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Implementation of Server Virtualization Technology: The Human Resource capacity factors to consider.

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ABSTRACT
Virtualization is gradually losing its image as a new, highly advanced technology and it is becoming a mainstream data management technique. Indeed, two-thirds of all organizations (whether IT is their core business or not) are implementing virtualization in live production and even for core applications. Thus, virtualization is no longer considered to be a risky or unreliable technology. The findings and recommendations of this study will be useful to IT managers and other IS policy makers in organizations intending to implement server virtualization. The results of this study identify key factors that will influence the success or failure of server virtualization in their organisations. As such they will be in a position to understand the server virtualization process and avoid the pitfalls that may face them. The study employed a correlational survey research design and targeted the chief information technology officers, information communication technology managers, Management information systems managers and other managers involved in policy making decisions on computing systems in the listed companies on the NSE. The target population consisted of 360 persons, and the sample size was 25% of the population, namely 89 persons. Primary data were collected in completing this study. Primary data is collected using a questionnaire. Descriptive and content analysis techniques were employed on the collected data. Quantitative data analysis was done by descriptive statistics by use of SPSS version 20.0 to obtain percentages, tabulations, means and other measures of central tendency. The analysis indicates that 97.5% of the respondents indicated that server consolidation minimizes wasted capacity. The study found out that 82% of corresponding change in the implementation of server virtualization technology induced human resource capacity factors. Test of overall significance ANOVA, at 0.05 level of significance and found the model to be significant. The study recommends that organizations should develop proper infrastructure in order to keep up with the demands of the constantly evolving virtualized environment that runs their servers.

Keywords: Technology, Server, Virtualization, Resource

1.1 Introduction

Organizations are becoming increasingly dependent on IT for daily operations. Despite this, an accurate analysis of the economic value of IT processes, such as virtualization, is difficult, notwithstanding its self evident enabling capabilities (Riel, 1998). There is evidence that 75% of companies with more than 500 employees are using virtualization, and that they intend to virtualize 45% of their new servers purchased in the following year (Goldworm & Skamarock 2007). Virtualization is the use of special software to safely run multiple operating systems and applications simultaneously on a single computer (Kovar, 2008). Indeed, Virtualization allows a company to consolidate its servers to improve efficiency and to reduce costs (Godbout, 2007). Server Virtualization has since been applied to data storage and desktop systems.

In recent years, the developing world has received considerable attention from established global server virtualization service providers. Similarly, firms based in the developing world have begun to compete in this service industry (Slaheddine, 2012). However, in the author's findings and conclusions, it is inconclusive as to whether server virtualization in the developing world is a short-lived or a long term trend.

It is theoretically possible for African countries to bridge the digital divide by using server virtualization, as it offers them the same IT infrastructure, data centres and applications. Server virtualization also enhances the IT capabilities of small and medium-sized enterprises (SMEs) (Myers ,2010). Indeed, Slaheddine (2012)

suggests that virtualization is a short term solution to the lack of IT equipment on the continent. The author also states that the education and banking sectors are in the forefront of adopting server virtualization in Africa, and that by 2012, nearly half of SMEs in Africa had virtualized their basic IT structure.

Companies listed in the various stock exchange(s) in the world tend to be industry leaders in various aspects of technology adoption (Makatiani, 2012). Therefore, the companies listed in the Nairobi Securities Exchange (NSE) would have an influence on the adoption and implementation of server virtualization in Kenya. Most of Kenya's Small and Medium sized companies look towards the big corporations listed on the NSE to see how they react to the new technology wave such as server virtualization, its adoption and implementation.

1.2 Statement of the Problem

Recent studies have shown that IT personnel and ICT oriented organizations, have identified server virtualization technology as an important and trending technology to help organizations improve their business productivity, become competitive, achieve cost reductions, embrace green energy and as a means of mitigating global economic recession effects (McGee, 2010). However, Bitta (2012) laments that while companies are ready to virtualize, the IT paradigms necessary to facilitate successful implementation of server virtualization is still lacking, and as a result, very few companies have been able to implement server virtualization fully. From the foregoing, it is apparent that the current literature does not address the way in which four key factors (energy policy factors, human resource capacity factors, structural factors and innovation characteristics) affect the implementation of server virtualization technology. The majority of studies focus on aspects of implementation of server virtualization without giving due consideration to the challenges that server virtualization presents. The Server virtualization technology gives organizations, huge benefits, but not much is known about its implementation among organizations listed in the Nairobi Securities Exchange. It's against this background that the current study sought to find out how the aforementioned critical factors for server virtualization affect the implementation of server virtualization among companies listed on the Nairobi Securities Exchange.

1.3 Objective of the study

The main objective of the study was to find out find out the influence of human resource capacity factors on corporations virtual server technology implementation

2. Literature Review

Virtualization as a technology is a technique that divides a physical computer into several parts or completely isolated machines commonly known as virtual machines (VM) or guest machines. In today's modern computer architectures, virtualization really exists in almost every layer, from the application to the operating system, server, networks, and storage devices Rahman (2010). For example, application clustering technologies such as Microsoft Clusters and Oracle's Real Application Clusters (RAC) manage the process of selecting a server to deliver an application without the user knowing which server it's coming from. Server virtualization allows you to run multiple operating systems on the same physical hardware platform to improve utilization of the central processing unit (CPU) and memory. Most of these form of virtualization work together to optimize efficiency throughout the layers of technology.

Server or machine virtualization is the most common method of virtualization. Usually in server virtualization, the whole machine is made to run independently in a virtual system. It has a separate operating system as well as hardware and networking capabilities. The virtual server is displayed to users as a separate physical server although there can be several similar systems in one physical server (Von Hagen 2008). Virtualization, in computing, is the creation of a virtual (rather than actual) version of a hardware platform, operating system, storage device or network resources (von Hagen 2008). Server virtualization creates numerous isolated environments, and allows multiple Operating Systems's and workloads, to run on the same CPU/server. A virtual machine (VM) is an abstraction layer or environment between hardware components and the end-user. Virtual machines run operating systems and application software and can run many virtual machines while sharing system hardware components such as CPUs, controllers, disk, memory, and I/O among virtual servers (Kreuter, 2004).

Virtualization is gradually losing its image as a new, highly advanced technology and it is becoming a mainstream data management technique. Indeed, two-thirds of all organizations (whether IT is their core business or not) are indeed implementing virtualization in live production and even for core applications. Thus, virtualization is no longer considered to be a risky or unreliable technology (F5 Networks, 2009). The benefits of virtualization include simplified administration, hardware independence/portability, increased hardware utilization, server consolidation, improved security, software development, testing/quality assurance, product evaluations/demonstrations, training and disaster recovery.

The costs of data centres running physical servers include extra floor space and rack space as compared to those running on virtual servers. Physical/real servers are becoming more expensive to operate as energy costs tend to increase in the long term. Therefore, IT managers want to optimize their firms' investment in existing computing power while minimizing server sprawl and operating costs (Daniels, 2009). Evidence suggests that organizations are using server virtualization as a tactical tool, which is an effective technology for consolidation, offering increased utilization levels, reducing server sprawl, and lowering capital and energy expenses. However, this viewpoint is slowly changing to a more strategic one, in which server virtualization is seen as a catalyst for IT modernization that transforms IT acquisition, deployment, consumption, management, and purchase, and ultimately as tool for competitive advantage (Kamer & Vranken, 2011).

Server virtualization improves IT service and it allows scalable and elastic computing service provision at higher speeds than actual machines, thereby improving economies of scale through the use of shared resources, and dynamic usage. Thus, server virtualization enables an IT organization to act like an internal cloud-computing provider (Kamer & Vranken, 2011). However, these findings also apply to corporations that are not core IT businesses, as virtualization improves their data management, allowing them to streamline their business processes.
Server virtualization implementation are discussed and four major factors namely; energy policy, structural, human resource capacity factors and innovativeness characteristics were identified to form part of the main factors that influence the implementation of server virtualization in organizations.

2.1 Human Resource Capacity Factors

Globalization has made adoption of emerging technologies a challenge because of changing practices (El Sawy & Pavlou, 2008). A virtualized data centre is ideal for business continuity as it allows operations to continue round the clock and even easier to continue when systems break down. Virtualization also reduces long term hardware, software, maintenance, and operation costs. In order to be able to fully implement the server virtualization technology, normally a company has to deal with a number of factors including expertise and skills, integration with existing technologies and external factors including security risks (Hoving, 2007; Peansupap & Walker, 2006). Thus, virtualization may reduce the manpower requirements of corporations, but it will call for fewer, more and better skilled personnel. Server virtualization can also significantly simplify the task of deploying servers. This often reduces the provisioning time for a new server from days to hours, with a corresponding drastic drop in staff needed to do the job. Although tools for managing virtualized environments are important, they are still immature according to Dawson & Bittman (2008), which may call for highly skilled staff to manage the virtual system after it is installed in the organization. The number of physical servers is reduced in virtualization, and thereby reducing the complexity of server management.

On the other hand, since it is easy to deploy and run virtual machines, this may result in server sprawl (Pfister, 2008). Not all applications are suitable to be virtualized and certain software vendors will not support their product when virtualized (Tanaka, Tarui & Naono, 2009; Woltjes & Berg, 2008). Therefore, additional staff and/or man hours will be needed to deal with the complexities of virtualization in this connext. Thus, if virtualization is not well planned, it may reduce hardware requirements while ironically increasing manpower requirements.

Virtualization can be implemented by adding a privileged software layer, which can in some instances introduce new vulnerabilities. Attacks against this layer may give access to multiple virtual machines under the server

virtulization environment (Ray & Schultz, 2009), making them more vulnerable. Although, attacks against a single virtual machine do not compromise other virtual machines due to their isolation (Menascé, 2005). A virtual machine is a set of files, and hence can be easily copied, inspected or modified, breaching confidentiality and integrity compromising information integrity (Cleeff, Pieters & Wierenga, 2009). Also patching suspended virtual machines introduces new management challenges (Pfister, 2008). This is matched by the need to protect different virtual machines using different passwords, which may cause even further difficulties in terms of security and manpower requirements.

Some authors state in literature that changes are easier to execute but harder to keep track of (Cleeff et al., 2009). In practice, certain changes can be easier because there is no need to acquire new hardware even software. Since the risks involved are lower, changes can be executed more often during daytime. However, the difficulties with keeping track of changes can cause additional problems when replacing staff, as the new employees may have problems with learning the virtualized infrastructure that was set up by their predecessors who have since left.

One positive aspect of virtualization is that it allows much faster recovery from a crash or disaster, against low costs, hence allowing business continuity. There are however risks involved with virtualization, that might threaten continuity. Human errors can have larger consequences in a virtual environment. Also, some software vendors may not give support if their products are run in a virtualized environment, which causes problems in the event of a malfunction, as the designers of the software are not available to rectify it, when they spoil, creating additional manpower headaches for the firm in terms of downtime and extra training for system technicians. Thus disaster recovery plans need to be re-evaluated for these additional factors that have been introduced by virtualization (Kamer & Vranken, 2011).Furthermore, virtualized environments do not differ much from the physical ones in terms of security. Companies now cannot rely on having only authorized access as a security method.

A recent example of a horrifying security breach happened in February 2011, when a former IT technician of Shionogi pharmaceutical company accessed their servers and deleted 88 virtual servers (Department of Justice, 2011). Another case was researched in Simon Fraser University about the effect of Denial-of-Service attack (Carnegie Mellon University, 1999) in virtualized servers. The research proves that malicious hacker attacks consume more CPU and memory space in virtualized servers than in non-virtualized servers (Internet Engineering Task Force, 2007). This makes them more vulnerable to the Denial-of-Service attacks c The aforementioned scenarios demonstrate another human resource capacity factor associated with server virtualization: the need to hire trustworthy and competent employees and to include restrictive clauses in employment contracts to prevent ex-employees from deliberately causing havoc in virtual systems. This amounts to an additional human resource cost that has been generated by server virtualization technology in an organization.

Social engineering or “inside attacks” are common in virtual environments. A former administrator can easily access the Virtual Machine Manager and, for example, delete the machines. Often intra-virtual machine traffic is not monitored enough. The security professionals do not monitor the intra-virtual machine traffic, as it does not travel through the physical network device. End-point security is another issue most organization security administrators forget. They rely on the host security, while jeopardizing securing the virtual machines (Forrester, 2011).

The workload for the operational staff can spiral out of control due to the constant stream of configuration changes that must be made to the static data centre network devices in order to support the dynamic provisioning and movement of virtual machines (Metzler, 2011). One way to think about the current generation of virtualized data centres, and the related human resource capacity challenges, draws on the concept of a fractal. A fractal is a geometric object that is similar to itself on all scales. If you zoom in on a fractal object it will look similar or exactly like the original shape. This property is often referred to as self-similarity (Metzler, 2011). Although a virtual machine can be made as a copy of the parent machine, there are corporate systems in which each

employee has their own, dedicated virtual machine. Thus the initial similarities to the parent machine disappear over time, as each individual makes changes to his or her virtual machine, meaning that the fractal concept is only valid when dealing with virtual copies of the parent machine.

As the virtual IT infrastructure becomes more dynamic in order to deliver on-demand application delivery, the traditional approach to network design and the associated labour-intensive management tools that are typically used to control and manage the IT infrastructure will not be able to keep pace with the frequent, dynamic changes that are required. For example, the traditional approach to data centre network design is based on the concept of interconnecting and managing relatively static physical devices. This approach has two fundamental limitations when used to support virtualized servers. One limitation is that the workload for the operational support staff can spiral out of control due to the constant stream of configuration changes that are needed to support the dynamic provisioning and movement of virtual machines. The second limitation is that even if IT organizations had enough support staff to implement the necessary configuration changes, the time to support these changes is typically measured in days and weeks. In order to truly have a dynamic IT infrastructure, these changes must be made in the same amount of time that it takes to provision or move a virtual machine; i.e., seconds or minutes (Kamer & Vranken, 2011).Thus server virtualization should be considered as a balance between hardware and manpower requirements, which suggests that in deed virtualization is not a panacea for cutting costs in a corporate IT environment.

In recent times, most IT organizations have deployed a form of distributed computing often referred to as n-tier applications. The typical 4-tier application is comprised of a Web browser, a Web server, an application server and a database server. Even in the traditional server architecture in which the servers that support the application are not virtualized, when the performance of the application degrades it is typically noticed first by the end user and not by the service provider. In addition, when the service provider is made aware of the fact that the performance of the application has degraded, it often takes a considerable amount of time to find the root cause of the degradation (Metzler, 2011), which calls for the deployment of additional manpower, as described above.

3.0 Research Methodology

3.1 Research Design

This was a correlational survey research design. This type of study is aimed at determining the critical factors influencing corporations' implementing virtualization technology of companies listed on the NSE. The correlation research design was chosen because it will show whether and how strongly pairs of variables are related. Consequently, Correlation research will be looking for variables that seem to interact with each other, and this will enable the researcher to see as one is changing, one will have an idea of how the other will change.

3.2 Population of the Study

The population of interest in this study comprised companies listed at the Nairobi Securities Exchange. There are 60 companies listed at the Nairobi Securities Exchange as of May 2013 (NSE, 2013). The study targeted 2 chief information technology officers in each company, 2 information technology managers, information system managers and managers involved in policy making decisions on computing systems. This amounted to 6 persons per company, which gave us a population of 360 persons.

3.3 Target Population

The target population for this study were the IT employees (chief information technology officer, information technology managers, information system managers and managers involved in policy making decisions on computing systems) from the 60 companies listed on the Nairobi Securities Exchange. They amounted to 360 persons, This is presented in table 3.1 below.

Table 3.1: Target Population

Category	Frequency	Percentage %
Chief Information Technology Officer		
Information Communication Technology Managers		
Management Information System Managers		
Managers involved in ICT policy decisions making		16.5
Total	**360**	**100**

Source: Author, 2015

3.4 Pilot test

Hill (1998) suggested 10 to 30 participants for pilots in survey research; Julious (2005) in the medical field, and van Belle (2002) suggested 12 participants while Treece and Treece (1982) suggested 10% of the project sample. In this study, the pilot testing applied the questionnaire on 17 respondents to identify and eliminate potential problems in all its aspects including content, wording sequence, layout and navigation. It was intended to eliminate potential problems, estimate the amount of time required for actual field work and propose modifications to the questionnaire and data collection methods. This sample was not included in the final findings. Hence the sample of study was 72 participants.

4.0 Results and discussions

The results were discussed under these thematic areas: Response rate, Job Titles of Respondents, Satisfaction with Virtual Server Technology, Human Resource Capacity Factors and Server Virtualization Technology, Correlation Analysis, Regression Analysis and ANOVA

4.1. Response Rate

The data was collected from all the listed firms in the Nairobi Securities Exchange (NSE). The sample of the study consisted of 72 respondents. The information on response rate is presented in table 4.1.

Table 4.1: Response Rate

Issued questionnaires	Returned	Response Rate
72	48	66.7%

Source: Author, 2015

Seventy-two (72) questionnaires were given to the responses in the sample. However, only 48 questionnaires were filled and returned. Among the respondents who did not answer the questionnaire, some simply refused to communicate, while others returned the questionnaires unanswered. According to Kombo & Trump (2008), a 50% response rate is adequate, 60% good and above 70% rated very good. Based on this assertion the response rate for this study can be said to be good at 66.7%.

An internal consistency technique using Cronbach's alpha was then be applied to measure the reliability of all the questionnaires issued to different group of pilot respondents. According to Kothari (2009). Cronbach's alpha is a coefficient of reliability that gives an unbiased estimate of data generalizability. An alpha coefficient higher than 0.75 indicates that the gathered data has a relatively high internal consistency and could be generalized to reflect opinions of all respondents in the target population Chandran (2004). Data reliability played an important role towards generalization of the gathered data to reflect the true characteristics of the study problem (Myers, 2010).

Table 4.2 Reliability Analysis

Reliability Statistics	No. of Items	Cronbach's Alpha value
Server virtualization	10	0.71
Environmental factors	10	0.85
Human factors	10	0.78
Organizational factors	10	0.82
Innovation characteristics	10	0.81

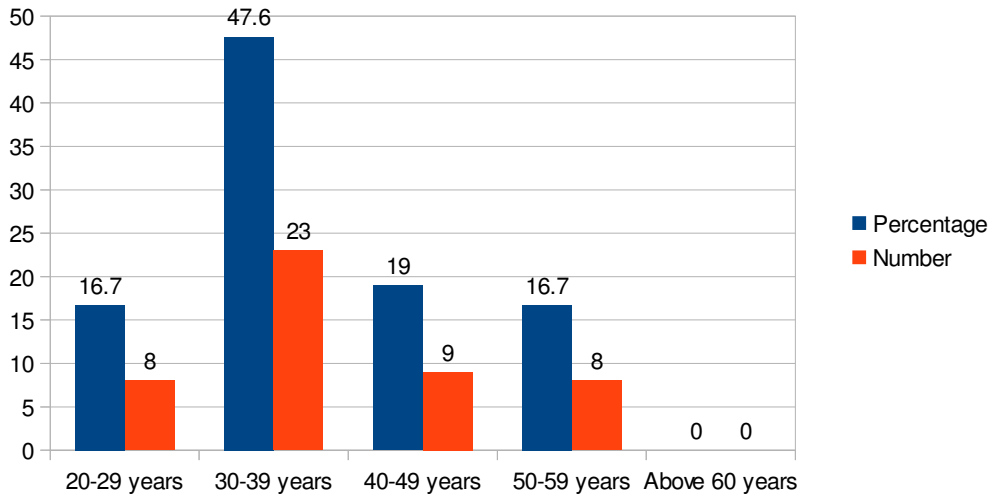
Source: Author, 2015.

4.2 Demographic Information

4.2.1 Age of Respondents

The study also sought to find out the age of the respondents. The findings are displayed in Figure 4.1.

Figure 4.1Age of Respondents



Source: Author, 2015

The findings indicate that 8 respondents (16.7%) were in their 20s, while 23 (47.6%) were in their thirties. Cumulatively, this means that 31 respondents (64.3%) were aged below 39 years. This shows that majority of listed firms have entrusted their IT systems to the young people. Being a dynamic field, young people cope well in the IT well as they are able to adapt to change quickly (Wendy, 2008). None of the respondents was aged above 60 years.

4.2.2 Job Titles of Respondents

The findings on this parameter are displayed in Figure 4.2

Although the unit of observation for this study was the MIS manager and the ICT managers as already indicated in the methodology, an overwhelming 15 (30.9%) of the respondents were ICT security managers with only one (2.90%) indicating MIS manager designation. In addition, 8 of the respondents (17.6%) were database managers, 8 (17.6%) were system engineers and 4 (8.8%) were chief information officers. This was a very important profile distribution for this study since the respondents had the right qualifications to give information relevant to this study on matters of server virtualization.

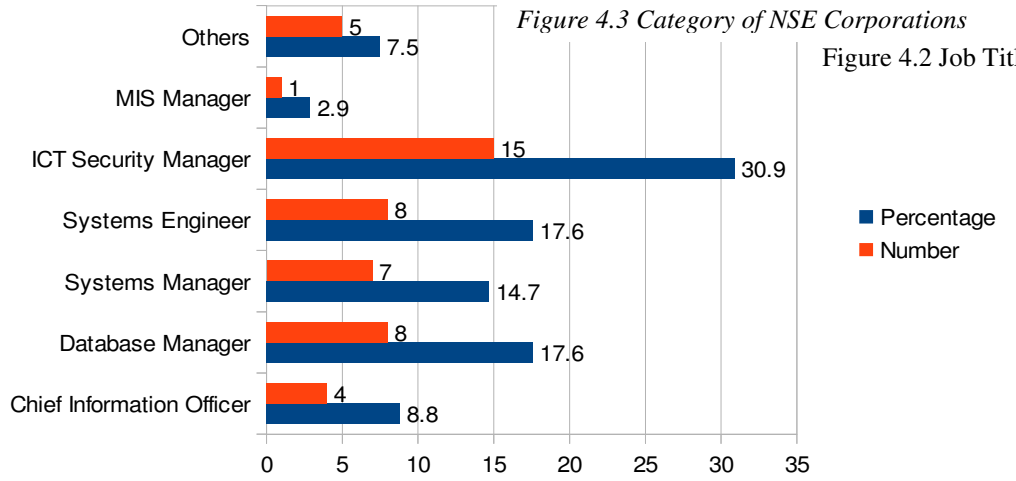
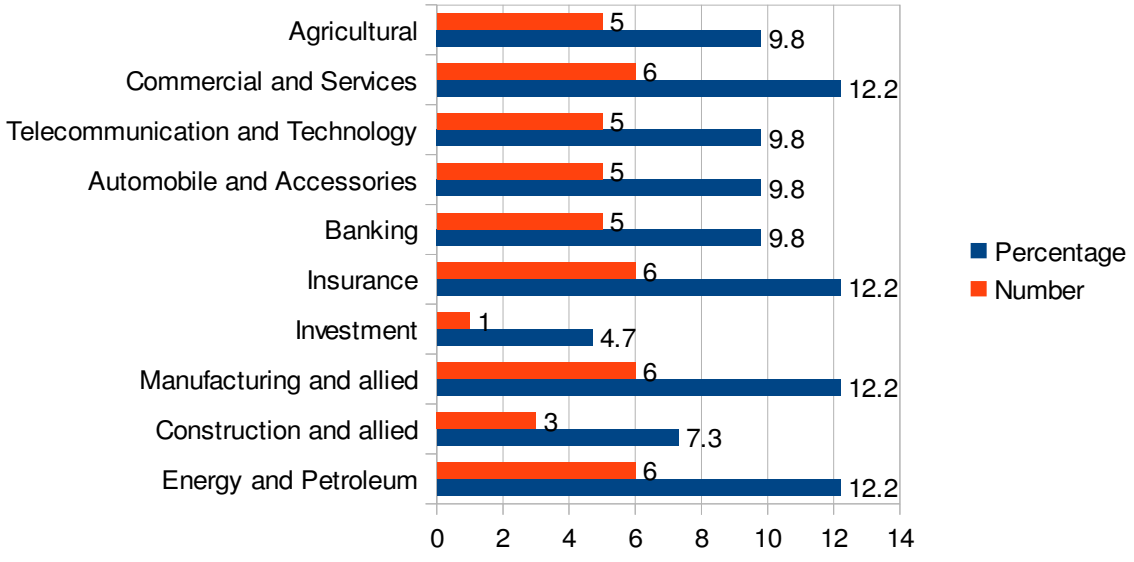


Figure 4.3 Category of NSE Corporations

Figure 4.2 Job Titles of Respondents

4.2.3 Category of NSE corporations



Respondents were asked to indicate the categories in which their corporations belonged. Results are in Figure 4.3. above.

The results show that 6 (12.2%) of the corporations belonged to the energy and petroleum category, while 3 (7.30%) were in construction and allied, 1 (4.7%) investment, 6 (12.2%) were in insurance, 6 (12.2%) were in the commercial and services sector, 5 (9.8%) were in banking, 5 (9.8%) were in automobile and accessories, 5 (9.8%) were in telecommunication and technology and 5 (9.8%) were in the agricultural sector. This was a very good distribution based on the various categories used to classify firms listed in the Nairobi Securities Exchange as all categories were represented. This is because the study sourced data from across all the available categories

of the corporations making it a more representative sample that eased the generality of the research findings. This is important as it helps to demonstrate that the factors affecting server virtualization are no longer the sole preserve of IT firms, but affect companies across sectors. Such a broad cross section of corporations is also useful in helping to determine whether organizational factors influence corporations' virtual server technology implementation.

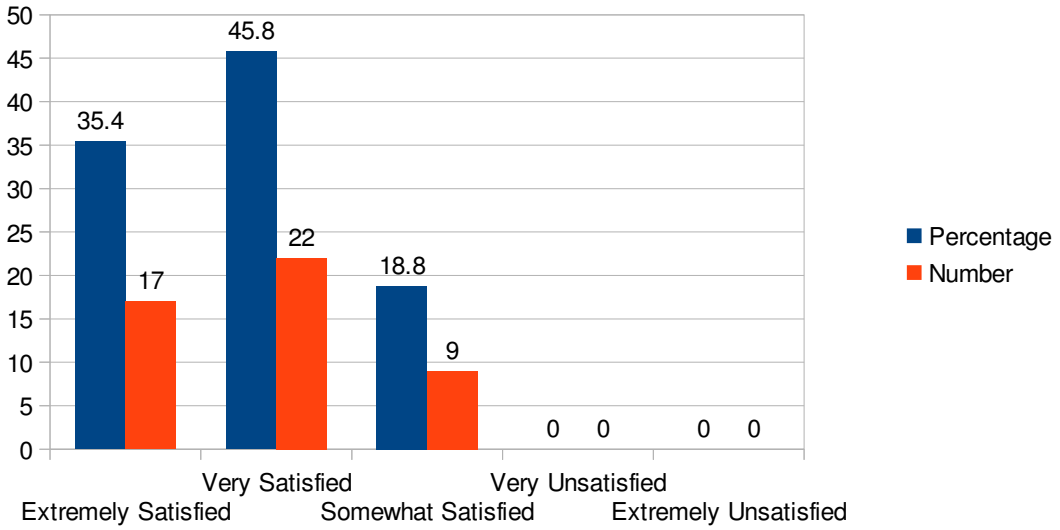


Figure 4.4 Satisfaction with Virtual Server *Technology*

4.2.3 Satisfaction with Virtual Server Technology

According to the findings in Figure 4.4 above, from the onset, the study sought to find out how satisfied the respondents were with virtual server technology. The study findings indicate that 17 respondents (35.4%) were extremely satisfied, 22 (45.8%) of the respondents were very satisfied while 9 (18.8%) were somewhat satisfied. This implies that there is a sizeable number of respondents who felt that more could have been done to enhance their satisfaction. This further lends credence to the justification of this study, and calls for more investigation into how server virtualization is carried out.

Table 4.3 Importance of Virtual Server Technology

Statement	**Strongly agree**		**Agree**		**Neutral**		**Disagree**		**Strongly disagree**	
Percentage/Number	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**
Server virtualization uses computing resources more effectively than standalone systems	23.8 %	11	66.7%	32	9.5%	5	0.0%	0	0.0%	0
Server virtualization ensures that data and applications are more secure than if operated on separate servers	30.4 %	15	39.1%	18	30.4%	15	0.0%	0	0.0%	0
Server virtualization has significant cost benefits	19.0 %	9	54.5%	26	21.1%	11	4.8%	2	0.0%	0
Virtualized servers are more vulnerable as they have a single point of failure	2.6%	1	5.1%	2	30.8%	15	41.0%	20	20.5%	10
Server virtualization can cause confusion due to the ease with which virtual machines can be created and migrated	2.6%	1	0.0%	0	0.0%	0	25.6%	12	71.8%	35

Source: Author

In regard to the importance of virtual server technology, the study findings indicate that 11 respondents (23.8%) strongly agreed, and 32 respondents (66.7%) agreed that server virtualization uses computing resources more effectively than standalone systems. In addition 20 respondents (41.0%) disagreed and 10 respondents (20.5%) strongly disagreed with the assertion that virtualized servers are more vulnerable as they have a single point of failure. These findings show that even though virtualized servers might have a single point of failure, the current security measures in place deter such actions from happening. In addition, 12 respondents (25.6%) disagreed, and 35 respondents (71.8%) strongly disagreed of the respondents disagreed with the assertion that server virtualization can cause confusion due to ease with which virtual machines can be created and migrated. From the researchers' viewpoint, there are many security features in place to ensure order and flow in server virtualization technology and therefore there are no grounds for confusion in implementing server virtualization.

4.3 Correlation Analysis for Human Resource Capacity Factors

A correlation analysis for the construct human resource capacity factors was conducted to find out how human resource capacity factors correlated with implementation of server virtualization technology. The analysis shows that the Pearson correlation coefficient was 0.822904 a clear indication that human resource capacity factors has a positive correlation with implementation of server virtualization technology (p-values >0.05). These findings indicate that there is a strong linear relationship between human resource capacity factors and implementation of server virtualization technology.

Table 4.4 Correlation Analysis for Human Resource Capacity Factors

		Server virtualization technology	Human Resource Capacity Factors
Implementation of server virtualization technology	Pearson Correlation	1	0.82
	Sig. (2-tailed)	0.0001	
	N	48	48
Human Resource Capacity factors	Pearson Correlation	0.82	
	Sig. (2-tailed)	0.0001	
	N	48	48

Correlation is significant at the 0.01 level (2-tailed)

4.4 Regression Analysis for Human Resource Capacity Factors

The findings presents the regression model of human resource capacity factors with a coefficient of determination of R^2 = 0.440 and R= 0.442 at 0.05 significance level. The coefficient of determination indicates that 44.2 % of the variation on implementation of server virtualization technology is influenced by human resource capacity factors. This shows that there exists a positive relationship between human resource capacity factors and implementation of server virtualization technology. The test of beta coefficient shows that there is a significant relationship between human resource capacity factors and implementation of server virtualization technology as positive. The coefficient significance of human resource capacity factors effect as .191 and is significantly greater than zero since the significance of t-statistics 0.00 is less than 0.05. this demonstrates human resource capacity factors as having a positive effect on implementation of server virtualization technology.

Table 4.5 Model Summary for Human Resource Capacity Factors

Model Summary				
Model	R	R Square	Adjusted R Square	Std Error of the Estimate
	.442	.440	.390	0.9362

Predictors: (constant) human resource capacity factors

4.5 ANOVA for Human Resource Capacity Factors

The results of Analysis of variance (ANOVA) for regression coefficients are shown below. The analysis results revealed that the significance of F statistics is 0.00 which is less than 0.05. This implies that there is a significant relationship between human resource capacity factors and implementation of server virtualization technology. Implementation of server virtualization technology is justified only when the perceived benefit is large enough to cover the cost. The high cost of initial investment associated with the required infrastructure and training of personnel, quantifying the return on investment often becomes a barrier to corporations (Godbout, 2007).

Table 4.6 ANOVA for Human Resource Capacity Factors

Model	Sum of Squares	Df	Mean of Square	F	Sig
Regression	18.605	1	18.605	8.5	.0001
Residual	465.814	135	3.450		
Total	484.419	136			

Predictors: (Constant) Human resource capacity factors

Dependent Variable: Implementation of server virtualization technology

4.6 Human Resource Capacity Factors and Implementation of Server Virtualization Technology

The findings indicate that 19 respondents (39.0%) disagree, and 25 respondents (52.2%) strongly disagreed with the assertion that virtualization makes incident management more difficult while 7 respondents (14.5%) disagreed, and 28 respondents (58.5%) strongly disagreed that under virtualization it is harder to keep track of system changes. The analysis indicates that 11 respondents (22.2%) strongly agreed, and 31 respondents (64.4%) agreed that server virtualization technology reduces manpower requirements. In addition 16 respondents (34.1%) disagreed, and 26 respondents (52.3%) strongly disagreed that virtual machines can be accidentally or maliciously deleted by a member of staff. This is supported by the fact that 15 respondents (30.9%) disagreed, and 21 respondents (43.2%) strongly disagreed that their virtualized server is vulnerable to attacks from within the organization.

5.0 Conclusion

The essence of this study was to explore the critical factors for corporates implementing server virtualization technology among listed companies in the NSE in Kenya. Based on previous studies the critical factors were expected to have positive relation with implementation of server virtualization technology in Kenya but the actual empirical impact was not known. The empirical results from the study and the subsequent analyses done suggest that Server virtualization success depends, Human resource capacity factors. This is captured through the items in the research instrument.. The outcome of the tests suggests that the instrument is highly reliable and valid. Testing of the overall model through appropriate test statistics indicate that both model is acceptable.

The human resource capacity factors influencing corporations' implementation of server virtualization technology include the reduction in manpower requirements, which has significant benefits in terms of cost savings, which also influence the structural factors discussed above. However, there are also concerns about virtualization and data security, which may affect the decision making of corporations as regards manpower, especially if additional security staff needs to be recruited.

5.1 Suggestions for Future Study

The findings emphasize the importance of the critical component influencing implementation of server virtualization technology in enhancing performance, the human resource capacity factors.It is worth noting that, the study is not without limitations, bearing in mind the data for developing the success instrument was gathered in companies listed in the Nairobi Securities exchange in Kenya, there is an important need to do a cross-cultural validation of the instrument using data gathered from other sectors in Kenya and other developing countries as well, in order to enhance the generalization of items.

Comparisons of the key factors in the implementation of server virtualization technology among corporations with different scales and industry sectors may be helpful in understanding further the impacts of virtualization in organizations.Future studies should take care of this limitation.

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