International Journal of Business Marketing and Management (IJBMM)
Volume 2 Issue 6 July 2017, P.P.08-17
ISSN: 2456-4559
www.ijbmm.com

Integration of Information and Communication Technologies(ICT's) into smallholder farming systems for improveddata capturing and farm recordsin Zimbabwe; a case of selected farms in Bindura district, Mashonaland Central Province

By

Chisango Future Fortune T

Senior Lecturer; Zimbabwe Open University, Faculty of Agriculture

Abstract : A study to analyze the factors hindering adoption and integration of Information and Communication Technologies(ICT's) intosmallholderfarm data capturing and record keeping systems to enhance efficiency in agricultural productivity was carried out in 2 farms drawn from ward three (Matepatepa) of Bindura district in Mashonaland central province, Zimbabwe. Deprivation of new technologies to the smallholder sector has always remained a major obstacle hindering farmers from accessing new information and skills to boost production in the sector. As the smallholder sector remains a livelihood option for a majority of the Zimbabwean farming families, it is imperative that the aggregation of new technologies particularly ICTs would be an indispensable tool for empowering the farmers, so that they can be able to make informed decisions based on advanced data capturing and record systems. Deprivation of new technologies to the smallholder sector has always remained a major obstacle hindering farmers from accessing new informationand skills to boost production in the sector.The study was carried out in 2 farms drawn from ward three (Matepatepa) of Bindura district in Mashonaland central province; Zimbabwe. The study used data from 80 smallholder farmers who were purposively sampled, through a stratified random sampling technique. Guided interviews complemented by questionnaires were used for soliciting data from the participants. Regression analysis was employed to statistically determine the significance of various factors hindering adoption of ICTs by Zimbabwean smallholder farmers to augmentfarm data capturing and record keeping systems. The analysis indicated that from the 6 variables that were analyzed, 4 had a coefficient value of $p<0.05$ while the other 2 had $p<0.5$ values, signifying that the adoption of ICTs was weak owing to a diverse of challenges predominantly inadequate ICT gadgets in farms,Power outage unreliable supply of electricity andBureaucratic bottlenecks in setting up information centres for dissemination of new technologies in small-scale farming communities. The study therefore established that in order to intensify ICT adoption and use in the farming communities there is need for government support in the acquisition of more ICT gadgets and establishment of community information cantres to avail the technology to local farmers.

I. Introduction

Agriculture forms the indispensable backbone of Zimbabwe's economy as majority of the Zimbabwean population both urban and rural largely depend and derive their livelihood from agriculture and other related off- farm economic activities. Research acknowledges that during its heydays Zimbabwean agriculture used to employ and sustain the livelihoods of 60-70 percent of the population, supplied 60 percent of the raw materials required by the industrial sector and contributed 40 percent of the total export earnings. Notably despite the high level of employment in the sector, agriculture contributed only 15-19 percent to national annual GDP (Government of Zimbabwe, 1995).It is in retrospect of the shambles of the "fast track land reform" that the demise of the country's agricultural performance understated the true importance and dominance of the agricultural industry, in a country that was formerly the bread basket of SADC region. It has unanimously

become an accepted phenomenon that when agriculture performs poorly, the multiplier effect is that, the rest of the economy suffers. It is critical that even after the fast track land reform the distinguishing characteristic of Zimbabwe agriculture remained its dualism under the new tenure systems where the two major subgroups were still based on the size of landholdings. The smallholder A1, model and communal farmers constitute the larger group of resource poor farmers, whose activities are predominantly unsophisticated and production is comparatively lower than the anticipated levels. The category occupies the larger portion of Zimbabwe's agricultural land totaling 21 million hectares. The other group comprises large-scale A2 Model farmers whose production systems are sophisticated, and as always favored by government input programs; production surpasses the breakeven point thus farming under the system is relatively viable. The group occupies about 11 million hectares of land, primarily located in the areas with absolute and high comparative advantage on diversified agricultural activities.

1.1 Background to the Study

Current status of smallholder farming and adoption of ICTs in Zimbabwe

The smallholder A1, model and communal farming in Zimbabwe is under severe threat from a plethora of challenges. Farmers are underfunded due to mainly lack of property rights/ title deeds to surrender to financing institutions as collateral, farmers therefore resort to extensive peasantry practices which fuel low productivity as farmers salvage paltry output levels not even adequate to meet family consumption requirements. As farmers also face difficulties in accessing viable markets for their meagre surplus produce in good years, family incomes have always been subjected to a sharp decline. Youths are not spared as the worsening situation has made them refrain from embracing farming as a viable option for sustaining livelihood. Youths therefore spend time on off farm activities such as; brick moulding, gold panning and indiscriminate cutting down of trees for fire wood, which result in massive land and environmental degradation.

Deprivation of new technologies to the smallholder sector in Zimbabwe prohibits this group of farmers from accessing new information, knowledge, skills and technology that could be useful in boosting productivity. The prevailing scenario keeps the farmers at bay and widens the gap of their isolation from economic and technological change. As smallholder A1 and communal farming models are there to stay and remain a livelihood option for a majority of the rural Zimbabweans, it is therefore imperative that the aggregation of new technologies particularly ICTs would be an indispensable tool for empowering small scale agricultural farmers, so that they can be able to make informed decisions and keep records of activities on their farming units intact.

Information and Communication Technologies (ICTs) is a generic term referring to technologies that are used for collecting, storing, editing and passing on (communicating) information in various forms. Jones, G.E, (1997)notes that access; efficiency and affordability of agricultural information are the major barriers in the battle to uplift agricultural productivity among small scale farmers. However Maru1 et al cited that the challenge can be alleviated through the effective exploitation of innovative solutions that integrate Information and Communication Technologies in the dissemination of agricultural information. This entails that the application of ICTs adapted to local conditions needs to be adopted by Zimbabwean farmers to improve farming efficiencies. Current farming trends show that challenges bedevilling the agricultural sector can be alleviated through effective exploitation of innovative solutions that integrate Information and Communication Technologies in the dissemination of agricultural information. This therefore emphasizes the need for farmers to be e-literate in order to competently manage and monitor farming programs through the ICT systems.

Richardson, D, (1996) reaffirms that ICT is an enabler for growth and maximization of profits on the farm, and as an enabler, can result in improved market competitiveness of the local farm products hence widening the profit margin for the farmer. It has generally been noted that the aggregation of ICTs into farming, enhances farmers' market participation and access to massive data/information on mitigatory strategies of the possible catastrophes of climate change and enables farmers to access online financial services. It also facilitates the monitoring of; humidity, ambient environment and soil nutrient sensors, irrigation/fertigation and prescriptive planting with effective weed and pest management through integrated systems, to boost productivity.

Integration of ICTs to advance farm record systems in Zimbabwe's smallholder sector

Background to the Study

In modern agriculture the role of record keeping cannot be over-emphasised, as records constitute an integral component and are generally perceived as the life-blood of any organisation. They represent organisational corporate memory and aid efficient and effective processes in farming. Agribusinesses generate decisive information which they use daily in the running of diverse farm operations. The records vary from one farm to the other depending on the scale of operation of an individual farm and according to Durosaro et al. (2008:3); they normally include the production records, cash flows/ budgets, workforce attendance registers and machinery/ asset registers and inventories. Zijp, W. (1994) cited in Nakpodia (2011:44) concur that regardless of size, location or ownership, all organisations gather and generate data to enhance efficiency. Atulomah (2011:1) agreed that in any organisational set-up, sound record keeping ensures that information on existing and previous operations is always readily available and can be retrieved at any given moment. It is therefore essential that anyone who takes farming as business requires adequate and accurate farm records for purposes of effective planning and management systems.

Globally, there is a general consensus that modern life has now become dominated by new technologies predominantly computers/ ICTs to ease the processing, storage and retrieval of vital information in an organisation. Similarly, farming and agribusinesses worldwide, particularly in the developed world are being redesigned to fit more into the electronic era to facilitate efficiency in operations (Osakwe, 2012:39). However, their potential to enhance human abilities and the ease of doing business in current Zimbabwean farming models has remained afarfetched, horrendous ideology as farmers fail to appreciate and adopt the innovation. Apparently thus, in this present age of globalisation, where digital divide is continually widening between the developing and developed nations as farming and agricultural technologies in African countries like Zimbabwe is still lagging behind particularly in terms of ICT implementation.

Regardless of the efforts made in the mobilisation of ICT facilities, in other government departments their integration in farming management systems still remains at its infancy as the majority of the newly resettled farmers are inclined to their traditional systems of data processing and storage. Mandoga et al, (2013:1) posit that in Zimbabwe's primary productive sectors,ICT is not a common phenomenon – particularly in terms of sustaining record keeping, which is a highly neglected area. Tsokota and Solms (2013:2) concur that majority of business organisations in Zimbabwe conduct business the traditional way, as they lack knowledge on the integration of modern technologies mainly ICTs into their farming systems. Similarly, the manual record keeping systems still prevail as the integral facet for data capturing in Zimbabwe's smallholder farming sector. The preferred traditional systems of data storage lack standardized ways of managing records and encourages loss of records as archival material is exposed to a number of risks.Inflexibility to accommodate alterations or adjustments on the existing data is also a major shortcoming of the traditional physical system of record keeping.

Literature available on ICT in agriculture in Zimbabwe was mainly concerned with data processing and storage by government departments and studies are relatively few regarding its impact on the management of on-farm activities, Zimbabwe therefore needs to draw lessons from the developed world.Bukaliya and Mubika (2011), andMandonga et al. (2013:1) cited that even in the education system computers are not serving their main purpose as they are relegated to the prime function of typing services as users lack proficiency on advanced computer literacy skills. This therefore may explain the reason why farmers are sceptical and reluctant about adopting computerization of farm records despite the obvious benefits that accrue from the innovation.

GOI, (2001) reveals that ICT provision in developing African nations is concentrated in administrative operations rather than having computers connected to the internet for purposes of accessing valuable business information and getting connected to the world. A survey carried out by Hare's (2007:4) also established that in Tanzania ICTs were predominantly confined to administration and in most cases they had not been integrated as a medium of instruction to guide execution of duties in the productive sector. The scenario presents the need to

explore the unfolding opportunities that ICTs can offer to enhance processes involved in efficient farm management for the ease of doing business.Over the years agriculture worldwide has evolved and it has become a mammoth task to execute some operations manually. Apart from the drudgery associated with manual record keeping it has been noted that such documentation has been subjected to human error, leading to distortion of critical farm information. Storage of such records also presented a mammoth task for the resource poor smallholder farmers as they lacked proper infrastructure and facilities for the safe upkeep of the hard copies of information. Thus the system remains highly exposed to the risk of information destruction through mishaps such as termite attack, rodents, theft and fire.

As farming evolves and looks set to become more complex thrust therefore needs to be put on programmes that focus on electronic farm management software which could facilitate easier processing and storage of agricultural information for all regions in the country. Central to such programmes can be availing information to farmers on; how to grow crops specific to their regions including land preparation, input requirements i.e. seed, fertilizers, insecticide/chemicals, manpower, when to plant, rainfall and irrigation requirements as well as expected yield per hectare. To comprehensively address the farmers' needs the programmes should also have a broader base of information on livestock, product value addition, marketing and prevailing prices. Integration of accounting packages which comprise: billing, receipting, creditors', cash book, fixed assets and general ledger modules would entail that all activities are done on the farm - a cost cutting measure as farmer's visits to urban centres for such services are limited. To address the turmoil of serious cash crisis faced by Zimbabwe, the accounting package should have an electronic transaction module which enables payment to be effected by swiping electronic visa cards; e-mailing or cell phone eco-cashing which is now widely used in Zimbabwe's retailing system.

As noted by World Bank (2012:1), the mammoth task that has always been confronting agriculture policy-makers in Africa was the alignment of farming practices so that they conform to the rapid mounting demands of globalization and the technology-driven world. It is in this vain that as the Zimbabwean government grapples to come to terms with the pace of adopting ICTs in its institutions, farmers are not left in the cold as always the case, but taken on board so that they embrace the technology. This therefore presents the backdrop upon which a study that sought to assess impacts of the integration of ICTs into the farm management systems particularly the farm data capturing and record keeping systems was conducted. The thrust of the study was to comprehensively address the farmers' needs through adoption of ICTs to narrow the increasingly widening gap of their access to information, knowledge and technologies aimed at improving farm productivity and enhance their ability to participate in viable markets, hence thwart poverty through agro-based economic empowerment.

1.2 Statement of the Problem

The smallholder A1, model and communal farming in Zimbabwe is under severe threat from a plethora of challenges. Deprivation of new technologies to the smallholder sector prohibits farmers from accessing new information, knowledge and skills that can be useful in boosting productivity. The prevailing scenario keeps the farmers at bay and widens the gap of their isolation from economic and technological change. As farmers are underfunded due to mainly lack of property rights to surrender to financing institutions as collateral, they resort to extensive peasantry practices which fuel low productivity resulting in farmers salvaging paltry output not even adequate to meet family consumption requirements. As smallholder farming sector is there to stay and remain a livelihood option for a majority of the rural Zimbabweans, it is imperative that the aggregation of new technologies particularly ICTs would be an indispensable tool for empowering the farmers, so that they can be able to make informed decisions based on advanced data capturing and record systems; which is the thrust of the study.

1.3 Research Questions

- How do Zimbabwean smallholder farmers perceive challenges associated with the manual farm data capturing and record keep systems?
- How do farmers view benefits of integrating ICTs in the management of data and records on the farm?
- What are the challenges associated with the integration of ICTs in the management of data and records on the farm?

II. Research methodology

2.1 Site Selection

The study was carried out in 2 farms drawn from ward three (Matepatepa) of Bindura district in Mashonaland central province; Zimbabwe. Bindura district is characterized by a wide variety of land tenure typologies, namely: communal areas (Musana, Masembura and Chiweshe), newly resettled small scale (A1), newly resettled large scale (A2), small scale commercial, large scale commercial and old resettlement areas (Chisango and Dzama, 2013). The district is made up of areas of varying agricultural potential ranching from agro ecological zone 2 receiving as much as over 1000mm of rainfall annually to agro-ecological zone 4 which receives as little as below 450 mm of rainfall per year, signifying special need for the resuscitation of irrigation systems in the district.

2.2 Population and sampling procedure

According to Patsika and Chitura (2004:60) a population in research refers to all the individuals or objects of a study (the larger group) with common observable characteristics. A sample is therefore regarded as a small portion of individuals drawn from the target population for purposes of generating specific data for the study (Chikutsa and Chingozho, 2011:42). A sample thus should be selected because collecting data from all individuals in the population would be uneconomical and at times compromises validity of the data. Bernard, (2002) opines that data gathering is crucial in any research, as the data is meant to contribute to a better understanding of a theoretical framework.

The Selection criteria of participants for the study therefore focused on members who were willing to impart their knowledge and experiences on the possible impacts of ICT integration into farm management systems, particularly the data capturing and record keeping processes on the farm. The purposive sampling technique was found to be the most ideal tool for the study as it focused on knowledgeable members of the farming communities. The study used data from 80 smallholder farmers who were purposively sampled, through a stratified random sampling technique. Guided interviews complemented by questionnaires were used for soliciting data from the participants. Regression analysis was employed to statistically determine the significance of various factors hindering adoption of ICTs by Zimbabwean smallholder farmers to enhance data capturing and farm record keeping. The analysis indicated that from the 6 variables that were analyzed, 5 from the 2 farms had a coefficient value of $p<0.05$ signifying that there are numerous challenges impeding adoption of the new technology in the smallholder sector.

III. Results and discussions

Table 3.1: Challenges associated with the manual farm data capturing and record system

Nature of challenge	**No. of Respondents**	**%**
Duplication of work	**12**	**15**
Uneconomic in terms of space, manpower, stationery and equipment requirements	**10**	**12.5**
Challenges of information sharing	**11**	**13.75**
Too laborious/Time consuming	**9**	**11.25**
Inflexible/too rigid to change	**11**	**13.75**
Prone to human error, e.g misfiling/misplacement	**14**	**17.5**
Security of records is poor	**13**	**16.25**
TOTAL	**80**	**100**

Table 3.1 above reveals that 17.5% and 16.25% respectively indicated that the main challenges experienced with manual data generation and record keeping systems in Zimbabwe's smallholder farming communities are duplication of work, being prone to human error and lack of proper security for the upkeep of the records. Farmers indicated that the manual system of record keeping is highly susceptible to human error which encompasses misfiling and misplacement which in most cases lead to loss of valuable information on the farm. A significant number of participants also expressed that the manual system is tedious and uneconomic in terms of material and human resources required to keep the system functional. Farmers from the two sampled farms unanimously retorted that manual system is tedious and slow hence needs to be replaced by more efficient systems which would embrace the modern technologies such as ICTs to enhance data capturing and record keeping systems on the farm. This however required heavy capital investment for proper infrastructure and the gadgets as cited by Adeleye, (2007:21) who opines that the digital divide across government departments in African states has been an attribute of lack of local capacity and financial resources vital for a sustainable integration of ICTs across sectors.

Table 3.2: Farmers' proficiency on the use of common computer software programs

FARM	**Computer Program**	**Unskilled**	**Fairly skilled**	**Skilled**	**Highly skilled**
Farm A	Word processing (e.g. Microsoft word)	4	2	2	1
	Data processing (e.g. Microsoft Access)	2	2	1	0
	Presentation (PowerPoint)	4	1	1	0
	Spreadsheet (e.g. Microsoft Excel)	7	0	0	0
	Internet	8	0	0	0
	E-mail	3	1	1	0
TOTAL					**40**

Farm B	Word processing (e.g. Microsoft word)	5	1	1	0
	Data processing (e.g. Microsoft Access)	3	2	1	0
	Presentation (PowerPoint)	4	2	0	1
	Spreadsheet (e.g. Microsoft Excel)	6	1	1	0
	Internet	5	1	0	0
	E-mail	3	2	1	0
TOTAL					**40**

An assessment to establish farmers' proficiency on the use of common computer programs and level of usage at their farms reveals that the sampled farmers from the two farms were generally computer illiterate as they could not operate simple software programs such as Presentation PowerPoint presentation and Spreadsheet/Microsoft Excel. The Lack of skill/skills gap identified among farmers can be a barrier in the adoption of ICTs as Adeoye et al,(2013:120) posit that there is a link between adequacy of skills among beneficiaries and successful adoption of new technologies. Thus, the more skilled people are, the more they develop positive perception towards new innovations. The study established that farmers are less skilled and lack proficiency in operating basic computer programs such as word and data processing. Such skills gap signifies the critical need for farmer training by the local ministry of agriculture through (Agritex) department.

Table 3.3: Barriers to ICT Integration into smallholder data capturing and record systems

Nature of Variable	Model	Un-standardized Coefficient		Standardize d Coefficients	t	sig
	(Constant)	B	Std. Error	beta	t	sig
ICT vs. Farm record management systems						
Farm 1	Inadequate and training on ICT use	2.826	1.333	.162	2.120	.037*
	Inadequate ICT gadgets in farms	1.151	2.431	.033	.473	.637N S
	Power outage unreliable supply of electricity	-.321	.398	-.053	-.807	.422N S
	Limited support by other stakeholders	2.447	1.189	.168	2.058	.043*
	Inadequate funding & prohibitive cost of gadgets	4.607	1.002	.312	4.600	.000*
	Bureaucratic bottlenecks	.405	1.508	.019	.268	.789N S
ICT vs. Farm record management systems						
Farm 2	Inadequate training on ICT use	-2.134	2.691	-.130	-.793	.430N S

	Inadequate ICT gadgets in farms	8.45	2.976	.024	.284	.000*
	Power outage unreliable supply of electricity	-.733	1.806	-.031	-.406	.686N S
	Limited support by other stakeholders	-3.669	1.881	-.126	-1.950	.054N S
	Inadequate funding & prohibitive cost of gadgets	-2.784	2.157	-.086	-1.290	.200N S
	Bureaucratic bottlenecks	4.319	1.375	.258	3.140	.002*

a. Dependent Variable: ICTs
b. Independent variable: Farm record management systems

*, denotes significance at p = 0.05, NS – not significant; β0 - the intercept of the regression line

In an effort to establish challenges affecting adoption and use of ICT to upgrade data processing and record keeping by smallholder farmers in Zimbabwe the analysis indicated that from the 6 variables analyzed, a coefficient value of $p<0.05$ was obtained on 5 variables signifying that the adoption of ICTs was weak owing to a diverse challenges particularly Inadequate ICT gadgets in farms,Power outage/unreliable supply of electricity andBureaucratic bottlenecks in setting up information centres for dissemination of new technologies in small-scale farming communities. Though a coefficient of $p>0.05$ was obtained on some variables it was established that the causal effect on adoption rate was equally the same.The scenario concurs well with GESCI's (2009:50) observation that in the developing world, irregular electricity supply was a major impediment to ICT adoption. Challenges of inconsistent supply of electricity are a prominent feature in Zimbabwe's rural communities. The study established that in order to intensify ICT adoption and use in the farming communities there is need for government support in the acquisition of more ICT gadgets and establishment of community information centres to avail the technology to local farmers. The training of farmers by (Agritex)/extension workers on basic computer applications was also identified to be central in promoting computer literacy among farmers.

IV. Conclusions

Farmers from the two sampled farms unanimously indicated that manual system of data capturing and record keeping on the farm is tedious and slow hence needs to be replaced by more efficient systems which would embrace the modern technologies such as ICTs to enhance operations. This however has been noted to demand heavy capital investment for proper infrastructure and the gadgets. The study established that adoption of such modern technologies by the resource poor, smallholder farmer is incapacitated by a multiple of challenges such as; level of farmers' literacy, availability of material resources,power outages andbureaucratic bottlenecks in the extension of new technologies to the farming communities. The study established that in order to intensify ICT adoption and use in the farming communities there is therefore need for government support in the acquisition of more ICT gadgets and establishment of community information centres to effectively avail new technologies to local farmers.

V. Recommendations

Based on the findings and conclusions, it is recommended that:-

- To intensify ICT adoption and use in the farming communities there is need for government to support the initiative through the establishment of community information centres to effectively avail new technologies to local farmers.

- It is essential for the government to avoid bureaucratic bottlenecksso that a conducive environment, necessary for the successful integration of new innovations into the existing indigenous technology systems for easier acceptance by local communities.

- Comprehensive planning is required before contemplating on embarking and implementing computerized systems in the farming communities so that possible challenges are identified and dealt with prior to implementation.
- The responsible ministries should commit to budget for training as the study established that the majority of farmers lack the prerequisite basic skills on computer applications.
- Knowledge needs to be imparted on farmers so that they fully embrace the new technology and abandon their traditional archaic data capturing and record keeping systems.
- Qualified and dedicated technical support should be engaged to ensure regular servicing of ICT equipment in farms to avoid prolonged breakdowns which may disrupt the smooth operation of activities on the farm.

References

[1.] Ajit Maru1 Robin Bourgeois, Walter Mayer&GFAR Secretariat, C/O DDNG, Food and Agriculture Organization of the United Nations (FAO), Rome, 00153, Italy 1 3 PROGIS Software GmbH, Postgasse 6, A-9500 Villach, Austria

[2.] ACAS, (2010), *Building Employee Engagement*.Acas Policy Discussion Papers. London,United Kingdom. January 2010. Retrieved 25/2/2015 from http://www.**acas**.org.**uk**/.../Building_employee_engagement-accessible-version-...

[3.] Adeleye, M.O. (2007), *Problems facing computerization of school records in Jos,*Unpublished Postgraduate Diploma in Education Thesis submitted to the National Teachers' Institute, Kaduna. Nigeria.

[4.] Atulomah B. C. (2011) *Perceived Records Management Practice and Decision Making Among University Administrators in Nigeria*, PAGE 1-2 *Library Philosophy and Practice* 2011, Babcock University Ilishan-Remo, Ogun State, Nigeria http://unllib.unl.edu/LPP/

[5.] Bukaliya R. and Mubika A. K., (2012), Factors Militating Against the Introduction of Computer Education in Secondary Schools.Zimbabwe Open University,Marondera, Zimbabwe.*Journal of Education and Instructional Studies in the World. August 2012 Volume:2 Issue: 3 Article: 06 ISSBN: 2146-746*

[6.] Bukaliya R. and Mubika A. K., (2011), Teacher Competence in ICT: Implications for Computer Education in Zimbabwean Secondary Schools.*International Journal of Social Sciences and Education ISSN: 2223-4934. Volume: 1 Issue: 4 October 2011 pp. 56.*

[7.] Chikutsa A, Chingozha M P I, (2011), *Research Methods*, BRAM308/BLIS307 ZOU Module, ZOU Press, Harare, Zimbabwe.

[8.] Durosaro D.C, Ibraheem E. Demir K. (2007) *Management of School records*. The crafts of Education manage D.C Durosaro, S. Ogunsaju (ed) Ilorin. Indemic print media.Babcock University Ilishan-Remo, Ogun State, Nigeria

[9.] GOI (2001) 'Report of Prime Minister's Task Force on India as Knowledge Superpower'. Planning Commission, Government of India, New Delhi.

[10.] Government of Zimbabwe (2012) Government of Zimbabwe Industrial Development Policy 2012-2016 policy, Government Printers, Harare.

[11.] Jones, G.E. (1997) 'The history, development and the future of agricultural extension' in B.E. Swanson, R.P. Bentz and A.J. Sofranko (1997) *Improvingagricultural extension – a reference manual*. Rome: FAO.

[12.] Kundishora S, (2016). ZARNet ALGAF, Sept 2k Paper; ICTs Improving Family Farming sam@zarnet.ac.zw

[13.] Mandoga E, Matswetu V. and Mhishi M. (2013), Challenges and Opportunities in Harnessing Computer Technology for Teaching and Learning: A Case of Five Schools in Makoni East District, Bindura University of Science EducationBindura, Zimbabwe.*International Journal of Humanities and Social Science Vol. 3 No. 1; January 2013 103 pp,* Accessed 25/1/2015 from http://gjournals.org/GJER/.../2014/.../021714113%20Nwangwu%20et%20al.p.

[14.] Marireng S. (2013), *Effects of Computers in Management of Secondary Schools in Kenya: A Case Study of West Pokot County, Kenya*.A Research Project.Department of Education, Extra-Mural Studies, University of NairobiNairobi, Kenya.

[15.] Osakwe R.N. (2012), Problems and Prospects of Using Information and Communication Technology for Record Keeping in Tertiary Institutions in Nigeria. Department of Educational Administration and Policy Studies, Delta Stateuniversity, Abraka. *Journal of Education and Practice ISSN 2222-1735 (Paper) ISSN 2222-288X (Online) Vol 3, No 14, 2012 pp 39.* Accessed 19/1/2015

[16.] Patsika L and Chitura M, (2004), *Nursing Research in Practice,*Benaby Printing and Publishing (Pvt) Limited. Harare, Zimbabwe.

[17.] Richardson, D. (1996) *The Internet and rural development: recommendations for strategy and activity – final report.* Rome: SustainableDevelopment Department of the Food andAgriculture Organization of the United Nations.http://www.fao.org/sd-dimensions.

[18.] Tsokota T and Solms R. (2013), ICT and the turning-around of the Zimbabwean Economy, Nelson Mandela Metropolitan University, Cape Town, South Africa, *International Conference on ICT for Africa 2013, February 20 -23, Harare, Zimbabwe.* Accessed 15/12/2014 from *http*://www.ictforafrica.org/attachments/.../4/ict4africa2013_submission_19.pdf

[19.] United Nations, (2004), *Zimbabwe Millennium Development Goals: Progress Report.* United Nations, Harare, Zimbabwe.

[20.] World Bank (2012), *ICT in Educational Management,* Accessed on 1/12/2014, from http://www.worldbank.org/education/saber-ict

[21.] Zijp, W. (1994) *Improving the transfer and use of agricultural information – a guide to Information Technology*. Washington DC: World Bank.