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INFLUENCE OF GENDER ON LEADERSHIP STYLES AND EFFECTIVENESS OF LEADER – (STUDY BASED ON GOVERNMENT UNIVERSITY ADMINISTRATIVE STAFF OF SRI LANKA)

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1. Abstract

The number of females in higher management positions are very low in Sri Lanka. Women in management positions have to face prejudice according to the literature. Current male and female leader prototypes are associated with gender in evaluating leaders.

Is there a scientific base to justify those entry barriers and prejudice against female managers? Is there actual difference in male and female managers as leaders and does the effectiveness of the male and female managers differ according to their gender are the problems?which are discussed in this study.

The objectives of the study are to categorize male and female managers to Transformational, Transactional and Laissez-faire leadership styles using the Multifactor Leadership Questionnaire (MLQ) and to compare the effectiveness of leadership in male and female managers and compare the strengths of male and female managers in each leadership style. The target population for the study is the administrative staff in the university system in Sri Lanka.

The results show that there is no significant difference in Transformational and Laissez-faire leadership styles of male and female administrators in government university administrative staff of Sri Lanka. However female administrative staff have more Transactional leadership qualities compared to male administrators. Other than that there were no significant difference in the effectiveness of male and female administrators in government university administrative staff of Sri Lanka

Findings of the study pointed out that there is no scientific base to justify prejudice against female managers since there is no significant difference in male and female managers as a leaders. Also female administrators scored more in some leadership styles comparing to their male peers.

Key Words: Gender, Leadership, Administrators and Effectiveness.

2. Introduction

Gender plays a vital role in human society. The popular belief is that males and females have different roles in society. However, gender roles in society are changing as the world changes. How these changes affect the socio economic factors of the world is very complex.

Modern day society is far more complex compared to old, traditional society. The main relationship which drives any society is the relationship between leader and followers. Leaders can be found in many forms. They can be managers, entrepreneurs, spiritual guides or they just can be a simple employee of an organization. At the same time as there is no consensus on the definition of a leader across the world, a leader may be distinguished from a follower by his or her qualities.

Different kinds of leaders are needed for different scenarios, so there is no such a thing as a universal leader. However some leaders can adapt to various situations and act accordingly. The role of a leader is basically to guide followers to achieve goals effectively and efficiently. If the leader is not competent enough to do the task efficiently and effectively, the whole team will collapse. Therefore the leaders of modern society are considered the top level and are the driving power of the society. Since the leaders are considered as a valuable assets to society, demand for superior leaders are at a height in any organization. Therefore people try to cultivate leadership qualities and skills inside them and be leaders in organizations. Leaders are the individuals who live with better life standards in any society since the demand for leaders is high.

According to the Howell (1997) modern leadership theories and models, leaders are now assessed on the basis of the satisfaction and performance of their subordinates. However, these theories and models are based on the assumption that the leadership style of the leader can be changed according to the situation most of the time, and that some leadership style can be applied to any situation.

Some findings have pointed to the fact there are a number of substitutes available for leadership. Literature in this field provides evidence that to maximize organizational outcomes, the members of an organization seek to obtain both guidance and good feelings from that organization. Guidance is offered in the form of both direct instructions and written guidelines such as work sheets. On the other hand, good feelings can be cultivated using various other workplace-related aspects. According to Howell (1997) leaders do not necessarily need to be involved in providing all of these factors. Even though all of those things can be done without managers, the importance of the leaders in any organization is still considered as a one of the most important aspects in the success of any given organization. What an organization needs to be successful is the people who can drive the organization effectively.

The existence of leaders is mainly dependant on the followers. To be a leader, the leader should have at least one follower. This relationship should be based on mutual understanding and respect on the part of both the leader and the follower. Some organizations attempt to force this relationship by giving the hierarchical power of authority to the leaders but this type of leader-follower relationship is not stable in the long term. To have a healthy relationship, the trust and respect of the followers needs to be earned by the leader.

There are plenty of social barriers to becoming a leader of certain group of individuals which depends on the situations, beliefs, cultures and opinions. Therefore, some individuals in society have to put an extra effort

compared to others to be a leader in a society or an organization. Most of the time, the reasons behind those hurdles are baseless.

Leaders in most of organizations in the world are mainly male, even though some of the middle level management positions and supervisory positions in the organizations are dominated by females. Female leaders have to face and break the glass ceiling when they are trying to advance their position towards top level positions in an organizations. The cause for this barrier can vary from the organization to organization and also culture to culture(Palacio, 2010).

Eagly & Karau (2002) propose that two types of prejudice toward female leaders can be identified. Generally, prejudice arises from misconceptions formed by the way people view and define gender roles and characteristics in society. This gender stereotyping causes prejudice towards females and also creates barriers in the career advancement of female manager's worldwide. The other reason for prejudice toward female managers is the general belief that female managers do not possess the required leadership skills and qualities compared to male managers. Because of the prejudice towards females, female managers have to exert extra effort when climbing towards the top level positions in an organizations.

Johnson et.al (2008) claimed that current male and female leader prototypes are associated with gender in evaluating leaders. They also pointed out that male individuals expect that leaders are more masculine, strong, and oppressive than feminine individuals. And also sensitivity was more toughly associated with feminine leadership. According to the researchers, female leaders needed to prove both sensitivity and strengthto be considered as effective in the other hand male leaders only needed to demonstrate strength. This biasness create extra barriers to female leader to become top level managers.

Even when female managers become top level managers in an organization, some of the male subordinates do not like to follow the directions given by the female managers due to various reasons (Eagly & Karau, 2002). Male subordinates do not like to work under the direction of females since most cultures in the world are male dominant. Hence the female leader has to put an extra effort to maintain her followers compared to the male leader with same leadership ability. Because of that, the shareholders and the stakeholders of an organization positioned in this type of cultural background do not like to advance female leaders to the top level positions. This creates a huge gender imbalance in top level positions all around the world. This problem is especially present in Asian countries since almost all the Asian cultures are male dominant.

The number of female managers in Asia is increasing slowly but steadily due to various reasons (Palacio, 2010). Since the effect of Asian's economy on world economy has increased in the last two decades, the money flow and living status of Asian families is slowly increasing. The improvement in economy has ensured access to better healthcare and education for people in Asian countries. Access to better education is one of the most important causes for the increase in the number of female leaders in organizations. Since accessibility to schools and the money required to attend schools was higher compared to the income of the families in the past, most families could only afford to give education to male children. Because of the improvement in the economic status of Asian families, they can now provide education to all the children of the family (Strachan, Adikaram, & Kailasapathy, 2015)

Other than better access to education, there is another reason for the increase in the number of female leaders. Throughout the world, fertility rates are falling. Because of falling fertility rates, the number of children in a family is low even in Asia. The lower the number of children in a family, the less the female needs to participate exclusively in household duties. This has led to an increase the women's participation in the labour force. Due to these reason, the number of women managers in Asia is expected to be rise further over the next decade.(Wen-Chi et.al 2008). However, though the number of female leaders has increased, they still have to face prejudice in the working place due to their gender.

The lack of women in management roles in Asia is influenced by culture and religion. Most of the studies conducted on the effects of gender on management are done in western cultures (Wen-Chi et. al., 2008). Since culture plays a vital role in management styles and human relationship between leaders and followers, it is essential to study gender related management issues in Asian countries.

Since the popular belief is that the abilities and skills of male and female leaders are different, it is important to understand whether there is a difference between the leadership styles of male and female managers and also to understand whether gender has an effect on the effectiveness of leadership. The findings in this field will be important since the gender balance of managers is changing around the world. This phenomenon can affect the management of organizations, since men's and women's behaviour is different. It is very important to understand whether there is a significant relationship between preferred leadership styles and the effectiveness of the leaders with regard to the gender of managers. The study can be used by human resource effectively even if the effectiveness and leadership styles of the managers vary with the gender of the managers.

Only 4.8 percent of women were working in top positions in Sri Lankan decision-making bodies in 2005 (Palacio, 2010). When it comes to the top positions of organizations, there were only 3 female CEOswhich is 4.3 per cent, out of a total of 69 CEOS in the country. According to the International Labour Organization survey conducted in thirteen companies in 2013, only one women CEO was there on active duty. (Palacio, 2010)

On the one hand, male managers already in the top level positions in organizations discourage potential female candidates from applying top level positions. On the other hand, female managers in some organizations face problems in building trust and confidence among male subordinates due to the belief that males possess more leadership qualities compared to women even though the female leader may have more experience, education and other qualifications.

Studies carried out in the western world have pointed out that there is no significant difference between leadership qualities and the effectiveness of female managers compared to male managers(Eagly & Carli, 2003). However, these findings are not relevant to Asian countries since females in Asia have less access to education and less opportunities.

3. Research Problem

Is there a differences in male and female managers as leaders considering their leadership styles and how effective it makes them as leaders according to their gender?

According to Palacio(2010), the number of women in the top management positions in Sri Lanka is low. Women in management positions still face a lot of entrance barriers and prejudice according to the literature. Also some researchers claimed that current male and female leader prototypes are associated with gender in evaluating leaders(Eagly & Karau, 2002).

Equal treatment for Sri Lankan women is guaranteed by the constitution. They have equal opportunities and access to free education as male children do. According to Article 12 of the constitution of Sri Lanka "no citizen shall be discriminated against on the grounds of race, religion, language, caste, sex, political opinion, place of birth or any such grounds". However when it comes to leading positions in the private sector and government sector, only a few female managers can be found.

Most of the studies has done in this field were conducted in European countries or USA. Since culture plays vital role in developing leaders, findings of those countries might not be applicable to Sri Lankan context directly. This study is designed to fill these gap by doing study among the leaders nurtured under Sri Lankan culture which has some major differences comparing to the Western culture.

4. Research questions and hypothesis

4.1 Research questions

- Whether there is a significant difference between leadership styles of male and female administrators in government university administrative staff of Sri Lanka?
- Whether there is a significant difference in the effectiveness of male and female administrators in government university administrative staff of Sri Lanka?

4.2 Research hypothesis.

H1: There is a significant difference between the Transformational Leadership styleof male and female managers in government university administrative staff in the universities of Sri Lanka.

H2: There is a significant difference between the Transactional Leadership styleof male and female managers in government university administrative staff in the universities of Sri Lanka.

H3: There is a significant difference between the Laissez-faire Leadership styleof male and female managers in government university administrative staff in the universities of Sri Lanka.

H4: There is a significant difference in the effectiveness of male and female managers in government university administrative staff in the universities of Sri Lanka.

5. Research Objectives

The objective of this research is to identify the effect of gender on leadership. Two main areas of leadership are considered in this study. These are leadership style and the effectiveness of a leader.

- To identify whether there is a significant difference in the Transformational Leadership style between male and female managers

- To identify whether there is a significant difference in the Transactional Leadership style between male and female managers
- To identify whether there is a significant difference in the Laissez-faire Leadership style between male and female managers
- To identify whether there is a significant difference in the effectiveness of management in male and female managers

6. Significance of the study

57 percent of 21 million estimated population in Sri Lanka is female. However only 8.5 million people of that 21 million is economically active. From that, only 33.4 percent are women (Palacio, 2010)

According to Eagly & Karau (2002) two types of prejudice toward female leaders can be seen in general. The first one is general prejudice towards women as subservient to men. This stereotyping causes prejudice towards female and also creates barriers in career advancement of female manager's worldwide. The other reason for prejudice toward female managers is the belief that female managers do not possess the required leadership skills.A lot of studies in this field have been conducted in Europe and the United States. Since the leadership styles and characteristics of a person is subject to the cultural background, beliefs and economical perspective of the environment that the person lives, the findings of those studies cannot apply to the Sri Lankan context directly.

The objective of the study is to identify whether there is significant difference in leadership styles and the effectiveness of male and female managers in the administrative staff of Sri Lankan Universities. This study is designed to identify whether there is a basis for the common belief that male managers have more leadership qualities compared to female managers. The findings of this study may lead to breaking the glass ceiling for women and decrease the prejudice against emerging female managers in Sri Lanka. Also these findings can be used to properly utilize the human capital in Sri Lanka.

Target population of the study is the administrative staff in the Sri Lankan university system. Those are one of the most important employees in the Sri Lankan public sector. These managers were selected using very competitive test followed by a comprehensive interview conducted by the University Grants Commission. The sample population gives a proper representation of all the population in the country since the members of the administrative staff are selected from all over the country. So the sample might give a better representation of the population of Sri Lanka.

7. Research Methodology overview

Methodology of the research is quantitative research methodology. Research hypothesis was developed and variables and dimensions were designed according to the theoretical framework. Four variables are measured using a questionnaire. Those variables are:

- Transformation Leadership Style
- Transactional leadership Style
- Laissez-faire leadership Style
- Effectiveness of the leader

The sample population of the study is the Administrative staff of the government universities in Sri Lanka. The population size is nearly 350 since there is no up to date data available to be found out. The data available

in the University Grants Commission web site is up to 31st of December 2015(Tufte, 1992). The selected sample size is 175 from 350 staff which is approximately 50% of the total population.

The questionnaire consists of 52 items with a five-point Likert-type scale. The first part of the questionnaire is primarily designed to categorize the leaders into the three leadership categories. The first part of the questionnaire was adopted from Multifactor leadership Questionnaire (4X format). Four variables are used to determine how strong the participants are as transformational leaders. Two variables and one variable respectively are used to determine Transactional and Laissez-faire leadership.

Other variables including Innovator, Broker, Producer, Director, Co-ordinator, Monitor, Facilitator, Mentor are the attributes that need to be possessed by the effective managers according to the Quinn's model.

The sampling method is random sampling. The delivery method of the questionnaire used is online questionnaire. The link for the online questionnaire is delivered using email to the target sample of the population. Telephone calls were given to the participants to explain the questionnaire and the significance of the study.

Analysis is done using SPSS software. The statistical method used to identify whether there is a significant difference in leadership styles of each gender and whether there is a significant difference in the effectiveness of the leader isIndependent Samples T-test.

8. Results

The four main hypotheses are tested in this section. Hypotheses are tested using Independent Sample T tests. Other than the main Hypothesis, major factors which are used to determine each main variable are tested with the independent variable here to elaborate the findings of the study. Findings will be compared with the literature in the discussion section.

8.1 Hypothesis 01

Results showed that the female administrators (N78) had scored 3.1377 for Transformational leadership in a scale of 0 to 4 while male administrators (N64) had scored 3.0072 for Transformational leadership. Two-tailed significant value for the T Test for equality of means **(p) is 0.058** for two samples. Therefore there is no significant difference in Transformational leadership between male and female managers even though female scored high in this leadership style.

Hypothesis one tests whether there is a significant difference between the Transformational Leadership styleof male and female managers in government university administrative staff in the universities of Sri Lanka. According to the results Hypothesis 01 has to be rejected.

Four factors are considered to measure the Transformational leadership. First factor is idealized influence. According to the results of Independent-samples T-test conducted to compare factor, idealized influence between male and female, there was not a significant difference in the scores for female (M=2.917, SD=0.60) and male (M=2.75, SD=0.65) conditions; t (140) = 1.538, **p = 0.126**. Therefore both males and female administrators have no significant difference in confidence, power, focusing on ideals and ethics.

The second factor is inspirational motivation. This attribute of Transformational leadership focuses on how the leaders motivate their followers and how to communicate his vision to the followers.An Independent-samples

T-test conducted to compare Inspirational motivationbetween male and female administrators. According to the calculations, there was not a significant difference in the scores for Female (M=3.13, SD=0.495) and Male (M=3.09, SD=0.61) conditions; t (140) =0.481, **p = 0.631**.

The third factor considered for Transformational leadership is intellectual stimulation. According to the results of Independent-samples T-test conducted to compare the factorintellectual stimulation between male and female, there was not a significant difference in the scores for female (M=3.18, SD=0.60) and male (M=2.97, SD=0.74) conditions; t (140) = 1.825, **p = 0.70**. Therefore there is no significant difference between males and females on the ability of leader to direct followers to think creatively and solve problems in a different way

The fourth and final factor considered for Transformational leadership is individualized consideration. According to the results of Independent-samples T-test conducted to compare factorIndividualized consideration between male and female, there was a significant difference in the scores for female (M=3.26, SD=0.58) and male (M=3.01, SD=0.62) conditions; t (140) = 2.505, **p = 0.013**.

This factor shows the ability to support and give attention to the needs of followers. The result of this factor claimed that female leaders consider more about their followers on an individual level and provide support when necessary.

Table 1: Summary of the Group Statistics of the Factors effecting to Transformational leadership

Group Statistics							
Factor	**Sex**	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**	**Sig. (2-tailed)**	**Significant?**
Idealized influence	Female	78	2.92	0.61	0.07	0.13	No
	Male	64	2.75	0.65	0.08		
Inspirational motivation	Female	78	3.13	0.49	0.06	0.63	No
	Male	64	3.09	0.61	0.08		
Intellectual stimulation	Female	78	3.18	0.60	0.07	0.70	No
	Male	64	2.97	0.75	0.09		
Individual consideration	Female	78	3.27	0.58	0.07	0.01	Yes
	Male	64	3.01	0.62	0.08		

According to the findings, females scored high in all the factors effecting to Transformational leadership but the only factor which has a significant difference between males and females is individual consideration.

Literature in this field claims different findings with regards to the Transformational leadership. Some researchers claim that female leaders are significantly more Transformational than male leaders while some of the past studies backed the findings of the study.

According to the creator of the full range leadership theory, women leaders can be more Transformational than male leaders(Bass, 1999). (Eagly & Johannesen-schmidt, 2001) also claimed that female managers are rated higher in all three leadership styles even though the Transformational leadership style is somewhat considered as a male stereotype leadership style.

However, some other researchers' studies are backing the finding of the study. According to Bruke and Colins ,there is no significant difference in four factors in five factor Transformational leadership style (Burke & Collins, 2001). (Judeh, 2010) also claimed that there is no significant difference in Transformational leadership between male and female.

The same result were observed by a study conducted by (Bass, et al, 1996) using Multifactor Leadership Questionnaire. They claimed that there is no difference in the Transformational leadership style in males and females. Influence and Style also claimed that there is no significant difference in Transformational leadership style between men and women in the study conducted in Sweden and China. (Influence & Styles, 2006).

However, Sebastian Bailey, a contributor of Forbes magazine suggested that the male managers claimed higher rating in self-rating studies as effective transformation leader while other rating systems claimed the opposite result. ("Who Makes A Better Leader: A Man Or A Woman? - Forbes," n.d.). Since the study was conducted using self-rating this factor might affect the results.

According to the theory, aligning the members towards the interests of an organization is a duty of Transformational leaders.This type of leaders inspire and intelligently motivate the followers. These leaders can be directive or participative. Because of the attributes they possess, Transformational leaders are considered as proactive and help followers achieve targets. Therefore this leadership style is considered as a most favourable leadership style for most of the situations. However the findings of the research indicated that there is no significant difference between male and females in the Transformational leadership.

8.2 Hypothesis 02

Hypothesis two tests whether there is a significant difference between the Transactional Leadership styleof male and female managers in government university administrative staff in the universities of Sri Lanka.

According to the Independent-samples T-test conducted to compare Transactional Leadership for between male and female there was a significant difference in the scores for Female (M=3.08, SD=0.45) and Male (M=2.87, SD=0.52) conditions; t (140) =2.54, **p = 0.012**. The results claimed that females have more transactional leadership qualities comparing to the males.

Two factors are considered to evaluate the transactional leadership of administrative staff. One is Management-by-exception, which is designed to find out whether the leader is always focused on the goals, and objectives are met and the leader intervenes only when a mistake happens.

There was no significant difference in the scores of the T-test conducted to compare Management-by-exception of males and females.Scores for female (M=2.89, SD=0.64) and Male (M=2.78, SD=0.59) conditions; t (140) =1.072**, p = 0.286**. The results showed both males and females focused on the goals and objectives and intervene when the followers are deviating from the original goals.

The other factor effect for transactional leadership is Contingent reward leadership which can be used to measure whether the leader provides material or psychological rewards to the followers who fulfil the tasks or obligations.

There was a significant difference in the scores of the T-test conducted to compare Contingent reward leadership of males and females.Scores for Female (M=3.301, SD=0.55) and Male (M=2.98, SD=0.70) conditions; t (140) =3.000, p =.003 0.286. The results claimed that thefemale managers give rewards if the followers achieve target.

When it comes to transactional leadership, female administrative staff have more transactional leadership qualities compared to male administrators. However, both male and female managers give equal importance in achieving targets but female managers tend to give rewards to followers more than males.

Some literatures backs the findings of the study. Belasen and Franks (2008) claimed that female's strength of leadership styles mostly in the transactional leadership styleby using the result of a study conducted among the senior staff on transactional leadership. The researchers suggested that women are not always willing to do Transformational activities such as nurturing and relationship building with their followers. (Belasen & Frank, 2008)

Jones & Rudd (2008) also reported that males scored higher in transactional leadership than females. They also claimed that male managers are more Transformational than female managers.

8.3 Hypothesis 03

Hypothesis 01 tests whether there is a significant difference between the Laissez-faire Leadership styleof male and female managers in government university administrative staff in the universities of Sri Lanka. The hypothesis was tested using one factor. According to the results of Independent-samples T-test conducted to compare Laissez-faire leadershipbetween male and female, there was no significant difference in the scores for female (M=1.15, SD=0.96) and male (M=1.24, SD=0.91) conditions; t (140) = -0.536, **p = 0.593.**

However the result for laissez-faire leadership style of both male and female administrators are significantly low comparing to the other two leadership styles. This is a positive observation since this leadership is considered as the most passive leadership style of all the three leadership styles in the model. This type of leader does not like to use the authority. They do not involve themselves in making decisions. Basically this type of leader avoids taking actions. Male administrators showed higher mean comparing to the female administrators but the difference is not statistically significant. And the means are very low compared to the scores observed for the other leadership styles.

8.4 Hypothesis 04

Hypothesis 04 of the research is developed to test whether there is a significant difference in the effectiveness of male and female managers in government university administrative staff in the universities of Sri Lanka. The effectiveness of the leadership is measured quantitatively using Quinn's Competing Values Framework. According to the framework, managers should possess key competencies to play eight roles to be an effective manager. Effectiveness is measured using how often the administrators displaythose eight roles.

According to the results of Independent-samples T-test conducted to compare Effectiveness of the leaderbetween male and female, there was no a significant difference in the scores for female (M=3.05, SD=0.45) and male (M=2.94, SD=0.48) conditions; t (140) = 1.412, **p = 0.162**. The results displayed that there is no difference in the effectiveness of both female and male administrators.

Literature in this variable also showed conflicts. Researchers such Eagly&Johanesen claimed that female managers scored significantly higher in effectiveness than the male managers (Eagly & Johannesen-Schmidt, 2001)

However (Dawley et al., 2013) claimed that even the leadership styles of both male and female managers are different, the effectiveness of their leadership had no significant difference in each gender.

As claimed by(Paustian-Underdahl et al., 2014) the effectiveness of the managers also changed according to the type of review carried out by the researcher. According to some of the meta-data analysis conducted, men rated themselves higher in self-rating while other ratings suggested that women are more effective as leaders but they claim that there is no significant difference in gender ratings in combined studies.

Other than the main hypothesis, independent sample T-test was carried out to check whether there is a difference between each role in male and female administrators.

Innovator Role of Administrators

According to the results of the Independent-samples T-test conducted to compare Innovator Role between males and females, there was no significant difference in the scores for Females (M=2.624, SD=0.825) and Males (M=2.697, SD=0.719) conditions; t (140) = -0.563, **p = 0.575.**

To be an innovator in an organization a managers need to be able to live with change, think creatively and create changes in their organization. According to the results for the role both female and male have these qualities to the same level and the means of both females and males are high for this role.

Broker Role of Administrators

An Independent-samples T-test conducted to compare **Broker Role**between male and female. According to the calculations, there was no significant difference in the scores for Females (M=2.765, SD=0.640) and Males (M=2.697, SD=0.627) conditions; t (140) =0.853, **p = 0.532.**

According to the model, building and maintaining a power base, negotiating agreement and commitment and presenting ideas are the competencies that should be possessed by a manager to be an effective broker. Since there is no significant difference in the scores of males and females for this roles administrators of both genders should be equally effective and competent in this role.

Producer Role of Administrators

According to the results of Independent-samples T-test conducted to compare Producer Role between males and females, there was no significant difference in the scores for female (M=3.256, SD=0.642) and male (M=3.099, SD=0.755) conditions; t (140) = 1.343, **p = 0.182.**

Therefore both male and female administrators might equally work productively, foster a productive work environment and they could manage time and stress in the organization. However female managers have a slightly higher mean for this role.

Director Role of Administrators

According to the results of Independent-samples T-test conducted to compare Director Role between males and females, there was no significant difference in the scores for female (M=3.333, SD=0.608) and male (M=3.161, SD=0.639 conditions; t (140) = 1.638, **p = 0.104.** Visioning, planning and goal setting, designing and organising, the roles of male and female administrative staff do not have any difference according to the findings.

Coordinator Role of Administrators

According to the results of Independent-samples T-test conducted to compare Coordinator Role between males and females, there was a significant difference in the scores for female (M=3.269, SD=0.753) and male (M=2.9583, SD=0.660 conditions; t (140) = 2.808, **p = 0.006.**

According to the findings on this role, females can manage different projects in an organization better than males and also they are more competent in managing across various functions in an organization.

Monitor Role of Administrators

This role demonstrates how effective managers are in monitoring and managing individual and organisational performance. The manager should be a good monitor to maintain the overall effectiveness of the people and organization. According to the results of Independent-samples T-test conducted to compare the monitor role between males and females, there was no significant difference in the scores for female (M=3.153, SD=0.728) and male (M=3.015, SD=0.706 conditions; t (140) = 1.141, **p = 0.256.**

FacilitatorRole of Administrators

According to the results of Independent-samples T-test conducted to compare Facilitator Role between males and females, there was a significant difference in the scores for female (M=3.107, SD=0.707) and male (M=2.802, SD=0.717 conditions; t (140) = 2.538, **p = 0.012.**

The results indicate that female administrators are better than male administrators in team building, taking subordinates to decision making and conflict management in the workplace. The result can be accepted since female administrators scored significantly high in individualized consideration factor in leadership. That factor shows the ability to support and give attention to the needs of individual followers.

FacilitatorRole of Administrators

According to the results of Independent-samples T-test conducted to compare Mentor Rolebetween males and females, there was no significant difference in the scores for female (M=3.261, SD=0665) and male (M=3.125, SD=0.709 conditions; t (140) = 1.173, **p = 0.243**. The results indicate that both male and female administrators are good facilitators.

Result Summary of the effectiveness of managers

Table 2: Group Statistics of the Roles of an Effective Managers

Role	Sex	N	Mean	Std. Deviation	Std. Error Mean	Sig. (2-Tailed)	Significant?
Innovator	Female	78	2.624	0.826	0.094	**0.575**	No
	Male	64	2.698	0.719	0.090		
Broker	Female	78	2.765	0.640	0.073	**0.532**	No
	Male	64	2.698	0.628	0.078		
Producer	Female	78	3.256	0.642	0.073	**0.182**	No
	Male	64	3.099	0.755	0.094		
Director	Female	78	3.333	0.608	0.069	**0.104**	No
	Male	64	3.161	0.640	0.080		
Coordinator	Female	78	3.269	0.654	0.074	**0.006**	Yes
	Male	64	2.958	0.660	0.083		
Monitor	Female	78	3.154	0.728	0.082	**0.256**	No
	Male	64	3.016	0.706	0.088		
Facilitator	Female	78	3.107	0.708	0.080	**0.012**	Yes
	Male	64	2.802	0.717	0.090		
Mentor	Female	78	3.261	0.666	0.075	**0.243**	No
	Male	64	3.125	0.709	0.089		

The result of this variable claimed that there is no statistically significant difference in the effectiveness of male and female administrative staff in the universities. However, female administrators scored significantly higher in two out of eight roles which are used to determine the effectiveness of the leaders. There was no significant difference between male and female administrators in the other six roles considered to measure the effectiveness.

The gender gap in management positions is reducing year by year because the number of female managers in the top and middle management level is increasing slowly. However, the number of women in the top management levels is very low. According to the International Labour Organization survey conducted in thirteen companies in 2013, only one women CEO was on active duty in Sri Lanka (Palacio, 2010).

9. Summary and Discussion

Since gender plays a considerable role in leadership style, the influence of gender to the leadership style of managers has a significant influence on the efficiency and effectiveness of organizational decisions. There are plenty of studies done in this field in western countries but very few studies have been done in Asia. Since leadership roles of the leaders are developed based on various factors such as gender and cultural background of the manager, it is important to conduct a research in Sri Lanka rather than rely on the information provided by western researchers.

It is observed that the number of female managers is considerably low in the country even though the female population is larger than the male in Sri Lanka. (Eagly & Karau2002) proposes that two types of prejudice toward female leaders can be identified. Generally, prejudice arises from misconceptions formed by the way people view and define gender roles and characteristics in society. This gender stereotyping causes prejudice towards females and also creates barriers in career advancement of female managers worldwide. Also some other researcherssuch as Johnson et al.(2008) claim that current male and female leader stereotypes are associated with gender in evaluating leaders.

The study is designed to identify whether there is a significant difference in each leadership styles between male and female managers and also to determine whether there is a significant difference in effectiveness of the leadership in the two genders. The findings of past studies on this matter are not consistent. Several studies indicated that women are better in Transformational leadership styles more than men (Bass, 1999)(Eagly & Johannesen-schmidt, 2001). Others claimed that there is no gender difference in leadership style (Bass, et al, 1996), (Influence & Styles, 2006) and no difference in the general effectiveness of men and women as manager either (Eagly & Johannesen-schmidt, 2001), (Dawley et al., 2013), (Paustian-Underdahl et al., 2014)

The findings of the study claim that there are no significant difference in Transformational leadership between male and female managers. Females have scored high in all the factors affecting Transformational leadership. However, the only factor which has a significant difference between males and females is the individual consideration. Therefore the female managers care more about their individual subordinates compared to male managers.

When it comes to transactional leadership, female administrative staff have more transactional leadership qualities compared to male administrators. However both male and female managers give equal importance in achieving targets but female managers tend to give rewards to followers more than males. There was not a significant difference in the scores of male and female managers for Laissez-faire leadership. However both males and females scored low in this leadership style.

The effectiveness of male and female administrative staff in the universitiesis similar according to the findings. Eight leadership roles were considered to determine the effectiveness of a leader. Female

administrators scored higher in two out of eight of those roles. There was no significant difference between male and female administrators in other roles.

The results claim that there is no significant difference in Transformational and Laissez-faire leadership styles of male and female administrators in government university administrative staff of Sri Lanka. However female administrative staff have more Transactional leadership qualities comparing to male administrators. Other than that, there were no significant differences in the effectiveness of male and female administrators in government university administrative staff of Sri Lanka

The findings of the study pointed out that there is no scientific base to justify prejudice against female managers since there is no significant difference in male and female managers as a leaders. Female administrators even scored more in some attributes of leadership styles compared to their male peers. The effectiveness of the male and female managers is no different. Therefore both male and female managers should have equal opportunities to advance their careers in non-biased competitive corporate environment.

Transformational leadership is considered as the most effective leadership style for most scenarios since Transformational leaders inspire and intelligently motivate the followers (Bass, 1999). Since there is no significant difference in the male and female managers in this leadership style, prejudice against female leaders based on the traditional approach is baseless. Since female managers scored high in Transactional Leadership, they can be utilized more effectively in the fields which transactional leaders can achieve more results comparing to Transformational leaders.

9.1 Suggestions for Future Research

This field of research is comparatively new. This research can be taken as foundation for further researches in the following areas:

Since the survey only focuses on administrators in the higher education sector, it is difficult to apply results to the entire population of Sri Lanka. The research needs to be extended to private sector organizations. Future researchers can compare the findings in private sector and public sector to provide better narration. Research in the private sector will provide a larger sample and it would give a more generalized result.

The data collection method for this study was through self-rating. However some researchers show that male managers rate themselves high in self-rating. Since this might affect self-rating, the same study can be conducted using both the self-rating and peer and subordinate rating. Since gender bias affect the results of peer and subordinate ratings, future researchers can compare results of peer rating and subordinate rating with self-rating to observe a better picture.

Another field that can be subjected to future research is to check whether there is a difference in the leadership of male and female in other leadership theories such as bureaucratic and autocratic leadership.

Also the research is conducted using quantitative techniques most of the time. Since some aspects of the leadership should be measured using qualitative methods, future studies can be done using both methods.

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LIFE CYCLE ANALYSIS OF SUB-SURFACE BRICK-DOME RAINWATER TANKS IN SRI LANKA: A COMPARISON WITH BELOW GROUND RCC TANKS

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ABSTRACT

Sub-surface brick dome tanks are promoted by governmental and non-governmental organizations in Sri Lanka and elsewhere to water stressed communities in remote regions as a low cost alternative to reinforced cement concrete (RCC) tanks to store harvested rainwater. However, feedback from users indicates that the durability of brick-dome tanks are relatively low compared to RCC tanks depending on the soil conditions at site. In the light of comparatively low useful lifetime, it is therefore useful for the promoters as well as the users to realistically compare the lifetime cost, energy utilization and the environmental impact of brick-dome rainwater tanks to those of durable but costly RCC tanks using normalized values. This study focuses on life cycle analysis techniques to determine and compare the cost, embodied energy and CO_2 emissions of brick-dome tanks with RCC tanks

Key words: Sub-surface, water stressed, rainwater, durability, life-cycle, normalized, embodied energy

INTRODUCTION

Life Cycle Analysis (LCA) is a tool which is capable of evaluating competing alternatives based on quantification of resource use over the useful life of a product (Mithraratne and Vale, 2007). This paper briefly examines the life cycle cost, embodied energy and environmental impact by way of CO_2 emission contributions of sub-surface rainwater storage tanks made of brick masonry and RCC in Sri Lanka. Both embodied energy and embodied CO_2 are recognized as important due to the impact on fossil fuel consumption and on climate change (Boyle, 2013) while life cycle cost analysis is important in an economic sense. LCA allows evaluating what type of rainwater retention structure will have the lowest cost, amount of embodied energy and related CO_2 emissions under normalized conditions.

In Sri Lanka, 5 m^3 capacity brick-dome tanks were initially introduced by the World Bank funded Community Water Supply and Sanitation Project (CWSSP) under the Ministry of Housing, Construction and Public utilizes in Sri Lanka to water stressed communities in hilly terrains where the ground water table was low. The tanks made of bricks are of cylindrical shape with a domed brick cover having an inner diameter of 2280 mm and a height of 1210 mm. With a concrete (1:2:4) base of 60 mm thick, the tank is constructed of ½ brick wall in 1:5 cement sand mortar. The brick dome cover is ¼ brick thick in 1:2 cement sand mortar. The concrete wedging to support the dome is of 1:2:4 and the inner walls are plastered with 10 mm thick 1:3 cement sand, then a coating of neat cement slurry and finally a 10 mm thick 1:2 cement sand mixture. The 450 mm diameter opening is covered by fly proof netting and Aluminum sheet cover with an opening (Fig. 1). The durability of well maintained tanks are known to be of 15 years with cracks appearing mainly due to soil settlement, pressure from wet soil and root penetration from surrounding vegetation.

The selection of the tank capacity as 5 m^3 is justifiable as it can cater to a daily demand of 150 liters of harvested rainwater with 95% reliability throughout the year when connected to a roof collection area of approximately 100 m^2 at annual average rainfall depths of 1850 mm which prevails in Sri Lanka. Further verification using generalized curves for water saving efficiency (WSE) (Fewkes, 1999), validated for tropical countries (Sendanayake et. Al, 2014) gives 5 m^3 as the optimum tank capacity for the given demand, roof catchment area and annual average rainfall.

For the comparison, an equal capacity RCC tank is taken of rectangular shape, 1.75x1.75x1.75 m internal dimensions. The rectangular shape is considered to match the local skills available for cast-in-place construction. Wall thickness is taken as 150 mm with the reinforcement on the soil side of 12 mm steel bar at 175 mm c/c and on the water side of 12 mm steel bar at 200 mm c/c vertically and horizontally to withstand wet soil and water pressure. Reinforcement for the base is 12 mm steel bar mesh at 100 mm c/c. Inner walls are plastered with a 10 mm thick 1:3 cement sand and a coating of neat cement slurry. A structurally sound concrete water tank that will not leak is constructed by providing the proper amount and distribution of reinforcement, the proper spacing and detailing of construction joints and the use of quality concrete giving a durability of 50 years. The cover of the tank is taken as of 2 mm thick GI sheeting. The cover is so fabricated that unrestricted access to the interior of tank is possible for cleaning and maintenance.

In LCA, the selection of system boundary is important and in this study the boundary covers the construction, use and disposal stages of tanks. All pipes, pumps and other accessories used in actual operation are considered as external and are not included in the calculations.

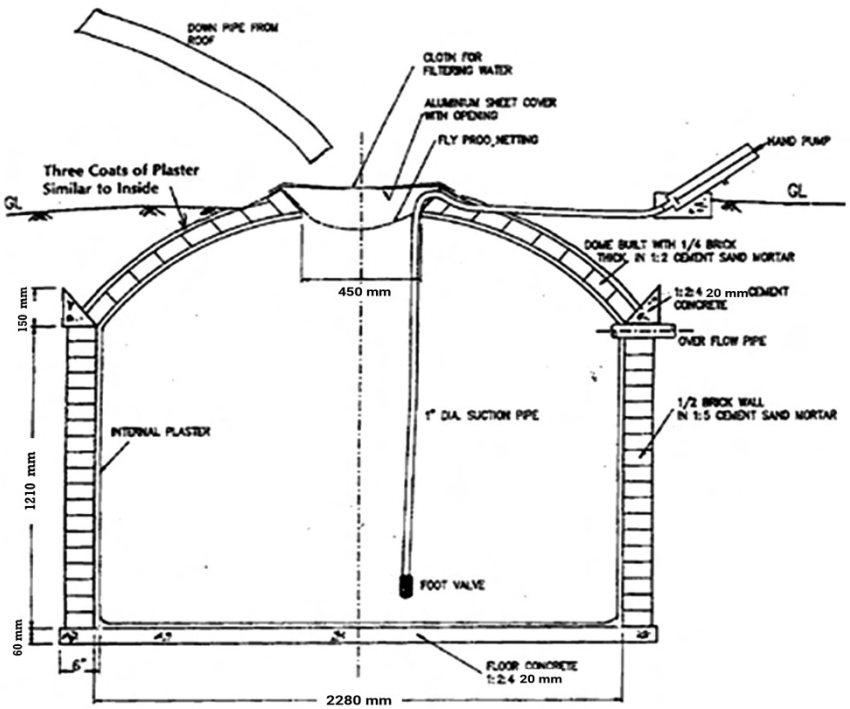


Figure 1: A detailed drawing of a sub-surface brick-dome rainwater tank (SLICIR, 1995)

OBJECTIVE

The objective of the study is to compare the viability of brick-dome tanks as rainwater tanks with that of reinforced concrete tanks in terms of normalized values of cost, embodied energy and CO_2 emission contributions in their useful lifetime.

METHODOLOGY

In the study, techniques of life cycle analysis (LCA) are used to estimate the cost, embodied energy and CO_2 emissions in the construction, use and disposal stages of each type of tank. Taking into consideration the differences in durability of the two tanks in focus, the calculated values are normalized using a functional unit (FU) for realistic comparisons. The FU is taken as 1 m^3 of collected rainwater used per capita per year.

Data from the Inventory of Carbon and Energy (ICE) (University of Bath, UK), (Alcorn, 2003) and the Centre for Building Performance Research, New Zealand (2007) are used to identify the embodied energy and CO_2 emissions of materials in each tank while costs and quantities are gathered from local suppliers and contractors.

CALCULATIONS

For the calculation, the average daily demand of water for drinking, cooking and cooking related activities (potable water) in a typical household of 4-5 occupants in a diffuse setting is taken as 150 liters (Sendanayake, 2016). Therefore the per capita water use is calculated as 13.69 m^3 per year.

In the calculations the following assumptions are made;

- Excavation of pit 2.5x2.5x2 m is assumed to be manually carried out due to space restrictions for mechanized methods. The number of hours allocated for unskilled labour includes excavation of pit.
- Concrete mixing is carried out at site manually, taking into account the volumes involved and the possible remoteness of the site from the nearest batching plant. The amount of cement, sand and aggregates are for both concrete and plaster. A cost is not allocated for water assuming ground or surface is used either from site or transported from elsewhere. It is assumed that vibrators are not used in the process.
- Tanks and covers are assumed to be not painted and any attachments to the tank cover such as handles, supports etc are assumed to have no significant contributions to the calculation.
- The cost and energy for maintenance is negligible.
- It is assumed that plywood and lumber used in the formwork are not re-used. Any lumber used is not taken into calculation due to its relatively low quantities and cost.
- At the end of the useful lives, both Brick-dome and RCC tanks are assumed to be de-constructed and materials used for land filling at site. In the case of RCC tanks, recycling of materials from deconstruction is considered non-viable due to low volumes. Energy required for the deconstruction is considered minimum.

Cost analysis:

Costs of procurement, construction, usage and disposal are calculated at current prices in Sri Lankan Rupees (SLR, Conversion ratio; 1 US$ = 145 SLR). Cost calculations for ferro-cement, RCC and HDPE tanks of 5 m^3 capacities are given in Table 1. It also shows the normalized costs (cost per FU).

Material transportation to site is taken as from an average distance of 50 km assuming the sites are remotely located.

Table 1: Cost analysis for Brick-dome and RCC Tanks

Tank type ($5m^3$ capacity)	Quantities	Unit Cost (SLR)	Normalized Cost (SLR)
Brick-dome			
Bricks	750 Nos.	14	51.1
Cement	450 kg	18	39.5
Sand	1 m^3	5185	25.3
Aggregates 20mm	0.25 m^3	2000	2.4
Labour			
Skilled	24 Hr	225	26.3
Unskilled	112 Hr	175	95.6
GI sheet -cover 1.2x2.4m 2 mm thick	1.5 m^2	3000	22.0
Transportation	100 km	60/km	29.3
Total			291.1
RCC (Cast-in-place)			
Cement	650 kg	18	17.1
Sand	1.25 m^3	5180	9.5
Aggregate 20mm	1.5 m^3	2000	4.4
Steel 10 mm bar	450 m	75	49.3
Plywood sheets 12 mm thick 1.2x2.4 m	30 m^2	1080	47.3
Labour			
Skilled	40 Hrs	225	13.2
Unskilled	112Hrs	175	28.6
GI sheet cover 2 mm	2.88 m^2	3,000	12.6
Transportation	200 km	60/km	17.6
Total			199.5

Embodied energy and CO_2 emissions:

To estimate the embodied energy and CO_2 emissions, the Inventory of Carbon and Energy (ICE) data (University of Bath, UK) are used (Table 2). It is assumed that tractor trailers or light trucks (less than 7.5 tonne) are used for material transport and the number of t.km units calculated accordingly, taking into consideration the total tonnage and the number of trips.

Table 2: Embodied energy & CO_2 Emission Comparison of sub-surface Brick-dome and RCC tanks

Tank Type (5 m^3)	Qty.	Embodied Energy (MJ/unit)	Embodied Energy MJ/FU	Carbon Kg CO_2 per unit	CO_2 emissions kg/FU
Brick-dome					
Bricks	1300 kg	3	18.9	0.23	1.45
Sand	2000 kg	0.081	0.8	0.0048	0.05
Cement	450 kg	5.6	12.2	0.93	2.03
Aggregates 20mm	500 kg	0.083	0.2	0.0048	0.01
GI sheeting	25 kg	20.1	2.45	1.37	0.17
Transportation (Diesel)	210 t.km	2.5	2.56	0.0687	0.18
Total			37.25		3.89
RCC (Cast-in –place)					
Cement	650 kg	5.6	5.31	0.93	0.88
Sand	2500 kg	0.081	0.3	0.0048	0.02
Aggregates 20 mm	2335 kg	0.083	0.28	0.0048	0.01
Steel 10 mm bar	285 kg	20.1	8.36	1.37	0.6
Plywood (Formwork)	160 kg	15	3.5	1.07	0.25
GI sheets (Cover)	65 kg	20.1	1.9	1.37	0.13
Transportation (Diesel)	585 t.km	2.5	2.1	0.0687	0.06
Total			21.8		1.93

RESULTS AND DISCUSSION

Comparing the construction cost of the tanks made of Bricks and RCC it can be seen that for the same capacity of 5 m^3, Brick-dome tanks are more economical at 44% of the cost of RCC tanks. However, when the costs are normalized to account for the differences in durability, it can be seen that the cost/FU of Brick-dome tank is 46% higher than that of RCC tank. Breaking down the total cost for the Brick-dome tank, cost of labor per FU contributed the most to the total at 41.9% while for RCC tanks cost/FU of reinforcement steel, plywood for formwork and labor at 24.6%, 23.7% and 21% are dominant ahead of cost/FU of cement (Fig. 2).

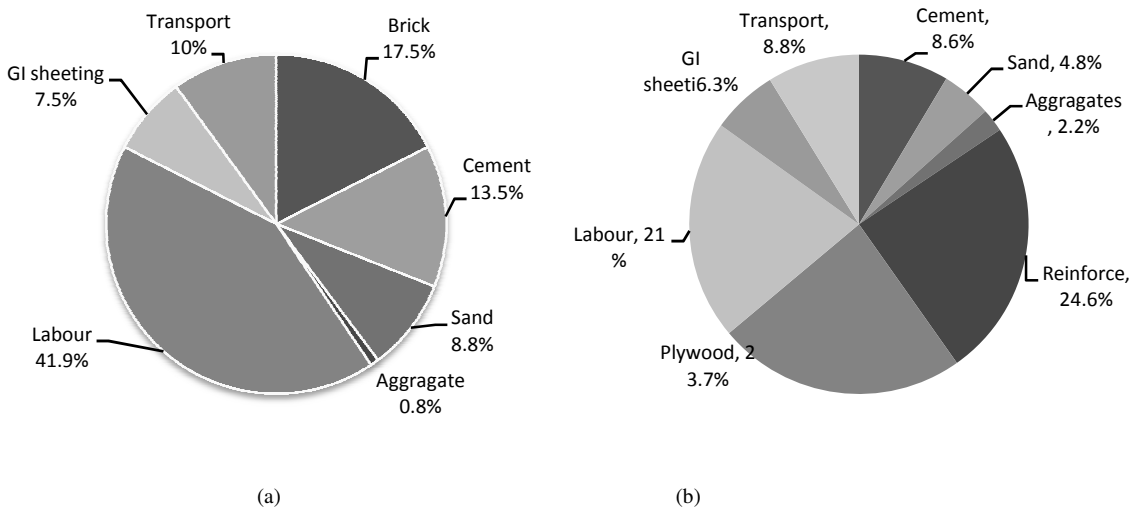
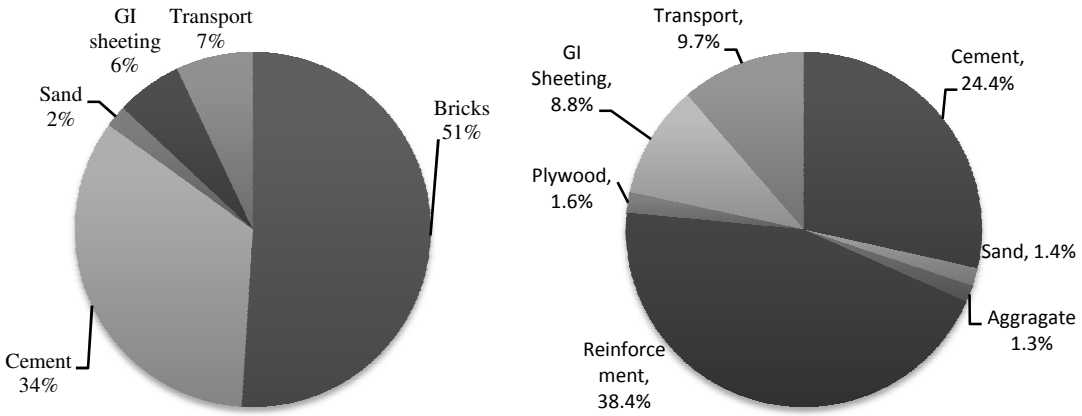


Fig (2): Percentage cost of components of Brick dome (a) and RCC Tanks (b)

The relatively high contribution to the cost from labor is partly attributed to the assumption that pits are excavated manually. However, if machinery such as excavators can be used, provided that the site is accessible, a low overall cost can be achieved. On the other hand, taking into consideration that these tanks are constructed as community based projects, it is possible to consider unskilled labor as contribution from potential users and hence free of cost. In such scenarios the cost of Brick-dome and RCC tanks drop by as much as 32.9% and 12.5% to SLR 195.7 and 170.87 per FU respectively. Usually plywood for formwork is used up to 4 times with a 10% loss at each time. If only 25% of the cost of plywood is taken, the total construction cost of RCC tanks would drop by a further 17.8% for a cost per FU of SLR 135.28 thus making the life cycle cost of RCC tanks lower than Brick-dome tanks.

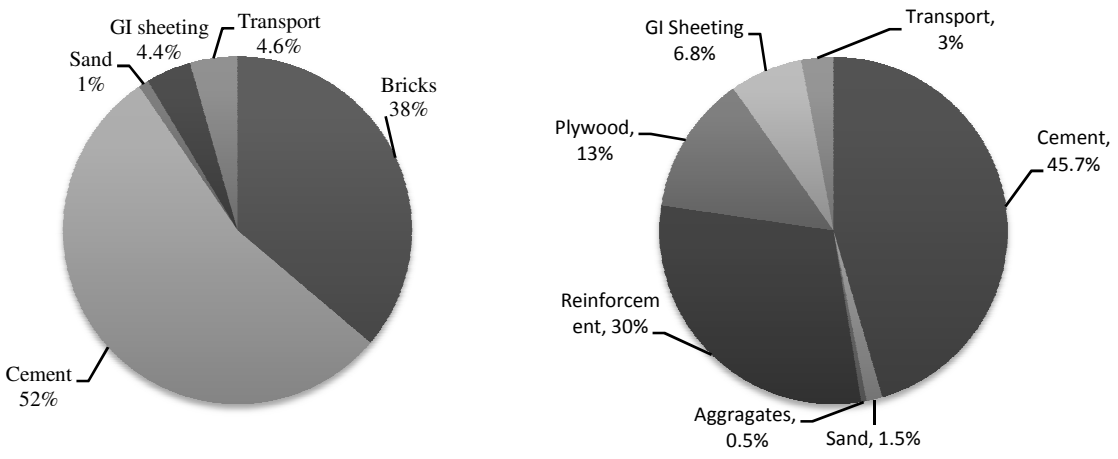
Comparing the embodied energies of the two types of tanks, Bricks with 51% of the total dominates in the case of Brick-dome tank while cement at 24.4% dominates in the RCC tank (Fig. 3). From Table (2) it can be seen that even though the total embodied energy in the 5 m^3 capacity RCC tank is higher at 14931 MJ compared to 7651 MJ for the Brick-dome tank, when normalized values are taken embodied energy per FU of RCC tank is 41.5% lower. This is despite 8.8% contribution to the total embodied energy from the GI cover which may be replaced with an alternative material such as wood with lower embodied energy. It is also important to note that if plywood for formwork is not taken as a single use material, the embodied energy per FU will be even lower to 19.18 MJ or 48.5% lower than that of Brick-dome tank.



(a) (b)

Fig (3): Percentage embodied energies of Brick dome (a) and RCC Tanks (b)

A similar outcome can be seen in comparing normalized CO_2 emission values with RCC tanks having CO_2 emissions per FU 50.3% lower than that of Brick-dome tanks. If plywood is reused and tank covering material is wood the margin expected to be higher.



(a) (b)

Fig (4): Percentage embodied CO_2 of Brick dome (a) and RCC Tanks (b)

CONCLUSIONS

Comparing the sub-surface Brick-dome and RCC tanks, in all three aspects; cost, embodied energy and embodied CO_2, RCC tanks prove superior with lower normalized values, mostly on account of longer life span. In community based projects if constructions are carried out under similar social conditions to that of Brick-dome tanks, it can be anticipated that RCC tanks would be 30.8% lower in life cycle cost, 48.5% lower in embodied energy and 50.3% lower in CO_2 emission contributions. A further economic gain can be anticipated for the user if disposal of approximately 285 kg of steel used for reinforcement as scrap iron at the end of the useful lifetime of RCC tank is considered. In the study, the use of energy and emission data from multiple sources is taken as not substantially affecting the estimated values. Assumptions and values used were kept constant enabling a comparative LCA of the two types of rain water tanks.

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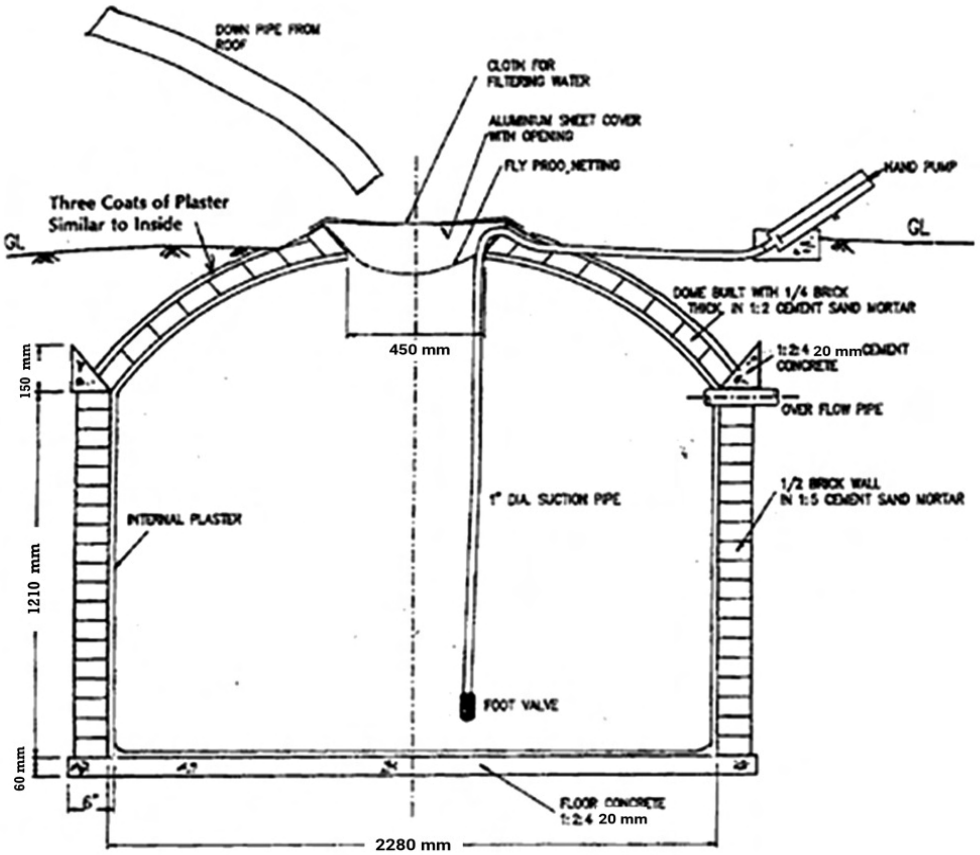


Figure 1: A detailed drawing of a sub-surface brick-dome rainwater tank (SLICIR, 1995)

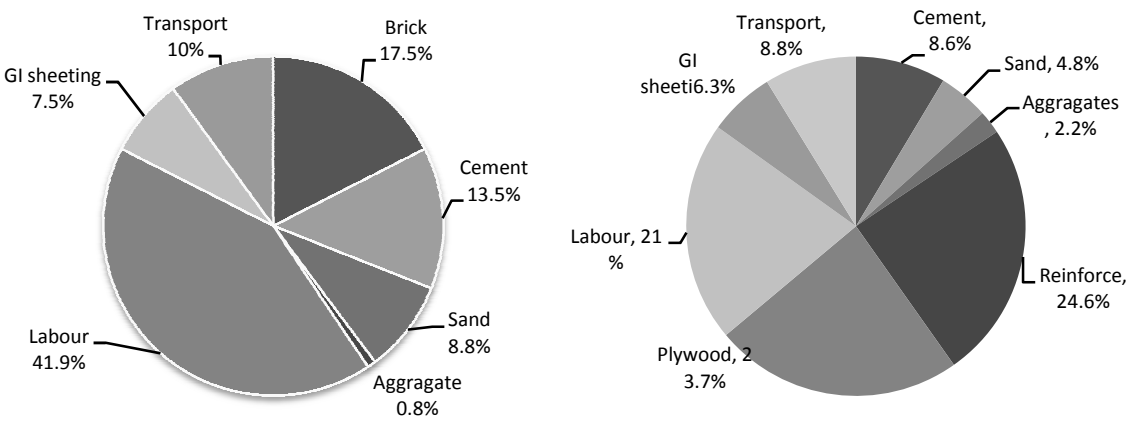
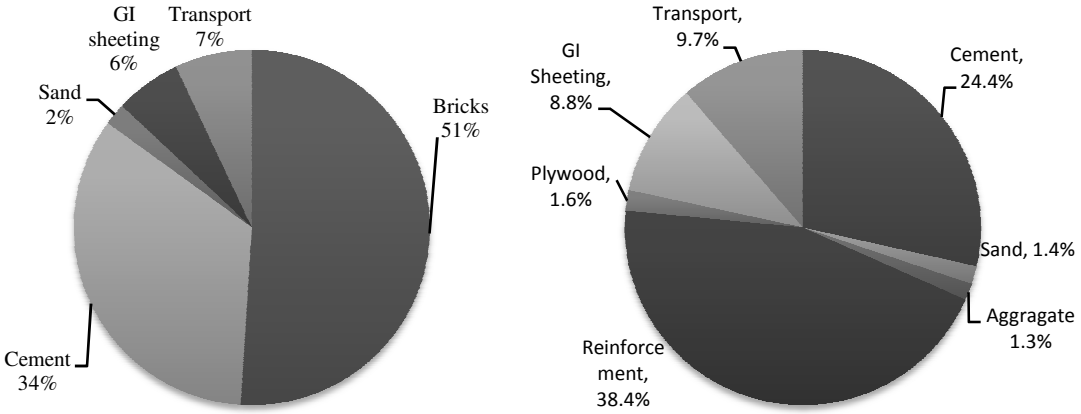
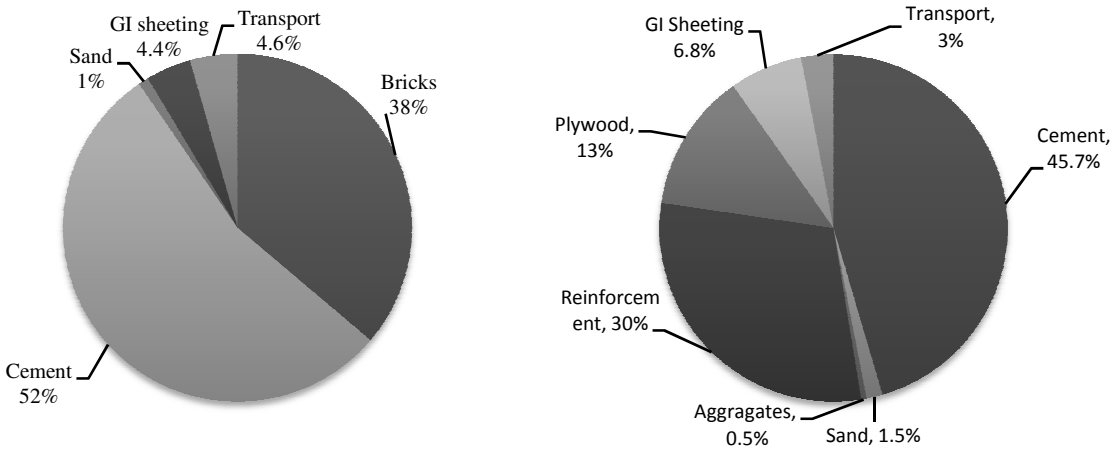


Fig (2): Percentage cost of components of Brick dome (a) and RCC Tanks (b)



(a) (b)

Fig (3): Percentage embodied energies of Brick dome (a) and RCC Tanks (b)



(a) (b)

Fig (4): Percentage embodied CO_2 of Brick dome (a) and RCC Tanks (b)

Assessment of Information Communication Technology Adoption for Performance of Selected Small and Medium Enterprises in Nairobi County, Kenya

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Abstract

The SMEs are regarded as the backbone of economy growth for developed and developing countries principally Kenya. The dynamics in the state of conducting business has necessitate many organization to align their business in order to survived and compete in the global market. Moreover, ICT is one of propelling force of change which has pose unique opportunities to most of SMEs enabling them to compete in the global market. However, from various literatures review it reveals that despite SMEs being engines for growth globally, the ICT adoption by SMEs in Kenya has been reported to be comparatively low. Therefore the study embark on the assessment of ICT Adoption for Performance of SMEs so as to achieve an insight into the various factors that affects the adoption of Information and Communication Technology for performance of SMEs in Nairobi county Kenya. The study used descriptive design. The targeted population was 4560 SMEs registered by the Ministry of Trade and Industrialization within Nairobi County. The sample size of 367 SMEs was used. The stratified random sampling was used in selecting the sample. The data was collected using structured questionnaire. The administering was on a "drop and pick-later" basis. The questionnaires return represented an approximately 70% of the sample population.The data analysis was conducted using both descriptive and inferential statistics with the help of SPSS. Moreover, the result was presented using pie charts, bar charts and tables. From the findings ICT infrastructure, ICT user skills, ICT services, and government policies as licenses showed statistical significance in relation to ICT adoption on performance.

Keywords: Gross Domestic Product, Information Communication Technology, Small and Medium-Sized Enterprise(s), Technology Acceptance Model, Technology-Organization-Environment

1.0 Introduction

The ICT concept is an innovative development adapted as a result to world dynamics of which has transformed the modes of performing stuffs ranging from government services, trade, commerce, agriculture, and manufacturing (Olusola & Oluwaseun, 2013). Today the adoption and use of InformationCommunicationTechnologyby theSmall and Medium Enterprises has rapidly change way transaction and operations are conducted especially for the developed nations. In the global perspective the SMEs have empowered nations in both economic development and growth. Alam& Noor (2009) agreed that Information communication technology application currently has greatly impacted enterprises worldwide among many businesses which have extensively change global yield, business procedures among customers and enterprises.

The SMEs are known to be a backbone and driving force in alleviating poverty through economic growth and job creation and thus have boosted the private sectors eminently (Higon, 2011). According to Ongori (2009) he supported the fact that ICT adoption will create dynamism in business bureaucracy, quality service delivery, and competitive advantage at this time of globalization. Irefin, Abdul- Azeez and Tijani (2012) stated that most type of organizations are using the ICT globally to facilitate better service for customers ,efficiency as well as reduced cost of operation. Kazi (2007) stated that among developing countries as United Kingdom as well as Australia SMEs is accounting to more than half of all business and employment. However as the world moved on with increase integration of ICT, create more opportunities as SMEs participate in regional and international markets. According to Akunyili (2010) he defines ICT as an umbrella term that process and communicate information technically. Ashrafi and Murtaza, (2008) also term it as a technology which capture, transform, transmit and allow communication of information. This involved technology in computers, portable hand held devices. Wireless and wired internet enables devices, data storage, application software's and security product and services.

The adoption of ICT has transformed the manner in which business and enterprises transaction and information processing is carried out. Consequently this have not only applies to larger organizations but also SMEs have not been left behind. Apulu (2012) state that ICT is use in a wide range of areas in organization and plays a key role in the present knowledge based economy. The ICT adoption makes SMEs to have outstanding communication with their customers, improve customization and market awareness, escalation in loyalty of customers, marketing costs reduction, increased sales capacity and profitability (Harrigan, Schroeder, Qureshi, Fang, Ibbotson, Ramsey & Meister, 2010). The adoption has advantage the SMEs and the government to alleviate poverty, innovation and sustainable development, hasten economic growth and enhance integration of voluminous countries into the global economy (Ajayi, 2014). Today the ICT has enormously acted as a chief catalyst and promoter of organizational change (Hazbo, Arnela& Chun-yan, 2008).

Moreover, the informal sector aspects a lot of challenges as lack of skills, limited access to markets and finance, lack of awareness concerning new trends and changing technologies. The reduction in income disparities realization among the sectors should be through embarking on global technological changes within the environment. This can be realized by investing on required ICT infrastructure, skills acquisition and awareness (Olusola & Oluwaseun, 2013).

According to Gikenye, (2014) Kenya has taken part in a spirited role in the growth and economic empowerment through employment opportunities provision to the population where 70% of employment in 2008 which encompasses 18% GDP was the informal sector. Consequently, the main source for the millions of Kenyan population livelihood is significantly contributed through the informal sector.

The SMEs as faced a number of neglects and poor public image for long where they have survived aggravation from government agents and authorities, but though so far efforts from government to instill ICT policies and installing fund agencies to boost SMEs development and growth such as youth ,women and UWEZO fund (Gikenye, 2014). But still most activities of the SMEs are extremely vulnerable as a result of self-support reliant independently of modern institutions and thus lack enough fund to invest on the robust ICT infrastructure and innovation that can boost their performance and as a result most SMEs thereby continue to lag behind and remain small in terms of performance, operations, growth and productivity (Apulu, 2012).

Bearing in mind the significance of ICTs incorporation in business activities, the SMEs lack of enough funds, awareness, skills and interest in the innovation keeps the SMEs production, incomes and profits relatively low and thus unable to breed beyond persistence of competitiveness in the global market and large organization due to lack of required access to relevant business information (Djatikusumo, 2014). Therefore, they are unable to create strong opportunities and thus could not afford the new dynamics of technology, creativity and innovation.

However, in developing countries especially Kenya studies reveal that SMEs are still to gain the full benefits of adoption and use of ICT as equated to the developed countries. Though the significance of SMEs' as impacted many countries' economy, it is realized that those in developing countries still far behind and for any SMEs to stand competition within the environment they should use ICT more effectively to reach to expected level of competitive (Apulu, 2012). According to Gholami et al, (2010) argues that SMEs are consisting of a low annual turnover with few employers and assets compared to big firms as multi-national companies. He commented that major decisions as ICT adoption singly and centrally made by high authority personnel as managers.

Despite the advocacy of Kenya's government commitment at enacting ICT policy to support the growth of small enterprises through ICT adoption, it progress is still unsatisfactory. It is quite at a slow pace as compared to countries like the United States and United Kingdom (Lal, 2007).

There has been much affirmative relationship between SMEs growth and development economies among various nations that are developed (Golding, Donaldson, Tennant, and Black, 2008). Moreover, comparatively not much has been done with this relationship among developing nations. Therefore, this study is significant among the SMEs in Kenya to comprehend the factors affecting SMEs ICT adoption for performance. The various studies have revealed these factors as: ICT Services, ICT Infrastructure, ICT User skills, Management support and Government policy (Makau, Wawire and Ofafa, 2013; Alam and Noor, 2009; Raravi, 2014; Kabanda, 2011).

The research study was based on Nairobi County. The target population was 4560 SMEs and the selected strata to be sampled among senior, mid-level and low level management in order to have a sample size of 367 SMEs.

1.2 Statement of the problem

The SMEs has no universal term to define because of numerous sectors which are diverse. According to Mwarari (2013), he defines to the small enterprises to consist of 11 -50 employees while the medium enterprises range from 51- 100 employees in Kenya both in informal and formal sectors.

Moreover the enterprises are belief to span around the all sectors in creating employment, reduced poverty and source of income (Rok, 2009). The SMEs contribute about 80% of the total employment and in Kenya the sector has shift the GDP from 13.8% in 1993 to almost 40% as of 2008 (Rok, 2009). Studies has been carried out which have recognized the various role of economies played by SMEs.

Despite SMEs being engines for growth globally, the use of ICT within SMEs in Kenya perceived to be low and thus cannot coped with the competitive environment in delivery of service (Apulu and Latham, 2009). Ihua (2009) stated that SMEs still lag behind due to various factors that hinder their development and growth in customer satisfaction and quality services.

The ICT adoption by SMEs has been largely documented based on benefits, growth, challenges by a number of research (Ongori and Migiro, 2010; Apulu and Lathama, 2009; Manuere, Gwangwava, and Gutu, 2012). These studies yet did not, focused on the assessment of factors affecting adoption of ICT on performance perspective of SMEs in most developing countries (Ndiege, Herselman, &Flowerday, 2014). Moreover the few studies have match relationship that exist between variables but with growth context on relatively big businesses among developing countries but little especially SMEs in Kenya (Kiveu, 2013; Alam and Noor, 2009; Olusola and Oluwaseun, 2013).

However, there being little literature that based on establishing the link between variables of ICT adoption and performance at the SMEs context. The study will thereby provide a thin body of knowledge to the variety of stakeholders through assessment of factors affecting ICT adoption for performance of Kenyan SMEs' and, more, trying to find if there is relationship between the variables and the SMEs' performance.

The ICT adoption by SMEs in Kenya has been reported to be comparatively low. Taking into consideration on low level of ICT adoption (Kuteyi, 2009; Apulu and Lathman, 2009) in developing countries especially in Kenya .It was therefore necessary to investigate the assessment of ICT Adoption for Performance of SMEs so as to achieved an insight into the various factors that affects the adoption of Information and Communication Technology for performance of SMEs in Nairobi county Kenya

1.3 Objective of study

i. Determine the effect of ICT infrastructure on the adoption of ICT for Performance of SMEs in Nairobi County, Kenya.

ii. Assess the effect of ICT Services on ICT adoption for performance of SMEs in Nairobi County, Kenya.

iii. Examine the effect of ICT user skills on ICT adoption for performance of SMEs in Nairobi County, Kenya.

iv. Establish the effect of management support on ICT adoption for performance of SMEs in Nairobi County, Kenya.

v. Investigate the effect of government policy as an intervening variable on ICT adoption for performance of SMEs in Nairobi County, Kenya.

1.4 Research questions

i. What is the effect of ICT infrastructure on the adoption of ICT for Performance of SMEs in Nairobi County, Kenya?
ii. What is the effect of ICT Services on ICT adoption for performance of SMEs in Nairobi County, Kenya?
iii. How do ICT user skills affect ICT adoption for performance of SMEs in Nairobi County, Kenya?
iv. How does management support affect ICT adoption for performance of SMEs in Nairobi County, Kenya?
v. What is the effect of Government policy as an intervening variable on ICT adoption for performance of SMEs in Nairobi County, Kenya?

2.1 Theoretical Review

2.1.2 Technology Acceptance Model (TAM)

The model was developed by Davis (1989) and is considered most use in the acceptance of technologies in most of the literatures. The theory was effective in that it stated that decision of adoption and use of a given technology introduced in an environment is in the hand of individual which is influence by number of things as perceived ease of use and usefulness (Manueli, Latu, &Koh, 2007).

The theory has been criticized for failing to account for the influence of the external factors in the environment as economic factors, competition from customers and suppliers (Manueli*et al,* 2007). The model project various view of users perceptions regarding the ease of use and usefulness of the technology (Davis, 1989).

i. The Perceived ease of use of technology

This is a key determinant in the use of technology as perceived by users and customers in the organization. The technology or innovation is much adopted by users when they consider the use of technology as easier (Okechi & Kepeghom, 2013).

ii. The Perceived usefulness of technology

Davis (1989) argues that the users can perceived the benefits expected from the system by making use of it.

2.1.3 Technology-Organization-Environment Model (TOE)

Tornatzky& Fleischer (1990) stated that innovation adoption depends on technological, organizational and environmental factors. There are a number of research studies as Borgman, Bahli, Heier and Schewski, (2013); Scott (2007); Ifinedo (2011), have adopted the model in the adoption process and used of the technology. Moreover, the model incorporates the three qualities of the technology, organizational factors, and macro-environment factors (Okechi & Kepeghom, 2013). Ifinedo (2011) reveal from his studies based on the TOE framework factors that affects e- business acceptance and usage in small and medium enterprises included variables as organizational readiness, top management support, financial resources, perceived cost of deploying ICT.

The model adopts three perspective which affects ICT adoption, this involved technological, environmental, and the organization perspective.

i. Technological Perspective

According to Okechi & Kepeghom, (2013) the organization should demonstrate understand of the ICT innovation characteristics which help in redesigning and aligning of business activities to be integrated in the ICT service applications and current systems to boost SMEs performance. There should be installation and integration of ICT with the existing business services which meets the end users requirements.

ii. Environmental Perspective

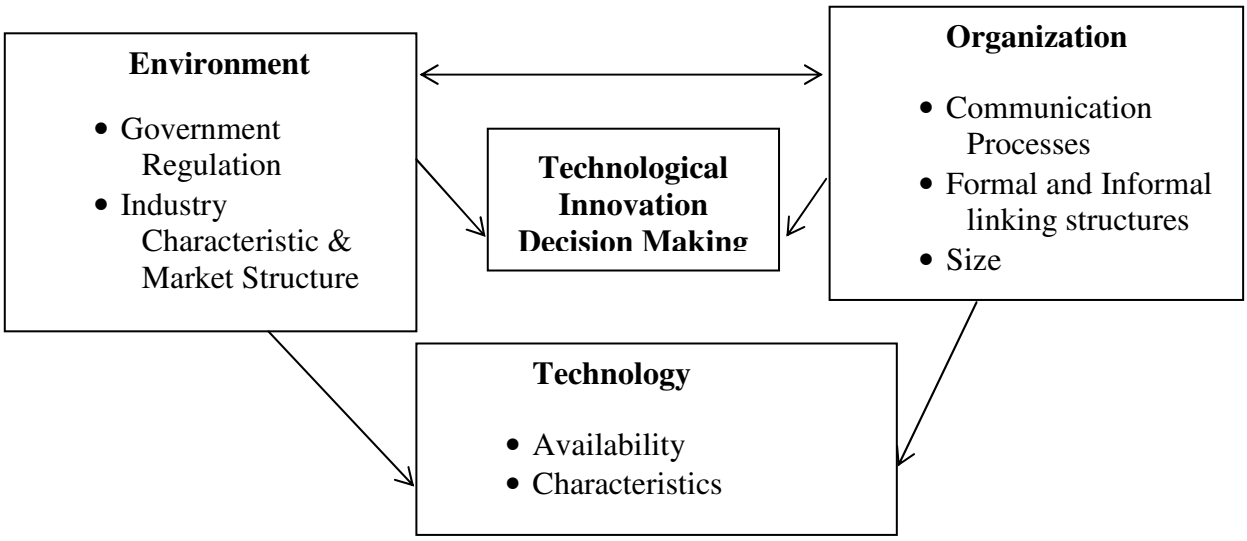
Raravi, Shrinivas.N., & Timmanagoudar, (2014) pointed out that environmental perspective involves influences surrounding the business such as the government policies. Angeles, (2013) reveals that these external factors affect the way SMEs interprets the need for innovation and deployment where they can either support or deny technological innovation. The government regulation can affect SME's activities where costs of production can rise due to mandatory regulations policies criteria's.

iii. Organizational Perspective

There is wide range of characteristics as firm size, managerial structure complexity and managers support. The top executives can strengthen the organizational growth by enhancing and collaborating a distinct image of the SMEs ,goals, strategies and core values and facilitating consistent linkages within and outside on ICT interaction (Angeles, 2013).

The TOE models are significant to the study in that it is able to bring out the independent variables which do underpinned the study. These include manager's support, government regulations and policies, ICT services and ICT infrastructure.

Figure 2.1: Technology, Environment, and Organization framework



Source: Adopted from Oliveira and Martins (2011).

2.2 Empirical Review

This section present a review of the relevant studies related to the problem under study. It reflects on SMEs performance, ICT infrastructure, ICT user skills, management support, government policy and research gap and conceptual framework.

2.2.1 Empirical Studies

Moreover, the SMEs has face a comparable challenges with respect to adoption and implementation of technological innovations and used of ICT (Salamzadeh*et al*., 2011; Ifinedo, 2012). Additionally Irefin*et al*,(2012) supported that global economy as progressively relied on implementation of ICT to obtain, process, and disseminate out information, the SMEs in the developing countries it forms a substantial lot of its developing economies of which they still to benefits on ICT services.

Golding, Donaldson, Tennant, and Black (2008) perceived that there are variants concerning ICT adoption by developing and developed nations where developing countries lag behind as results of factors hindering them. The Considering rampant dependent of information systems and invention of new technologies in conducting varied transactions, the acceptance of technology remain to be a significant matter (Zarea and Salamzadeh, 2012). However Idisemi*et al,* (2011) from his paper found that lack of ICT user skills and training, cost, inadequate infrastructure, lack of management support, policy and institutional framework are among factors that hinder utilization of sophisticated ICT effectively in Nigerian SMEs.

A number of SMEs faces numerous menaces in adoption and implementation of ICT due to insufficient or limited resources and skills, lack of physical infrastructures about information system (Bruque*et al*, 2007; Achimugu, Oluwagbemi, Oluranti and Afolabi, 2009). According to Irefin*et al*, (2012) argues that there are set variables such as management support, ICT infrastructure, ICT services, government support, ICT user skills and, cost, which affects adoption of ICT among SMEs.

2.2.2 SMEs Performance

According to Chowdhury & Wolf (2003) the ICT are both use in transaction and production processes in capturing and distributing data inputs. The SMEs performance can be boosted by increasing labour production and saving indirect cost (labour cost) and direct cost (information cost).Moreover the ICT can impact both long and short run term as market niche growth and redesigning of both transaction and production processes. This increases quality of output and services and thereby increasing sales volumes and thus high revenues and profits.

According to Ongori and Migiro (2010) stated that SMEs help not only to boost the of people's living standards but also bring about income and capital growth to attained high levels of production capacity and performance. SMEs are progressively recognized as a key means of viable industrial diversification realization by many nations and therefore the SMEs serve as major drivers for economic growth and development. The ICT is referred as an umbrella term that surrounds all technical means for capturing processing and communicating information (Olise, Anigbogu, Edoko, & Okoli, 2014) where the convergence of Information Technology and Telecommunication originate to ICT (Akunyili, 2010). Therefore the digital innovation include dimensions as computers, mobile, internet, telephone systems as well as online electronic applications and broadband technologies as broad.

The explosion of ICT adoption by SMEs as posed a great benefits in promotion of economic growth as from a number of studies. Therefore a number of SMES in developing countries are adopting ICT due to many benefits that come with it (Irefin*et al,* 2012). Commonly, ICTs has posed plentiful benefits across a broader range of business services, transactions, operations and performance. Most of SMEs are slowly appreciating the positive results of ICT as increased sales due to internet presence, better communication and linkages via electronic mail and efficient practices hence improves coordination, optimization and utilization (Olise, Anigbogu, Edoko, & Okoli, 2014).

Harrigan*et al.* (2010) reveals that ICT adoption has made SMEs to have effective communication with their customers, improve customization, market awareness, marketing costs reduction, escalation in loyalty of customers, increased sales capacity, profitability and performance. These however create customer based, competitive advantage and boost growth of enterprises.

2.2.3 ICT Infrastructure

According to Sessional Paper No. 10 (2012) it point out that economic, social and political are key pillars of Kenya Vision 2030 which can be anchored on by macroeconomic stability, enhanced equity and wealth creation opportunities, infrastructure technology and innovation. According to Saleh*et al*, (2009) stated that most of developing nations still remain behind as compared to developed nations in ICT infrastructure such as easy access of internet, phones and other infrastructure since they are well situated; also argued that despite the use of the internet by some SMEs they still fear to use it for transactions due to perceived security and privacy issues. Some of technological factors involved reliability, technology availability, capabilities, security and attitude regarding technology compatibility, relative advantage, and complexity issues (Elbeltagi, Sharji, Hardaker, & Elsetouhi, 2013).

To boost the business's markets reach and enhance operation effectiveness and efficiency ICT technologies and innovations such as internet services are more critical to performance of SMEs, but SMEs are not able to invest on such ICT infrastructure as servers, fiber optics and other applications due to their complexity, availability and cost (Djatikusumo, 2014).

There are major factors that inhibit ICT adoption as lack of technical supports in ICT, telecommunication infrastructure, high cost of internet access, lack of online payment processes; lack of access to computer hardware, and other software, lack of telecommunication at a reasonable cost and security concerns of ICT (Manuere, Gwangwava&Gutu, 2012). According to Farhoomand (2009) on his studies on ICT Adoption in Hong Kong SMEs found that most SMEs are not using the Internet norcreate and use website due to cost and lack of interest as they do not help advance their businesses. This suggested that a lack of the business need and awareness of the benefits of Internet are prompting not to adopt internet since theyfeelthat so far theyhave beenmanagingsuccessfullywithout PCs or other technologies.

2.2.4 ICT Services

The development of cost effective ICT services as communication and information sharing is essential in promoting and creating conducive environment for SMEs enhancement of competitive advantage and the rapid technological innovation in production of ICT services involving customize applications and programs has greatly contributed the economic and GDP growth (Development, 2007). The SMEs are regarded reluctant in conducting their business with ICT applications thus making them not to cope well within dynamic and competitive environment hence incur more costs (Makau, Wawire, & Ofafa, 2013)

Apulu*et al*, (2013) reveals that the overall, maintenance, and training cost are some of the issues for non-adopters and there is reluctant upgrading of their systems and other sophisticated ICT service applications due to fear of high cost of adoption. According to earlier studies most of SMEs do not completely adopt ICT to enhance transaction and support to customer's services (Harrigan, Schroeder, Qureshi, Fang, Ibbotson, Ramsey, &Mesiter, 2010). This is a result of cost of implementing ICT innovation and services and also inability of the SMEs to access aid from financial institution and could not afford to adopt applications as customer relationship management (Djatikusumo, 2014).

The integration of ICT services are under a paradigm shift from technology-based products to commercial-based products which employs new applications of ICT. The development of niche products, software's , modern data storage as cloud computing with other ICT services had enable global communication, information access and sharing and thereby impacting SMEs production and decisions (Development, 2007). But most SMEs as not take this advantage to invest on such ICT services and applications due to their complexity, cost, availability and security issues (Djatikusumo, 2014).

However, Kabanda(2011) stated that low adoption of ICT by SMEs is as a result of their small size, lack of capital and inability to obtain competitive opportunities, and thus unable to cope with dynamics of technology .The major reasons why SMEs are most perceptive on cost is that a number of financial institution have low expectation from smaller businesses which make them focus more on large businesses ,making the business unable to invest on more sophisticated technologies and applications that could boost their transactions (Djatikusumo, 2014).

2.2.5 ICT User Skills

According to Olusola & Oluwaseun (2013) study reveals that at the moment most technologically radical economies are greatly skills based where nations globally are adopting knowledge economy rather than an industrial economy to make, gather and distribute knowledge. However Apulu*etal,* (2011) pointed out from his studies that deficiencies in ICT user skills are one of factors that have hindered adoption or effective utilization of ICT among many SMEs.

The lack of ICT userskills is one of the issues that are faced by adopters and non-adoptersin the use of computers and internet (Apulu, Lathama, & Moreton, 2013). Moreover, the most SMEs experience difficulty such that unable to get supported from internal and external expertise responsible for ICT control, management and organizing. (Harrigan*et al*, 2010) and Alam& Noor (2009) agrees that lack of required managerial and technical personnel's with basic ICT expertise is one the hindrance for adoption of ICT by SMEs thus affects the successful technology implementation.

A study done byManuere, Gwangwava, &Gutu (2012) point out that the lack of ICT user skills and awareness among owner/manager requires training and education for them to address the lack of readiness of SMEs in using and adopting their electronic business potentials. However in spite of the informants' knowledge on the copious benefits of adopting ICT, it is realized that a number of SMEs still make use of paper-based memos in their operations, and thus suggest that SMEs are still reluctant to change the manual way of conducting business with ICT applications making them to incur more costs (Makau, Wawire, & Ofafa, 2013).

Therefore to cope with dynamics and competition in the knowledge economy, the SMEs are required to have strong IT literate skills which can innovate and adapt quickly to environment with large organizations which have not been the case (Olusola & Oluwaseun, 2013).

2.2.6 Management Support

Management support is the extent to which the management is believes to be committed to successful use and implementation of a system (Gono*et al,* 2013) where is known to be a crucial determinant in the adoption of ICT by SMEs (Duan, Deng & Corbitt*,* 2012; Jeyaraj,Rottman and Lacity*,* 2006) though limited resources as well as technical expertise are usually allocated for in the new technology adoption by management.

Elbeltagi, Sharji, Hardaker, & Elsetouhi (2013) identifies in his study that ICT adoption and implementation are based on manager's innovativeness, active participation, experience and knowledge of ICT plays a significant role. Therefore, the manager must own a sensible working knowledge on the new technology.

The top manager's level of IT knowledge, accompanied by a favorable attitude towards IT, increases the level of IT investment (Harrigan*et al,* 2010). Consequently, the owner/managers play crucial part in decision making within the SMEs; the owner's lack of knowledge on how to use of ICT technology and perceived benefits with the low computer literacy is a key barrier to adoption of ICT. Therefore Most of the SMEs are in business to create profit and consequently the owners are interested on return on their investments rather than concern on ICT support (Manuere, Gwangwava, &Gutu, 2012).

Alam & Noor (2009) reveals that the SMEs CEOs or owners relied on ICT decisions making based on ICT adoption which relatively related to firm size. Therefore it is essential for SMEs to evaluate employee's skills and or knowledge on ICT SMEs as to effectively influence the performance of SMEs.

According to Warue & Wanjira (2013) reveal from their studies that most managers among the SMEs do shy away from training their staff for refreshing courses or short programs as they fear of their job takeover by their subordinates. These usually become worst if the managers have no requisite qualifications to match their position in management.

2.2.7 Government Policy

The government policies which can limits foreign entry may greatly impact on the SMEs availability of credit in the developing nations and thereby its restrictions have strong effects on competition (Berger & Udell, 2004).

Raravi *et al*,(2014) argues that there are a number of government factors that have effects on the operation and performance of SMEs. These include regulatory issues, irregular changes in tax policies, procedures and rules and moreover if there can be stability in government policies the SMEs production capacity, growth and performance could greatly improve.

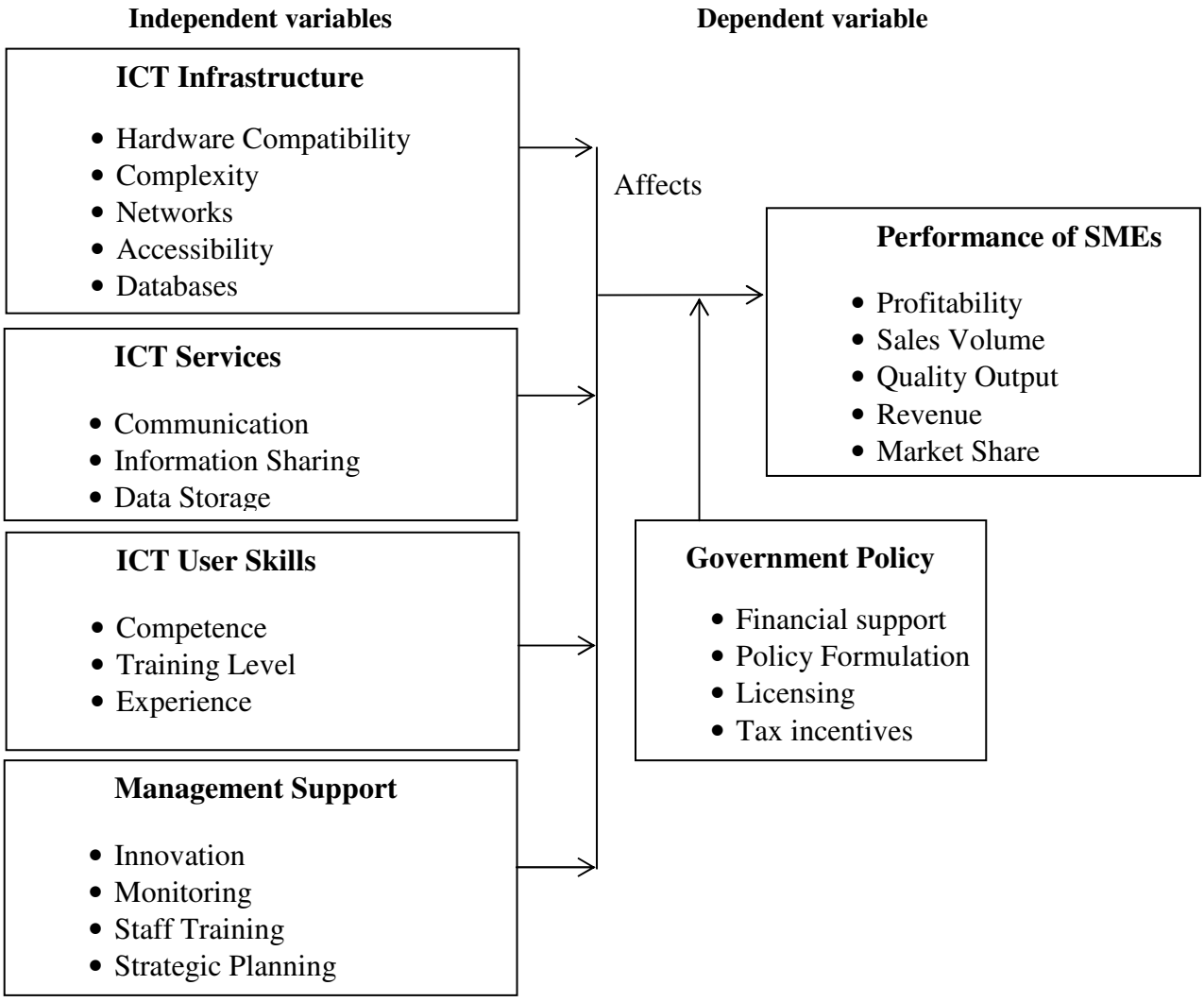
According to Kiveu (2013) he stated that factors as regulations, prices, national policies on taxes, labour and trade are some of the government interventions that hinder most of SMEs in adoption of SMEs. These inflexible government policies, unstable tax policies and inappropriate inspection procedures, issues in regulatory of ICT infrastructure and services sometimes conducted by government authorities create discomfort and discourage growth of ICT adoption by this SME's (Raravi*et al,* 2014).

2.3 Research Gaps

The various literatures from empirical have given insights on the various factors that affect ICT adoption of SMEs from various point of view and perspectives. This includes management support, ICT infrastructure, ICT services, ICT user skills of which affects adoption of ICT. Most of the researches have point out determinants, benefits and factors affecting ICT adoption by SMEs. Therefore much has not been assess from the perspective of the performance. This gap hence requires to be filled.
However, the study will fill the gap by appraising the factors that affect ICT adoption for performance of SMEs which are essential to incorporate missing literatures.

2.4 Conceptual framework

The Conceptual framework brings a clear understanding on the four independent variables which influence ICT adoption as discussed from empirical review. These include ICT infrastructure, ICT services, ICT user skills, and Management Support. The dependent variable was Performance of SMEs and the Government Policy was the intervening variable.



Source: Author, (2015)

3.0 Methodology

This chapter describes the methodology of carrying out the study. It involved the research design, sampling design, target population, research techniques and instrument, sources and types of data, data analysis, presentation and discussion of findings.

3.1 Research Design

The study used descriptive design .This is a research method that collect information of a given subject under study by observing the environment and describing their behavior as it is to demonstrate a relationships that exist between them. The design is importance in that it helps to gain more insight about subject of study and define relationship between the variables. Therefore the descriptive design is adapted to describe the variables hindering ICT adoption and their relations to performance in the selected SMEs within Nairobi County.

3.2 Target Population

The researcher targeted 4560 SMEs which is regarded by Ministry of Industrialization and Ministry of Trade (2011) as registered within the Nairobi County which involve 1500 trading SMEs, 2500 manufacturing SMEs and 560 service sectors (Rok, 2012). According to Mugenda and Mugenda (2003) define a population as the entire groups of individuals or objects having some common observable characteristics which is to generalized the study.

The target population is an inference taken from a sample which defined only the population from a properly selected sample (Banerjee, 2007). However, Griffiths (2009)stated that a sample refers to a selection of elements extracted from an entire population and is chosen to act as subset and legitimate representative of the entire population under study.

The researcher administered 367 respondents both employees currently working in the small and medium enterprises and the managers/owners. The target population shall include the three management team, which comprise of:

Table 3.1: Target Population

Sections	**Population**	**Percentage %**
Human Resource Manager	80	22%
Accountants	100	27%
Clerks	187	51%
Total	**367**	**100%**

Source: Author, (2015)

3.3 Sampling Design

The study used the sampling technique. A proportionate sample of 367 SMEs was selected by using a stratified random sampling. The sampling was conducted among the SMEs stratified within the sectors as service, trade, and manufacturing.

3.4 Sample Size

The Cochran's (1977) formula was essential in estimating sample size :

$n=N/ (1+N (d) ^2)$……..Eq. 1

Where n=Sample Size, N=Population Size, d=0.05 or 5% level of statistical significance.

$n = 4560/ (1 + 4560 (0.05)2)$

$n = 4560/ (1 + 4560 (0.0025))$

$n = 4560/ 1+ 11.4$

$n = 4560/12.4$

$n = 367$

3.5 Data Collection Methods

The data was collected using structured questionnaire that use likert type scale on primary data sources. To allow the responded speak their mind freely, the researcher used both open ended and closed questions. The structured is adopted because can help the responded candidly understood to the simple, well define and purposeful questions and hence allowing a comfortable environment without intimidation and therefore reliable information is achieved.

3.5.1 Validity of Instrument

According to Burns & Grove (2007) validity can be define as the extent to which the measurement instrument is able to measures on what it says to measures and the more the valid the instrument is, the less the systematic error. The Internal consistency was established before a test can be conducted which ensure validity for research instrument (Tavakol & Dennick, 2011).

The construct validity is considered as a theory dependent and the estimate of the extent of which the measured variance reflects the variance of the underlying construct (Westen*et al,* 2003).To evaluate the validity of the questionnaire as data collecting instrument, a pilot test shall be done. The researcher administered the instruments on specific objective addressed and assessment be made to ascertain clarity, accuracy, relevance and suitability of the instrument. The respondent was help to checked if question used are relevance to capture reliable information to address the studied scope topic.

3.5.2 Reliability of Instrument

The reliability of the questionnaire was established by conducting reliability analysis where the items internal consistency was measured using Cronbach's alpha (α) coefficient, the coefficient usually ranges between 0 and 1 (Cronbach, 1951).

According to George and Mallery (2003) the formula = rk / [1 + (k -1) r].…….Eq. 2 where the k=number of items r=mean of inter item correlations is used to find the size of alpha. If the Cronbach's alpha coefficient is closer to1.0 the reliability of the items in the scale is greater. The internal consistency outlines the extent of which all the items in a test measure similar concept or construct (Tavakol & Dennick, 2011).

The reliability of the research was achieved by administering the instrument with well-trained data collectors who understand the specific objective of the study, who distribute and help the respondent understand the instrument. The researcher broadens the sample questions inclusive of closely related and consistent questions to enhance consistency of the response in relation to studied area. The questions in the research instrument were specific and it addressed the prevailing scenario under study.

4.1 Data Analysis

This is a chapter where data collected, analyse are presented. This involved the analysis of response rate, descriptive analysis of the background information and all the variables involved.
The data was collected using structured questionnaire administered to 367 managers, clerks and accountants of the SMEs among the 9 regions of Nairobi County as shown by Table 4.1. The administering was on a "drop

and pick-later" basis. The questionnaires return represented an approximately 70% of the sample population. The analysis of data was then done using Statistical Package for Social Sciences (SPSS) for the Windows platform version 21.0.

Table 4.1: Business location

Variable	**Frequency**	**(%)**
Business location		
Embakasi	19	7.6
Langata	19	7.6
Dagoretti	24	9.6
Westland	90	36.0
Kasarani	25	10.0
Njiru	16	6.4
Madaraka	19	7.6
Kamukunji	16	6.4
Others	14	5.6
CBD	8	3.2
Total	**250**	**100**

Source: Survey data, (2015)

4.2 Reliability Analysis

The reliability of the scale was established by conducting reliability analysis where the items internal consistency was measured using Cronbach's alpha (α) coefficient, the coefficient of which ranges between 0 and 1 (Cronbach, 1951). According to George and Mallery (2003) stated that if the Cronbach's alpha coefficient is closer to1.0 the reliability of the items in the scale is greater and thereby Alpha value threshold is at 0.7 According to the table 4.1 reveals that ICT services had the greatest reliability (α= 0.738), followed by ICT user skills: (α=0. 735) and SMEs performance (α=0.720). Therefore it indicates that the variables studied were all reliable as they were within the 0.7 threshold.

Table 4.2: Reliability Statistics

Reliability Statistics		
Variable	Cronbach's Alpha	N of Items
ICT services	0.738	5
User skills	0.735	5
Performance	0.720	5

Source: Survey Data, (2015)

4.3 Demographics Information

4.3.1 Gender of the Respondent

As shown in the figure 4.1 below, the occurrence of the respondents dictates that the participants in the SMEs are usually run across almost all the genders but businesses are dominated by male as its evident where 70% of respondents were male while 30% of respondents were female.

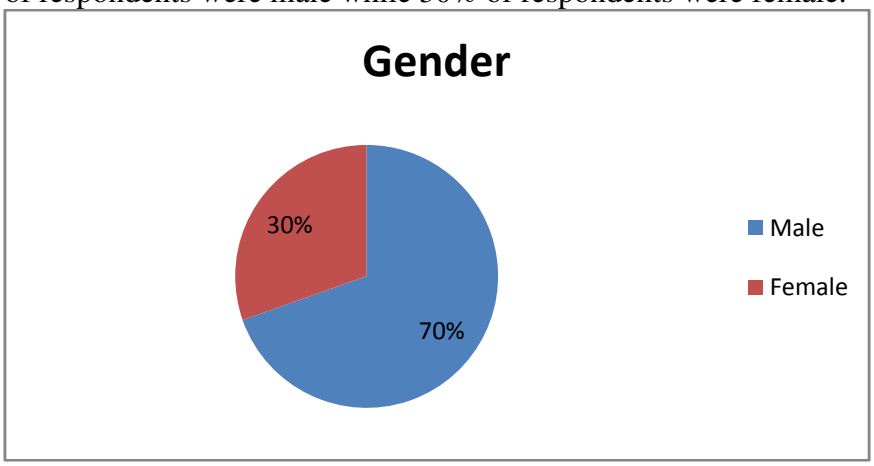


Figure 4.1: Gender of the Respondents

Source: Survey Data, (2015)

4.3.2 Category of the business

As indicated in Figure 4.1, more than half of respondent are running service SMEs which represent 67.2% of SMEs were service, out of these 23.6 % of respondent are operating trading businesses and 9.2% are manufacturing. This was able to identify the common kind of SMEs undertaken within the county. The dominance behind service firms is because respondents do not require a large physical site production, large capital and manpower to conduct the business as compared with manufacturing as its evidence with low percentage of response. The service output involved training, consultancy or maintenance.

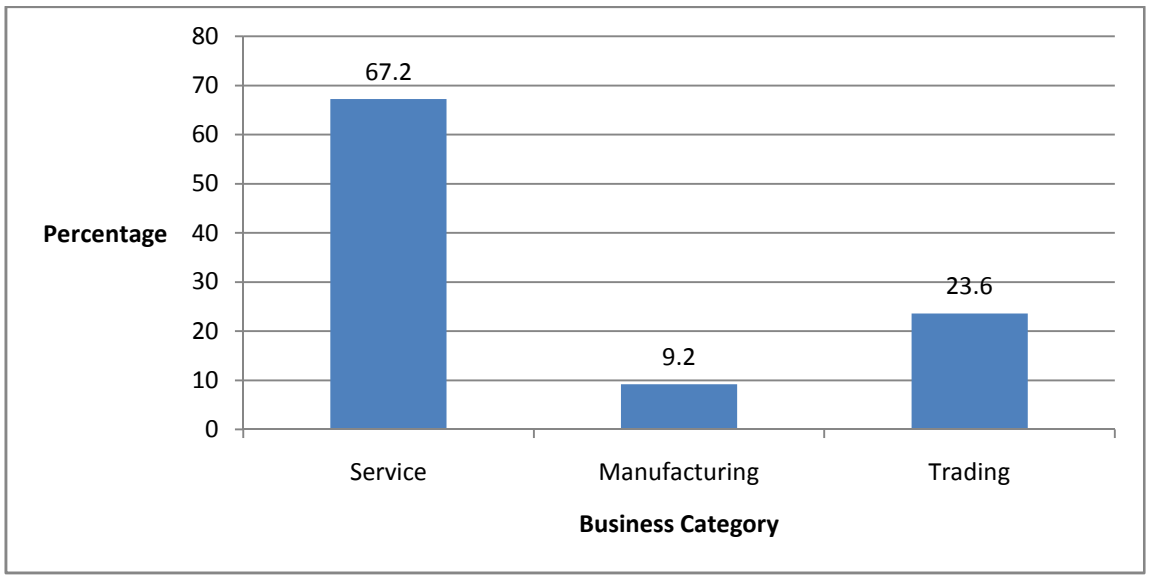


Figure 4.2 Category of the business

Source: Survey Data, (2015)

4.4 Effect of ICT infrastructure on ICT adoption

Table 4.3 Effect of ICT infrastructure on ICT adoption

Variable	Have adopted ICT	Not adopted ICT	P value
Are computers readily available or enough in the market?			
Yes	177 (99.4)	1 (0.6)	0.013
No	53 (93.0)	4 (7.0)	
We have internet access			
Yes	226 (99.6)	1 (0.4)	<0.001
No	4 (50.0)	4 (50.0)	
ICT facilities are user friendly			
Yes	238 (99.2)	2 (0.8)	<0.001
No	5 (62.5)	3 (37.5)	
Have experienced hardware/software compatibility issues			
Yes	218 (100.0)	0	<0.001
No	22 (81.5)	5 (18.5)	

Source: Survey Data, (2015)

According to the table of cross tabulation of ICT adoption and various variables on ICT infrastructure, the correlation proved significant for all the cases (the p values were all less than 0.05). Therefore ICT infrastructure played a role in the ICT adoption as indicated from the findings ,most of the business have enough computers readily available which was agreed by 99.4% with internet connection. These have make most of SMEs to improved efficiency and effectiveness in conducting business transaction. The compatibility issues within the infrastructure as software and hardware are limiting adequate utilization and make SMEs to incur more overall maintenance and training cost as agreed byApulu*et al*, (2013).

4.5 Effect of ICT Services

4.5.1 Descriptive Statistics

In the table 4.4 below the respondents were asked to rate the various ICT application and programs centred on their customizations. Thereby it's crucial to note that most applications are not align and customise to meet needs of the SMEs as reflected by 25.2% of respondent disagreement. As well, majority of the respondents agreed to the fact that there is an adequate information sharing, high cost of ICT training and good communication systems available. This supported studies by Djatikusumo (2014) that there is low expectation from smaller businesses to focus largely and invest on more sophisticated technologies and applications that are customize and align to meet SMEs needs, hence results to poor performance due to low revenue.

Table 4.4: ICT services frequency table

Variable	Strongly disagree (%)	Disagree (%)	Undecided (%)	Agree (%)	Strongly agree (%)	Median (IQR)	Mode
ICT application and programs are well customize to meet the business needs	63 (25.2)	38 (15.2)	35 (14.0)	62 (24.8)	52 (20.8)	3 (1.0-4.0)	1
There is secure data storage and management	38 (15.2)	47 (18.8)	15 (6.0)	97 (38.8)	53 (21.2)	4 (2.0-4.0)	4
There is adequate information sharing	63 (25.2)	33 (13.2)	37 (14.8)	75 (30.0)	42 (16.8)	3 (1.0-4.0)	4
Training on the ICT use application is cost effective	38 (15.2)	44 (17.6)	13 (5.2)	95 (38.0)	60 (24.0)	4 (2.0-4.0)	4
There is good communication systems within the business	37 (14.8)	43 (17.2)	15 (6.0)	97 (38.8)	58 (23.2)	4 (2.0-4.0)	4

Source: Survey Data, (2015)

4.6 Effect of ICT User Skills

4.6.1 Regression Analysis

Table 4.9: Model Summary on ICT User Skills

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.465[a]	.217	.213	4.35046

Source: Survey Data, (2015)

The variable ICT User Skills under study as shown from Table 4.9, its value of the R^2 is 0.217, thus means that 21.7 % of the total variance in ICT User Skills has exhaustively been explained.

Table 4.10: ANOVA on ICT User Skills

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1297.283	1	1297.283	68.543	.000[b]
	Residual	4693.773	248	18.927		
	Total	5991.056	249			

Source: Survey Data, (2015)

As indicated by table 4.10, F critical this at 5% level of significance was 18.927. As F calculated is more than the F critical with a value of 68.543 this revealed the significance of the overall model. The p value <0.001 is significant value which is less than 0.05 required and thereby, the variable predictor (ICT user skills) explained the dependent variable variation in SME performance. However if in case F significance value was more than 0.05 thus could have not indicated dependent variable variation by the independent variables.

4.7 Effect of Government Policy

Table 4.4: Cross tabulation of effects of government policy on ICT adoption

Variable	Adopted ICT	Not adopted ICT	P value
Licenses			
Yes	157 (99.4)	1 (0.6)	0.027
No	87 (94.6)	5 (5.4)	
Taxation			
Yes	189 (98.4)	3 (1.6)	0.140
No	55 (94.8)	3 (5.2)	
Training			
Yes	36 (94.7)	2 (5.3)	0.227
No	208 (98.1)	4 (1.9)	
Funding			
Yes	23(100.0)	0(0.0)	1.000
No	221(97.4)	6(2.6)	

Source: Survey Data, (2015)

From the analysis, government policy under licenses showed statistical significance in relation to ICT adoption (p=0.027 which is less than 0.05). Taxation, training and funding policies on the other hand had no significance in relation to ICT adoption (p values greater than 0.05). The government policies affect ICT adoption on performance. There should be flexibility in government policies, stability in tax policies, good inspection procedures, quality regulatory bodies for ICT infrastructure and services by government to create enhanced and encouraged growth of SMEs. This is in accordance with study by Raravi *et al,* (2014).

4.8 Multiple Regression Analysis

Table 4.14: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.610[a]	.372	.359	3.92675

a. Predictors: (Constant), GovtPolicy, ManagementSupport, ICTinfrastructure, ICTUserSkill, ICTservices

Source: Survey Data, (2015)

The variables (ICT services, ICT user skills) explained 37.2% of the performance as represented by the R^2.The other % represented by other variables.

Table 4.5: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2228.724	5	445.745	28.908	.000[b]
	Residual	3762.332	244	15.419		
	Total	5991.056	249			

a. Dependent Variable: Performance

b. Predictors: (Constant), Govt Policy, Management Support, ICT infrastructure, User Skill, ICT services

Source: Survey Data, (2015)

The F critical at 5% level of significance was 15.419. The F calculated is more than the F critical with a value of 28.908 indicating the significance of the overall model. The p value <0.001 is significant (less than p=0.05), the variable predictor (Govt Policy, Management Support, ICT infrastructure, User Skill, ICT services) explained the dependent variable variation in SME performance. But in case F significance value was more than 0.05 it could have not indicated dependent variable variation by the independent variables.

5.1 Finding and Discussion

The data was collected and analyzed using descriptive statistics with help of SPSS software. As indicated by analysis presented the following discussions, conclusion and recommendation can be drawn. The objectives and questions ascribed in the study were guiding the response.

The research study has exhaustively demonstrated empirical details on how SMEs in Nairobi County, Kenya is affected by ICT adoption on performance. Most of the studies done earlier as more relate to only adoption of the ICT and the Growth of the SMEs but not much has been carried out to ascertain effects on SMEs performance. The study as explored how ICT infrastructure, ICT services, ICT user skills, management support, and government policy affects adoption and the performance of SMEs.

The ICT infrastructure is one of factor that influences the ICT adoption of SMEs. When there is sophisticated and enough ICT infrastructure by SMEs, allow ease adoption of which can influence performance .The results of study is in accordance Djatikusumo, (2014) that to boost the SMEs markets reach and enhance operation effectiveness and efficiency ICT technologies and innovations are more critical to performance of SMEs. The SMEs should invest on such ICT infrastructure as servers, fiber optics and other applications to enable improved performance.

From the findings, ICT services were known to most factor in the ICT adoption by SMEs .It's was noted to be crucial to note that most applications are not align and customize to meet needs of the SMEs thereby inhibiting effective adoption of ICT, besides the fact that there is an adequate information sharing and good communication systems availability there is high cost of ICT training which limits effective ICT services implementation. These are directly affecting the performance of SMEs in Nairobi County.

The ICT user skills was found not to influence ICT performance as ICT training and access to latest information rating on the overall SMEs as per the respondent's opinion shown a majority in disagreement. Therefore the researcher found not much association existed between ICT user skills and SME performance.

However, awareness of computer application software of help, the utility of web and social platform and the knowledge of various computer brands demonstrated positive relation to performance. Therefore it is accredited to the insufficient capital and funds to invest on personnel training within the SMEs to boost employee's skills. This is in agreement with Apulu et al,(2013) in their findings that lack of ICT user skills is one of the issues that are faced SMEs in the use of computers and internet due to lack of training.

The management support also the findings revealed to be affecting adoption of SMEs which enhanced and boost the production, sales volume, increased revenue and performance. In the study ICT investment and room for new advanced technologies showed statistical significance on relation to ICT adoption. The rest of the indicators for management support on ICT adoption proved not significant .This study found also there is constructive relation with ICT adoption. There is need for managers to support, invest and implement new innovations. This is concur with the findings of Elbeltagi et al,(2013) in his studies that ICT adoption and implementation are based on manager's innovativeness, active participation, experience and knowledge of ICT plays a significant role. Therefore, the manager must own a sensible working knowledge on the new technology.

The government policies as licenses showed statistical significance in relation to ICT adoption but taxation, training and funding policies on the other hand had no significance in relation to ICT performance. The influence of government policies as licenses and initiatives like training support can spur the ICT adoption and performance. This is concurring with Raravi*et al*, (2014) where inflexible government policies, unstable tax policies and inappropriate inspection procedures, issues in regulatory of ICT infrastructure and services sometimes conducted by government authorities create discomfort and discourage growth of ICT adoption by this SME's

5.3 Conclusion

The research study establish the crucial effect of ICT infrastructure, ICT services, ICT user skills, management support and government policy on ICT adoption and performance of SMEs. The empirical and statistical analysis proves the relationships existing with these variables and SMEs performance. The study shown that for effective ICT adoption there must be a manager's innovativeness, active participation, experience and knowledge of ICT facilities as a significant role to enhanced SMEs performance
The ICT services, ICT user skills and ICT infrastructure are powerful factors that boost the ICT performance as revenues, profitability, market share and sales volume. However the researchers found that SME performance was not affected by variables discussed but could be having other forces not examined.

To enhance the business's markets, customer satisfaction, operations, effectiveness and efficiency, SMEs should embark on ICT technologies and innovations as internet services which are more importance to their performance and growth. Moreover, the SMEs are not able to invest on such ICT infrastructure as servers, fiber optics and other applications due to their complexity, inaccessibility, and ICT cost problems. Therefore ICT infrastructure is one of factor that influences the ICT adoption of SMEs and performance there is must be sophisticated and enough ICT infrastructure by SMEs.

The SMEs needs to integrate current ICT services to allow a paradigm shift from what referred to technology-based products to currently commercial-based products that are customize to employs new applications of ICT and in line with business objectives. There should be development of niche products, software's , modern secure data storage as cloud computing, good encryption techniques and system controls to enable global communication, information security ,access and sharing and thereby impacting SMEs decisions ,production, performance and growth.

The insufficient ICT user skills and awareness among all the stakeholders undermine adequate ICT adoption and SMEs performance and thus requires investment in training, awareness and sensitization to enabled effective implementation and integration of required systems within the business environment to give the valid and quality output.

The management support has been found to be affecting adoption of SMEs on performance. Therefore it's crucial for managers to be well informed on various technologies and the dynamics within the business for them to support, invest and implement those new innovations to boost the business processes and decision making. The innovativeness, commitment, active participation, experience and good knowledge of the management enable effective implementation of ICT to realized increased performance

The government policies affect ICT adoption on performance. There should be flexible government policies, stable tax policies, appropriate inspection procedures, good regulatory bodies for ICT infrastructure and services by government to create appropriate environment and encourage growth of SMEs.

5.4 Recommendations

Researcher recommend also for the government to support the SMEs in initiatives as training and more funds to boost most of the business that are not fully utilizing potentials of technology due to insufficient capital.There is need for managers to support, invest and implement new innovations through training, and adequate provision of resources for improves growth and performance of SMEs. The SMEs also need to understand and embarked on the current ICT technologies and innovations that are correctly customized to business goals and best practices.

5.5 Suggestion for Further Research

Future research should be able to explore more factors influence ICT adoption on SMEs performance. There is need to research on appropriate and sophisticated technologies that can help SMEs improved performance. More research also can be conducted to relate between ICT adoption, growth and performance of SMEs.

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THE FIRST OFFICIALTWIN BIRTH RATES IN TURKEY DURING 2004-2009

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ABSTRACT

Twin birth rates are increasing due to similar dimensional factors both in Turkey and in the world. Even though this increasing numbers, there has been no official data about twin birth rates thitherto in Turkey. The data has been taken from Turkish Ministry of the Interior General Directorate of Civil Registration and Nationalityin 2015. This study tried to analyze twinning rates during 2004-2009 in Turkey. The children,who were born between 2004 and 2009, are at the concrete operation period of Jean Piaget. As a result of the study, 109.138 twin students are registered at Piaget's concrete operational period in Turkey.

Keywords: twins, twin studies, birth rate, Turkey

1. Introduction

Twins are born together at the same time sharing the same womb as a fetus. They can be monozygotic or dizygotic according to fertilization of the egg. Twin birth is the most common birth among multiple children and their numbers are increasing day by day because of dimensional reasons around the world. This increase made many countries analyze and make research about twin birth rates. Even though the numbers of twin birth are increasing in Turkey, there has been no official twin birth rate data in Turkeythitherto. Thefirst official twin birth rate data[1]will be fruitful to do research about twin studies in Turkey and comparative studies with world. However, there has been no official data aboutmonozygotic and dizygotic twin rates in Turkey.

French psychologist, Jean Piaget mentions that 6-11/ 7-12 year-old children are at concrete operational period and they learn and understand concrete things. Twins who are at this period are between at the 1st and 6th grades in Turkey. As a result, it has been tried to cite the number of twins who are at Piaget's concrete operational period, whowere born between 2004 and 2009 in Turkey[2]. The official data will be fruitful for the ministry of education in Turkey to develop some laws and regulations for twins.

2. Types of Twins

Twins can occur as monozygoticor dizygotic. Monozygotic twins are also called identical twins. They occur from one egg splitting into two eggs that conclude with two fetuses. Monozygotic twins look like each other very much. They are always same sex: girl-girl or boy-boy. Monozygotic twins have same genetic code (they have same DNA).

Dizygotic twins are also called as fraternal twins. They are occurred by two eggs that fertilized by two different sperms.Dizygotic twins look like each other like a brother or sister.Their genders can be same or different: girl-boy, boy-boy, and girl-girl. They share their DNA as %50.

Monozygotic twin birth rate is rare among twin births. Segal (Fiegl, National Geographic Magazine, 2012) mentions that

> "natural twinning rate is nearly 1 in 80 births in Western countries and monozygotic twins are only a 3rd of those".

Even though we have gained the twinning birth rate, it has been no official data about monozygotic and dizygotic twin rates. As we did small scale research, our questionnaire results embedded on www.siradisiannelik.com show that monozygotic twins are rare than dizygotic twins (Şinik Ö. P., 2014). In the questionnaire, 88 (23%) monozygotic twins and 295 (77%) dizygotic twins were cited.

[1] It was taken from Turkish Ministry of the Interior General Directorate of Civil Registration and Nationality

[2] 2004 -2009 years corresponding to 6-12 year-old twin children who are at the concrete operational period in 2015.

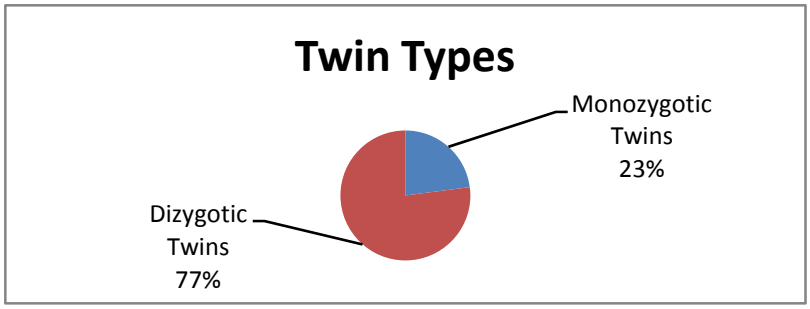

Figure 1: Twin Types

Sources: Google Form Questionnaire Results on www.siradisiannelik.com between 2011 and 2014.

2.1 The Reasons of Rising Twin Birth Rates

According to Hellin's law (Hellin, Die Ursache der Multiparität der unipare Tiere überhaupt und der Zwillingsschwangerschaft beim Menschen insbesondere, 1895), twin births are seen as 1 of 80 births: 1:80. Segal (Fiegl, National Geographic Magazine, 2012)mentions that this rate can be true forWestern nations. However, we do not know this number is true or not for Turkey. After our study, the cooperative demographic studies can be done and result can be compared with Western countries.

Having twin children can be seen because of some reasons:

If a woman has twin genes as genetically, such as Utah MZ twin gave birth for the second time (Nico).

If a woman is taller and heavier (Segal, 2011),

If a woman lives in a hot city or country (Erol),

If a woman delays marriage age and has fertility treatment (Sandbank) ,

If a woman continues to give a birth that has a chance of having twin children (Smits and Monden).

3. Jean Piaget's Concrete Operational Period

French psychologist Jean Piaget explains children's cognitive development in four steps (Piaget, 2004):

Age	Stage	Explanation
Birth- 18th	Sensory-motor	pre-verbal stage until 18th month
18th -6/7	Preoperational	beginning of languages, symbolic function, thought and representation
6/7- 11/12	Concrete Operational	starting age to primary school
11/12+	Formal Operational	formal or hypothetic deductive operation

Table 1: Piaget's Cognitive Development Stages

Sensory motor start from birth and continue until 18th month old. This process includes preverbal stage. After 18th month, children get into preoperational period that language, symbolic functions, thought and presentation

were seen until children start a primary school at the age of 6 or 7. After school life, children begin to learn concrete things. They believe and understand only concrete things until they reach 11 or 12 years old. The final development stage starts with 11 or 12 years, during this period, children begin to learn and understand formal things. They develop and shape their thoughts during this period.

3.1 Twin Birth Rate at Concrete Operational Period in Turkey

As it was mentioned above, concrete operational period prepares children learn concrete things. This period also gives children to be social, work in a group, try new things and do experiment, etc. (Piaget, 2004). Children, at this period in Turkey, are between1st grade and 6th grades of primary schools (1st and 4th grades) and secondary school (5th and 6th grades).

At the age of six, children start primary school in Turkey. At the 1st grade, children begin to learn how to write and read the alphabet during the first term of first grade. Second term is generally easier than the first term, because they know how to read and write. They also have Turkish, math, music, visual art, social life lessons and physical education (PE)(Ministry). At 1st grade of primary schools in Turkey in 2015, 19,649 twins,who were born in 2009, were seen.

At 2ndgrade, it is generally the repetition of the 1stgrade. Children develop their reading and writing skills. They also begin to learn English as a foreign language (EFL). 20,059 twins, who were born in 2008, were at the second grade of primary schools in 2015 in Turkey.

At 3rdthird grade, children develop their knowledge and the lessons are similar with the 2nd grade. Additionally, children take science lesson.18, 479 twins, who were born in 2007, were seen during 2015 as 3rd grade students in Turkey.

The last grade of primary school is the 4thgrade. Children take social knowledge, science, traffic, human rights, religion, physical education (PE), English (EFL) lessons at 4th grade. 17,877 twins, who were born in 2006, were at the 4th grades of primary schools in Turkey.

In Turkey, the education system consists of 4+4+4. The first 4 represents primary school. The second 4 represents the secondary school and the last 4 represents the high school. The first 4 consists of 1st, 2nd, 3rd, 4th grades. Second 4 consists of 5th, 6th, 7th, 8th grades. Children after 7th grade are at the formal period of Piaget. We analyzed twins who are at only concrete operational period. The last 4 represents the high school.

After the first 4 is finished, children choose secondary school for themselves. Secondary schools can be verified, such as: private, state, religious high schools (Imam Hatip) or single-sex schools.

5th grade is a kind of repetition of 4th grade and children's behaviors are generally childish. They take similar lessons (not traffic and human rights) as it was at 4th grade. 16,582 twins, who were born in 2005, attended as a 5th grade student in Turkey, in 2015.

However, when children are at 6th grade, they are more like a teenager and behavior changes can be recognized easily. They have similar lessons as it was in 5th grade. At 6th grade, children prepare for TEOG (Temel Öğretimden Orta Öğretime Geçiş Sınav Sistemi/ The Transition Exam from Elementary Education to

Higher Education) exam that is a kind of entrance exam for high schools. 16,492 twins, who were born in 2004, were registered as 6th grade students in 2015, in Turkey. Twin children who are at concrete operational period between 2004 and 2009 are shown in the table:

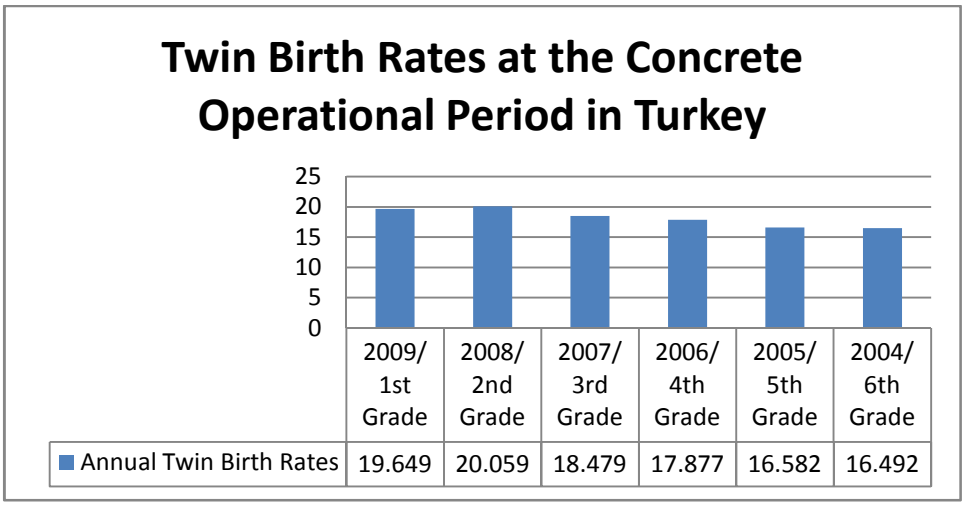

Table 2: Twin Birth Rates at the Concrete Operational Period in Turkey: 2004-2009
Sources: Turkish Ministry of the Interior General Directorate of Civil Registration and Nationality(Şinik Ö. P., 2015)
Note: The figure shows live twin births.

When the population of twin births compared, twin birth rates increased regularly during 2004 and 2009 and had peak in 2008, citing: 20,059 than began to decrease in 2009, citing: 19,649.

4. Results and Recommendations

Twins are one of the disadvantageous people in societies. Even though there are some regulations and laws for these disadvantageous individuals however no for twins and multiple children in most countries and in Turkey. At the concrete operational period: between the 1st and 6th grades, totally, 109,138 twins were registered in Turkey. Even though the number is high amount of, there has been no regulation and law about twin children's education lives. Especially, when twins begin to primary school, educational problems start, too. Whether they should be in same school or not, or same class or not, teacher choice, their individual differences, paces, performances are very essential problems for families of twins.

109,138 twins between at 1st and 6th grades in Turkey show us that multiple children are considerable amount of in Turkey. As a result, Turkish National Education Ministry should take some precautions, do some regulations and introduce some laws for twins and multiple children. Thus, their families and teachers will be informed about twins, their psychology and performances. As a result, twins as an individual will be more successful at their education lives and develop their individuality.

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Effect of Broadcast Policy & Regulations on Timely Implementation of the Analogue to Digital Migration in Kenya

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Abstract

This study examined the effect of broadcast policy & regulations on the digital migration process in Kenya. Research has shown that a review of the existing broadcast polices and regulations is critical to the successful implementation of digital migration in any given country, however, no study had been done to establish the linkage of broadcast policy & regulation and timely digital migration. Digital migration was intended to offer both technical and commercial benefits to the ICT sector globally – ranging from better television reception, efficient utilization of broadcasting frequencies and potential for investment in the sector by utilizing the spare frequencies released by the migration. Kenya's target to have fully completed the migration by July 2012, ahead of the 2015 international deadline, was unmet. This study employed a cross-sectional survey research design.Using hierarchical and moderated multiple regression (MMR) analyses, the theoretical models and study objectives were tested based on empirical data collected from key technical personnel involved in the digital migration process. The study samples were drawn from the regulator, broadcast signal distributor, equipment vendors, broadcasters, media owners and consumer protection agencies. The data collected was analyzed qualitatively and quantitatively and a model that can be used to guide the digital migration process developed. Theresults of this study revealed a strong positive correlation between broadcast policy & regulations and timely digital migration and the moderating effect of awareness and campaign on the relationship. This study recommends some of the key aspects of broadcast policy and regulations that require review for sustainable digital migration as well as contributing to the body of knowledge on the aspects of ICT Policy and Regulations.

Keywords: Analogue Broadcasting, Digital Broadcasting, Digital Migration, Set-Top-Boxes, Broadcast Policy, Regulation.

1. Introduction

The digital age has heralded a new competition for consumer services and emerging entrepreneurial opportunities (Yoffie, 1996). Broadcasting has a significant impact on the social and political class of a society. The broadcast industry has evolved from being a miniscule industry to a key contributor to national and global economies (Golding & Murdock, 2000) and investment in the technology employed in

broadcasting and communications sector has a way to better the lives of the citizens (Castells, 2011; Hernández and Acevedo-Ruiz, 2007).

In the United States of America (USA), The Federal Communications Commission of the USA recognized that the migration of television broadcasting to the digital platform is part of social and economic development (Cianci, 2007). The Republic of Kenya underpins science, technology and innovation as one of the foundations for socio-economic transformation of Kenya into a globally competitive and prosperous nation by the year 2030 (RoK, 2007).

The evolution of television broadcasting from the traditional analogue broadcasting to the modern type digital broadcasting entails coding and decoding of digital signals from the broadcasting station to the consumer of broadcast services (Starks, 2013). Trends in digital broadcasting technologies, the ever increasing demand for better broadcasting services and the push to implement modern principles of frequency spectrum management necessitate the switchover from analogue to the digital platform for broadcasting services (ITU, 2006) which set the year 2015 as the final cut-off deadline for member organizations in which Kenya falls.

Digital migration was initiated in 2006 when the I.T.U., through its council regulation 1185 during the I.T.U. Regional Radio Conference (RRC-04/06). At the conference, the 101 member stated drawn from Europe, Africa and Middle East signed a treaty committing to the transition from analogue to digital broadcasting by the year 2015 (Beutler, 2008). Kenya, being one of the member states, set a target to commence digital broadcasting in the year 2007 by having dual illumination/simulcast where both the analogue and digital signals would be broadcasted until final switch off in July 2012 (RoK, 2007) ahead of final international deadline of 2015 line with the guidelines for the transition from analogue to digital broadcasting (I.T.U., 2010). This plan necessitated the formation of the national taskforce on migration from analogue to digital broadcasting in Kenya.

Digital migration which will result in spectral efficiency (better utilization) of the scarce frequency spectrum (I.T.U, 2010; DigiTAG, 2008; Analysys, 2009). The minimum utilization of spectrum within the Ultra High Frequency (UHF) band is envisaged to result in "spare" frequencies being freed up – what has been christened the digital dividend. This available spectrum can be used for community broadcasting, wireless broadband to the last mile users and mobile communications (4G and LTE), and in effect, serve the remote poor populations in an economically viable manner (Prahalad and Hammond, 2002; I.T.U., 2006).

The digital migration has the potential to bridge the digital divide by availing broadband access to households, arguably, because of the bundled services of broadcasting and broadband access (Dutton, Gillett, McKnight and Peltu, 2004; European Commission, 2001).The digital migration will result in improved quality of broadcasting services amongst the consumers of broadcast services in most households (Kristensen and Tadayoni, 1998; I.T.U., 2006) that is likely to improve their social and economic livelihoods arising from the access to information.

Digital migration creates entrepreneurial opportunities.Digital migration is a key motivator for economic revolution as stipulated by the Schumpeterian theory of technological innovation (Schumpeter, 1934). This

economic revolution creates new business opportunities for enhancing radical innovation, closed innovation, cultural diversity and ethnic cohesion (Castells, 2011; RoK, 2007, 2010; Analysys, 2009).

The critical milestones for a smooth migration as proposed by the digital migration taskforce for Kenya and corroborated by the I.T.U. guidelines are: (a) Planning phase – where the state engages the stakeholders in defining the digital migration policy, technical and business readiness, the licensing and regulation regime to be adopted and the analogue switch-off method to employ. (b) Implementation phase where the various parties (the broadcasters, network operators and government) engage in deployment of the digital broadcast including license administration, sites preparation and signal roll out and (c) Analogue switch-off after a successful migration of the analogue signal (RoK, 2007; I.T.U., 2006).

1.1. Problem Statement

Broadcasting significantly accounts for the global and national economies and as such timely migration significantly accounts for the increase in pooled taxed base for Kenya (Wangusi, 2011). On the other hand, research shows that countries that have either not done the digital migration or delayed in the migration process have had a negative impact on the ICT sectors within those nations (Starks, 2013; Deloitte and Touché, 2012).

Different countries adopted unique migration plans depending on the policy, technical and institutional changes that needed to be in place for the successful digital migration (Adomi, 2010). In Europe, seven nations were able to complete the migration by the target 2009 time frame (Van den Broeck and Pierson, 2008; Iosifidis, 2006). In East Africa, Tanzania and Rwanda were able to migrate by 2012 and 2014 respectively (Kisaka, 2015; Mutabazi, 2015). Kenya was not able to meet the implementation time frame of June 2012 to have the country migrated to digital television broadcasting despite having an existing broadcast policy and regulations framework (Murungi, 2007).

Despite the efforts by the government to license signal distributors and equipment vendors, zero rate cost of Set Top Boxes in a bid to encourage the uptake of the digital broadcasting and carrying out a consumer awareness campaign (Agona and Otim, 2011; Wangusi, 2012) the target date remained unmet. Likewise, the sector players, mostly equipment vendors, have made attempts to increase uptake of digital broadcast services by reducing cost of with minimal impact. The migration dates constantly changed – ostensibly brought about by protracted court battles by aggrieved stakeholders (Starks, 2007), who feel their interests in the migration have not been addressed.

On the local scene, Ericsson Kenya Ltd (2007) has done a study on migration from analogue to digital television in Kenya, while Murungi (2007) studied regulatory and policy reforms in the broadcasting industry in Kenya. All these studies have aimed at unpacking the critical success factors for digital migration. Limited attention has been paid to the study of the effect of the existing broadcast policy and regulations regime and the digital migration in Kenya. Therefore, further research was needed which would include current status of digital migration in Kenya. This study sought to fill in on this existing knowledge gap.

1.2. Objective of the Study

The objective of this study was to empirically determine the effect of Broadcast Policy & Regulations on the timely implementation of the Analogue to Digital Migration in Kenya.

2. Literature Review

The existing policy, legal and regulatory framework in the countries that are undergoing the digital migration is a key imperative to successful migration process. As such, country regulators have a responsibility to review their regimes against the digital migration guidelines to ensure readiness and smooth transition (I.T.U., 2006). A policy approach in integrating new digital broadcasting rules is therefore essential to protect the digital migration plan. An old broadcast regulatory regime cannot favor a seamless digital migration (Armstrong & Collins, 2004).

In the Kenyan context, the current legislation around the regulation of broadcast services where frequencies are issued by the sector regulator and licenses are issued by the ministry needs to be reviewed and harmonized to ensure independence of the industry (Murungi, 2007). This broadcast regulatory structure could be an impediment to the digital migration process and Murungi goes further to argue that structuralamendments of the regulator would give it the latitude to effectively run its mandate considering the convergence in the ICT sector with broadcasting, internet and telecommunications converging in the manner of licensing and service delivery.

A study by Deloitte & Touché (2012) on Kenya's broadcast sectorobserved that there were gaps in the licensing of the digital migration landscape. The existing licensing of having a national (and public) broadcaster being a broadcast signal distributor was a potential hindrance on the digital broadcast market structure. Deloitte & Touché recommended a review of the structure of the national broadcaster by explicitly defining a public wing (with mandate to provide public broadcast services) and a private commercial entity that competes with the rest of the other players in the digital broadcast industry.

Governments should embrace the commercialization of the digital migration and offer competitive services away from state run, state funded public broadcasters (Iosifidis, 2005; Adda and Ottaviani, 2005). This commercialization however would require appropriate policy and regulatory reforms. The commercialization can be in the form of infrastructure setup, digital broadcast equipment acquisition or spectrum management.

The linkage between awareness & campaign on the existing broadcast policies & regulations and impact on digital migration. The regulator and the digital transition committee are responsible to create awareness to the digital broadcasting value chain on the rights, obligations and responsibilities of every stakeholder (Berger, 2010; Adomi, 2010). Broadcasting being a medium of access to information implies the right of citizens and as such, the digital migration policy must embed in itself social objectives associated with free and fair public broadcasting that does not discriminate any citizen the right to access broadcast services based on their ability to have the mechanism to access these services (Candel, 2007).

2.1. Conceptual Model

The conceptual model is based on Broadcast Policy & Regulations (independent variable), Timely Digital Migration (dependent variable) and Awareness & Campaign being the moderating variable as shown in figure 1.

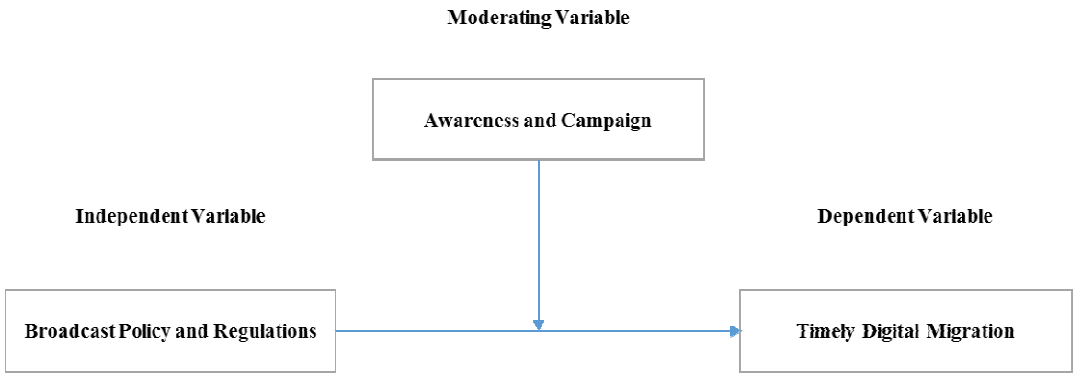

Fig. 1 Conceptual Model

3. Methodology

Cross-sectional survey research design was used in this study. Cross sectional studies take a snapshot of the respondent group within the target population and analyze the behavior of the respondents with reference to the study topic (Abbott & McKinney, 2012).The target population of study was the key stakeholder organizations in the migration process as defined by the Communications Authority of Kenya and informed by the digital migration taskforce. The respondents were the technical personnel responsible for digital migration from their respective institutions.The study employed purposive random sampling to get to appropriate responses from a sample of 140 respondents.

Data was collected using semi-structured interview guides and a questionnaire with both open ended questions and a 5-point Likert Scale ranging from 1 (strongly disagree) to 5 (strongly agree).A Likert Scale can be evaluated easily through standard techniques like, factor analysis and logistic regression analysis (Montgomery, Peck & Vining, 2001).Data collection was done using a hybrid of data collection procedures to maximize the reach of the respondents that is using both self-administration of the questionnaire and using Survey Monkey online platform.Online surveys afford the study greater geographic reach at the least cost enabling a high response rate quickly and cheaply (Reynolds, Woods, & Baker, 2006).

A pilot study was done on 10% of the sample population to test the reliability and validity of the questionnaire (Mugenda & Mugenda, 2003). This sample was representative of the target study population - large enough to provide useful information about the aspects that were being studied (van Teijlingen & Hundley, 2001). A resulting Cronbach's alpha coefficient of 0.739 qualifiedthe instrument as reliable and consistent (Nachmias and Nachmias, 1996; Sijtsma, 2009).

The study used the Statistical Package for the Social Sciences (SPSS) version 21 for Windows to assist in analyzing quantitative data. Qualitative data was analyzed by categorization and summarization of key

thematic areas based on the responses (Keegan, 2009).This study employed descriptive statistics to analyze quantitative data. Correlation analysis was carried out on the study variables to determine the strength of the relationships between the study variables. The moderating effect of Awareness and Campaign was tested using Moderate Multiple Regression (MMR) analysis. MMR models allow the simple relationship between the dependent variable and an independent variable to depend on the level of another independent variable (Irwin & McClelland, 2001).

4. Results

The study established that majority (65.4%) of the respondents had migrated to the digital platform, while a few (34.6%) had not compared with official estimates by the Communications Authority of Kenya (CAK) of May 31st, 2016 which indicated that television penetration had increased from 57.0% during analogue broadcasting to 64.0% of the population with digital broadcasting.
A majority (77.0%) agreed to the need of the regulator to review spectrum regulation and pricing policy to attract investors to fund the migration in exchange for spectrum assignment, 10.0% were neutral while a few (13.0%) disagreed.Majority (62.0%) of the respondents polled disagreed that the licensing of the 2nd broadcast signal distributor (BSD), the Pan-Africa Network Group (Kenya) Co. Ltd, had been done in a free and fair manner, 19.0% were neutral while a few (19.0%) agreed.

Correlational Analysis for Broadcast Policy & Regulations and Timely Digital Migration indicated a strong positive linear correlation between Broadcast Policy & Regulations and Timely Digital Migration ($r=0.742$, $p<0.05$) as shown in table 1.

Table 2 shows the moderating effect of Awareness & Campaign on the relationship between Broadcast Policy & Regulations and Timely Digital Migration. Broadcast Policy & Regulations was a strong predictor of Timely Digital Migration. From table 2, Model 1 shows that R=.772, R2= .596 and [F (5, 79) =23.278, p=0.05]. The values of R2 indicates that 59.6% of the variance in Timely Digital Migration can be accounted for by broadcast policy and regulations. Model 2 shows results after the interaction variable (Broadcast Policy & Regulations*Awareness and Campaign) was added into the model. From table 3, the moderating effect of Awareness and Campaign gained 4.3 % variance in Timely Digital Migration, over and above the variance of Broadcast Policy & Regulations and Awareness and Campaign. The amount of change in R2 is a measure of change in the predictive power of a given dependent variable or variables with introduction of the dependent variable or variables in the model (Aguinis, 1995). From the aforementioned, Awareness and Campaign was found to moderate the relationship between Broadcast Policy &Regulations and Timely Digital Migration.

In table 3, Model 1 indicates that Broadcast Policy & Regulations (BPR) was statistically significant ($p < 0.05$; Beta value = 0.469); Awareness and Campaign (AWC) was also statistically significant ($p < 0.05$). Equation 1 shows that for a 1-unit increase in review of Broadcast Policy and Regulations, Timey Digital Migration is predicted to have a difference by 0.251, given that the Awareness and Campaign is held constant. The regression coefficient associated with Awareness and Campaign means that the difference in Timely Digital Migration characterized by an aggressive Awareness and Campaign and that with a very limited Awareness

and Campaign drive is 0.090, given that Broadcast Policy & Regulations is held constant. Substituting these values in the OLS regression model ($Y = \beta 0 + \beta 1\ X + \beta 2\ Z + \varepsilon$), the following equation is obtained:

Timely Digital Migration = 5.12 + 0.251 BPR + 0.090 AWC……...……..….. Equation (1)

Model 2 shows the details of inclusion of the interactive variable in the model. Broadcast Policy & Regulations was found to be significant (p=.006 <0.05, Beta value =.407), Awareness and Campaign was found to be statistically insignificant (p=0.326 >0.010, Beta value =.126) and Broadcast Policy & Regulations*Awareness and Campaign was found to be significant (p= 0.010 <0.05, Beta value =.471). From equation (1), if we substitute these values in the OLS regression model ($Y = \beta 0 + \beta 1\ X + \beta 2\ Z + \varepsilon$)we obtain:

Timely Digital Migration = 7.99 + .218 BPR + .076 AWC + .252 BPR*AWC ……. Equation (2)

5. Discussion and Conclusion

This study found a positive relationship between Broadcast Policy & Regulations and Timely Digital Migration in Kenya as supported by the literature review. Lie (2004) of the I.T.U. in his study on technology focused and market based reforms in spectrum management found out that regulatory regimesthat favour best assignment of spectrum within constraints of the market conditions spur technology migration. Similar findings were made by Deloitte & Touché (2011) in their study on the broadcasting industry in Kenya who observed that the digital migration in Kenya would be as successful if the existing broadcast regulatory framework was reviewed.

The licensing of the players involved in the digital migration players is a key determinant to the successful and timely digital migration process. This opinion is consistent with observations by Iosifidis (2006) in his study on the Digital switch over in Europe that political and broadcast regulatory issues relating to licensing of players directly impacts the digital migration process. In the Kenyan digital migration process, there was perceived unfairness in allocationof the 2ndBSD license to the Pan African Network Group (PANG). This unfairness triggered protracted court battles that prompted the decision by the CAK to allocate a provisional 3rd BSD license (temporal authorization) to the African Digital Network (ADN) consortium as a result of the prayers of the complainant being granted by the Supreme Court of Kenya in 2015. The ADN consortium consists of 3 media houses - The Standard Group, Royal Media Services and The Nation Group.

There was a strong positive correlation between reviews of the regulatory framework and the Digital Migration process. This is supported by a study done by Murungi (2007). The study found an empirical relationship between review of the regulatory regime as a pre-cursor to a timely and successful digital migration process. He further established that the Kenyan broadcast landscape that was regulated under the analogue regime was significantly due for review to effectively support the broadcasting industry in the converged digital space.

Moderation results led to the conclusion that there was a moderating effect by Awareness & Campaign ontherelationship between Broadcast Policy & Regulation and Timey Digital Migration in Kenya.The regulator has a responsibility to create awareness on the critical nature of consumer education on the importance of the digital migration to the ICT sector, and the economy at large. Equally, the stakeholders in the digital broadcasting value chain have to campaign and advocate for fair play in order that the benefits of the migration are realized by the majority of consumers. Scott (1995), in his study on institutions and organizations makes similar observations that institutions, which include legal, political, regulatory frameworks compel a specific behavior in organizations – in this case, the digital broadcasting ecosystem.

The study established that the licensing regime for infrastructure service providers needed review to ensure fair play, quality of services and availability of ICT services. The infrastructure sharing policy needed to be reviewed, adopted and signed into law to ensure environmental protection and reduction of cost of infrastructure development.

This study fills a significant gap identified in the literature review and provides a model that can be adopted in future undertakings that involve technology migration. The outcomes of this study greatly enriches the academia as much has not been researched in the field of digital broadcasting in Kenya.

6. Recommendations

This study advocates for the need to draft, review, adopt and ratify a digital broadcasting policy (for both radio and television broadcasting) that will inform future licensing for broadcast signal distributors & self-carriers, allocation and assignment of the digital dividend spectrum. This digital broadcasting policy should be part of the National ICT Policy and Communications Act.

Equally important is the need to review, adopt and ratify the draft Infrastructure Sharing Policy that will ensure that there are cost effective ways of building and sharing appropriate ICT infrastructure to support the digital migration. Shared use of passive network infrastructure has a potential impact of reducing the total cost of ownership of the required digital broadcasting infrastructure. In the absence of a National Infrastructure Sharing Policy, there is a risk of having multiple players building their own infrastructure which in the end makes the cost of the services higher while at the same time negatively impacting the environment.

Lastly, this study recommends a review the procurement and licensing strategy that is currently in place to ensure fair play of the Kenyan enterprises in the allocation of rights and licenses for participation in the digital migration process. The current public procurement policy for the scale of the migration project upstages the Kenyan entrepreneur to stiffer competition from the foreign players. It is imperative to review the provisional 3rd BSD license issued to the Africa Digital Network (ADN) through a court order and consider an administrative process in light with best practice within the sector to ensure commitment by the licensees to their licensing obligations.

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Table 1 Correlational Analysis for Broadcast Policy & Regulations and Timely Digital Migration

Variable		Timely Digital Migration	Broadcast Policy and Regulations
Timely Digital Migration	Pearson Correlation	1	0.742
	Sig. (2-tailed)	*	0.000
	N	78	78
Broadcast Policy and Regulations	Pearson Correlation	0.742	1
	Sig. (2-tailed)	0.000	*
	N	78	78

**. Correlation is significant at the 0.05 level (2-tailed).

Table 2 Moderated Multiple Regression Model summary for Broadcast Policy and Regulations

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.772[a]	.596	.570	4.16976	.596	23.278	5	79	.000
2	.768[b]	.589	.579	4.12608	.043	58.775	2	82	.070

a. Predictors: (Constant), Awareness and Campaign, Broadcast Policy and Regulations
b. Predictors: (Constant), Awareness and Campaign, Broadcast Policy and Regulations, Broadcast Policy and Regulations*Awareness and Campaign

Table 3 Moderated Multiple Regression Model Coefficients for Broadcast Policy and Regulations

	Coefficients				
Model	**B**	**SE**	**Beta**	**t**	**p**
(Constant)	5.12	1.850		-0.277	0.783
AWC	0.090	0.098	0.149	0.920	0.361
BPR	0.251	0.097	0.469	2.599	0.011
(Constant)	7.99	1.534		-.521	.604
AWC	.076	.077	.126	.989	.326
BPR	.218	.078	.407	2.798	.006
AWC*BPR	.252	.096	.471	2.631	.010