

This study is based on the theory of DeLone and McLean model of information systems success (effectiveness) to aid in the understanding of how the independent variables affects the effectiveness of the electronic certification system.

### DeLone and McLean Model of Information Systems Success (Effectiveness)

In Information system literature, many models were used to measure the success of different types of information systems. However, it is not easy to define the success of any information system since there are different stakeholders who assess information systems success in an organization (Mutaz et al., 2013), and each group assesses success from its own perspective. Dealing with this issue and in order to provide a more general and comprehensive definition of information system success; one that covers these different perspectives. DeLone and McLean (2003) reviewed the existing definitions of information system success and their corresponding measures, and classified them into six major variables; namely, 'System Quality', 'Information Quality', 'Use', 'User Satisfaction', 'Individual Impact', and 'Organizational Impact'.

They then created a multidimensional measuring model with interdependencies between the different success variables, which became very popular. Several studies have been conducted in an attempt to extend or re-specify DeLoneand McLean original model that was originated in 1992. For example, some scholars either suggested that further dimensions should be included in the model, or they presented alternative success models (e.g. Wilkin, 2007; Wang, 2008;Urbach et al., 2011; Rocha, 2012). Others have conducted research focusing on the model's application and validation (e.g., Rai et al., 2002) and have raised some critics and weaknesses of the original model in 1992, to which DeLone and McLean have responded and developed an updated model in DeLoneand McLean (2003).

The updated model consists of six interrelated dimensions of information system success: 'Information Quality', 'System Quality', 'Service Quality', 'Intention to Use', 'Use', 'User Satisfaction', and 'Net Benefits'. The model can be interpreted as follows. A system can be

evaluated in terms of system quality, information quality, and service quality; these characteristics affect subsequent use or intention to use, and user satisfaction. As a result of using the system, certain benefits would be achieved and sacrifices would be made. If net benefits are positive from the perspective of the owner or sponsor of the system, then the system will be re-used continually, thus influencing and reinforcing subsequent use and user satisfaction. These feedback loops are still valid, even if the 'Net Benefits' are negative. The lack of positive benefits is likely to lead to decreased use and possible discontinuance of the system or of the information system department itself (e.g., outsourcing).

The key modifications in the updated model in 2003 can be summarized as follows: the inclusion of 'Service Quality' as an additional aspect of information system success, the elimination of 'Individual Impact' and 'Organizational Impact' as separate variables, and their replacement with 'Net Benefits', the clarification of the 'Use' construct, by measuring 'Intention to Use' (i.e., an attitude) rather than 'Use' (i.e., a behavior

The DeLone and McLean information system success model was used by many studies to evaluate the success of various types of information systems, such as government to citizen (G2C), e-government systems (Wang & Liao, 2008), e-commerce (Molla & Licker, 2001; Zhu & Kraemer, 2005),knowledge management systems (Wu & Wang, 2006; Kulkarni et al., 2006), web-based applications (Kwan, 2006), and portals (Urbach et al., 2010). In this study, DeLone and McLean information system success model is suitable and the researcher feels it will explain how the three independent variables are affecting the dependent variable

**Research Gaps**

Mutual exclusivity and additively of success measures: This shows the divide of opinions which exist of the information system success model, some agree with the categories that are represented in the information system success model while others are under the impression that instead they represent distinct dimensions of a complex, higher-order. Gable (2004) instead argues that the dimensions in his model can be combined to prevent an overarching measure of success. The proposed model focuses on the satisfaction. To make sure that each measure is connected with information system success but does not overlap with any other measures in the model.

Model completeness: This point outlines that "the completeness of the model becomes critical as adding good and bad, high and low, positive and negative, or hot and cold effects may otherwise mask, neutralize, or distort results."

Choice of information system Success Dimensions: In the DeLone and McLean Model it highlights the need to "develop a comprehensive measurement model/instrument for a particular

context, the constructs and measures should be systematically selected considering contingency variables". Gable (2003) has commented that most studies in this area do not include any rationale on any choices of success dimensions and any success measures employed. As previously stated above model completeness is an important factor, it connects in with how the aim is "to gain a full, overarching view of success, it is critical that the complete set of success dimensions be employed, not a selected subset".

Theoretical basis for causal/process paths: The taxonomy in the DeLone and McLean model is highlighted "without sufficient explanation of its underlying theory and epistemology". This only emphasizes the "causal/process nature of the model". The fact that there is a "weak explanation for causality and mixed results from empirical studies raises concerns about the causality of the DeLone and McLean model and the utility of the suggested relationships".

The nature of the contemporary information system environment: This is the transformation of indirect oriented use of information system to more direct use. Due to modern technologies information system has changed how organizations produce and manage information. Due to modern times new measures and evaluation models are required to measure success with contemporary information system. This is not always the case and surprisingly most research on information system success is still using outdated measures to try to determine success in information system.

Multiple stakeholder perspectives: In information system evaluation "respondent's perspective on measurement is another important design consideration in information system evaluation". It is very important to have a clear picture of information system success in all levels of the company. In contrast with how important it is to know all levels of success the focus is usually to quantify any impacts (benefits and drawbacks) of information system by analyzing data collected mostly at senior levels in a company only.

## RESEARCH METHODOLOGY

The study adopted a Descriptive research design to determine how effective is the Electronic Certification System project for exports at Kenya Plant Health Inspectorate Service. The target population of this study comprised 105 users of the Electronic Certification System and the sampling frame was the list of all the users of the system. The study utilized primary data, which was collected by use of structured questionnaires. Multiple regression analysis technique was used to determine the effect of independent variables on the dependent variable

Regression Model;

$Y=\beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \varepsilon$

Y is the dependent variable (Effectiveness of the Electronic certification system),

β0 is the regression coefficient/constant/Y-intercept,

β1, β2 and β3 are the coefficients of the linear regression equation

X1 is Information Quality

X2 is Service Quality

X3 is System Quality

ε is an error term normally distributed about a mean of 0 and for purpose of computation, the ε is assumed to be 0

The quantitative data obtained was analysed using both descriptive (means, standard deviations, frequencies) and inferential statistics (ANOVA) were used for testing significant differences and multiple regression for determining relationships).

## EMPIRICAL FINDINGS AND DISCUSSION

### Descriptive and Correlational Statistics

53.4% of the respondents were males while 46.6% were females. The majority of the respondents were in the age bracket of 31-40 years old which stood at 42.0%. This was followed by respondents in the age bracket of 21-30 years old who stood at 26%.Majority of the respondents were first undergraduate degree holders at 52.3%. This was followed by College certificate at 23.9%. College certificate in this context includes diplomas and certificates. Holders of PhD degree were lowest at 1.1%.

Information Quality of the ECS and the Effectiveness of the ECS are strongly correlated, $r$ =0.68, $p$<0.01. Service Quality of the ECS and the Effectiveness of the ECS are strongly correlated, $r$ =0.73, $p$<0.01. System Quality of the ECS and the Effectiveness of the ECS are strongly correlated, $r$ =0.62, $p$<0.01.

### Regression Results

The Regression model summary shows that the three independent variables in the regression model (Information Quality, Service Quality, and System Quality) account for 57.2% of the total variation in the effectiveness of the ECS because the 'R square' value is 0.572.

Table 1. Regression Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of Estimate |
|---|---|---|---|---|
| 1 | .756[a] | .572 | .557 | 2.90801 |

a. Predictors: (Constant), Service Quality, Information Quality, System Quality

**Results from the Anova Model**

Table 2. ANOVA[a]

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 948.639 | 3 | 316.213 | 37.393 | .000[b] |
| | Residual | 710.350 | 84 | 8.457 | | |
| | Total | 1658.989 | 87 | | | |

a. Dependent Variable: Effectiveness of the ECS
b. Predictors: (Constant), Service Quality, Information Quality, System Quality

Regression analysis was used for hypothesis testing and analyzing the relationship between predictors (independent variables) and outcomes (dependent variables). the results of Regression analysis, which is model fitness between the three independent variables (information Quality, Service Quality and System Quality of the ECS) and the dependent variable of the Effectiveness of the ECS. The last column (Sig.) shows the goodness of fit of the model. The lower this number, the better the fit. Typically, if "Sig" is greater than 0.05, we conclude that our model could not fit the data. In the above table, 'Sig' value is .000 which is less than 0.05 and therefore we can conclude that this model fits the data.

Table 3. Regression Coefficients

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 6.297 | 2.512 | | 2.507 | .014 |
| | Information Quality of the ECS | .196 | .077 | .281 | 2.543 | .013 |
| | System Quality of the ECS | .043 | .057 | .088 | .768 | .444 |
| | Service Quality of the ECS | .360 | .102 | .450 | 3.522 | .001 |

a. Dependent Variable: Effectiveness of the ECS

The beta values that were obtained explained the regression equation. The standardized beta coefficients give a measure of influence of each variable to the model and indicate how much the dependent variable varies with an independent variable when all other independent variables are held constant. The findings of the study revealed that Service Quality of the ECS had the most influence on the effectiveness of the ECS (β = 0.360), followed by Information Quality of the ECS (β= 0.196).

Y = 6.297+ 0.196 Information Quality +0.360 Service Quality

The equation above shows that Information Quality and Service Quality positively and significantly affect the effectiveness of the KEPHIS Electronic Certification System.

## CONCLUSION AND RECOMMENDATIONS

There is overwhelming evidence from the study showing that information Quality and Service Quality of the KEPHIS Electronic Certification System has a positive influence on the effectiveness of the system. The study also shows that System Quality of the KEPHIS Electronic Certification System does not necessarily lead to the satisfaction of the system users. From the findings of the study, it is recommended that government authorities should ensure that more attention is given to both Information Quality and Service Quality of E-government systems since from this study finding, these quality parameters contributes more to the effectiveness of such E-government systems by giving satisfaction to users of such systems.

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