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Relationship between Selected Technologies Adoption and Organizational Performance; a Case of Dairy Societies in Uasin Gishu County, Kenya

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Abstract

Dairy societies in Kenya, like many Africa countries are carried out by small-scale dairy farmers located in the rural areas, often with low literacy levels and very few technological skills. For dairy cooperatives to survive they have to streamline their operations and improve their management processes to have positive balance sheet and surplus money to pay dividends to their members, therefore, the study assessed the relationship between selected technology adoption and organizational performance of dairy societies in Uasin Gishu County in Kenya. The study specifically determined the relationship between financial technologies, Information communication technologies, human resources information system, and storage and processing technologies on organization performance of dairy societies. The study was informed by Diffusion of Innovation theory (DOI) and Theory of Constraints (TOC. It adopted explanatory research design and a census of all the dairy cooperative societies in Uasin Gishu County was conducted. Quantitative data collected was analyzed using descriptive statistical techniques and inferential statistics such as Pearson moment correlations and Multiple regression model. The study concluded that financial technologies adoption, information communication technology adoption and storage and processing technologies adoption are important determinants of performance of dairy societies. However, human resources information system had no significant effect on performance of dairy societies.

Key words: financial technologies, communication technologies, human resource information system, storage and processing technologies

INTRODUCTION

Dairy farmers' co-operative societies have played an important role in the adoption of market-oriented dairying by smallholder farmers (Hopcraft & Ruigu, 2006). This indicates that dairy cooperative also play a pivotal role in social and economic empowerment of their members as compared to non-members. However, Rathod et al., (2012 b) and Biradar (2009) pointed out the constraints related to financial, human resources, policies and administrative aspects hamper the organization performance of dairy cooperatives.

The technology adoption decision within organizations in Malaysian and Turkey is usually authorized by a group of senior managers (Peansupap & Walker, 2005), therefore a key question of information technology adoption in construction firms should be how to ensure that users accept and utilize information technology in their work processes. However, studies in China indicate that the rate of unsuccessful information technology implementation is growing and further, the adoption rate is very slow (Acar et al., 2005; Mole et al., 2004; Shin, 2006).

Information and communication technology plays an increasingly important role in facilitating the introduction of new products or services, in improving operational processes, and in guiding managerial decision making. The impact of globalization has compelled dairy societies to adopt ICT, to enable dairy societies to survive and compete with large companies.

Dairy societies would greatly benefit by ICT adoption in their business processes (Maguire et al., 2007). However, as dairy societies continue contributing to the economy, they are faced with many challenges which

inhibit them not to compete with large enterprises. One of the major constraints is lack of ICT adoption in their business processes. It is commonly accepted that ICTs provide many potential benefits to organizations so as to make them more efficient, effective and competitive (Fink & Disterer, 2006).

ICT has changed the way finance officers work. Technological advances in hardware and software have taken users of accounting information systems from the mainframe environment to mini and desktop computers and have become critical and integrated part of modern financial management system (Mensah & Marfo, 2009). In Kenya the Dairy industry accounted for 4.1% of Gross Domestic Product with Small holder dairy production accounting for over 70% of the total milk production and has always received a lot of attention from the government since independence (National Livestock Policy, 2008)

For most Kenyan dairy farmers, their only source of income comes from selling milk. But over the years, many small-scale producers have pooled their resources and built up strong cooperative societies that collect the milk and then sell it on to bulk processors. Some cooperatives belong to an even bigger union that also processes milk from its members before selling the final product in retail markets. It has been argued that the use of IT enhances the performance of service employees, both in terms of efficiency and effectiveness, by enabling customization and flexibility in their encounters with customers (Bitner et al., 2000).

Despite the increase in the use of computers, there is still mismanagement of cooperatives which has accelerated their collapse (Atieno & Kanyinga, 2013). Most of the cooperative societies in Uasin Gishu County are not performing well compared to other cooperative societies in similar regions in the country (Kipyego et al., 2015). Poor management of dairy societies results in among other challenges, delayed payments to its members; this kills the farmers' initiatives and morale. Technologies have been found to promote the dual objective of sustainability and outreach of organizations (Ssewanyana, 2009).

Therefore, the study seeks to address the relationship between selected technology adoptions on organizational performance of dairy societies in Uasin Gishu County.

GROUNDING THEORIES

Diffusion of Innovation Theory (DOI)

Diffusion of innovation is a theory that seeks to explain how, why, and at what rate new ideas and technology are spread through cultures. Diffusion is the process by which an innovation is communicated through certain channels over time among the participants in a social system (Rogers, 1995). Individuals are seen as possessing different degrees of willingness to adopt innovations, and thus it is generally observed that the portion of the population adopting an innovation is approximately normally distributed over time (Rogers, 1995).

Breaking this normal distribution into segments leads to the segregation of individuals into the following five categories of individual innovativeness (from earliest to latest adopters): innovators, early adopters, early majority, late majority, laggards (Rogers, 1995). The innovation process in organizations is much more complex. It generally involves a number of individuals, perhaps including both supporters and opponents of the new idea, each of whom plays a role in the innovation-decision. Innovativeness is related to such independent variables in this study as financial technologies adoption, communication technologies, human resources information system and storage and processing technologies adoption.

Theory of Constraints (TOC)

The theory of constraints (TOC) is a systems management philosophy developed by Eliyahu M. Goldratt in the early 1980s. The fundamental thesis of TOC is that constraints establish the limits of performance for any system. Most organizations contain only a few core constraints. TOC suggest that managers should focus on effectively managing the capacity and capability of these constraints if they are to improve the performance of their organization. Theory of Constraints (TOC) in a services environment, specifically for the dairy societies, analyses the factors involved in the decision to adopt the TOC by organizations in this sector. Management practices in industry as a whole are undergoing profound changes as the methodologies of total quality management (TQM), just in-time (JIT), and the theory of constraints (TOC) are being absorbed.

EMPIRICAL REVIEW

Financial Technologies Adoption on Organization Performance

Ott and Rendleman (2000) used multiple regression on dairy societies in a study conducted in the United States dairy firms on financial technologies. They argued out that dairy societies are significant users of financial technologies that employ economic and statistical models to create and value new securities, estimate return distributions and make portfolio decisions based on financial data and thus performance of the societies.

Gloy and Akridge (2000) studied the use of technology in Wisconsin and Kansas to determine which factors influenced financial technologies usage by farmers and asserted that there has been a push towards the adoption of financial technologies thus more performance of dairy societies. The increasing growth in international trade, cross border financial transactions and investments which unavoidably involve the preparation and presentation of accounting reports that is useful across various national borders, has brought about the adoption of financial technologies by both the developed and developing countries (Armstrong et al., 2007).

According to Barth (2007), the adoption of financial technologies is expected to have the benefits like lowering the cost of financial information processing and auditing to capital market participants as users, familiarity with one common set of international accounting standards instead of various local accounting standards by Accountants and Auditors of financial reports, comparability and uniformity of financial statements among companies and countries making the work of investment analysts easy, attraction of foreign investors in addition to general capital market liberalization and thus performance. Ball (2006) stated that many developing countries like Kenya where the quality of local governance institutions is low, the decision to adopt financial technologies would be beneficial in ensuring performance.

According to Lipsey and Chrystal (2003) the adoption of financial technologies alters country's comparative advantages and improves its competitiveness through technology transfer and relationship myriad externalities, domestic investment which can alter a country's volume and pattern of trade in many income enhancing directions.

Communication Technologies Adoption on Organization Performance

According to Trant (2002) adoption of Information and Communication Technology (ICT) comprises computing and allied equipment and communications infrastructure which together facilitate the gathering and processing of data, subsequent storing, distributing and communicating information. The rapid advances in technology drastically changed the traditional ways in which information was processed, communications conducted, and services made available (Sarfo, 2007). De Vinals (2001) argues that ICT-solutions help dairy societies to increase their productivity and achieve higher business performance.

A very moderate usage of ICT by dairy societies in the emerging economies can be observed. This can be explained due to the fact that in the developing countries the dairy societies are faced with additional challenges such as high cost of telecommunications, lack of legislative support from the state, use of obsolete technologies, overall technological illiteracy, lack of qualified staff and poor communication infrastructure.

Stiroh (2002) argues that this productivity acceleration was broad based and finds an increase in productivity related to ICT use in nearly two-thirds of dairy industries from 1995 to 2000. Recent work has demonstrated a link between computer networking and acceleration in establishment-level productivity (Atrostic and Nguyen, 2002; Stiroh, 2002). Recent research have also argued that the link between IT adoption and performance of dairy societies will depend on usage.

Human Resources Information System on Organization Performance

The use of Human Resource Information Systems (HRIS) has been advocated as an opportunity for human resource (HR) professionals to become partners with top management and to improve their management skills (Lengnick-Hall and Moritz, 2003). The idea has been that HRIS would allow for the HR function to become more efficient and to provide better information for decision making. Walker (2001) conducted a study on dairy societies in the UK and found out that HRIS is a system used to acquire, store, manipulate, analyze, retrieve and distribute pertinent information about an organization's human resources thus ensuring performance.

(Walker, 2001), revolves around the perspective that HRIS will create informational efficiencies and cost savings such that HR departments can turn their attention to providing better analysis of current data and creative uses of the HRIS to provide better and more accurate data upon which to base decisions. Dairy societies become more complex as the amount of information they need increases the need for automated information systems. The organization determines what kind of information it will need by deciding what kind of decision it will be making based on the HRIS information and which will be the decision maker.

In a case study done in Kenya on Limuru Dairy Farmers Cooperative Society it was argued that the human resource strategy has a significant role in supporting the implementation of the strategy of an organization and performance of dairy societies. In this direction, a lot of the literature covering the link between human resource management and firm performance is based on the universalistic or best practices perspective that implies a direct relationship between particular approaches to human resources and performance.

Storage and Processing Technologies on Organization Performance

In a study conducted by Lacobbo (2006) in the US it was argued that food producers are responsible for the safety of their products, and to guarantee food safety of dairy products, the dairy industry implemented storage and processing technologies of critical control points and systems that contribute to performance thus greater profits. This enables quality assurance of final products via a chain management approach (European Commission, 2004). The quality and safety of raw milk is essential for the quality and safety of milk and dairy products

In addition to their significance for public health, storage and processing, technologies create a very good microbial quality of raw milk that is also important to prevent production losses and to achieve an optimal shelf life of dairy products. The necessity for critical multidisciplinary review of management processes, difficulties in establishing limits via the identification of critical control points, the use of routine surveillance procedures and effective record keeping and documentation of standard processes restrict the widespread adoption of storage and processing technologies programme to dairy farms (Ruegg, 2003).

Storage and processing technologies have been criticized in the dairy processing industry as it can contribute to food borne illness outbreaks. As processing plants have become larger and they handle larger volumes of products sometimes from many different sources and distribute them over a broader geographic area.

METHODOLOGY

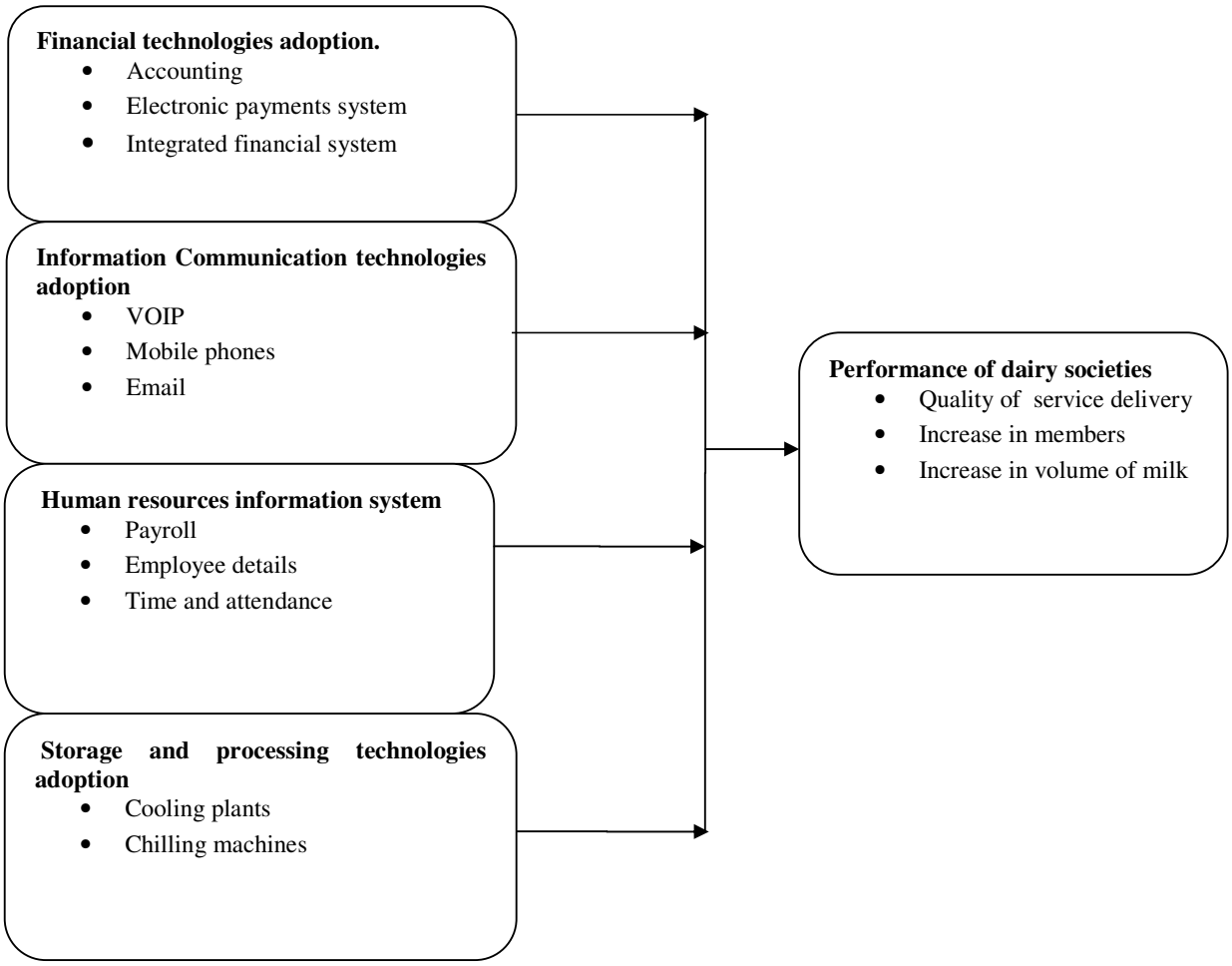
The study was carried out in Uasin Gishu County in Kenya. Explanatory research design was adopted. This design was best for determining the causal relationship of adopted technologies on performance. A Census of 20 dairy societies in Uasin Gishu County was used and reliability of the instrument was tested using the minimally acceptable Cronbach Alpha coefficient of 0.7. The primary data for the study was obtained using questionnaires.

Data collected was analyzed using descriptive statistical techniques which are frequencies, mean and standard deviation. Inferential statistics such as Pearson moment correlations was used to establish the relationship between variables. Multiple regression model was used to test the hypotheses. The multiple linear regression model is as shown below:

$$y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where;
Y = performance
α = Alpha (constant)
$\beta_1 \ldots \beta 3$= the slope representing degree of change in independent variable by one unit variable
X_1 = Financial technologies adoption
X_2 = Communication technologies adoption
X_3 = Human resources information system
X_4 = Storage and processing technologies adoption
€ is error term (represents all other factors which influence the dependent variable other than the independent variables in the study.

Conceptual Framework



Source: Research study 2015

RESEARCH FINDINGS

Demographic Characteristics

The researcher sought to establish the demographic information of the respondents paying close attention to their level of professional qualification, job tenure and employment status. The level of professional qualification of the respondents was put into account. As evidenced in table 1 below, majority 50.8% (60) of the respondents have a Diploma,24.6% (29) degree,18.6% (22) certificate level of education while 5.9% (7) are at secondary level precisely form four. It appears therefore that respondents were in a better position to assess the relationship between selected technology adoptions on organization performance of dairy societies. Precisely, most of the respondents had a Diploma hence they were reliable to give relevant information as sought by the study.

In terms of job tenure, 42.4% (50) of the respondents have worked in the organization for 3-5 years, 30.5% (36) of them for 2 years and below, and 27.1% (32) of the respondents have worked for 6 years and above in the organization. As a result, majority of the respondents were experienced and had the ability to make comprehensive decisions, leading to improved organizational performance. In terms of employment status,

61.9% (73) of the respondents are on contract, 31.4% (37) are employed permanently and 6.8% (8) of the respondents are under casual employment.

Table 1: Demographic Characteristics

		Frequency	Percent
Level of professional qualification	Certificate	22	18.6
	Diploma	60	50.8
	Degree	29	24.6
	Any other - form four	7	5.9
	Total	118	100
Job tenure	Less than 2yrs	36	30.5
	2-5yrs	50	42.4
	6yrs and above	32	27.1
	Total	118	100
Employment status	Permanent	37	31.4
	Contract	73	61.9
	Casual	8	6.8
	Total	118	100

Source: Field data (2015)

Findings in table 2 below revealed that Financial Technologies adoption were positively associated with organizational performance (r = 0.771). Storage and Processing Technologies were also positively correlated to organizational performance (r = 0.663).

Moreover, Information Communication Technologies Adoption were positively correlated with organizational performance (r = 0.503) while Human Resources Information System was indicated to be positively related with organizational performance (r = 0.409). This implies that Storage and Processing technologies, Information Communication Technologies adoption, Human Resources Information System and Financial Technologies adoption are expected to influence organizational performance.

Table 2: Correlation Results

	Organizational performance	Financial technologies adoption	Human resources information system	Information communication technologies adoption	Storage and processing technologies
Organizational performance	1				
Financial technologies adoption	.771	1			
Human resources information system	.409	.476	1		
Information communication technologies adoption	.503	.419	0.105	1	
Storageand processing technologies	.663	.673	.503	.455	1

Source: Field Data (2015)

Hypothesis Testing

Study findings in ANOVA table 3 below indicated that the coefficient of determination was significant as evidenced by F ratio of 54.05 with p value 0.000 <0.05 (level of significance). Thus, the model was fit to predict organizational performance using Storage and Processing Technologies, Information Communication Technologies Adoption, Human Resources Information System and Financial Technologies Adoption. The R^2 of 65.7 indicates 65.7% variation of organizational performance explained the selected technologies.

Table 3: Multiple Regression Results

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	1.005	0.286		3.51	0.001		
Financial technologies adoption	0.456	0.065	0.55	7.042	0	0.498	2.008
Human resources information system	0.031	0.07	0.03	0.447	0.656	0.682	1.467
Information communication technologies adoption	0.189	0.067	0.18	2.804	0.006	0.737	1.356
Storage and processing technologies	0.147	0.061	0.196	2.402	0.018	0.457	2.188

R Square	0.657
Adjusted R Square	0.645
F	54.05
Sig.	.000

Source: Field Data (2015)

$H_{O1:}$ *Financial technologies adoption has no significant relationship on organization performance of dairy societies*

Findings indicated that financial technologies adoption had coefficient of estimate which was significant basing on $\beta_1 = 0.55$ (p-value = 0.000 which is less than $\alpha = 0.05$).Therefore, null hypothesis was thus rejected and it was concluded that financial technologies adoption had a significant effect on organizational performance.

$H_{O2:}$ *Information Communication technologies has no significant relationship on organization performance of dairy societies*

Findings showed that information communication technology adoption had coefficient of estimate which was significant basing on $\beta_3 = 0.18$ (p-value = 0.006 which is less than $\alpha = 0.05$) implying that the null hypothesis was rejected and it was concluded that information communication technology adoption has significant effect on organizational performance.

$H_{O3:}$ *Human resources information system has no significant relationship on organization performance of dairy societies*

Research findings showed that human resource information system had coefficients of estimate which was insignificant basing on $\beta_2 = 0.03$ (p-value = 0.656 which was more than $\alpha = 0.05$) hence the null hypothesis was accepted.

$H_{O4:}$ *Storage and processing technologies adoption has no significant relationship on organization performance of dairy societies*

Storage and processing technologies adoption had coefficient of estimate which was significant basing on $\beta_4 = 0.196$ (p-value = 0.018 which was less than $\alpha = 0.05$) hence null hypothesis is rejected and concluded that storage and processing technologies adoption had a significant effect on organizational performance.

CONCLUSION

The adoption of financial technologies has allowed dairy societies to increase in their performance in various aspects such as productivity as well as quality of products. This has been possible through faster decision making and increased efficiency and effectiveness in completing auditing tasks. The dairy societies therefore have an edge over other players in the dairy industry since they have lowered their cost of financial information processing and auditing and have uniformity of financial statements. As such, the high levels of accountability brought about by financial technologies make it easier for the societies to attract foreign and local investors hence improving their performance.

Further, the findings of the study revealed that the adoption of human resource information system has no significant effect on organization performance. This is contrary to prior studies that have established a positive link between the adoption of HRIS and organizational performance. It would be important to establish if indeed the HRIS would allow for the HR function to become more efficient to an extent that there is better information for decision making hence improved performance.

The study has established that the adoption of ICT has a positive effect on organizational performance. The adoption of ICT in dairy societies changes the way in which information is processed, communication is conducted, as well as services are made available.

Finally, the adoption of storage and processing technologies is necessary for improved performance of dairy societies. Storage and processing technologies ensures that there is guaranteed food safety of dairy products. Storage and processing technologies also prevent production losses of dairy products by creating an excellent microbial quality of raw milk.

Recommendations

The study has established that financial technologies are instrumental in enhancing the organizational performance of dairy societies. It would therefore be prudent for dairy societies to adopt financial technologies such as computerized budgeting, integrated financial management information systems and enterprise resource planning so as to heighten their performance.

There is clear supportive evidence of an acceleration of productivity in dairy societies with the adoption of ICT. It is therefore important for organizations to not only adopt ICT but make use of ICT so as to have an advantage over competitors.

It is evident that storage and processing technologies are essential for the quality and safety of milk and dairy products. It is therefore paramount for dairy societies to ensure that coolers are available so that they can store excess milk and reduce on wastage. Future research should have to draw sample of respondents from a larger scope for the sake of generalizing the results of the study. This study also recommends that further research be carried out to determine the effect of human resource information system on organizational performance of dairy societies since the study exhibited insignificant relationship between the two variables.

REFERENCE

Acar, E., Kocak, I., Sey, Y. and Arditi, D. (2005) 'Use of information and communication technologies by small and medium-sized enterprises (SMEs) in building construction', *Construction Management and Economics,* 23, 713-722

Armstrong, C., M. Barth, A. Jagolinzer, & E. Riedl.(2007). Market reaction to the adoption of IFRS in Europe. *Working paper, Stanford University*.

Atieno,R. and Kanyinga K.(2013). The Revitalisation of Kenya Cooperative Creameries: The Politics of Policy Reforms in the Dairy Sector in Kenya, Institute for Development Studies (IDS), University of Nairobi, Kenya.

Atrostic, B. K. and S. Nguyen (2002) 'Computer networks and US manufacturing plant level productivity: New evidence from CNUS data', *Centre for Economic Studies working paper* 02-01, U.S. Bureau of the Census, Washington D.C.

Ball, R., (2006). International Financial Reporting Standards (IFRS): pros and cons for investors. *Accounting & Business Research* 36: 5-27.

Barth, M.E. (2007). *Research, standard setting, and global financial reporting*. Hanover, MA: New Publishers.

Biradar, C. (2009). Evaluation of Livestock Service Delivery by Different Agencies in Karnataka M. V. Sc Thesis (Unpub.), IVRI, Izatnagar, India

Bitner. M. Jo, Stephen W, Brown, and Matthew L, Meuier (2000). 'Technology Intusion in Service Encounters," *Journal of the Academy of Marketing Science.* 28 (I). 1389

De Vinals, and L.R. Mongiardino, M.E. (2001).Studies on the causes of inefficiencies of artificial insemination systems in dairy cattle in Argentina. Proc. of final Research Co-ordination Meeting on 'Radioimmunoassay and related techniques to improve artificial insemination programmes for cattle reared under tropical and sub-tropical conditions ;IAEA-TECDOC-1220, p. 79 – 91. Vienna IAEA

European Commission (2004a) Regulation (EC) No 852/2004 on the hygiene of foodstuffs. *Official Journal of the European Union*, L139, 1–54.

Fink, D. and Disterer, G. (2006) "International Case Studies: To what extent is ICT infused into the Operations of SMEs?", *Journal of Enterprise Information Management*, Vol. 19, No. 6, pp 608-624.

Gloy, B.A. and Akridge, J.T. (2000).Computer and Internet adoption on large U.S. farms. *International Food and Agribusiness Management Review*, 3: 323-338.

Hopcroft, R. L. (2006). Sex, status and reproductive success in the contemporary United States. Evolution and Human Behavior 27: 104–120.

Lengnick-Hall, M.L., & Moritz, S. (2003). The Impact of e-HR on the human resource management function. *Journal of Labor Research*, 24, 365-379.

Lipsey, R. G., & Chrystal, K. A. (2003). *Principles of Economics,* (9th Edition). London: Oxford University Press.

Maguire, S., Koh, S.C.L. and Magrys, A. (2007), "The adoption of e-business and knowledge management in SMEs", An International Journal, Vol. 14 No. 1, pp. 37-58.

Mensah E A and Marfo G, E-(2009). Business adoption in the Banking Industry in Ghana,

Ministry of Livestock Development (2008) *National Livestock policy*. Sessional paper No.2 of 2008

Ott, S.L., Rendleman, C.M., (2000). Economic impacts associated with bovine somatotropin (BST) use based on survey of US dairy herds. AgBio Forum 3, 173–180.

Peansupap, V. and Walker, D. (2005) Factors affecting ICT diffusion: a case study of three large Australian construction contractors. *Engineering, construction and architectural management*, 12(1), pp.21 - 37

Rathod, P., Nikam, T. R., Landge, S. P. and Hatey, A. (2012 a). Farmers Perception towards Livestock Extension Service: A Case Study. Indian Res. J. Ext. Edu. Special Issue Vol-II, pp:1-5.

Rogers E M. (1995).Diffusion of innovation model. http://nnlm.gov/pnr/eval/rogers.htm

Ruegg, P.L. (2003b) The role of hygiene in efficient milking. *Milking and Milk Quality*, 406, 1–6.

Sarfo F K, (2007). Educational Technology. College of Technology Education, 2nd ed. Kumasi: UEW Press,

Ssewanyana, S. (2009). ―Growth, Inequality, Cash Transfers and Poverty in Uganda.‖ Country Study 19, International Policy Centre for Inclusive Growth, United Nations Development Programme, Brasilia. http://www.ipc-undp.org/pub/IPCCountryStudy19.pdf.

Stiroh, K. (2002) Information technology and the U.S. productivity revival: What do the industry data say? *American Economic Review*, 92, 1559-1576.

Walker, G. P., C. R. Stockdale, W. J. Wales, P. T. Doyle, and D. W. Dellow. 2001. Relationship of level of grain supplementation on milk production responses of dairy cows in mid-late lactation when grazing irrigated pastures high in paspalum (*Paspalum dilatatum* Poir.). Aust. *J. Exp. Agric*. 41:1–11