INFLUENCE OF ICT SYSTEMS ON DISASTER MANAGEMENT IN SELECTED ORGANIZATIONS IN MANUFACTURING SECTOR IN KENYA

Abdulkadir Waqo Jarso
Jomo Kenyatta University of Agriculture and Technology, Kenya

Dr. Wario W. Guyo
Jomo Kenyatta University of Agriculture and Technology, Kenya

Dr. Tobia Mwalili
Jomo Kenyatta University of Agriculture and Technology, Kenya

Prof. Romanus Odhiambo
Jomo Kenyatta University of Agriculture and Technology, Kenya

International Academic Journal of Information Systems and Technology (IAJIST) | ISSN 2518-2390

Received: 12th May 2018

Accepted: 17th May 2018

Full Length Research

Available Online at:

http://www.iajournals.org/articles/iajist_v2_i1_78_101.pdf

Citation: Jarso, A. W., Wario, W. G., Mwalili, T. & Odhiambo, R. (2018). Influence of ICT systems on disaster management in selected organizations in manufacturing sector in Kenya. *International Academic Journal of Information Systems and Technology, 2*(1), 78-101

ABSTRACT

According to the Disaster Recovery Preparedness Council, 73 percent of companies worldwide are failing in terms of disaster readiness. With advancement in Information & Communication Technology in the form of Internet, GIS, Remote Sensing, satellite-based communication links; it can help a great deal in planning and implementation of disaster risk reduction measures. In Kenya, there are experiences of a number of natural hazards, the most common being weather related, including floods, droughts, landslides, lightening/thunderstorms, wild fires, and strong winds (UNDP, 2004). This shows that Kenya is one of the countries in classified as disaster-prone areas and thus the need for comprehensive mitigation efforts will be critical. However, while the use of ICT in Disaster mitigating is increasingly becoming critical, disaster frequency appears to be increasing and represent a major source of risk for the poor and wipe out development gains and accumulated wealth (Dilley et al. 2005). The overall objective of this study is to examine the effect of ICT systems in disaster management in selected organization in manufacturing sector in Kenya. The key variables in this review are as follows ICT Hardware, CT Software, Human resource and procedures, ICT Policies and institutional information. Descriptive survey design was used to obtain information that will help the study unveil the influences of ICT systems on disaster management in selected manufacturing firms in Kenya, for the purpose of this study the unit of analyzes will be the Head offices of the three selected manufacturing firms which are Unga Limited, Unilever and Bidco Africa Ltd while the unit of observation will be the employees of the selected organizations. This study employed a simple random sampling technique to selected 137 employees from the sampling frame that was sourced from the respective sample. To ascertain the validity and reliability of the questionnaire, a pre-test survey was conducted. Consisting 1% of the target population. The data was analyzed using descriptive statistics and quantitative approach such as correlation and regression was used for inferences. The results of this study has established that ICT hardware has significant influence on disaster management and closely followed by ICT software and Human Resource with ICT Policy and Institutional knowledge having less influence. Evolution of computer technology and availability of hardware is helpful for rapid expansion of GIS in both disaster research and communication. The study recommends extension of ICT services and ICT awareness in Kenya (both rural and urban areas). In order to achieve this government and other relevant authorities to ensure right infrastructure be put in place so that no area is left behind in benefiting from the increased use of ICT enabled services. Key among this is electricity supply.

Key Words: *ICT systems, hardware, software, human resource capacity, ICT policies, institutional knowledge disaster management*

INTRODUCTION

Information Communication Technology (ICT) refers to the combination of manufacturing and services industries that capture transmit and display data and information electronically (OECD 2012). Apart from providing informative topographic maps to coordinate relief efforts, GIS was extensively used in specific sectors during the initial response to the disaster including the following (ESRI, 2014): ICT has played a significant role to bring paradigm shift in disaster management from conventional response and relief practice to a more comprehensive risk reduction culture in (Azad, Bahauddin and Himel, 2013). Due to importance of the new era in digital domain highlighting change in the trend was fully explored in IFRC's World Disasters Report (2013) with a focus on technology and the future of humanitarian action. Communication systems have also become indispensable for providing emergency communication and timely relief and response measures (Yap, 2011).In 2010, a post-Haiti earthquake meeting of technology and development experts identified opportunities facing ICT use in disaster response (Yap, 2011. For effective DRR an integrated communication system is indispensable (Aizu, 2011).

On the contrary hardly there is any mention of illiteracy as a significant barrier to access, and basic education as a necessary policy response to this barrier. Yet the digital divide affecting ICT usage in disaster management is partly a literacy divide (Yap, 2011). With advancement in Information & Communication Technology in the form of Internet, GIS, Remote Sensing, satellite-based communication links; it can help a great deal in planning and implementation of disaster risk reduction measures. These technologies have been playing a major role in designing early warning systems, catalyzing the process of preparedness, response and mitigation GOI (2010). A policy that ensures that system access is discontinued when a staff member leaves an organization will also assist in preventing malicious attacks. Account/password management policies set out how often passwords used to access accounts should be changed, their complexity and length (Richards 2009). Employee education and awareness programs include courses and seminars to inform staff about computer security issues (Richards 2009). Gordon (2009) predicts that talent shortages are going to increase well into the next decade, limiting the ability of companies to expand and, in fact, jeopardizing their chances of survival as global competition becomes more intense. Choosing appropriate ICT hardware and software, continuous pressing for more funds from parent institutions; seeking for alternative sources of funds, staff and user training and raising awareness are the among key strategies that can lead to effective utilization of ICT facilities and services, Emmanuel, Grace and Sife, Alfred (2008). According to Warfield (2008) disaster management aims to reduce, or avoid the potential losses from hazards, assure prompt and appropriate assistance to victims of disaster, and achieve rapid and effective recovery. A user access management policy sets out the access rights for staff on a business's computer system. Restricting administrative privileges prevents the installation of malware and minimizes the extent of damage done if users' accounts are compromised (AusCERT 2008).

ICTs provide options to help maintain or re-establish services during times of personal or community crises, which is described in numerous disaster management reports (e.g., Government of India, National Disaster Management Division, nd; United Nations, 2006; Wattegama, 2007). Anie (2006), who stated that electric power supply and connectivity is one of the problems librarians encounter in the use of computer. ICT tools are also being widely used to build knowledge warehouses using internet and data warehousing techniques. These knowledge warehouses can facilitate planning & policy decisions for preparedness, response, recovery and mitigation at all levels. Similarly, GIS-based systems improve the quality of analysis of hazard vulnerability and capacity assessments, guide development planning and assist planners in the selection of mitigation measures. Communication systems have also become indispensable for providing emergency communication and timely relief and response measures.

The focus of this study was around ICT Hardware, ICT Software, Human Resource, Institutional Knowledge and ICT Policy. From the survey results under key study variables it's evident that not all organizations were fully prepared and are likely to recover in case of a disaster. For Example, Benchmark survey 2014 results, demonstrated an enormous shortfall in DR preparedness of companies worldwide. Using a common grading system from A (the best) to F (the worst) 73% of survey participants or nearly 3 out of 4 companies worldwide are failing in terms of disaster readiness, scoring ratings of either a D or F grade. Only 27% scored an A, B or C passing grade, with the remaining 73% of respondents at risk. Benchmark survey 2014 indicated that more than one third or 36% of organizations have lost one or more critical applications, VMs, or critical data files for hours. Nearly one in five companies has lost one or more critical applications over a period of days. Even more alarming is that one in four respondents said that they had lost most or all of a datacenter for hours or even days an indication of a true disaster scenario for companies that rely on IT to conduct business. The cost of losing critical applications has been estimated by experts at more than $5,000 per minute, and our survey respondents confirmed that losses are substantial in some cases. In the same survey, more than 60% of those who took the survey do not have a fully documented DR plan and another 40% admitted that the DR plan they currently have did not prove very useful when it was called on to respond to their worst disaster recovery event or scenario. One third of all organizations participating in the survey test their DR plans only once or twice a year and fully 23% or one in four never test their DR plans. Without testing and verification of DR plans, most companies have no idea as to whether they can fully recover their IT systems in the event of a disaster or an extended outage. When companies do test their DR plans, the results are most disturbing; more than 65% do not pass their own tests. Similarly, the according the respondents to my study 40% of software failure was due to failure to meet minimum requirement specification. On the other hand, 50% of the respondents say lack of Service Level agreement with external service provider is a major challenge to them. When respondents were asked whether their organization has policy on offsite backup 60% of the respondents answered yes while 40% answered no, which means if a disaster affect their primary site, there is likelihood of 40 % of organizations failing to recover.

According to my study human factor is key in responding to any form of disaster and from the feedback obtained, there is less than 50% respondents who feel there is adequate employee engagement and communication that takes place in there organization which from the study can easily affect employee retain and thus institution knowledge. On the contrary more than 50% of respondents gave excellent feedback on policy enforcement and major emphasis on institutional knowledge where proper training and better handling of transition existed. Today it is a proven fact that Disasters can happen at any place irrespective of the developed, developing or the least developed status of a country. It can cause massive destruction to the lives and livelihoods of companies and hence, to the national economies. It is experienced that the least developed and developing countries are impacted more severely by large scale natural disasters. In Kenya for example a number of activities have been started since ICT policy was first developed in 2006 to increase ICT skills levels in the country. Key among these are as follows: Start of the Centre of Excellence (COE) which is based at the University of Nairobi with the aim of training 5,000 students every year to be adequately prepared for employment in the Business Process Outsourcing/Information Technology Enabled Services (BPO/ITES) Another initiative was a Chipuka a certification programme for software developers targeting entry-level developers in colleges to build their capacity in software development. The third Initiative was Huawei Telecom Seeds for the Future Through a capacity building partnership, Huawei is supporting a programme aimed at providing practical on-the-job skills to 100 top engineering students from all universities countrywide, with the requisite ICT skills. The Huawei Telecom Seeds for the Future Programme aims to fulfil the important objectives of the National ICT Masterplan 2017, specifically on human capital and workforce development, and ICT as a driver for industry.

There is also Microsoft ICT Skills Training programme through which Microsoft will offer support in providing a platform that will enable ICT Skills training for up to 300,000 teachers. This includes proficiency in Microsoft Technologies, Microsoft Teach with Technology courseware and accreditation as Microsoft Certified Educators. This is in line with the government's recognition that to be a leader in ICT, the country must enhance the skills of the workforce for both entrepreneurship and employability so as to create jobs and promote inclusive economic growth. There is also Oracle e-Government Capacity Building programme which aim to raise the level of technical understanding and IT skills required in executing e-Government services, and support the transition of Kenya into the digital age. The programme includes internship and mentoring opportunities for the youth, corporate leadership activities that benefit the community, and enhancing ICT skills development programmes and initiatives.

The Presidential Digital Talent Programme (PDTP) which is a Public Private Partnership Internship Programme. PDTP targets fresh and qualified ICT graduates and provides a training ground to equip them to be industry leaders and experts in ICT. The programme is designed build and entrench ICT capacity within the Kenyan Government to ensure ICT effectiveness and efficiency in service delivery. There also other initiatives such as SAP Skills for Afirca and SAP dual study programme among others. Key enablers of ICT infrastructures are four submarine

cables; TEAMS, EASY, SEACOM and LION that offers connectivity to the rest of the world via redundant routing. Inland, the NFOBI has cut across the country and reaches more than half the 47 County Governments in the republic of Kenya. The Kenya vision 2030 and the Kenya National ICT Policy and Kenya ICT master Plan are the key enablers of technology development in the country. The paper aims at researching into the influence of ICT Systems in Disaster Management in Manufacturing Sector in Kenya with special reference to Unga Limited, Bidco Africa and Uniliver.

STATEMENT OF THE PROBLEM

Information that reaches the public on disasters has tended to focus on disasters of large magnitude, involving tremendous loss of life, property and infrastructure. This has helped create a public perception that disasters are comparatively rare. The dissociation of disasters from the normal has had serious consequences, in particular the mindset that normal development decisions on settlement, construction, production, trade and commerce can proceed without considering the hazards that they may create or disaster vulnerabilities that they may exacerbate. In light of this, Federal Office for Information Security (2009), mentions that great attention and effort has been directed towards the application of telecommunications/ICTs for the purpose of disaster preparedness, mitigation, response, and recovery Nalo (2007). In Kenya, there are experiences of a number of natural hazards, the most common being weather related, including floods, droughts, landslides, lightening/thunderstorms, wild fires, and strong winds (UNDP, 2004). This shows that Kenya is one of the countries in classified as disaster-prone areas and thus the need for comprehensive mitigation efforts will be critical. However, while the use of ICT in disaster mitigating is increasingly becoming critical, disaster frequency appears to be increasing and represent a major source of risk for the poor and wipe out development gains and accumulated wealth (Dilley et al. 2005). Disaster Recovery Preparedness Council, suggests that 73 percent of companies worldwide are failing in terms of disaster readiness. This corroborates the findings by Ferris &Petz (2013) that the increasing intensity and frequency with which disasters are being experienced worldwide demonstrates the critical need to enhance disaster risk management. Locally, several studies (Nyambura, 2005; Muoki, 2010; Mathenge, 2011) on ICT and disaster management were conducted , however while all these studies acknowledge the presence of firm ICT security infrastructure in organizations, they fail to further explain why these ICT infrastructure does not help in mitigating disasters and risks in organizations. This reason builds the impetus for examining the role of ICT in disaster management in selected Organization in manufacturing sector in Kenya. Despite sufficient knowledge, modern hardware and software many organizations are not prepared for the challenges affecting ICT systems in their organizations for a long time.

OBJECTIVE OF THE STUDY

The overall objective of this study is to examine the effect of ICT systems in disaster management in selected organizations in manufacturing sector in Kenya.

SPECIFIC OBJECTIVES

1. To find out the influence of ICT hardware on disaster management in Kenya
2. To investigate the influence of ICT software on disaster management in Kenya
3. To assess the influence of human resources capacity on disaster management in Kenya
4. To examine the influence of ICT policies on disaster management in in Kenya
5. To find out the influence of Institutional Information on disaster management in Kenya

THEORETICAL REVIEW

Research studies on influence of ICT systems looks at the following theories diffusion of Innovation theory, information processing theory, ICT Procedures and Policy Theory, Resource Based View Theory, Institutional Knowledge Theory

Diffusion of Innovation Theory

Rogers (2003) described the innovation-decision process as "an information-seeking and information processing activity, where an individual is motivated to reduce uncertainty about the advantages and disadvantages of an innovation" (p. 172). For Rogers (2003), the innovation-decision process involves five steps: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. These stages typically follow each other in a time-ordered manner. The Persuasion Stage The persuasion step occurs when the individual has a negative or positive attitude toward the innovation, but "the formation of a favorable or unfavorable attitude toward an innovation does not always lead directly or indirectly to an adoption or rejection" (Rogers, 2003, p. 176). The individual shapes his or her attitude after he or she knows about the innovation, so the persuasion stage follows the knowledge stage in the innovation-decision process. Furthermore, Rogers states that while the knowledge stage is more cognitive- (or knowing-) centered, the persuasion stage is more affective- (or feeling-) centered Sahin, (2016).

The Decision Stage At the decision stage in the innovation-decision process, the individual chooses to adopt or reject the innovation. While adoption refers to "full use of an innovation as the best course of action available," rejection means "not to adopt an innovation" (Rogers, 2003, p. 177). If an innovation has a partial trial basis, it is usually adopted more quickly, since most individuals first want to try the innovation in their own situation and then come to an adoption decision. The vicarious trial can speed up the innovation-decision process. However, rejection is possible in every stage of the innovation-decision process. The Implementation Stage At the implementation stage, an innovation is put into practice. However, an innovation brings the newness in which "some degree of uncertainty is involved in diffusion" (p. 6). Uncertainty about

the outcomes of the innovation still can be a problem at this stage. Thus, the implementer may need technical assistance from change agents and others to reduce the degree of uncertainty about the consequences.

Information Processing Theory

Humphreys and William (1984) introduce a model to relate the personality dimensions of introversion-extraversion, achievement motivation, and anxiety to efficient cognitive performance. They show how these personality dimensions in combination with situational moderators (e.g., success, failure, time pressure, incentives, time of day, and stimulant drugs) affect the motivational constructs of arousal and effort. The theory proposes a general information-processing model that accounts for the systematic effects of these motivational states on certain task components (sustained information transfer and some aspect of short-term memory). We combine empirical generalizations about task components in a structural model and derive testable predictions that differentiate alternative motivational hypotheses. Information processing theory combines elements of both quantitative and qualitative development. Qualitative development occurs through the emergence of new strategies for information storage and retrieval, developing representational abilities (such as the utilization of language to represent concepts), or obtaining problem-solving rules (Miller, 2011). Increases in the knowledge base or the ability to remember more items in working memory are examples of quantitative changes, as well as increases in the strength of connected cognitive associations (Miller, 2011). The qualitative and quantitative components often interact together to develop new and more efficient strategies within the processing system.

Within this model, humans are routinely compared to computers. This comparison is used as a means of better understanding the way information is processed and stored in the human mind. Therefore, when analyzing what actually develops within this model, the more specific comparison is between the human brain and computers. Computers were introduced to the study of development and provided a new way of studying intelligence (Lachman, 1979) and added further legitimacy to the scientific study of the mind (Goodwin, 2005, p. 411). In the model below, you can see the direct comparison between human processing and computer processing. Within this model, information is taken in (or input). Information is encoded to give meaning and compared with stored information. If a person is working on a task, this is where the working memory is enacted. An example of that for a computer is the CPU. In both cases, information is encoded, given meaning, and combined with previously stored information to enact the task. The latter step is where the information is stored where it can later be retrieved when needed. Is a physical component of a computer such as monitor, keyboard and central processing units ICT is increasingly being used in almost every activity and embedded in more and more things (ubiquitous computing). Computer is used for Recording Data, Storing data, Manipulating data and Retrieving data, sending and sharing. The convergence model is presented in detail in the book “Social and Community Informatics Humans on the Net” (Bradley 2006).

ICT Procedures and Policy Theory

IT-acceptable use policies set out how business's computer resources should be used (Stay Smart Online 2010). As well as outlining expectations in relation to things such as personal use of resources and the handling of sensitive information, these policies may cover the installation of applications or the forwarding of emails that may contain malware. A user access management policy sets out the access rights for staff on a business's computer system. Restricting administrative privileges prevents the installation of malware and minimizes the extent of damage done if users' accounts are compromised (Aus CERT 2008). Similarly, limiting staff access to only the files that they require will minimize insider abuse of access or the damage caused by unauthorized access. A policy that ensures that system access is discontinued when a staff member leaves an organization will also assist in preventing malicious attacks. Account/password management policies set out how often passwords used to access accounts should be changed, their complexity and length (Richards 2009). Employee education and awareness programs include courses and seminars to inform staff about computer security issues (Richards 2009). Small business respondents to the ABACUS survey were much less likely than medium and large businesses to report having staff policies or training in place. Only seven percent had IT-acceptable use policies, 12 percent had user access management policies, 19 percent had account/password management policies and 15 percent provided employee education and awareness programs (Richards 2009).

Resource Based View Theory

Initiated in the mid-1980s by Wernerfelt (1984), Rumelt (1984) and Barney (1986), the resource-based view (RBV) has since become one of the dominant contemporary approaches to the analysis of sustained competitive advantage. A central premise of the resource-based view is that firms compete on the basis of their resources and capabilities (Peteraf and Bergen, 2003). Most resource-based view researchers choose to "look within the enterprise and down to the factor market conditions that the enterprise must contend with, to search for some possible causes of sustainable competitive advantages" holding constant all external environmental factors (Peteraf and Barney, 2003). Gordon (2009) predicts that talent shortages are going to increase well into the next decade, limiting the ability of companies to expand and, in fact, jeopardizing their chances of survival as global competition becomes more intense. According to Delery and Shaw (2001), there is general agreement that human capital can be a source of competitive advantage and that HRM practices have the most direct influence on the human capital of a firm and that the complex nature of HRM systems of practice can enhance the inimitability of the system. Wright et al., 2001) the emphasis is on gaining sustainable competitive advantage by means of effective and efficient utilisation of the resources of an organisation. Resource-based theory caused a change in strategic management thinking from an outside-in approach to an inside-out approach. In this 'new' stream of thought, internal resources form the starting point of determining organisational success, in contrast to the 'old' paradigm of outside-in thinking.

According to Delery and Shaw (2001), the choice of the resource-based view (RBV) affords the researcher several advantages in investigating the strategic nature of HRM. The authors also acknowledge criticisms of the approach particularly that the resource based view does not meet the standards for a true theoretical perspective and contains several tautological elements (see Priem and Butler, 2001 for a more extensive overview). Based on our own experience, the RBV is more suitable in explaining competitive advantage, based on path dependency and administrative heritage, in retrospect. Lammerset al. (2000) state that new institutionalism criticizes 'functionalistic contingency approaches' from the sixties, as the latter assume rationality of the actors.

Institutional Knowledge Theory

Institutional memory is a collective set of facts, concepts, experiences and know-how held by a group of people. As it transcends the individual, it requires the ongoing transmission of these memories between members of this group. Recently, scholars have recognized institutional theory as a useful framework for identifying and analyzing differences encountered on international projects (Javernick-Will and Scott 2009; Mahalingam and Levitt 2007; Orr and Scott 2008). Mahalingam and Levitt (2007) demonstrate how institutional theory can describe cross-national challenges on global projects, Orr and Scott (2008) build on the framework to show how institutional exceptions arise on global projects and Javernick-Will and Scott (2009) use institutional theory to categorize important knowledge for international projects. This study draws particularly from Javernick-Will and Scott's work to analyze how important types of knowledge, categorized according to Scott's (2008) "institutional pillars" framework, are transferred within international firms.

CONCEPTUAL FRAMEWORK

A conceptual framework is an analytical tool with several variations and contexts. It is used to make conceptual distinctions and organize ideas. Strong conceptual frameworks capture something real and do this in a way that is easy to remember and apply. The relationship between ICT systems and Disaster management is that with the use of ICT systems disaster warning can be communicated by use of mobile, messaging services, email. The Geographical information System which is ICT based can be used to locate the risk areas. The ICT system has elements of computer hardware, software, Procedures and human aspect in it, without which computer systems may not operate effectively.

The key variables in this review are as follows ICT Hardware, CT Software, Human resource and procedures, ICT Procedures and institutional information. The various constructs and their relationships can be illustrated in the following conceptual framework in figure 1.

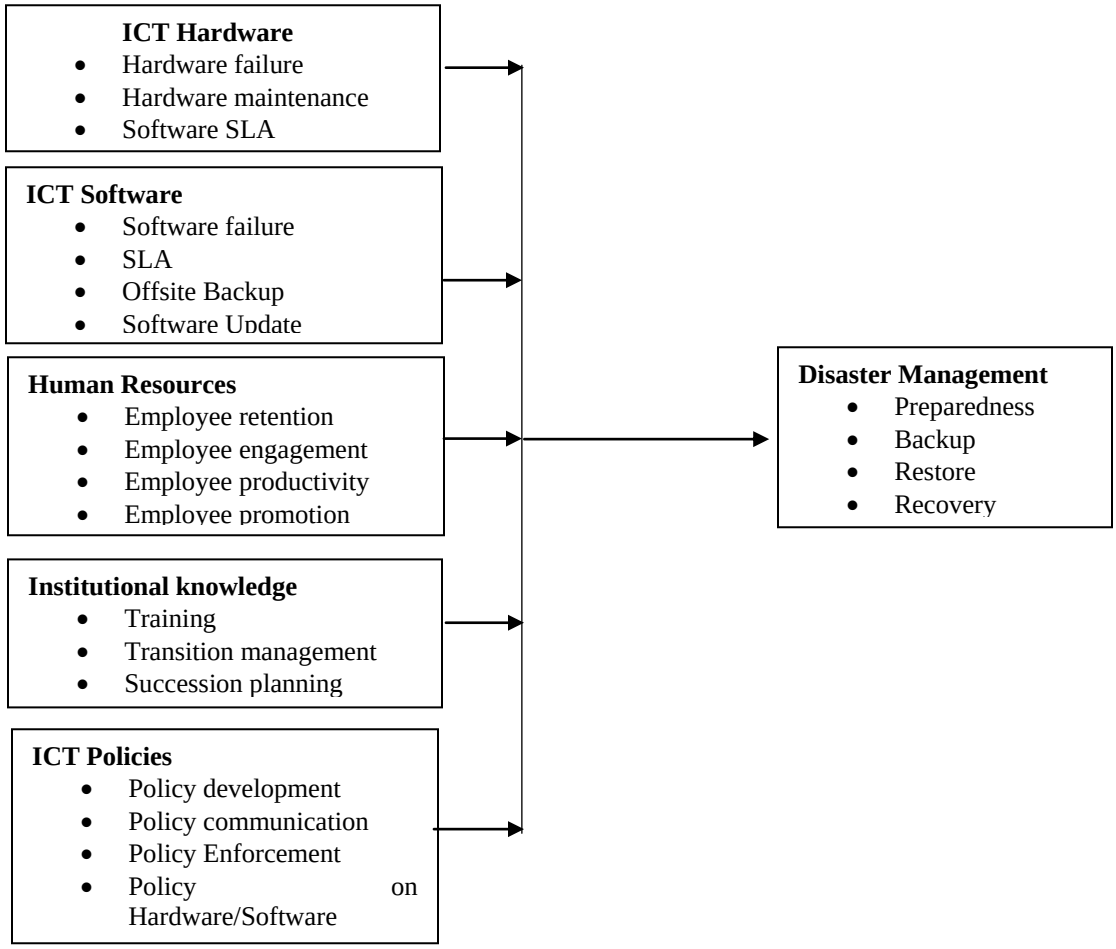

Figure 1: Conceptual Framework

EMPIRICAL REVIEW

Empirically, different authors have revealed that a number of elements have influence disaster management. ICT is increasingly being used in almost every activity and embedded in more and more things (ubiquitous computing). According to Bradley (2006), Computer is used for Recording Data, Storing data, Manipulating data and Retrieving data, sending and sharing. The convergence model is presented in detail in the book "Social and Community Informatics Humans on the Net". According to Stay Smart Online (2010) IT-acceptable use policies set out how business's computer resources should be used. In addition, AusCERT (2008),a user access management policy sets out the access rights for staff on a business's computer system. Restricting administrative privileges prevents the installation of malware and minimizes the extent of damage done if users' accounts are compromised. Similarly, limiting staff access to only the files that they require will minimize insider abuse of access or the damage caused by unauthorized access. According to Richards (2009), account/password management policies set

out how often passwords used to access accounts should be changed, their complexity and length. Also, Richards (2009) employee education and awareness programs include courses and seminars to inform staff about computer security issues. Further, Richards (2009), small business respondents to the ABACUS survey were much less likely than medium and large businesses to report having staff policies or training in place. Only seven percent had IT-acceptable use policies, 12 percent had user access management policies, 19 percent had account/password management policies and 15 percent provided employee education and awareness programs. Peteraf and Bergen (2003), a central premise of the resource-based view is that firms compete on the basis of their resources and capabilities.

Gordon (2009) predicts that talent shortages are going to increase well into the next decade, limiting the ability of companies to expand and, in fact, jeopardizing their chances of survival as global competition becomes more intense. According to Delery and Shaw (2001), there is general agreement that human capital can be a source of competitive advantage and that HRM practices have the most direct influence on the human capital of a firm and that the complex nature of HRM systems of practice can enhance the inimitability of the system. Wright et al., 2001) the emphasis is on gaining sustainable competitive advantage by means of effective and efficient utilization of the resources of an organization. Recently, scholars have recognized institutional theory as a useful framework for identifying and analyzing differences encountered on international projects (Javernick-Will and Scott 2009; Mahalingam and Levitt 2007; Orr and Scott 2008). Mahalingam and Levitt (2007) demonstrate how institutional theory can describe cross-national challenges on global projects, Orr and Scott (2008) build on the framework to show how institutional exceptions arise on global projects and Javernick-Will and Scott (2009) use institutional theory to categorize important knowledge for international projects. This study draws particularly from Javernick-Will and Scott's work to analyze how important types of knowledge, categorized according to Scott's (2008) "institutional pillars" framework, are transferred within international firms.

Human Resource

Aon's 2015 Global Risk Management Survey, which surveyed senior decision-makers across 60 countries, found that the failure to attract or retain top talent was the fifth most significant risk facing businesses worldwide. This has been confirmed by other studies more than 38 percent of hiring managers are struggling to find or retain the talent they need. In 2004, the European Union issued a Directive requiring organizations to establish some level of formal consultation with their employees. As Ferrabee (2005: 30) points out, this "reflects a growing acceptance of the need to involve employees more in business decisions that affect them." Although this refers to Europe, the New Zealand respondents would agree with this statement. They were asked how satisfied they were in 2000 of employee participation, and how important would it be in 2010. The respondents reported a 33% increase. In 2000 only 3% of the respondents regarded it as satisfactory, whereas 36% regarded it as a high priority in 2010. It can be deduced that human

resource practitioners want more active strategies from organizations in the future to generate employee participation. These could include greater involvement in strategic planning, as well as short term decision making. The respondents were more satisfied with the state of recruitment (13%) in 2000, but 27% still expected that it would be a high priority for 2010. This increase of 14% reflects the assertion by Dessler, Griffiths, Lloyd-Walker and Williams (2004: 245) that "personnel planning and recruiting directly affect employee commitment because commitment depends on hiring employees who have the potential to develop." Human resource professionals will be seeking to increase the accuracy and effectiveness of their recruitment and selection methods.

ICT Hardware

The incidence and costs of outages remains a major challenge for many organizations. More than one-third (36%)of organizations lost one or more critical applications, VMs, or critical data files for hours at a time over the past year, while nearly one in five companies have lost one or more critical applications over a period of days. Even more alarming, one in four respondents said that they had lost most or all of a datacenter for hours or even days. Reported losses from outages ranged from a few thousand dollars to millions of dollars with nearly 20% indicating losses of more than $50,000 to over $5 million. The culprits in causing these kinds of losses can be summarized in a lack of disaster recovery planning, testing and resources. More than 60% of those who took the survey do not have a fully documented DR plan and another 40% admitted that the DR plan they currently have did not prove very useful when it was called on to respond to their worst disaster recovery event or scenario. Given the general lack of DR preparedness, it is not surprising that nearly two thirds of respondents (60%) said their DR planning and testing did not prove useful in their worst event. The disturbing fact is that most organizations participating in the survey have not documented their DR plans, and have not established key metrics such as RTO, RPO, failover, failback processes.

ICT Software

Benchmark survey 2014 indicated that more than one third or 36% of organizations have lost one or more critical applications, VMs, or critical data files for hours at a time over the past year, while nearly one in five companies have lost one or more critical applications over a period of days. Even more alarming is that one in four respondents said that they had lost most or all of a datacenter for hours or even days an indication of a true disaster scenario for companies that rely on IT to conduct business. The cost of losing critical applications has been estimated by experts at more than $5,000 per minute, and our survey respondents confirmed that losses are substantial in some cases. Reported losses from outages ranged from a few thousand dollars to millions of dollars with nearly 20% indicating losses of more than $50,000 to over $5 million. In addition to direct dollar cost losses from outages and disasters, respondents experienced serious business disruption. While most organizations reported they were able to fully recover data, nearly one in

five could only partially recover data and 7% of respondents indicated a permanent loss of data. More than a quarter of respondents indicated outages cost them valuable staff time, while one in ten indicated damage to their business reputation from an outage.

ICT Policy

ICT policies may encourage or discourage the application of ICTs. If ICTs are to be part of a sustainable activity there will need to be a suitable policy environment. Poor ICT policy will also make Africa loose advantage of its diverse cultural heritage that should form technological development. There is considerable policy interest in the benefitsthat ICT can bring to education, which is a particular focus of the Millennium Development Goals and WSIS outcomes. The impact of ICT in education has been assessed in various studies, with mixed results (seethe discussion in Institute for Statistics.

Institutional Knowledge

According to AON survey 2015 of 41,700 managers in 42 countries, with 22 percent citing lack of experience as a key challenge. Aon's Trends in Global Employee Engagement report confirmed this average employee's work experience has dropped by 28 percent since 2013. However, very few metrics or measures exist to quantify the loss of institutional knowledge, continuity, and history. What we do know is that these costs manifest in the turnover, recruitment, replacement, and training costs that many organizations face. Many organizations have invested substantial resources in KM initiatives in the last decade (Haas 2006). For example, International Data Corporation (IDC), a market research and analysis firm, estimates that the global business spending on KM was $4.8 billion in 2007 (Babcock 2004), and the spending in US reached $2.9 billion in 2006 (Motsenigos and Young 2002). Employing both the resource-based and the knowledge-based views of the firm, Bogner and Bansal (2007) argue that a sustained competitive advantage stems from a firm's ability to develop rare and valuable knowledge through learning, and to subsequently build upon and spread that knowledge throughout the organization. They deconstruct a firm's complex KM capability into three key components: the firm's ability to produce new knowledge, its ability to build on that knowledge, and its effectiveness in capturing the potential value of the knowledge. To examine the impacts of the KM capability components on firm performance, they develop patent-citation measures for each of them: cited patents, citing patents, and citing patents owned by the innovator.

Disaster Management

Benchmark survey 2014 results demonstrated an enormous shortfall in DR preparedness of companies worldwide. Using a common grading system from A (the best) to F (the worst) 73% of survey participants or nearly 3 out of 4 companies worldwide are failing in terms of disaster readiness, scoring ratings of either a D or F grade. Only 27% scored an A, B or C passing grade, with the remaining 73% of respondents at risk.

RESEARCH METHODOLOGY

Research Design

A research design is the overall plan for conducting a study in order to answer the research questions. The research design used here is descriptive research design (Mark 2003, which determines and report the way things are. According to Neuman,(2000) Descriptive survey provides a detailed, highly accurate picture, can locate new data that confirms or contradicts new data among other merits. It is one of the superior research designs of the quantitative type of where the questions are given to the respondents in a written questionnaire. Descriptive survey design according to Creswell (2003), are used in preliminary and exploratory studies, to allow researchers to gather information, summarize, present data and interpret data for the purpose of clarification. Descriptive survey design will was used to obtain information that will help the study unveil the influences of ICT systems on disaster management in selected manufacturing firms in Kenya. Due to its flexibility descriptive survey design provides an opportunity for considering different aspects of the problem under study (Kothari, 2003). Borg, Gall&Gall (2003) noted that descriptive survey research is intended to produce statistical information about the aspects of the research issue(in this case ICT systems influences on disaster management in selected manufacturing firms in Kenya) that may be of interest to policy makers in manufacturing sector.

Study Population

A population can be defined as a collection of all subjects from where a sample is drawn. It refers to an entire group of individuals, events or objects having common observable characteristics (Mugenda & Mugenda, 2006). In research there are two main types of population, the target and the study population. The target population of this study was for three manufacturing firms in Kenya. The study was about the study the manufacturing firms in Kenya; this is because manufacturing industries have high incidences of disaster. According to the most recent fire statistics from the National Fire Protection Association (NFPA, 2016) manufacturing industries experience the highest rate of all forms of disaster, thus making it of interest to the study. Further, a recent survey on ICT systems in manufacturing sector organizations in Kenya by Bechet& Luke (2014) showed that Unga Ltd, Unilever and Bidco Africa Limited was found to have the best ICT infrastructure and systems than the rest of the organization's in Kenya thus necessitating the need for selecting the three organization in line with their developed ICT systems infrastructure hence best suited for this study. One of the most important ideas in a research project is the unit of analysis and observation. The unit of analysis is the major entity that you are analyzing in your study and the unit of observation is the unit described by the data that one analyzes, for the purpose of this study the unit of analyzes was the Head offices of the three selected manufacturing firms which were Unga Limited, Unilever and Bidco Africa Ltd while the unit of observation was the employees of the selected organizations.

Sample and Sampling Technique

A sample is the selected respondents, a few items picket of the study. The respondents should be as closely representative of the total population as possible (Kothari, 2009). It is a portion selected of the total population selected for observation and analysis and make inferences to the population from which it is obtained (KIM, 2009). It is part of the entire population that is studied to obtain information on the whole, the set of human and non-human respondents from the population (Saunders & Lewis & Thornhill, 2007). The population consist all the 22,500 employees of the three selected organizations. According to Mugenda & Mugenda (2008), the size of a sample in a descriptive statistics can be calculated as follows:

$$\frac{N=Z^2Pq}{d2} \quad \text{..... Equation 1}$$

Where: n = is the desired sample size; z = is the standard normal deviation at the required confidence level (Z=1.96) for a confidence level of 95% which is popularly adopted in social science research; P = is the population in the target population estimated to have the characteristics being measured; D = is the level of statistical significance, e.g. d=5%=0.05.

Therefore; $$n=\frac{1.96^{2*}\cdot 05*0.5=137}{0.05^2}$$

Thus, this gives the sample size of 137, which was considered to be adequate for this study which was proportionally distributed to the three selected organizations accordingly. This study employed a simple random sampling technique to selected 137 employees from the sampling frame that was sourced from the respective sample. This is a probabilistic sampling approach which according to Zikmund (2003), every element in the population has a known nonzero probability of selection and the bias inherent in non-probability sampling procedures is eliminate. Each and every employee was given a number that reflect their file number and this was selected using a computer generated random numbers.

Data Collection and Instrumentation

Both primary data and secondary data were collected. Primary data was collected using questionnaires which were administered. The questionnaire was semi structured and comprises of both open and closed ended questions (respondents are tied to choose the best scale to express their views. This is in order to collect a detailed all round data which provided a rich base for the descriptions of the variables under consideration. It also provides sufficient, complete and accurate information without bias to maximize reliability of the data. It is also easier to analyze such data and hence more economical (Mugenda & Mugenda, 2003). Standardized questions were constructed as a way of operationalizing the conceptual framework and in accordance with

the need to make it possible to measure reactions of many respondents to a limited set of questions, thus facilitating comparison and statistical aggregation of the data. This enables the focus on breadth and depth (Patton 2002). However, secondary data was constructed through empirical and theoretical reviews of the existing literatures.

Pilot Study

Reliability of these instruments was then tested through the Cronbach's alpha method (Cronbach, 1951). Using item Interco relation matrices as a guide, items that did not strongly contribute to alpha has the most utility for multi-item scales at the interval level of measurement, requires only a single administration and provides a unique, quantitative estimate of the internal consistency of (cooper & schindler,2003:Mugenda,2008). A reliability co-efficient (Rho) of 0.66 and above will be considered adequate for this (Mugenda, 2008).

Data Analysis and Presentation

The study was expected to generate both quantitative and qualitative data. Descriptive statistics data analysis method was applied to analyze numerical data gathered using closed ended questions. The Statistical Packages for Social Sciences (SPSS) computer software was used for analysis to generate data array that was used for subsequent analysis of the data. SPSS Version 21 has got descriptive statistics features that assist in variable response comparison and gives clear indication of response frequencies. The data was cleaned, coded, categorized per each of the research variables and then analyzed using descriptive analysis such as percentages. Further inferential statistics was conducted using regression to give correlations, coefficient in order to show the relationship between the independent variables and dependent variables that spell the influence of ICT on disaster management in the selected organization. The regression model was computed to show the significance of the research variables. The findings was shown using tables, since tables and bar graphs are user friendly and show response frequencies as well as percentages of the respondents on the influence of ICT on disaster management in selected organization. Qualitative data analyses method was applied to analyze the data gathered using open questions where the respondents gave the response to questions on the influence of ICT on disaster management in selected organization. The regression model was computed to show the significance of the research variables as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \mathcal{E} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{Equation 2}$$

Where: Y = Disaster Management (dependent variable); β_0 = Constant; $\beta_1 \ldots \beta_4$ = Coefficients of Independent Variables; $X_1 \ldots\ldots X_4$ = Values of the various independent (covariates) variables; X_1 = ICT Hardware; X_2 = ICT software; X_3 = Human resource; X_4 = Institutional Information; X_5 = ICT Policy; $\mathcal{E}$= error term which is assumed to be normally distributed with mean zero and constant variance.

RESEARCH FINDINGS

A regression model to predict the overall influence independent variables (ICT Hardware, ICT Software, Human Resource, Institutional Knowledge and ICT Policy) on the dependent variable (Disaster Management) when taken together was obtained. R-square was found to be 0.767 inferring that 76.7% of any positive change in ICT Hardware in selected manufacturing sector in Kenya can be attributed to ICT Hardware. These findings were statistically significant at $p<0.002$ for $F(1, 99) = 10.974$, actual pvalue = 0.002. The coefficients of regression model were obtained as shown in tables below. The unstandardized coefficients indicated how ICT Hardware varied with each independent variable when other independent variables were held constant. The coefficients helped generate the regression model of influence of ICT on disaster management on ICT Hardware as:

$$Y= 0.767+0.765+0.756+0.720+0.622+ ę$$

The coefficient of Intercept=0.541, x1; x2 is ICT Software; x3 is Human Resources; x4 is ICT policy; ę is error term which takes the unexplained variations in the model. This implies that Increase in ICT software by one unit increases Disaster Management in selected manufacturing sector by 0.538, while improvement of Human Resource by one unit increases Disaster Management in selected manufacturing by .116. Single unit of increase in ICT policy increases Disaster management by 0.356 while Single unit of increase in institutional knowledge increases Disaster management by 0.542. The t-values revealed that that Institutional knowledge (t=5.234) is the greatest influencer of Disaster Management, followed by ICT policy (t=4.835), ICT Software (t=4.218) and ICT Hardware (t=4.102) in that order. This shows that there is need to invest in knowledge, Human Resource capacity and proper policy formulation and implementation in addition to ICT hardware and software for effective response to disaster management.

Table 1: Coefficients

	Unstandardized		Standardized		
	B	Std. error	Beta	t	Sig.
(Constant)	.290	.213			
X1	.744	.181	.367	1.364	.175
				4.102	.000
X2	.538	.149		3.619	000
	.541	.128	.376	4.218	000
X3	1.513	.108		13.965	.000
	-.116	.335	.300	3.273	.001
X4	2.189	.197	.450	11.125	.000
	.542	.073		5.234	.000
X5	.567	.124	.422	4.585	.000
	.356	.074		4.835	.000

CONCLUSIONS

The researcher's objective was to examine the effect of ICT system in disaster management in selected organization in manufacturing sector in Kenya. The results of this study has established that ICT hardware has significant influence on disaster management and closely followed by ICT software and Human Resource with ICT Policy and Institutional knowledge having less influence. Evolution of computer technology and availability of hardware is helpful for rapid expansion of GIS in both disaster research and communication.

Management of spatial information used in disaster management is carried out through a Geo-Spatial Information System (GIS), which is a collection of computer hardware, software, and geographic data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. There are various kinds of spatial data used to increase disaster risk understanding including various types of multi-layered geographically referenced information such as aerial photographs, satellite imagery and digital maps. All these cannot be achieved without the ICT hardware, ICT software working jointly.

Disaster management activities depend on large volumes of accurate, relevant, on-time geo-information that various organizations systematically create and maintain. The advancement in Information and Communication Technology in the form of Internet, GIS, Remote Sensing, Satellite communication, etc. can help a great deal in planning and implementation of hazards reduction schemes. For maximum benefit, new technologies for public communication should be made use and natural disaster mitigation messages should be conveyed through these measures. GIS can improve the quality and power of analysis of natural hazards assessments, guide development activities and assist planners in the selection of mitigation measures and in the implementation of emergency preparedness and response action. Remote Sensing, on the other hand, as a tool can very effectively contribute towards identification of hazardous areas, monitor the planet for its changes on a real time basis and give early warning to many impending disasters.

RECOMMENDATIONS

The study recommends extension of ICT services and ICT awareness in Kenya (both rural and urban areas). In order to achieve this government and other relevant authorities to ensure right infrastructure be put in place so that no area is left behind in benefiting from the increased use of ICT enabled services. Key among this is electricity supply among others. Standardize system design, data collection and the flow of communication in emergency situations. Using standardized ways of communicating decreases the likelihood of non-compatibility of systems and of misunderstandings, which are crucial in crisis situations. This could also involve; developing standing orders for times of emergency that require priority access by emergency services personnel for communications, promoting disaster preparedness efforts, including the organization of drills in relaying information to and from the DRCC and the disaster sites.

Involve multiple stakeholders in all stages of the DRM, including in assessments, validation, and monitoring and evaluation, by using accessible and collaborative ICTs, including social media tools. Others include disaster management professionals and development actors who need to gain familiarity and build their capacity in the areas of DRM and ICT for DRM. It is also crucial to involve ICT specialists in post-disaster assessment, planning and monitoring activities to promote full use of ICTs in different stages of the DRM cycle.

Invest in risk reduction by using cost benefit analysis to target the risks which can be most efficiently reduced and produce positive economic and social benefits and also including risk assessments in sector development planning and investment. The research focused on the selected manufacturing industries which are in private sector and future research will need to include other industries or organizations from public sector to understand the similarities and differences on how to manage disasters.

This research further recommends for holistic and comprehensive ICT implementation approaches in adopting appropriate technologies and maximizing the benefits of existing infrastructure and initiatives as well as raising public awareness regarding use of ICT tools for effective DRR. The study also recommend reduction of the digital divide between urban and rural areas need to be given high priority in the context of DRR where the urban/rural dimension of the digital divide is more pronounced in poorer communities.

REFERENCES

Aizu, Izumi (2011), The Role of ICT during the Disaster, Institute for Info Socionomics, Tama University, Japan, pp: 2-7, retrieved on December 06, 2014 from www.ni.tama.ac.jp.

A., Levitt, Raymond. E. (2007.) Safety Issues on Global Projects, ASCE Journal of Construction Engineering and Management, Vol. 133, No. 7, July 2007

Agarwal, R., and Lucas, H. (2005): The information systems identity crisis: focusing on high-visibility and high-impact research, MIS Quarterly.

Allen, D.G. SHRM Foundation. 2008. Retaining Talent: A Guide to Analyzing and Managing Employee Turnover. Alexandra, VA.

Anderson MH and Sun PYT (2010) what have scholars retrieved from Walsh and Ungson (1991)? A citation context study. Management Learning.

Arif Kamal (2010)*Role of Information and Communication Technology in Natural Disaster Management in India.* Aligarh Muslim University, Aligarh (India)

Azad, S.M. Yeasir; Bahauddin, Khalid Mdand Himel, Tariq Muhammad Salahuddin (2013), Disaster Management through Mobile Technology: A Conceptual Model for Bangladesh, Bangladesh Research Publications Journal, Volume: 8, Issue: 1, pp: 34-40, retrieved on December 14, 2017 from

http://www.bdresearchpublications.com/
admin/journal/upload/1308111/1308111.pdf.

ADPC, (2011), *ICT for Disaster Risk Management*. Module 9. Asian And Pacific Training Centre For Information And Communication Technology For Development: retrieved from http://creativecommons.org/licenses/by/3.0/. On 10th September 2017

Carley K (1996) Organizational learning and personnel turnover. In: Cohen M, Sproull L (eds) performance of hospitals. Strategic Management Journal 25(5): 405–427.

Cascio, W.F. 2010. Managing Human Resources: Productivity, Quality of Work Life, Profits (8th ed.). BurrRidge: Richard D. Irwin.

Chadwick C, Hunter LW and Walston SL (2004) Effects of downsizing practices on the

Creswell, J. (2003). Research design: Qualitative, quantitative and mixed methods approaches (2nded.).Thousand Oaks, CA: SAGE Publications.

Charles R. Hulten, Edwin R. Dean, and Michael J. Harper, eds., New Developments in Productivity Analysis, Chicago, IL: University of Chicago Press

Dixit, N.B. 'Human resource development practices in urban co-operative banks in Pune district', 'Ph.D. thesis University of Pune, 2009

Dunne, T., L. Foster, J.Haltiwanger, andK.R. Troske (2004). Wage and Productivity Dispersion in United Sates Manufacturing: The Role of Computer Investment. Journal of Labour Economics, 22(2):397–429.

Delery, J., & Doty, H. 1996. Modes of theorizing in strategic human resource management: Tests of universalistic, contingency, and configurational performance. Academy of Management Journal, 39: 812-835.

Delery, J., & Shaw, J. 2001. The strategic management of people in work organizations: Review, synthesis, and extension. In G. Ferris (Ed.), Research in Personnel and Human Resources Management, Vol. 20. Oxford, UK: Elsevier Science.

Disaster Management Bureau (DMB), (2010), Bangladesh National Plan for Disaster Management 2010-2015, Disaster Management and Relief Division, pp 14-16, retrieved on December 05, 2014 from http://www.ddm.gov.bd/pdf/npdm_final.pdf.

Emmanuel, Grace and Sife, Alfred S. (2008),"Challenges of managing information and communication technologies for education: experiences from Sokoine National Agriculture Library", International Journal of Education and Development Using ICT,

E.,Javernick-Will A.,and Bernard Amadei (2011). Pathways to Community Recovery and Resiliency. 2011 EPOC Conference. Estes Park, Colorado, August 2011.

Eggenberger, R., Schanne, M., Esmael, Z. (2012). Social media and linguistics as part of an integrative risk management. In: International Disaster and Risk Conference IDRC Davos 2012, Proceedings, Davos, Switzerland 2012.

ESRI (2014), Spatial Information & Mapping Centre, Indonesia; GIS for DisasterRecovery, retrieved on February 06, 2018 from http://www.esri.com/library/brochures/pdfs/gis-for-disaster-recovery.pdf

Fiedler M and Welpe I (2010) How do organizations remember? The influence of organizational structure on organizational memory. Organization Studies 31(4): 381–407.

GOI (2010) *ICT for Disaster Risk Reduction*. Government of India

Massingham P (2008) Measuring the impact of knowledge loss: More than ripples on a pond? Management Learning 39(5): 541–560.

Gordon, E.E. 2009. Winning the Global Talent Showdown. San Francisco: Berrett-Koehler Publishers.

Gupta , Vibha and Ansari, MehtabAlam (2007), "Impact of Information Technology On Societal Development And E-Governance", Electronic Journal of Academic and Special Librarianship, 8(1).(spring).

Gordon, E.E. 2009. Winning the Global Talent Showdown. San Francisco: Berrett-Koehler Publishers.

Javernick-Will, A.,Chinowsky, P. and Christopher Senesi (2010). Disasters: Impact of Country Level Variables on Recovery Progression Engineering Project Organizations Conference. Tahoe, CA, November 2010.

Javernick-Will, A.(2010). The paradox of embeddedness: Local knowledge and knowledge management strategies for multi-national project-based firms.

International Projects." ASCE Construction Research Congress, Seattle, WA, April 2009.

Javernick-Will, A.and Raymond E. Levitt† (2009). "Knowledge as a contingency Variable for Organizing Knowledge management solutions". 2009 ASCE LEAD Conference, Lake Tahoe, California, November 2009.

Javernick-Will, A.(2009)"Mobilizing Institutional Knowledge for International Projects: The Relative Importance, Acquisition, and Transfer of Institutional Knowledge for International Firms." Ph.D. Dissertation, Stanford University, Stanford, CA.

Jorgenson, Dale W., and Kevin J. Stiroh (2000), "Raising the Speed Limit: U.S. Economic Growth in the Information Age," Brookings Papers on Economic Activity, 1, pp. 125-211.

Jorgenson, Dale W., and Eric Yip (2000), "Whatever Happened to Productivity Growth?"

Jubilee Manifesto (2011), Transforming Kenya: Securing Kenya's Prosperity 2013-2017.

Khan Nafees, A.(2008), 'Human resource development in tourism Industry in india : A case study of Air India Ltd., Aligarh Muslim University, Aligarh,

Kim, J. K. (2009). Calibration estimation using empirical likelihood in survey sampling. Statist.Sinica19, 145-157.

Kothari, C.R. (2004). Research Methodology; Methods and Techniques. New Delhi: New Age International (P) Ltd. Publishers.

Miller, G.A. (2003). The cognitive revolution: a historical perspective. Trends in Cognitive Science

Madsen TL, Mosakowski E and Zaheer S (2003) Knowledge retention and personnel mobility: The nondisruptive effects of inflows of experience. Organization Science 14(2): 173–191

M.Srimannarayana (2008), "Human Resources Development in India", Indian Journal of Industrial Relations.

Morss R (2008) Creative layoff policy and alternatives to layoffs. Salary.com. Available at: http://www.salary.com/Articles/ArticleDetail.asp?part=par276 (accessed 3 April 2017).

O'Connell, M. and Kung, M.C. 2007. "The Cost of Employee Turnover." Industrial Management, 49 (1), 14-19.

Oduwole, A.A. (2005). Information technology application to cataloguing in Nigerian university libraries. The Electronic Library 23(3):289-291

OECD (2012), OECD Internet Economy Outlook, OECD Publishing.

Oliner, S. and D. Sichel (2000). "The Resurgence of Growth in the Late 1990s: Is Information Technology the Story?" Journal of Economic Perspectives 14(4): 3-22.

Olivera F (2000) Memory systems in organizations: An empirical investigation of mechanisms for knowledge collection, storage and access. Journal of Management Studies 37(6): 811–832.

Oliner, StephenD and Daniel E. Sichel. 2000."The Resurgence of Growth in the Late 1990s: Is Information Technology the Story?"Journal of Economic Perspectives

Oketunji, I. (2006). Current trends in information and communication technology: Application to technical services. Proceedings of Selected Papers of the Cataloguing, Classification and Indexing Section of the Nigerian Library Association, 2003-2004 Library automation Automated circulation systems OUSL library *Wijayaratne, Anusha (2005)*

Patton, M. 2002. Qualitative evaluation and research methods. Third edition. Sage, Newbury Park, California, USA. Pease, M. L., R. K. Rose, and M. j. Butler. 2005.

Republic of Kenya (ROK)(2013), Second Medium Term Plan, 2013-2017.

Republic of Kenya (ROK) (2013), Kenya E-Government Master plan.

Richards K 2009. The Australian business assessment of computer user security: a national survey. Research and public policy series no. 102. Canberra: Australian Institute of Criminology. http://www.aic.gov.au/publications/rpp/102/index.htm

Rogers, E.M. (2003). Diffusion of innovations (5th ed.). New York: Free Press

Sapirstein, G. (2006). Human Impact Planning: Putting People First! In: International Disaster and Risk Conference IDRC Davos 2006, Proceedings, Davos, Switzerland 2006.

Schanne, M. (2012). Crisis, communication, social media. In: International Disaster and Risk Conference IDRC Davos 2012, Proceedings, Davos, Switzerland 2012

Shaw, Rajib; Mallick, Fuad and Islam, Aminul (2013), Disaster Risk Reduction Approaches in Bangladesh, Springer Japan, pp 112-139.

Trevor CO and Nyberg AJ (2008) Keeping your headcount when all about you are losing theirs: Downsizing, voluntary turnover rates, and the moderating role of HR practices. Academy of Management Journal 51(2): 259–276. downsizing affected corporate reputation. Academy of Management Journal 52(2): 314–335.

U. Pareek and T.V. Rao, Designing and Managing Human Resource System, (Oxford and IBH Publishing Co. Pvt. Ltd. 2007

Valipour, M., &Yingxu, W. (2015, 6-8 July). Formal properties and rules of concept algebra.Paper presented at the 2015 IEEE 14th International Conference on Cognitive Informatics & Cognitive Computing (ICCI*CC), (pp. 128-135)

Vazirani, N. (2007, March 16). Employee Engagement.SIES:College of Management Studies Working Paper Series.

http://repositorio.cepal.org/bitstream/handle/11362/36735/S20131130_en.pdf?sequen ce=1

Warfield, C., the Disaster Management Cycle, 2008.

Wattegama, Chanuka (2007), ICT for Disaster Management, Asian and Pacific Training Centre for Information and Communication Technology for Development, pp: 22-26, retrieved on December 06, 2014 from http://www.unapcict.org.

Yap, Nonita T. (2011), Disaster Management, Developing Country Communities and

Climate Change: The Role of ICTs, Institute for Development Policy and Management, Canada, pp: 6-7, retrieved on December 06, 2017 from http://www.niccd.org.