



Role of technology in determining the competitiveness of the Kenyan electrical and electronic manufacturing enterprises in Kenya

*Margaret K Chemengich, Roslyn W Gakure, Antony Waititu Gichuhi and Paul Katuse

Jomo Kenyatta University of Agriculture and Technology (JKUAT), Nairobi CBD Centre,
Box 62000 00200, Nairobi, Kenya

*Corresponding Email: chemengichmail@yahoo.com

Accepted 20 August 2013

Abstract

In today's globally competitive landscape, enterprises split their production processes into a number of business functions which they move around the world to gain efficiency and/or new markets. This has resulted, at the global level, to increasing outsourcing of manufacturing, with the overall ratio in 2004 standing at 73% against 27% of in-house manufacturing. This article on the role technology plays in determining competitiveness of Electrical and Electronic Manufacturing Enterprises in Kenya is extracted from a wider research on the *Determinants of Competitiveness of Electric and Electronic Manufacturing enterprises in Kenya*. It combines theoretical and empirical reviews to complement the analysis of the survey results in coming up with the critical role that technology plays a predominantly traditional industry characterized by the manufacture hardware, electrical machinery and appliances, the bulk of which are not traded in the global market. The challenges faced by the Kenyan electrical and electronic manufacturing sector include lack of strategic fit into the new paradigm shift of Global value Chains (GVC) that govern the sector competitiveness.

Keywords: Competitiveness, technology, value chains, markets, partnerships, productivity, skill competences, fragmentation and outsourcing.

INTRODUCTION

With increasing competitive pressures and progressing globalization, the success of both a country's economy and firm's performance depend largely on the degree to which they participate in global production networks. Enterprises split their production processes into a number of business functions which they move around the world to gain efficiency and/or new markets (UNCTAD, 2002). At the global level, the overall ratio of manufacturing outsourced against manufacturing in-house in 2004 was 73% to 27% (Schipper and Haan, 2005). According to Economic Commission of Africa (ECA) (1998), the global trends and the experiences of the more successful economies, have adopted strategies based on making more effective use of new and existing knowledge and technology throughout the whole economy. Integration into the high technology Global Value Chains (GVC) creates more wealth for participating countries (Erumban, 2011). Firms or nations that fail to innovate lose their competitive positions.

The Kenyan originating electrical and electronic manufactures remained at the bottom of the technology pyramid, the bulk of which are not traded in the global market (ECA, 1998; Magu, 2011). There is urgency in promoting high technology value addition for high yield productivity to sustain the projected manufacturing growth rate of ten per cent

(10%) per annum in Kenya. This will be achieved through expanded foreign direct investment into internationally networked productive sectors while the government on its part sustains its pace of reforms to create an internationally competitive business environment.

The Kenyan electronic and electrical sectors have as yet to be integrated into fragmented GVCs of production governing global competitiveness (Lall, 1998; ECA, 1998; Erumban, 2011; Moradi and Tajamohammadi, 2011). While over ninety per-cent (90%) of Kenya's manufactures are still resource based, only thirty four per cent (34%) of the operating firms in the electrical and electronic sectors are in actual manufacture (KNBS, 2011). The challenges include the family based ownerships that are not conducive to partnerships that have better options of infusion of new technology and innovations compatible with emerging paradigm shifts in production changes to meet customer changing needs in a globalised business environment characterised by stiff competition from substitutes and new entrants. Other challenges faced by the Kenyan electrical and electronic manufacturing sector include continued operation from uncompetitive low technology and knowledge intensity segments lacking strategic fit to the new paradigm shift of offshoring/outsourcing production processes (Lall, 2000; UNCTAD, 2002; Erumban, 2011).

The theoretical underpinning the research on the role of technology in Kenya's electric and electronic sector competitiveness include the GCI (Lall, 2000) tying competitiveness to a nation's technological advancement, Porters Five Forces (1985) emphasizing the threat of substitutes from efficient high performers, Porters Value Chain (1990) and the Dunning Eclectic (1998) aligned to fragmented production processes (UNIDO, 2009) which builds on the fact that a product is rarely consumed in its original form. In the case of GVCs, this entails management of supply chains within and across firms; governance structures shaped through the dominance of internationally operating buyers and retailers; and the innovation systems focusing on building individual and collective competences among value chain actors in networks (UNIDO, 2009). Other theories include Porters Diamond (1990) which recognises the interdependence of payers along the value chain; and Haines Customised Value chains (2005; 2008) acknowledges that business involves different stakeholder in form of shareholders, customers, suppliers, workers, partners whose different aspirations and competences in both formal and informal arrangements have to be harnessed in a symbiotic way for the benefit of all players along the chain.

These theories were supported by a number of local and international studies. At the national level, Magu (2011) and Vision 2030 which confirmed Kenya's continued operations from low technology and knowledge intensity segments specializing in the manufacture of limited hardware, electrical machinery and appliances, most of which are not traded in the global market. At the regional level, Mwakaje (2010) study on the role of ICT in improving rural Tanzania farmers' incomes and Ajayi (2000) study on the packaging of technology into FDI inflows facilitates less endowed countries to upgrade their product qualities to meet international demand requirements. However this was contradicted by African Economic Research Consortium (AERC, 2005) which concluded that irrespective of the extensive reforms in Africa, FDI inflows were as yet to be experienced. Hidding, Williams and Sviokla (2011) re-emphasize the role of partnerships of integration and competences significant in technology adoption.

Research Study

A descriptive survey based study from a stratified sample of 23 firms in manufacturing, policy and facilitation informed the findings of the role of technology in determining the competitiveness of the Kenyan electric and electronic sector competitiveness. Based on Babbie (1990) and Mugenda and Mugenda (2003) assertions that a response rate of 60% is good; 70% is very good, the response rate of 87% for a descriptive survey provided a firm basis for making inferences on the whole population as presented in Table 1.

Table 1. Response Rate by Public and Private Sector Categories

Respondents	Questionnaires issued	Returned	Response rate
Private sector:			
Non-KAM Members	6	5	83.3%
KAM-Members	10	8	80.0%
Private sector associations	2	2	100%
Public Sector:			
Ministries	2	2	100%
Parastatals	3	3	100%
Total	23	20	87%

DISCUSSIONS

Industrial structure and characteristics

Besides an aging industry, with 54% of the firms having been set up before 1980, less than 70% have upgraded their technology since 2005 with the coming into effect of the EAC CU. Less than 16% of the firms were set up after 2000 with expansion of regional markets into the EAC CU (2005), EAC CM (2010) and COMESA FTA (2000). The majority (45%) of the firms were involved in electronic appliances, computer and office equipment and industrial electronics all of which are at the bottom of the value chain. Close to 79% of the firms were privately owned and operating from savings which was consistent with family based SME undertakings. In spite of the wide knowledge on global value chains, nearly all the firms were not participating in any GVC. Trading was limited to national and regional markets. These characteristics were consistent with non-competitive low technology and knowledge intense industry (EAC, 2011; KNBS, 2011; Magu, 2011) lacking linkages and networks with MNC/TNCs and integration to the global economy (Lall, 2000; Abdullah, 2011; ECA, 1998). On the basis of Haughton and Thornborn (2004) knowledge and technology intensity classification of the electrical and electronic sector, the Kenyan industry falls within the category of basic services of repair and maintenance and assembly of original equipment.

Effect of Technology on the Electric and Electronic Sector Competitiveness

The effect of technology on Kenya's electrical and electronic manufacturing enterprise competitiveness in the study was investigation against the critical issues and factors impacting on technology adoption, This included strategies that could be prioritized in light of the paradigm shift in the current business environment, for enhanced technology upgrading and productivity investments, adoption of modern communication systems, improvement of staff competences and management efficiencies.

With the strong concurrence on technology adoption and upgrading, close to 70% of the firms upgraded their technology with coming into effect of the EAC CU and CM and COMESA FTA In this regard it would appear that market access prompted manufacturers to upgrade their production technology in order to remain competitive in the market place. This was corroborated with the GCI (Lall, 2000; Waheeduzzam, 2011); OECD (2007) and Erumban (2011) assertions that technology competences among other factors, determine competitiveness including product diversification in order to move up the chain. However, in spite of the technology upgrading, the Kenyan electrical and electronic products did not move from the low technology and low knowledge intensity levels (Haughton and Thornborn, 2004; Vision 2030, 2007; Magu, 2011) neither did they move up the value chain. This therefore was an indication that low technology intensity upgrades made were consistent with those for the non-competitive sectors. However, there could be also the problem of funding given that most of the firms are SMEs run on savings. There might be need to either evaluate the possibility of establishing a technology fund or investing in promotion of strategic partnerships for purposes of encouraging technology transfer.

The role of partnerships in introducing new technology in the electric and electronic manufacturing sector for purposes of enhancing competitiveness was acknowledged by 76.8% of the manufacturers. Further interrogation on what inspired their technology based partnerships, revealed that the driving factors were mainly market access, gaining competitiveness, introduction of new technologies for economies of scale, cost reduction, leveraging R&D opportunities and new skill competences from the better endowed partners. These views were further validated with the manufacturers' declarations of operational partnerships (61.5%) and potentials for local and foreign partnerships (69.2%). These findings confirmed that the electrical and electronic sector manufacturers were ready to enter into strategic partnerships in order to access new modern technology for purposes of improving their competitiveness. They were also corroborated by Hidding G.J. and Sviokla (2011) study on *How Platform Leaders Win* which demonstrated that networks of first movers and followers leverage each other's competences to avoid re-inventing the wheel. These findings imply that though the Kenyan industry was dominated by family based ownership, their attitude to partnerships was positive. As such introduction of outsourcing in the electric and electronic sector stood to be accepted. This should open doors for part of the equipment contract manufacturing to move from the more developed countries to the developing countries including Kenya. Nevertheless, further research should be carried out to determine the optimum mode of fund raising for technology upgrading while safeguarding the family interests.

The study further obtained views regarding the adoption of fragmented production systems governing the sector competitiveness in the local Kenyan industries. In addition to the 76.9% of the manufacturers' concurrence in adopting contemporary *fragmented production systems* governing competitiveness, the residual of 23.1% were indifferent. The manufacturers' sentiments were consistent with the global practice of outsourcing in which manufacturing in-house accounted for 27% against outsourced production of 73% (Schipper and Haan, 2005). The Kenyan industry appeared

not to be ready to adopt and fit into the new paradigm shift of off-shoring production processes (Lall, 2000; UNCTAD, 2002 and Erumban, 2011) because of their low placement in the value chain. The findings implied that the Kenyan business community including the public and private sector facilitators seemed to have faith in the new fragmented production systems. However, the operational partnerships in the sector had not moved up the value chain to justify off-shoring. There was need to establish the reasons for the continued non-participation of the Kenyan electric and electronic sector in the off-shoring production processes.

The stakeholder views on possibilities of investing in new products dominating the global markets were lauded by 84.6% of the respondents. The findings gave the impression that Kenyan businesses were ready to invest in new global products, consistent with Solow (1957) theory of short Product Life Cycle (PLC) requiring continued product renewal to meet the changing consumer tastes. Dell Computers for example had reduced their warranty to one year while Sonny required buyers to register or else enjoy a warranty of 90 days. Similarly, and consistent with short PLC, very cheap mobiles are now available in the market. The cost of repair for such products when they break down was no different from the purchase of a new one. However, with the predominance of short shelf life products, the Kenyan business community has to adapt to the new business environment otherwise the old traditional products shall no longer be trendy, particularly among the newer younger generation. These findings portrayed the non-alignment of the country policy and practice in as far as engaging in the production of products traded at the global level was concerned.

The contributions of management efficiencies and operational strategies in furthering the adoption of new technology in the electrical and electronic sector were analysed in accordance with the views and practices consistent with adoption of flexible business strategies and distribution systems in changing market requirements and business environment. A very high proportion of 84.6% of the manufacturers agreed on investing in flexible business strategies in order to cope with the changing consumer demands in a dynamic competitive business environment. These results confirmed that the industry was aware of the changing global business environment. The findings were corroborated by the different competitive strategies and tactics (Porter, 1995; 1998) to the effect that manufacturers had to employ new strategies to either remain or enter new markets. Some of these strategies included outsourcing, contracting, and agency operators among others. According to available literature (Prahalad and Principle 1990; Teece, 1992 and Spulber, 2007), the latest strategies for coping with competition in a globalised business environment was the production of non-reusable products at relatively cheap prices. These have been adopted by the larger global companies in the manufacture of phones, computers among others. Since electrical and electronic are among the global products and at the same time the priority products for transforming the Kenyan economy, the government has to team up with the private sector in planning for the migration of the sector into the new production systems and processes that include outsourcing/off-shoring in fragmented production systems.

All the manufacturers agreed on the need to invest in modern distributions systems, anchored on the supply chain management steeped into information technology (Haines, 2005; 2008). These findings were consistent with operational distribution systems in which supermarket distribution networks were on the increase in the urban and the more affluent rural areas. Except for the supermarkets, the distribution channels in the rural Kenya remain traditional. According to Economic Survey 2012, supermarkets and shopping malls catered for more than 30 per cent of the retail needs. Online advertising and sales had picked up momentum and captured substantial market shares. While modern distribution systems are critical for fragmented production systems, there was need to investigate their affordability by the SME manufacturers.

Apart from a minority group of 7.7% who were indifferent on modernising the communication and information systems, 92.4% were in agreement. These findings were consistent with the obtaining practice in which most of the manufacturers and facilitating institutions operated websites; and corroborate Supprasert (2006) study on the *Impact of ICT on the Growth of the Service Industry* which established that both productivity and profitability were significantly linked to the level of ICT intensity. The same conclusion was cited by Garicano and Heaton (2010) who in analysing panel data of criminal activities for the period 1987-2003 established that IT on its own may not solve crime; however, when taken as part of organizational change, there was noticeable productivity improvement. These were consistent with Haines (2005) theory of customised value chains in which information packaging on the appropriate IT platforms facilitated both business executives and customers to make decisions. The latest internet technology developments (emails, twitter, YouTube, Facebook, etc) had made communication across the globe instant (Postems, Spears and Lee, 1999; Orlikowski, 1992) and thus enhancing business opportunities for all. A large proportion of the government operations and service delivery including tax collection and administration are now transacted on line.

The role of staff competences in the changing business and market requirements in a globalised business environment established the need for continuous staff development in order to cope with advancement in communication, information, and transportation to facilitating diverse players. Both the public and private sector were in near total agreement (92.3%) on matters of continuous staff development to discharge their duties. These findings as corroborated with Kenya government reviewed education and training policy to equip the graduates with the skills that

meet the market requirements (GOK, 2012; Cap 211) confirmed the business community's belief in development of skill competences in managing the electric and electronic sector competitiveness. According to ECA (1998), international competitiveness was increasingly being defined in terms of agility to access, learn, adapt, utilize and innovate from available technology. In any case the more competitive segments of the electrical and electronic sectors were knowledge intense (Haughton and Thorborn, 2004).

Regression Analysis

The degree of correlation and levels of significance between competitiveness and technology was 0.466 and a p-value of 0.038 for a 5% 2-tail test (Table 2). This depicts a positive and significant relationship between competitiveness and technology adoption since the p-value is less than 0.05.

Table 2. Correlation Coefficients -Technology and Competitiveness

Variable	Coefficient Type	Competitiveness	Technology
Competitiveness	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	20	
Technology	Pearson Correlation	.466	1
	Sig. (2-tailed)	.038	

These results are corroborated by Kaskorda (2007) study on the role of ICT in industry competitiveness and the justification for professional training in the different aspects of ICT. Similarly, Kajogbola (2004) research on the impact of technology on Nigerian economy confirmed the strong correlation between technology and competitiveness of the manufacturing and services sectors. Further, UNCTAD (2003) Case Studies on Kenya, Ghana, Uganda and Tanzania in comparison with the Asian countries brought out the respective country technology gap challenges of low technology adoption and poor policy environment curtailing the individual country competitiveness. The findings of the correlation test confirm the need for adoption of technology in order to enhance sector competitiveness. The electrical and electronic sectors in Kenya stand to benefit from technology upgrading.

The coefficient of determination (R Square) of 0.217 indicated that the model explained 21.7% of the variation or change in the dependent variable. This meant that technology on its own could explain 21.7% of the variation in the competitiveness of the electronic and electrical sectors. The findings corroborate Njoga (2013) case study on the role of technology in improving the efficiency and competitiveness of the Kenya Pipeline Company. However, they were in contrast with Warren-Rodríguez (2008) Mozambican study on the *Linkage of Technology and Enterprise Growth* which identified a weak and, in some cases counterintuitive, association between levels of technological capability and innovation and enterprise performance. The findings of the analysis propel the Kenyan electrical and electronic sector into modernising its technology in order to gain competitiveness. However, since technology contribution to competitiveness was relatively low, there might be need to carry out additional research to establish the more critical issues inhibiting the competitiveness of the electrical and electronic sectors in Kenya.

Table 3. Model Summary Fitness Test- Technology and Competitiveness

Indicator	Coefficient
R	0.466
R square	0.217
Adjusted R Square	0.174
Standard Error Estimate	52.77455

The change in competitiveness due to a unit change in technology was positive with a unit change in technology leading to 5.962 units of positive change in competitiveness of the electrical and electronic sectors. This meant that technology was significant in influencing positively the competitiveness of the electrical and electronic sectors in Kenya. With a constant of 425.111, the model estimate for technology competitiveness reads as follows:

$$Y = 425.111 + 5.962X_1 + e$$

These findings corroborate the UK study reviews of various sectors which heightened competitiveness associated with globalised value chains (BIS, 2010) through the adoption of long term changes in technology and consumer preferences. UNCTAD (2002) report reaffirms the sustained movement in world exports towards the growing

significance of a limited number of products associated with intense technological. The results were further corroborated Aduda and Kingoo (2012) findings in which adoption of ATM technology improved returns in the banking sector in Kenya. The implications of these findings point to the need for intensified technology upgrading in global products, which include among other electric and electronic products. Kenya needs to take the decisive position of establishing linkages with multinationals so as to integrate into the global value chains and benefit from global markets.

When combined with innovation, market access and regulations with the moderating effect of the operational environment, the significance of technology in influencing electric and electronic sector competitiveness in Kenya did not decline. On the basis of the regression coefficients and the coefficients of determination of 100%, the model can be represented as follows:

$$Y = 3.267X_1 + 3.433X_2 + 4.117X_3 + 4.100X_4 + e$$

Where X_1 = Technology
 X_2 = Innovation
 X_3 = Market Access
 X_4 = Regulations

The independent variable VIFs in excess of 10 puts to question the coefficient estimates. However this could be sample size, categorical responses, estimation model or control independent variables (Allison, 2012; Greene, 2000; Wooldridge, 2000). The results indicate that there could be other factors impacting on the competitiveness of the electric and electronic manufacturing sector in Kenya. However, the goodness fit of 100% of the model discounts these doubts. These results Njoga (2013) case study on the role of technology in improving the efficiency and competitiveness of the Kenya Pipeline Company and Kajogbola (2004) research on the impact of technology on Nigerian economy confirmed the strong correlation between technology and competitiveness of the manufacturing and services sectors. The findings however contradict Ongwae (2011) and Mulatu and Florax (2003) studies on the effectiveness of the regulations in the counterfeits, and Tan (1996) study of Chinese entrepreneurs which had established that competitiveness was inversely to intense regulations.

Table 4. The Effect of Multi collinearity on the Regression Coefficients of the Independent Variables and Competitiveness

Model	Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
	B	Std. Error	Beta	t	Sig.	Tolerane	VIF
Technology	3.267	.000	0.081	5.375E6	.000	.056	17.868
Innovation	3.433	.000	0.103	5.255E6	.000	.033	29.934
Market Access	4.117	.000	0.458	2.821E7	.000	.049	20.476
Regulations	4.100	.000	0.377	2.243E7	.000	.046	21.910

The partial analysis of the model with the moderating variable validated the strong effect of technology in the electric and electronic sector competitiveness. However, technology and innovation were overestimated while market access and regulations were underestimated. This could have been occasioned by the sample size or the effect of the multiple questions. The results indicate that the operational environment was not very critical for competitiveness of the electrical and electronic sector in Kenya.

Table 6. Comparison of Partial and Independent Variable Coefficients

Control Variable	Variables	Partials		Individual variable	
		Correlation	Sig.	Correlation	Sig.
Operational environment	Competitiveness	1.000		1.000	
	Technology	0.465	0.045	0.466	0.038
	Innovation	0.542	0.017	0.623	0.003
	Market Access	0.457	0.049	0.580	0.007
	Regulations	0.590	0.008	0.399	0.082

CONCLUSION

The degree of correlation and levels of significance between competitiveness and technology was positive and significant. This was supported by the correlation coefficient which showed that 46.6% of the variations in electrical and electronic sector competitiveness were explained by technology. The p-value of 0.038 for a 5% 2-tail test was significant since it was less than 0.05. This was further re-enforced through the regression analysis, in which the coefficient of determination of 0.217 indicated that technology alone in the model explained 21.7% of the variation or change in the dependent variable. The positive Beta coefficients of 5.962 indicated that a unit change in technology leads to 5.962 units of positive change in competitiveness of the electrical and electronic sectors. Validation with partial analysis indicated that there was no effect from the operational environment in the effect of technology on the competitiveness of the electric and electronic sectors in Kenya. This means that technology was significant in influencing positively the competitiveness of the electrical and electronic manufacturing sectors in Kenya.

The challenges in technology adoption included continued operation from traditional low technology and knowledge intensity segments with low productivity, most of which are not globally traded. Further, family based ownership of businesses are not conducive to partnerships which have better options of infusion of new technology and innovations compatible with emerging production changes; and cannot sustain stiff competition from a globalizing business environment.

RECOMMENDATION

Besides the limitations of family based ownerships, access to modern technology in support of the electrical and electronic sector competitiveness seemed a major constraint to local Kenyan firms. Since most firms are SMEs, there was need to evaluate the possibility of establishing a technology fund or investing in promotion of strategic partnerships for purposes of encouraging technology transfer for enhanced productivity and graduation to higher value chain segments. These should be complemented with government providing leadership in policy direction, arranging for networks, skills development.

Areas of further Research

Further research should focus on what is really keeping away electrical and electronic investors from Kenya. This may include exploring the nexus for unlocking the stringent culture of family based ownerships and the strong affinity to traditional manufactures to move into the more lucrative outsourced production arrangements, align production with global demand to diversify the country's product/service range. It would also explore the possibilities of migrating part of the electrical and electronic sector into the EPZ facilities and the dedicated investment parks within the framework of Vision 2030 in order take advantage of the lucrative incentives and infrastructure.

REFERENCES

- Aduda J, Kingoo N(2012). The Relationship between Electronic Banking and Financial Performance among Commercial Banks in Kenya. J. Finance and Investment Analysis. 1(3): 99-118.
- Ajayi SI (2000). "Capital flight and external debt in Nigeria". In I. Ajayi and M. Khan, eds., External Debt and Capital Flight in Sub-Saharan Africa. Washington, D.C.: International Monetary Fund.
- Allison P(2012). When Can You Safely Ignore Multicollinearity? Statistical Horizons, SEPTEMBER 10.
- BIS (2010). Manufacturing in the UK: an economic analysis of the sector Cap 211. The Education Act. Laws of Kenya
- Dunning J(1998). "Location and multinational enterprise: a neglected factor?" J. EAC, 2011. EAC Trade Reports
- ECA(1998). The Contribution of Science and Technology to African Development, Annual General meeting, Abuja, Nigeria. ECA, Addis Ababa.
- GOK (2012). Economic Survey
- Haines M (2005). *Optimize Your Role in the IT Channel Value Chain - Ways you can ensure that a weak link won't sink your company*, VARBUSINESS, [Online] Available: www.crn.com/itchannel/163105266.jsessionid=PH25DV4NP44XOQSNLDSKHSCJUNN2JVN (31 May, 2008)
- Houghton J, Thorborn L (2004). The Victorian Electronics Industry Cluster, Yearbook of World Electronics Data: Volume 1, 2004. Available <http://www.instat.com/catalog/> on Australian ee sector).
- Kajogbola D O(2004). The Impact of Information Technology on the Nigerian Economy: A Study of Manufacturing and Services Sectors in the South Western and South Eastern Zones of Nigeria. African Technology Policy Studies Network. Kaskorda M(2007). Emerging Trends in Information and Communications Technology Education in Kenyan Universities.
- KNBS (2011). Economic Survey. Government Printers, Nairobi
- Lall S (1998). The Technological Structure and Performance of Developing Country
- Lall S(2000). The Technological Structure and Performance of Developing Country

- Magu DM (2011). Modern technology adoption trends of small and medium electrical/electronics manufacturing enterprises registered in Nairobi. Manufactured Exports, Pp. 1985-1998
- Mugenda MO, Mugenda AG(2003). Research Methods: Qualitative and Quantitative Approaches. ACTIS Press
- Mulatu A, Florax RJGM(2003). Environmental Regulations and Competitiveness: An Exploratory Meta-Analysis. 20: 23–54
- Mwakaje AG(2010). *Information and Communication Technology for Rural Farmers Market Access in Tanzania*. J. Info. Technol. Impact, 10(2): 111-128.
- Njoga AL(2013). Factors Affecting Effective Stores Management In The Public Sector: A Case Of Kenya Pipeline Company, Inter. J. Social Sci. Entrepreneurship. 1(3):149-157.
- OECD, (2007). Sustainable Development Programme. Invitation to Workshop on Sustainable Manufacturing Production and Competitiveness. Copenhagen, Denmark, 21-22 June 2007. of quantitative tools to determine the expected performance of unit processes in of the Royal Statistical Society, Series B. 48:170–182.
- Orlikowski WJ(1992). The duality of technology: rethinking the concept of technology in organizations. Organization Science. 3(3):398-427.
- Porter M.E(1998). On Competition. A Harvard Business Review Book Postems, Spears and Lee, 1999;
- Porter M. E (1986). Competitive Strategy. Harvard Business School Press.
- Porter M. E (1990). The Competitive Advantage of Nations. New York: Free Press.
- Prahalad CK, Principle (1990). The Core Competence of the Corporation. Harvard Business Review. Prentice Hall: Upper Saddle River, NJ, USA
- Managing Change. A Strategic Approach to Organisational Dynamics, Fourth Edition Press of Florida).
- Saprasert K(2006). The Impact of ICT on the Growth of the Service Industry. University of Oslo, Norway.
- Schipper I, Haan E(2005). CSR Issues in the ICT hardware manufacturing sector. SOMO ICT Sector Report. September 2005.
- Solow RM(1956). A Contribution to the Theory of Economic Growth. Quarterly J. Econ. 70(1): 65-94.
- Spulber DF(2007). Global Competitive Strategy. Pp. 290
- Tan J(1996). Regulatory Environment and Strategic Orientations in a Transitional Economy: A Study of Chinese Private Enterprise. 21(1):31-46
- Teece DJ (1998). Capturing Value from knowledge Assets: The New Economy, Markets, for Knowhow, and intangible Assets. California management Review. Spring, 40: 3
- UNCTAD (2002). Trade and Development Report.
- UNCTAD (2003). Africa's Technology Gap. Case Studies on Kenya, Ghana, Uganda and Tanzania
- UNIDO(2009). Value Chain Diagnostics for Industrial Development
- Waheeduzzaman ANM(2011). Competitiveness Review: An International Business Journal incorporating Journal of Global Competitiveness. 21(2):110 – 128
- Warren-Rodríguez A (2008). Linking technology development to Enterprise Growth: Evidence from the Mozambican manufacturing sector. London: School of Oriental and African Studies, University of London (Department of Economics Working Papers 160)
- Wooldridge JM(2000). Introductory Econometrics: A Modern Approach, South Western. (Library code: D 330.43 WOO).