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MIS adoption and its effects on the technical efficiency of agribusiness firms in Cameroon

This paper intends to determine the factors influencing the adoption of Management Information Systems (MIS) as well as the effects such systems have had on the technical efficiency of agribusiness firms in Cameron. 183 MIS users and 300 non-users were sampled through a multistage sampling procedure. An Ordered Logit model was employed to show that the user's level of satisfaction, the purchase price of equipment and technological performance all have a positive effect on MIS adoption. Conversely, fear of change in firm management, access to government regulations, and complexity of MIS equipment discourage the adoption of MIS. The Cobb-Douglas stochastic production function meanwhile revealed that ICT expense, firm size and number of customers were positively significant for the revenue of MIS users. For MIS non-users, ICT expense, firm size and quantity purchased also had a positive significance for revenue. However, the average technical efficiencies were 0.96 and 0.55 for MIS users and non-users, respectively, meaning that MIS users were far more technically efficient than MIS non-users. Also, the Tobit regression model on MIS users revealed that MIS improved the technical efficiency of agribusiness firms adopting them. This study therefore recommends that agribusiness firms in Cameroon invest in MIS; moreover, they should encourage its adoption by training their staff in how to use it optimally.

Keywords: adoption, Management Information Systems, technical efficiency, Agribusiness firms

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Introduction

All firms need information to better understand themselves, their environment and to make informed decisions. Although some information is meaningless, the right amount of information at the right time is a key factor for every organisation (Lapiedra and Devece Carañana, 2012). It is undeniable that information systems have revolutionised virtually every sector of the economy in which they have been applied (Sopuru, 2015). In developed and developing countries, there is a crucial need for organisations to transform their traditional bureaucratic management style into a modern management information system that is performant and efficient in the decision making process (Azeez and Yaakub, 2005). However, in Africa, due to lack of awareness, which restricts access to information and its proper dissemination (Sopuru, 2015), agribusiness firms have shown only a slight improvement, despite advances in agricultural innovations. The Cameroon government is encouraging investments in agribusiness both to promote effective strategies in relation to improved food security and as a vital source of economic development. This has made the agribusiness sector one of the major sectors in the economy of Cameroon. Emphasis is given to good agricultural practices, prescriptive agronomic recommendations, data-based farming, and other precision farming applications.

The definition of management information system (MIS) varies depending on authors. According to Lapiedra and Devece Carañana (2012), management information systems are information systems that provide managers with the information they need to make decisions and solve problems. Therefore, a management information system is a system that collects, processes, stores, retrieves, and disseminates the information needed to make decisions and solve problems in an organisation.

Today, the role of the computer system is essential to the company's information system, given that companies' information systems have to handle a large quantity of data and make structured information available to multiple decision-makers in the company (Lapiedra and Devece Carañana, 2012). Berisha-Shaqiri (2014) mentioned five tasks of computer operating system: data collection; data processing; data management; control and security of data and information generation. Management information systems have an increasingly crucial role to play in improving the operations of agribusiness firms in making goods and services readily available to the market.

Several studies have been carried out to explore factors affecting the adoption of management information systems and its effects on technical efficiency. Zide and Jokonya (2022) affirm that the implementation and adoption of innovation in organisations are influenced by technological, organisational, and environmental factors. Out of the six technological factors that affect the adoption of data management information systems in small and medium enterprises (SME) in South Africa, the security technological factor was the most highlighted. Among organisational factors, cost was the most frequently mentioned factor affecting the adoption of data management information services in SMEs. Lastly, among the five environmental factors that affect the adoption of data management information services in SMEs, government regulations were most often mentioned.

In Sweden, Imre (2016) also indicated that in addition to the well-known factors such as organisational size and IT

readiness, social norms and ownership characteristics of the firm played a prominent role in information systems adoption. Sepahvand and Arefnezhad (2013), in their study on factors affecting the success of information systems in Isfahan Province of Iran, focused on organisational factors – such as top management support, resource allocation, decision-making structure, management style, alignment of goals and knowledge of IT management – that in turn, affected the success factors of information systems (system quality, user satisfaction, perceived usefulness and quality of information). Based on expert choices, the results showed that the most important organisational factor affecting the success of organisational information system was top management support and amongst the success factors of information systems, user satisfaction was the most important. Similarly, Ghaderi *et al.* (2017) found that environmental, organisational and human factors are, respectively, the most important factors affecting the use of MIS in 22 districts of Tehran municipality. Munirat *et al.* (2014) examined the factors affecting the implementation of MIS in selected financial cooperatives in Nairobi. The study found out that the effects of training, cost, infrastructure and regulations were the highest in the implementation of MIS. In Nigeria, Irefin *et al.* (2012) analysed the vital influential factors affecting the adoption of information and communication technology from adopter and non-adopter perspectives in small and medium size enterprises located in different parts of Lagos State. The results indicated that, among the adoption inhibiting factors (cost, business size, availability of ICT infrastructure, government support and management support), cost was the major barrier for small and medium size enterprises adopting ICT. Conversely, Lal (2007) found that one of the major factors limiting the adoption of ICT in SMEs in Nigeria was poor hardware infrastructure.

The growing body of theoretical and empirical literature on firm efficiency has identified numerous other variables such as ownership structures, investment in fixed capital, soft budget constraints, firm trade orientation, quality of labour and competition among others, as determinants of firm performance and consequently firm efficiency (Aw *et al.,* 2000; Djankov and Murrell, 2002; Frydman *et al.,* 1999). Badunenko *et al.* (2006) investigated factors that explain the level of technical efficiency of a firm in 35,000 firms over the years 1992-2004 in Germany. The study revealed that industry effects accounted for one third of the explanatory power of the model; whereas the firm's size and headquarters' location accounted for one quarter and ten percent of the variation in efficiency, respectively. Other firm characteristics such as ownership structure, legal form, age of the firm and outsourcing activities were found to have small explanatory power, while research and development activities were neutral as regards technical efficiency.

Mbusya (2019) in an analysis of small and medium sized Kenyan enterprises found that physical capital is one of the major determinants of firms' efficiency, although its impact is weak. He further showed that labour force, age of the firm, and legal status all have positive and significant effects on the technical efficiency of the firms. In contrast, Alvarez and Crespi (2003) in an analysis of micro, small, and medium-sized Chilean manufacturing firms in 1996 found that efficiency was positively associated with the modernisation of physical capital, the experience of workers and product innovation activity. Also, variables such as outward orientation, the education level of the owner, and corporate social responsibility did not affect the efficiency of the firms.

The analysis of efficiency is mostly associated with the quality of human capital, due to its importance in the production process and consequently, economic growth. According to Ismail *et al.* (2014), an increase in human capital investment through education and training will produce a more knowledgeable labour force. Human capital will improve productivity and ultimately improve the efficiency of manufacturing firms. Likewise, Ismail *et al.* (2014) argued that firms that have a high number of educated workers are in an advantageous position to keep up with, control and adapt to new technologies.

Several studies have examined the effects of management information systems on the efficiency of firms. Shao and Lin (2002) investigated the effects of information technology on technical efficiency in a firm's production process in USA through a two-stage analytical study with a firm-level data set. It was found that information technology exerts a significant favourable impact on technical efficiency and in turn, gives rise to the productivity growth. In Nigeria, Tantua and Osuamkpe (2019) in a cross-sectional survey in Rivers State, revealed a significant relationship between the management information system and office productivity of the Print Media in Rivers State. Acknowledging that productivity is understood to be a measure of the efficiency of production, the study further encouraged the use of office automation systems such as computers, websites, and scanners to help boost the operational efficiency and profitability of Print Media in Rivers State. Based on an analysis of the impact of MIS on the performance of business organisations in Nigeria, Munirat *et al.* (2014) concluded that MIS has direct effects on the performance and efficiency of business organisations since 60% of them agreed that a lack of adequate knowledge and skill relating to MIS is one of the major factors affecting the efficient performance of management information systems in Nigeria. According to Alene (2018), MIS provides information that manages the organisation effectively and efficiently. Meanwhile, the study of Handzic (2001) focused on the efficiency of business decision making, based on information availability and people's ability to use information in short and long-term planning. The results showed that the higher the availability of information, the better the impact on both the efficiency and accuracy of business decisions. Likewise, Awan and Khan (2016) investigated the impact of management information system on the performance of the organisation by analysing 31 different organisations of Pakistan. Their results showed that having a management information system affected positively the performance and efficiency of organisations in Pakistan.

This study aims to fill a knowledge gap by examining the complexity related to the adoption of MIS in agribusiness firms in Cameroon and by investigating the effects of MIS on agribusiness firms' performance. Several empirical and conceptual studies have been carried out worldwide to examine this disputed but important issue. A big debate continues regarding the suitability of a set of variables that could be used to determine the users' perception of successful adoption of MIS in agribusiness firms. According to Zide

and Jokonya (2022), the successful adoption of MIS in companies is more dependent on technology, organisational, and environmental characteristics. However, these factors are much neglected by organisations, especially among small MIS users, where social and human characteristics play an important role. Moreover, little is known about the existing level of inefficiency among MIS users and non-users. These must be known to improve the efficiency of MIS users in the study area. Lastly, as far as the study area is concerned, there is insufficient literature that examines the effects of MIS on the technical efficiency of MIS users in Cameroon. It is against this backdrop that this study intends to fill the research gap by analysing the MIS adoption and its effects on the technical efficiency of MIS users in Cameroon.

This study intends to determine the potential factors that influence the adoption of a management information system in Cameroon; to estimate and compare the firms' technical efficiencies of MIS users and non-users; and to assess the effects of MIS on the technical efficiency of MIS users. This will provide a critical understanding of the complexity of MIS adoption. Estimating indicators associated with different technical efficiencies of MIS users and non-users is imperative, to enable the two groups to be compared. Moreover, the study will also give a sound demonstration of the importance of MIS in agribusiness firms, as well as identifying the various constraints and factors that affect the adoption of MIS in firms.

Methodology

The study area was Cameroon, located in the central part of Africa within latitudes 2 and 13 North and longitude 9 and 16 east of the equator. It covers a total land area of 475,442 square kms. The country has ten regions: Centre; Littoral; Adamawa; Far-North; North; South; East; West; North-West, and South-West (Djomo *et al.,* 2021; Farris *et al.,* 2010). The country has great potential for agricultural production thanks to its agroecological diversity. The sector employs around 70% of Cameroonians (Abia *et al.,* 2016) and its contribution to GDP in 2020 represented 17.38%. The population of the study comprised all registered agribusiness firms in Cameroon.

Sample size, sampling procedure and data collection

Multi-stage sampling technique was used based on purposive, stratified, simple random sampling technique for sample selection. Firstly, three out of the ten regions that make up the country were purposively selected, given that these regions are agriculture-based and have a high number of agribusiness firms. Secondly, two major towns were randomly selected in each of the three regions previously selected, amounting to six towns in total. Thirdly, from each of the towns selected, respondents were selected after stratifying them into MIS users and non-users.

For sample selection purposes, lists of all registered firms involved in agribusiness were obtained from the respective Regional Registries for Commerce and Industry in Cameroon. The sample sizes of the various strata were obtained using the Taro Yamane formula (Yamane, 1973). Should a listed firm not be available, other not yet selected firms might replace them.

The Taro Yamane formula was used from a sample frame of 340 registered MIS users and 1200 non-users involved in agribusiness (Yamane, 1973). The formula is expressed as follows:

$$n = \frac{N}{1+N(e^2)} \quad (1)$$

where:
n = sample size
N = real or estimated size of the population
e = level of significance (5% or 0.05)

To achieve proportional distribution of samples according to strata, the following formula was used:

$$n_h = \frac{nN_h}{N} \quad (2)$$

where:
n = sample size.
N_h = population size in each stratum.
n_h = number of questionnaires needed for each stratum.

Primary data was used for this study. These data were collected through well-structured questionnaires and interview techniques administered to managers or owners of agribusiness firm. We obtained data on physical quantities and monetary value of firms. We also collected firm data on technology, organisational and environmental characteristics of MIS. In addition, we collected socio-economic data on employees of the firms. The questionnaires were divided into sections based on information needed. It was administered to the respondents with the aid of trained enumerators.

Data Analysis and Estimation Techniques

The data collected for this study was analysed using inferential statistics. An ordered logistic regression model was used to determine potential factors that influence the adoption of MIS. A multiple regression model based on Stochastic Frontier Profit Function which assumed Cobb-Douglass specification form and inefficiency function model was employed to determine the technical efficiency of both agribusiness firms using MIS or not. A logistic regression model was used to assess the effects of MIS on technical efficiency of MIS users. And lastly, a t-test was used to test the hypothesis of no significant difference in technical efficiency among MIS users and non-users.

Ordered Logistic regression model

In determining factors influencing the adoption of MIS in agribusiness firm in the study area, this research employed an ordered logit model (OLM). The OLM is employed when the dependent variable has more than two categories and the

values of each category have sequential pattern in which one category is greater in value than the next (Otekunrin, 2022). This was done because the dependent variable was ordinal and categorical in nature, derived from a Likert rating scale which required the respondents to indicate the steps an individual goes through in adopting MIS in his agribusiness firm under five categories as (Adekoya and Tologbonse, 2011): Awareness stage = 1, Interest stage= 2, Evaluation stage = 3, Trial stage = 4 and Adoption stage = 5.

Ordered logistic regression and ordinal logit models are interchangeable when determining ordinal survey data (Cordero-Ahiman *et al.,* 2020; Samim *et al.,* 2021). Empirically, it has been argued that using either of the two models basically depends on the purpose of choice and convenience (Long, 1997; Samim *et al.,* 2021). The main assumption of the ordered logistic regression model (OLM) is the Proportional Odds Model (POM), where the association between each pair of outcome groups is identical. This is also known as a parallel regression assumption. Violations of the parallel proportional odds assumption might result in inconsistent estimates of the model variables (Chowdhury, 2021). If a POM assumption is violated by one or more explanatory variables, an unconstrained generalised ordinal logit (gologit) model, partial proportional odds model, or multinomial logit model (MNLM) can be used as an alternative.

The observed ordinal variable in the model is given as Y and it is a function of another variable y* not measured. As specified by (Long, 1997) and Otekunrin (2022), the y* has various threshold points as presented in (1):

$$y_i^* = x_i^{'}\beta + \varepsilon_i \tag{3}$$

where y_i^* is the hidden variable of the MIS adoption levels of the firm $i, x_i^{'}$ is a vector of explanatory variables describing firm i, β is a vector of parameters to be estimated, and ε_i is a random error term which follows a standard normal distribution.

Stochastic Frontier Model

The stochastic frontier production function model of Cobb-Douglas functional form was employed to estimate the efficiency of the firm. Many empirical studies particularly those relating to developing countries used the Cobb-Douglas functional form because its functional form meets the requirement of being self-dual, i.e. it allows an examination of efficiency (Ambali *et al.,* 2012).

The Stochastic Frontier Production (SFP) function used in this study is defined as follows:

$$\begin{aligned}\mathrm{LnY} &= \beta_0 + \beta_1 \mathrm{Ln}X_1 + \beta_2 \mathrm{LnX}_2 + \beta_3 \mathrm{LnX}_3 + \\ &+ \beta_4 \mathrm{LnX}_4 + \beta_5 \mathrm{LnX}_5 + \beta_6 \mathrm{LnX}_6 + \mathrm{V}_i - \mathrm{U}_i\end{aligned} \tag{4}$$

where; L_n = natural logarithm to base 10; Y_i = operating revenue in FCFA; X_1 = the expenditures in information and communication technology (ICT) in FCFA; X_2 = Labour used measured in man days per hectare; X_3 = expenditure in power supply in FCFA; X_4 = firm size in FCFA, X_5 = number of customers measured in number of people; X_6 = is retailed or wholesale, measured in quantity purchased.

The inefficiency of production was modelled in terms of factors such as:

$$\mathrm{U}_i = \sigma_0 + \sigma_1 Z_{1i} + \sigma_2 Z_{2i} + \sigma_3 Z_3 + \sigma_4 Z_{4i} \tag{5}$$

where: σ = a vector of unknown parameters to be estimated; Z_1= Level of Education measured in number of years spent in formal education, Z_2= manager experience in years, Z_3= gender of manager (1 is male and 0 is female), Z_4= corporate body (1 is yes, 0 is No).

According to Battese and Coelli (1995), technical efficiency occurs when there is possibility to reduce inputs used without negatively affecting output. On the contrary, technical inefficiency is defined as the amount by which the level of production for the firm is less than the frontier output (Usman *et al.,* 2013). TE takes values between 0 and 1.

Tobit Regression Model

The study used a Tobit regression to analyse the effects of MIS on technical efficiency of agribusiness firm. This model was used given the fact that technical efficiency has both the lower and upper bounds (from 0 to 1). According to Gujarati and Porter (2010), using the ordinary least squares (OLS) method would cause major violations of the assumptions of the OLS model (normality of distributions, homoscedasticity of errors, and exogeneity of independent variables) and lead to inconsistent parameter estimates. Moreover, the Tobit model has the advantage of using the maximum likelihood estimation (MLE) procedures to estimate errors in the presence of non-normal distribution, which is the most efficient estimator for asymptotically distributed dependent variable (Okello *et al.,* 2019; Wooldridge, 2002).

$$Y_i^* = \lambda_0 + \lambda_1 V_{1i} + \lambda_2 V_{2i} + \ldots + \lambda_{15} V_{15i} + \lambda_{16} V_{16i} + \rho_i \tag{6}$$

with $Y_i^* = TE_i$, λ_0 intercept, taking the value of TE_i when other variables are null. λ_i= are the parameters to be estimated, V_1 ease of use, V_2 = response time, V_3 reliability, V_4 = accuracy, V_5 precision, V_6 = timeless, V_7 = number of failures, V_8 = repair time. ρ_i is an error term which is assumed to be independent and identically distributed.

Results and Discussion

Factors affecting the adoption of management information systems

The analysis of factors influencing the adoption of MIS is presented in Table 1. Although 10 variables were hypothesised to have an influence in MIS adoption, the ordered Logistic regression result confirmed that only 6 factors were statistically significant (at 1% level) in influencing MIS adoption. These variables are government regulation, users' satisfaction, purchased price, complexity, technology performance and fear of change.

The explanatory power of the independent variables as expressed by Pseudo R^2 was relatively high (40%). The overall goodness of fit as rejected by Prob > Chi2 (0.0000) was also good. The estimated cut-off points (μ) satisfy the conditions that $\delta_1 < \delta_2 < \delta_3 < \delta_4$. This implies that these categories were ranked in an ordered way. In terms of consistency with a priori expectations on the relationship between the dependent variable and the explanatory variables, the model seems to have behaved well.

The government regulation was negative and significant in explaining the level of MIS adoption. This indicates that the more the government investigates in MIS firms, the lower the firms adopt MIS. This means that agribusiness firms are not ready to increase the use of MIS to prove their various activities. The findings are in line with Zide and Jokonya (2022), who found that government regulation was the highest environmental factor that affects positively the adoption of data management information service in small and medium enterprises in South Africa.

User satisfaction was positive and significant at 1% level of probability. This implies that the more agribusiness firms are satisfied with the use of MIS, the more they adopt it. The finding is in line with Sepahvand and Arefnezhad (2013) who found that the most important organisational factor affecting successful adoption of MIS was user satisfaction. The coefficient of purchased price was positive and statistically significant at 1% level of probability. This indicates that high cost would result in more adoption of MIS, implying that the equipment used for MIS in agribusiness firms are considered as Veben goods or luxury goods, whose demand increase as price increases.

Our study found a negative and significant relationship between complexity of MIS equipment's and the adoption level of MIS in agribusiness firms. This indicates that the more complex are MIS equipment, the less agribusiness firms are willing to adopt MIS in their firms. This might be explained by the fact that a complex MIS equipment would increase the complexity of tasks, as a wide array of hardware and software has to be managed. Moreover, greater heterogeneity of MIS equipment could complicate the task of migrating to more sophisticated systems because technologies change over time and this may offset any positive effects (Chau and Tam, 1997). This could then discourage firms to adopt such complex MIS equipment. This result conflicts with the findings of Chau and Tam (1997), who did not find a significant relationship between complexity of MIS equipment and adoption.

Results also revealed a positive and significant relationship between technology performance and MIS adoption in the firm. This means that farmers' perception of the performance of technologies significantly influences their decision to adopt them. In other words, farmers who perceive technology as being consistent with their needs and their environment are likely to adopt it, since they view it as a positive investment (Mwangi and Kariuki, 2015). A similar result was found by Wandji *et al.* (2012) who examined the famers' perception towards the adoption of aquaculture technology in Cameroon, as well as Adesina and Zinnah (1993) who studied the influence of how farmers perceived a modern variety of rice on their decision on whether to adopt it.

The coefficient of fear of change was negatively and significantly related with the level of MIS adoption. That is the more the users of MIS fear change in their management system, the more they are afraid of MIS adoption in their firm activities. This result is in disagreement with the findings of Zide and Jokonya (2022), who showed that fear of change in the management system was not a significant factor affecting the adoption of MIS in firms in South Africa.

Table 1: Determinants of MIS adoption.

Variable	Coefficient	Standard error	T-value	P-value
Constant	0.431	0.033	13.070***	0.000
Risk perception	-0.220	0.183	-1.190	0.232
Government regulation	-0.167	0.045	-3.670***	0.000
Self sufficiency	-0.252	0.229	-1.100	0.270
User satisfaction	0.450	0.152	2.770***	0.006
Education	0.035	0.053	0.670	0.504
Purchased price	0.0001	5.45e-06	8.020***	0.000
Experience	2.48e-11	2.79e-10	0.090	0.929
Complexity	-1.030	0.250	-4.060***	0.000
Technology performance	0.793	0.220	3.610***	0.000
Fear of change	-0.783	0.223	-3.510***	0.000
Pseudo R^2	0.397			
LR chi2(8)	165.160			
Prob > chi2	165.160			
Log likelihood	-125.316			
δ_1	1.290			
δ_2	6.850			
δ_3	8.010			
δ_4	9.430			

***, ** and * significant at 1, 5 and 10%, respectively.
Source: own survey.

Estimates of parameters in the Stochastic Production Function

The result on technical efficiency of MIS users in the study area is presented in Table 2. The analysis revealed that there were technical inefficiency effects as shown by the gamma value of 0.99 and 0.16 for users and non-users respectively. The significant gamma (γ) estimates indicate that 99% and 16% of the technical inefficiencies can be explained jointly by the socio-economic variables in the technical inefficiency equation. The estimated sigmas squared were significant at 1% level of probability. This indicated a good fit and correctness of the specified distribution assumption of the model.

For MIS users, the coefficients of ICT, firm size and number of customers were positive and statistically significant at 1%, 5% and 10% levels, respectively. That means that a unit expense in ICT under static condition of other independent variables will result in decrease of revenue by 0.09. This result is in conformity with Delina and Tkáč (2015) who concluded that using ICT for doing business leads to positive impact of ICT on revenue growth. Similarly, ICT not only improve the revenue but also the productivity and competitiveness of the firm (Bernroider *et al.,* 2011; Cardona *et al.,* 2013; Hall *et al.,* 2013; Tarutė and Gatautis, 2014). In the same way, the coefficient of number of customer (0.407) implies that a unit increase of customer will lead to an increase of 0.407 in the revenue. This result concurs with the work of Sharp and Allsopp (2002), who found that increases in sales are due more to growth of the size of the customer rather than increased rates of buying frequency. Likewise, a unit increase in firm size – i.e. a firm's capital – will increase revenue by 0.90. This shows that capital is a determinant of the technical efficiency of agribusiness firms in South Cameroon. Comparable result were reported by Mbusya (2019) who found that found that capital was one of the major determinants of firm's technical efficiency although its impact is weak. For MIS non-users, technical efficiency has a significant relationship with ICT, firm size and quantity purchased. Unlike MIS users, quantity purchased is statistically significant and positively related to revenue. This implies that a unit increase in quantity purchased will increase the revenue by 0.15.

The estimated coefficient from the inefficiency model included in the stochastic production frontier estimation revealed that for MIS users, only experience was found to exert a statistical influence on the inefficiency of agribusiness firms. The results showed that the estimated coefficient of experience (-0.47) had a negative sign for technical inefficiency and was statistically significant at 1% level of probability. The negative sign implies that the higher the level of experience is, the more the inefficiency decreases. In other words, a negative sign of experience means that experience has a positive effect on technical efficiency. This implies that increase in experience will improve the ability of the firms to optimally combine the available inputs to maximise their revenue. Specifically, a unit increase in experience will increase the revenue by 0.47. This result is conformed to the findings of Kaka *et al.* (2016), who found a negative and significant relationship between the experience and profit inefficiency of paddy farmers in Malaysia.

Technical efficiency distribution of agribusiness firms

The frequency distribution of technical efficiency (TE) scores for agribusiness firms is presented in Table 3. The technical efficiency scores were not fairly distributed with all firms having their technical efficiency within the bracket of 0.90 to

Table 2: Maximum Likelihood Estimates of the Parameters in the Stochastic Frontier Analysis.

Variables	Users		Non-Users	
	Coefficient	t-ratio	Coefficient	t-ratio
Constant	1.639	-4.530***	1.893	0.030
ICT	0.088	4.190***	0.205	1.760*
Labour	-0.029	-0.450	-0.019	-0.140
Power supply	-0.0396	-1.480	-0.007	-0.050
Farm size	0.902	51.960***	0.358	6.210***
Number of customers	0.407	1.660*	0.167	0.920
Quantity purchased	-0.011	-0.050	0.147	1.670*
Inefficiency model				
Constant	-0.637	-0.240	0.744	0.010
Education	-0.118	-0.620	-0.018	-4.480***
Experience	-0.047	-2.650***	-0.005	-4.090***
Sex	-1.157	-0.690	-0.096	-3.290***
Corporate body	-0.260	-0.280	0.103	4.710***
Sigma-square	0.352	47.560***	0.344	17.200***
Gamma	0.988	13.530***	0.157	17.440***
LR test	263.260		7.975	

***, **and * significant at 1, 5 and 10%, respectively.
Source: Own survey

1.00 for MIS users and 0.40 to 0.75 for MIS non-users. The means TE were 0.96 and 0.55 for MIS users and non-users, respectively. From the result, MIS users are highly technically efficient than MIS non-users. This might be explained by the efficient use of resources due to the use of management information system. However, there is room for improvement in technical efficiency of MIS users by 0.04 and more especially for MIS non-users, whose average technical efficiency is low compared to the one of MIS users. The mean technical efficiency of MIS non-users might increase by 0.45, through the efficient use of management information system.

Effects of MIS on technical efficiency of MIS users

To assess the effects of MIS on technical efficiency of MIS users, Tobit regression model was estimated. The results were presented in Table 4. The sigma revealed the fitness of the model at 1% ($p < 0.01$) level of significance. The likelihood ratio chi-square of 39.13, with a p-value of 0.000, tells us that our model is statistically significant overall. In other words, it fits significantly better than a model with no predictors. The result of the model shows that four out of the eight MIS variables were found to have a significant influence on technical efficiency of MIS users in the study area. These variables included use of office automation system, availability of information, skill on management information system and number of failures.

Results showed that the use of office automation system was positive and statistically significant at 1% level of probability. This implies that technical efficiency increases when office automation system was used in agribusiness firms in the study area. This result confirms our expectations and is in line with Tantua and Osuamkpe (2019), who found that the use of office automation system such as computers, websites and scanners has a positive effect on efficiency and profitability of print media in Rivers State of Nigeria.

The coefficient of availability of information was positive and statistically significant at 1% level of probability, indicating that better access to information would result in high technical efficiency of MIS users. In that case, MIS provides information in short and long term for both accuracy and efficiency of business decisions of the firm. The positive effect of availability of information on technical efficiency of MIS users confirms the results of Handzic (2001) who claimed that the better the availability of information, the better the impact on both accuracy of business decisions and efficiency of the firm.

The coefficient of skill on MIS revealed that an increase in skill on MIS increases the technical efficiency of agribusiness firms. This means that knowledge on MIS improve the performance of management information system. Comparable results were reported by Munirat *et al.* (2014) who

Table 3: Percentage distribution of technical efficiency.

TE	Users		Non-Users	
	Frequency	Percentage	Frequency	Percentage
[0.40 - 0.50]			63	21.2
[0.50 - 0.60]			168	57.3
[0.60 - 0.70]			62	20.8
[0.70 - 0.75]			2	0.7
[0.90 - 0.93]	3	1.6		
[0.93 - 0.96]	39	21.4		
[0.96 - 1:00]	183	100	300	100
Maximum	0.99		0.75	
Minimum	0.90		0.40	
Mean	0.96		0.55	
Standard deviation	0.02		0.60	

Source: Own survey

Table 4: Effect of MIS on technical efficiency.

Variable	Coefficient	Standard error	t-value	p-value
Constant	0.939	0.0060	157.8800	0.0000
Easeofuse	0.0010	0.0009	1.0900	0.2760
Use of office auto syst	0.0035	0.0012	2.9100***	0.0040
Reliability	0.0005	0.0013	-0.3900	0.6970
Availability of inform	0.0036	0.0014	2.6300***	0.0090
Skill on MIS	0.0047	0.0013	3.7200***	0.0000
Timeliness	0.0021	0.0073	1.6300	0.1040
Numberoffailures	-0.0028	0.0013	-2.6000**	0.0320
Repairtime	-0.0034	0.0011	-0.3100	0.7590
Sigma	0.0140	0.0008	19.0100***	0.0000
LR chi2(8)	39.1300			
Prob > chi2	0.0000			
Log likelihood	512.6000			

***, **and * significant at 1, 5 and 10%, respectively.
Source: Own survey

reveals that majority of firms agreed that lack of adequate knowledge and skill on information technology and the ability to manage the MIS process is one of the major factor that reduce the efficient performance of management information system in Nigeria. Results also showed a negative and significant relationship between number of failures and technical efficiency of MIS users. This means that the more the number of failures increases, the more the technical efficiency of agribusiness firm decreases. However, some apparent failures might be a consequence of a limited appreciation of the uses for which MIS can be put into practice (Malmi, 1997).

Two samples t-test

A two-sample Student's *t*-test assuming unequal variances using a pooled estimate of the variance was performed to test the hypothesis that the means technical efficiency scores for MIS users and non-users were equal. From the result in Table 5, we reject the null hypothesis, since $t(364.43) = 114.3$, $p = 0.000$ and $t\text{cal} > t\text{tab}$. We conclude there is significant difference in technical efficiency between MIS users and non-users.

Table 5: Two samples t-test for differences in technical efficiency

Levene's test on equality of variances		T-test on significance of means			
F	**Sig.**	**t**	**Sig. (bilateral)**	**Difference in means**	**Difference in variances**
164.256	0.000	92.286	0.000	0.4164	0.0045
		114.275	0.000	0.4164	0.0036

Note: *t* tab at 1% is 2.576.
Source: Own survey

Conclusions

This paper has analysed the factors influencing the adoption of MIS and its effects on technical efficiency of agribusiness firms in Cameroon. The results reveal that users' satisfaction, purchased price of equipment and technology performance have a positive effect on MIS adoption, while fear of change in firm management, government regulation and complexity of MIS equipment discourage the adoption of MIS in agribusiness firms in the area studied. MIS users are far more technically efficient than MIS non-users. The difference in technical efficiency might be explained by a more efficient use of resources that can be attributed to the use of management information system by MIS users. However, there is room for improvement in technical efficiency more especially for MIS non-users, whose average technical efficiency is very low compared to MIS users. The application of a Tobit regression model to MIS users reveals that the use of an office automation system, the availability of information, skill in making use of the management information system and numbers of failures have a significant influence on the technical efficiency of MIS users in the study area. More explicitly, the use of an office automation system, the availability of information and skill in making use of MIS all play a crucial role in improving the technical efficiency of agribusiness firms adopting MIS.

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