Technological Capital and Innovation Performance in Youth Enterprises in Kenya

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Abstract- Globally, 85 percent of the world's young people live in the developing countries, and an ever-increasing number of them are growing in the cities. By 2030, it is estimated that as many as 60 percent urban dwellers will be less than 18 years of age. The difficulties of penetrating the labor market for the youths is increasing day by day making the young people be 43.7 percent of the unemployed. The action is therefore required to achieve economic prosperity for and the inclusion of the youths. In Kenya, the rate of unemployment is at 40% and 70% of the unemployed are youths Despite the introduction of economic stimulant funds in Kenya the levels of unemployment have continued to increase. This brings to question the impact of Youth Enterprise Development Fund in reducing the unemployment. In knowledge based economy technology has taken a center stage in different spheres of the global economies in that from the startups to full grown enterprises technological skills and facilities enhance innovation leading to growth and sustainability of enterprises especially youth enterprises for job creation. The enterprises that aim to succeed they keep innovating in their product development, new market penetration and patenting. This study sought to investigate the relationship between technological capital and innovation performance in youth enterprises in Kenya. Descriptive and correlation research design was used and data was collected from 160 youth enterprises which have benefited from the Youth Enterprise Development Fund in Kiambu County. Structured questionnaires and interview guide were used to collect the data while Pearson correlation and regression analysis were used to establish the relationship and the significance of technological capital and innovation performance. The findings indicated that the three sub-variables which were technological skills, technological facilities and information management system had positive and significant relation with innovation performance in youth enterprises in Kenya. However technological skills and technological facilities were the most significant in influencing the level of innovation performance in youth enterprises in Kenya. Therefore investing in technological capital is of essence in promoting innovation performance in Youth enterprises in Kenya.

Index Terms- Technological skills, technological facilities, information management systems, innovation performance

I. INTRODUCTION

Background of the study

Globally, 85 percent of the world's young people live in the developing countries, and an ever-increasing number of them are growing in the cities. By 2030, it is estimated that as many as 60 percent urban dwellers will be less than 18 years of age. The difficulties of penetrating the labor market for the youths is increasing day by day making the young people be 43.7 percent of the unemployed. The action is therefore required to achieve economic prosperity for and the inclusion of the youths. In Kenya, the rate of unemployment is at 40% and 70% of the unemployed are youths
(RoK 2012).

World Bank (2010) on the other hand reported that Kenya is faced with poor utilization of human, structural, customer and technological capitals or intellectual capital (IC) among the SMEs leading to detrimental effects on the GDP. Recommendation by Narveka *et al*. (2006) indicates that improvement of IC by the management would enhance innovation performance. A study by Matanda (2007) on the role of human capital and entrepreneurial orientation on radical product innovation in small carpentry workshops in Nairobi revealed the importance of specific human capital and the strategic processes that firms utilize to develop radical innovation. According to Bueno et.al (2006) technological capital is the set of intangible assets which is based on innovation and technical processes. It is further described as a product of technological knowledge Ramirez (2010) as a combination of knowledge related to the development and technology systems of an organization. Technological capital is based on the activities and functions of both internal and external scope which are linked to the development of products and services of the organization.

Statement of the problem

According to the World Bank (2010) countries with over 90% growth rate of GDP achieved the rate of high utilization of the human, structural, customer, technological capital and entrepreneurial skills (Intellectual capital) or ability to innovate as defined by Subramanian et. al. (2005), Wu *et al*. (2008), Zenler *et al*. (2008) which has a significant effect on the enterprise growth and gives competitive advantage. Despite the inception of youth enterprise development fund in 2006 as an initiative to curb unemployment among the youths, the unemployment rate in Kenya has so far increased by 27.35% between 2006 and 2011(RoK 2012) as the youths account for 70 percent of the unemployed. This circumstance implies that the government's initiative has not met the expectations and probably innovation as an intervention is worthy being investigated. This statement is in agreement with Bird (1989) who defined

innovation as the commercialization of ideas and implementation and change of the existing systems, products and resources.
There is limited knowledge on how innovation performance has been factored in youth enterprises besides the pumping of funds to the enterprises in expectation of more jobs born out of growth in those enterprises. This study purposed to investigate the determinants of innovation performance in depth putting technological capital as the independent variable in three dimensions, technological skills, technological facilities and information management system.

II. Literature Review

2.1 Technological skills

According to Joseph Schumpeter (1939), technological change is one of the major determinants of industrial change and consists of the introduction of new products (product innovation), production processes (process innovation) and management methods (organizational innovation) in an economic system. In a knowledge based economy the role of technology is highly acknowledged and is mainly based on information technology. Technological capital according to Fernandez *et al* (2000) includes knowledge related to access, use or innovation of production techniques and products. According Bueno *et.al* (2006) Technological capital is the set of intangible assets which is based on innovation and technical processes. It is further described as a product of technological knowledge by Ramirez (2010) as a combination of knowledge related to the development and technical systems of an organization. Technological capital is based on the activities and functions of both internal and external scope which are related to the development of products and services of the organization.
According to Saleemi (2009) technology is the big bang that has propelled the world into endless possibilities. It is an important tool for excelling in the contemporary market place. It is further noted that technology gives an edge to the traditional ways of working and therefore provides innovative products and services. It gives speed in operations thus increases the productivity in overall processes.

Germany has expanded in research and innovation systems over the last decade such that investment in Research & Development has grown substantially since 2000 to reach 2.84 % of the GDP in 2011 which is close to 3% national target for 2020.Public expenditure represents one-third of investment in Research and Development. Their government increased the public budget on research and innovation even during the 2009 economic crisis as part of a policy of prioritizing spending on education and research. The commitment amidst the global economic crisis is a big lesson in fighting poverty through innovation. For high-level value creation and competitive advantage, intangible resources and capability have been widely acknowledged as confirmed by Drucker (1993) and Grant (1996).The value creation role of intellectual capital and in this case technological capital, remains understood accordingly to Schiuma and Lero (2008), and the effect on the innovation performance thereof. Griffith *et al*. (2006) assert that innovation is an essential cornerstone in performance concerning improving productivity, performance, and growth. There is a very close relationship between innovation and intellectual capital because according to Lev (2001) innovations are created primarily to be investing in intangibles. Recommendation by Narveka *et al*. (2006) indicates that improvement of intellectual capital which includes technological capital by the management would enhance innovation performance. Bontis (2000) further affirms that the poor utilization of IC leads to poor quality products and technology.

Research Design

Descriptive and correlational research design was adopted in this study in identifying, analyzing and describing the relationship between technological capital and innovation performance. According to Mugenda (2008) descriptive design provides an accurate account of characteristics of a particular individual or group in real life situation. The target population was youth enterprises which have benefited from Youth Enterprise Development Fund. The total population was 1170 youth enterprises while the sample frame was 223 youth enterprises that had been funded using youth enterprise development fund.

Target Population

The sample in this study was drawn from youth enterprises which have benefited from the youth enterprises development fund thus playing a critical role in reducing unemployment.

Sampling frame

According to Nicholas (2011) it is impossible to do a random sampling on a population without a sampling frame unless the population is extremely small. The sampling frame (see Table 3.2) is done from the enterprises within registered youth groups in Kiambu County which have benefited from the YEDF. This data was obtained from Youth Enterprise Development Fund headquarters.

Sample and sampling technique

The sample included 1 enterprise from 223 youth entrepreneurs which made 223 respondents as per the latest data for June 2014. Simple random sampling was used to select 1 youth entrepreneur from each of the registered groups. The sample size determination formulae and procedure for categorical data (Cochran 1977; Bartles *et al* (2001) was adopted and calculated according to the following formula. In which n=Z*Z(P(1-P)/(D*D) and the required sample is (N_o) = n/[1+(n-1/N] Z= confidence level at 95% (standard value 1.96).
P=True proportion of factors in the population, or the expected frequency value (estimated adoption rates of the intellectual capital elements specifically human, structural, customer, technological capital and entrepreneurial skills by youth entrepreneurs).

D= margin error at 6% (standard value 0.06)
n= $(1.96)^2(0.5)(0.5)/(0.06)^2$ =266.6667
Sample size (N_o) = n/[1+(n-1/N]
N_o=267/[1+266/1107]=223

Since the population is less than 10,000 the effective sample size will be 223.The study estimates that roughly 50% (0.5) of the youth entrepreneurs trained on entrepreneurial skills covering the elements of Intellectual capital have adopted the principles

and practice (Magnani,1997; Barringer & Bluedorn, 1999). A sample size of 223 was arrived at using the calculations under the guidance of the above formula. This criterion was used at 95% confidence level, 6 %margin of error and a Z-Value of 1.96

Instruments of data collection

The study used three basic methods to collect data which include questionnaires, interview guide, and review of secondary data. The researcher also used computer based data provided by youth Enterprise Development fund offices.

Research findings and discussions

Table 4.6 Descriptive statistics for Technological capital

	N	Range	Minimum		Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
TECHNOLOGY CAPITAL	160	17.41	2.16	19.58	13.1650	.26787	3.37771	11.409
Valid N (listwise)	160							

Table 4.6 represents the descriptive statistics of technological capital as independent variable in this study. The mean score of the 160 youth enterprises in terms of technological capital was 13.1650 with a minimum score of 2.16 and a maximum of 17.41.

Confidence interval was got from the mean and the standard deviation

C.I = 13.1650±1.6449 (0.95) *.26787

13.165± .418588

(13.58359, 12.74641)

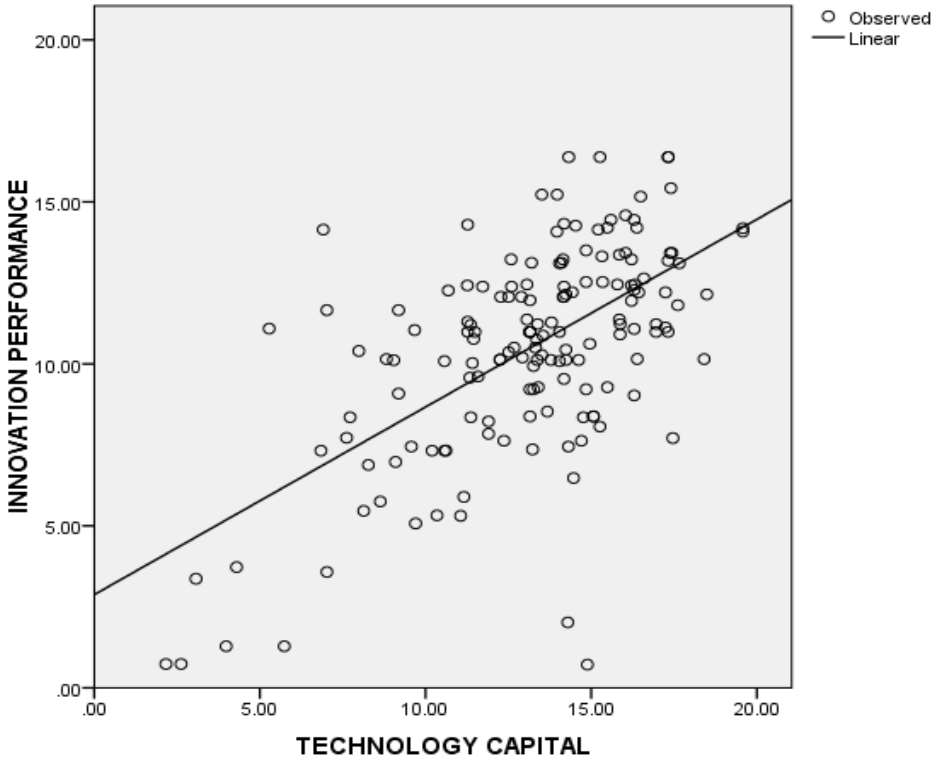


Figure 4.13 Scatter plot Technology capital

Regression Analysis

Technological capital was the fourth variable suggested to have a determining role in innovation performance in youth enterprise in Kenya. The objective of the study sought to investigate the influence of technological capital on innovation performance in youth enterprises in Kenya. In Figure 4.13 it is indicated that there was positive linear relationship between technological capital and innovation performance with a positive gradients of 0.579 (see table 4.16). It shows positive gradients which are a clear indication that technological capital as an element of intellectual capital influences the level of innovation in youth enterprises in Kenya. This also implies that increased technological capital leads to increased innovation

performance and the opposite is true that a decrease in technological capital leads to poor innovation performance. This is in conformity with another study done by Subramanian *et al* (2008) in Turkish automotive firms where customer capital as an element of technology capital was found to influence innovation in those automotive firms.

Correlation analysis

Table 4. 13 Correlations

		INNOVATION PERFORMANCE	TECHNOLOGY CAPITAL
INNOVATION PERFORMANCE	Pearson Correlation	1	.606**
	Sig. (2-tailed)		.000
	N	160	159
TECHNOLOGY CAPITAL	Pearson Correlation	.606**	1
	Sig. (2-tailed)	.000	
	N	159	159

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

Table 4.13 indicates that there is a positive significant linear relationship between technological capital and innovation performance in youth enterprises in Kenya .This has been illustrated by the correlation coefficient of 0.606 at 0.01 significant levels. This implies that there is a positive relationship between technological capital and innovation performance in youth enterprises in Kenya. It was therefore concluded that technological capital contributes to innovation performance in youth enterprises in Kenya as confirmed by previous studies done by advantage as by Bontis 1998;Stewart 1999 ; Edvinson and Malone 1997.

Table 4.14 Regression analysis
Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.606	.367	.363	2.578

The independent variable is TECHNOLOGY CAPITAL.

The regression analysis conducted as shown in Table 4.14 reflects a strong relationship with R=0.367 while R^2 =0.363 .This pointed out that there was 36.3 % of corresponding change in innovation performance with an increase of one unit of technological capital.

Goodness of fit

In order to test the research objectives, regression analysis was employed. The model equation $Y=\beta_4X_4+e$ explained 36.7 % as measured by the goodness of fit (R square) in table 4.14 (model summary).These results showed that human capital explained 36.7 % (adjusted R- square 13.9) of the variance in innovation performance as explained by the model $Y=\beta_4X_4+e$.It was therefore concluded that technological capital determines the level of innovation performance in youth enterprises in Kenya. The findings conform to previous studies done by Ngari (2012) and Cabrita (2008).The univariate model was significant and therefore supports the objective that technological capital determines innovation performance in youth enterprises in Kenya.

ANOVA
Table 4.15 ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	604.843	1	604.843	91.021	.000
Residual	1043.283	157	6.645		
Total	1648.126	158			

The independent variable is TECHNOLOGY CAPITAL.

The ANOVA Table 4.15 shows that the significance of f statistics was less than 0.05 .Due to this the null hypothesis $\beta_4=0$ was rejected and the researcher failed to reject the alternative hypothesis $B_4 \neq 0$ .This implied that the model $Y= \beta_0+\beta_4X_4+e$ was significantly fit.

Table 4.16 Coefficients

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
TECHNOLOGY CAPITAL	.579	.061	.606	9.540	.000
(Constant)	2.876	.825		3.486	.001

There is a positive unstandardized beta coefficient of 0.579 as indicated by coefficient Table 4.16.For the regression line to be significant, the following hypothesis has to be true.

Ho: $\beta_4 = 0$

Versus

H_4: $\beta_4 \neq 0$

Table 4.16 shows that the P-value is less than 0.05.Therefore in this case the null hypothesis was rejected and the study failed to reject the alternative hypothesis that $\beta_1 \neq 0$ which implies that technological capital has a significant influence on innovation in youth enterprises in Kenya.

Model $Y= \beta_0+ \beta_4X_4+e$ with a constant 2.876 and unstandardized beta coefficient of 0.579 and p-values of 0.000 and 0.001 respectively was significant in this study since the p-values were below 0.005.

$Y =2.876+0.579 X_4$

P-value (0.000) (0.001).

The p-values are less than 0.05 meaning the model $Y= \beta_0+ \beta_4X_4+e$ was significantly fit in this study. Standard error being a statistical term that measures the accuracy with which a sample represents a population, the independent variable Technological capital had a standard error of 0.061 indicating that the smaller the standard error the more representative the sample was of the overall population.

Technology capital and loan processing

If loan processing (LP) mediates the Technology capital (TC) and innovation performance (IP) relation, then the following condition must hold.

-TC predict IP

-TC predict LP

-LP predict IP

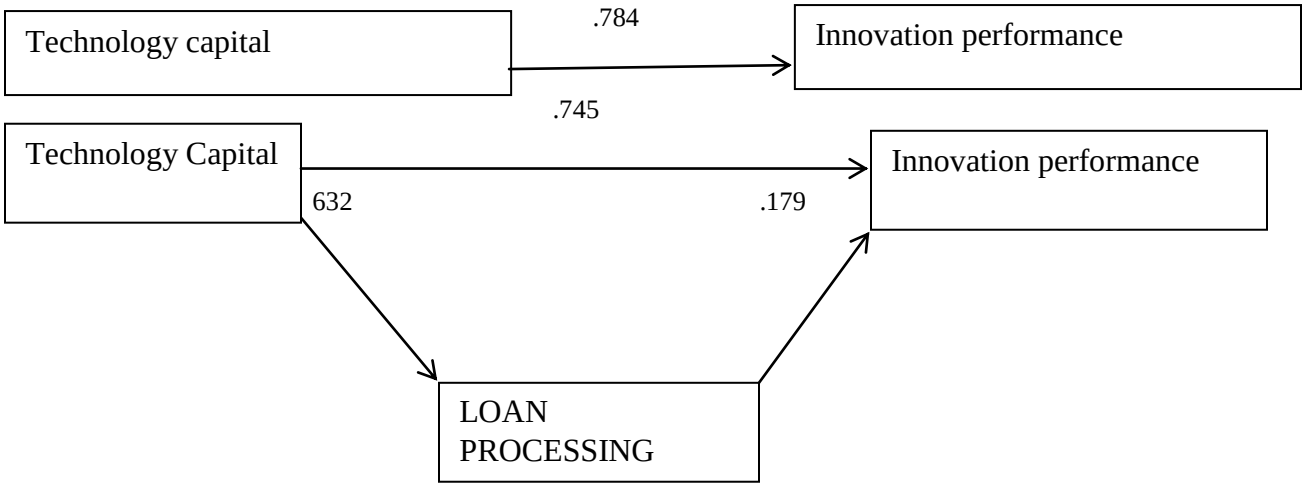
Step 1 $Y= \beta_{1+}cX_1+e$

Step 2 Y= a X+e

Step 3 Y= c'X +bZ+e

When IP are predicted by both TC and LP:

- The regression coefficient of LP(b) should be significant
- The regression coefficient of TC differently when LP is in the regression than when LP is not (c' is different from c)



(632*.179) =.113

.113 +.632=.745

The study showed that Loan Processing (LP) mediated the relation between human Technological Capital (TC) and Innovation Performance (IP) partially because the TC predicted IP coefficient .784 and p-value .000, TC also predicted LP coefficient. 632 and p-value .000 and LP predict IP when both LP and TC are in regression a coefficient .745 and p-value .000. It was therefore concluded that since the regression coefficient of TC is smaller (.745) when LP is in regression than when TC is alone in regression (.784), there is partial mediation in this study between TC and IP by LP. Loaning processing procedures and requirement therefore play a partial mediating role in the youth enterprises in terms of innovation where technological capital is in consideration as an element of intangible assets.

Table 4.17 Coeficients

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	TECHNOLOGY CAPITAL	.784	.016	.970	50.385	.000

a. Dependent Variable: INNOVATION PERFORMANCE
b. Linear Regression through the Origin

Table 4.18 Coefficients

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	TECHNOLOGY CAPITAL	.632	.044	.782	14.410	.000
	LOAN PROCESSES	.179	.049	.200	3.692	.000

a. Dependent Variable: INNOVATION PERFORMANCE
b. Linear Regression through the Origin

III. Discussion

In exploring how technological capital determines innovation performance in the youth enterprises in Kenya, the results indicated that technological capital explains 36.3% of innovation performance in youth enterprises in Kenya. This research established that technology capital determines innovation performance through technological skills, technological facilities and acceptance of new technology in business operations. Correlation analysis revealed the results of this study that technology capital and innovation performance indicated a strong positive linear correlation between technology capital and innovation performance. The regression analysis was significant because the alternative hypothesis was true that $\beta_4 \neq 0$.The implication is therefore that technological capital has a significant ability to determine the level of innovation performance in youth enterprises in Kenya. It therefore,

conforms to a study done by Ramirez (2010) indicating that technology capital is a combination of knowledge related to the development and technical systems of an organization. Technological capital is based on the activities and functions of both internal and external scope which are linked to the development of products and services of the organization.

IV. Conclusion

The technological capital had high influence in determining the level of innovation in youth enterprises in Kenya. It had three sub-variables which included technological skills, technological facilities and the information management systems. The results for the technological skills indicated that the ability to use technology among youth entrepreneurs highly demonstrated innovativeness. The ability to use smart phones and computers was evident among all youth enterprises, and this helped in diverse ways leading to high levels of innovation in their enterprises. The results for technology facilities indicated that all were well facilitated technologically thus were highly innovative since they could reach out to new markets and introduce new products in their enterprises as a results of using internet and communicating with mobile phone technology. Smart phones, tablets and computers were the main facilities in youth enterprises as indicated in the results. The results for information management systems indicated that little was accomplished in youth enterprises since the businesses were still small.

V. Recommendation

Technological capital in dimensions of technological skills, facilities and management information systems (MIS) emerged as determinants of innovation performance in the study but the need to improve on information management systems was clearly seen. Outsourcing the management system and cloud computing was recommended before the enterprises grow bigger and afford their information management systems. The need for the MIS was not evident in majority enterprises but the need to grow their businesses was recommended and as a result better ways of managing the information will be required. Through the growth, more employment opportunities will be created, and this will solve the problems of idleness, radicalism, and alcoholism and drug abuse among youths.

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