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Realizing energy management practices as a competitive strategy among manufacturing firms in Kenya: An alternative outlook

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The Kenya's Energy Management Regulations (2012) spells out a raft of actions that consumers of electricity and petroleum products can implement so as to enhance energy efficiency, reduction of energy costs and creation of surplus for distribution. However, few manufacturing companies have carried out implementation. The regulations create avenues for enforcements and promotion of energy management practices within the sector. With lack of coordination and capacity building, energy inefficiencies have continued unabated. The objective of the study was to determine the effect of implementation of energy management regulations on attaining competitive advantage among manufacturing firms in Kenya. Both qualitative and quantitative research approaches were used. A normative survey research design was considered with a target population of 1,459,870 employees drawn from manufacturing in Nairobi County, Kenya. A sample of 399 respondents was randomly selected. Self-administered questionnaire were used to collect primary data while empirical data was obtained from previous studies. Data analysis was done using descriptive statistics (mean, standard deviation, and frequency distributions). Inferential statistics included correlation for test of association, and regression for test of hypothesis. The results showed that implementing energy management regulations contributes 35.7% increase in firm competitive performance while holding other factors constant. The regression result showed that energy management regulations when implemented accounts for 18.6% change in competitive advantage; hence, there remains other factors to be investigated.

Key words: Practices, regulations, competitiveness, outlook.

INTRODUCTION

Mlamo (2004) and Xiaohua (2013) identified accreditation, regulation, audits, and information sharing as the avenues of enhancing energy efficiency practices among business enterprises. The Energy Regulatory

Commission (ERC) in Kenya developed the Energy Management Regulations (2012) through the Energy Act 2006. The Act requires users of energy to put in place energy efficiency practices in all sectors. This means that

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all firms should develop energy performance benchmarks that can be graded upon. In addition, these benchmarks can be used to measure efficiency performance and is instrumental in enforcing compliance of established regulations. IEA (2017) recommends capacity building, behaviour change, promotion of energy management standards, awareness and policy development as contributing to firm energy efficiency.

In Kenya, sub-sectors such as sugar, starch, meat, dairy and the drinks industry are known to use more electrical and fossil energy at the core of their operations. Such energy resources are essential for boiling, evaporation, pasteurization, drying and cooling. With rising energy prices, firms ought to adopt certain measures to achieve further energy management levels and attain its competitiveness (Rademaeker et al., 2011).

Energy management standards, such as the use of tax and fiscal policies, are measures that can also be adopted in energy management endeavours. The current study aims to link the benefits of such efficiency endeavours to attaining competitive advantages, since previous studies anchor on environmental conservations, cost reductions and reduced energy demands (Cantore, 2011).

Energy management regulations in manufacturing firms

In Australia, energy management practices are compulsory for large energy using firms while in Denmark and Netherlands, it is a voluntary initiative (IEA, 2012). The Government of South Africa as cited by Abrahams et al. (2013) noted that the world energy assessment suggests a cost reduction of up to 35% over a period of 20 years, if the appropriate policies are implemented in support of existing energy management practices.

The National Environmental Policy (2013) observed that Kenya is dependent largely on electricity and petroleum sources of energy. The policy document recommends that in order for the country to be energy efficient; “the country’s energy policies must ensure a robust and efficient energy system that is secure and sufficient.” This therefore promotes industrial competitiveness and economic growth.

Energy audits when carried out can lead to huge savings of between 15 to 30%. As such, Kenyan Companies such as Spin Knit and British American Tobacco (BAT) have enjoyed savings of more than 25% in expenses (Makambo, 2012). The energy audits found that flower firms in Kenya enjoyed energy savings of between 3,500 to 40,000 kWh per year and cost savings of between KSh. 71,000 to Ksh.811, 000 if energy management practices are implemented. In this case, it can be argued that; if all manufacturing companies implement the same, then the overall savings for both cost and usage is vast. Carbon Trust (2011) also states

that energy management practice yields a cost savings of 5 to 25%.

Oimeke (2013) concurs that for firms to promote energy management practices, awareness and dissemination of information for efficient use of energy are imperative. He further recommended that companies can strengthen consultancy services, promote research and development in the field of energy management, formulate and facilitate implementation of pilot projects, and give financial assistance to institutions for promoting efficient use of energy, assist in the preparation of energy management educational curriculum, provide incentives for companies that make investment in energy management practices, collaborate with Kenya Bureau of Standards in importation of energy efficient technologies and participation in international co-operation programmes relating to energy management practices. These recommendations are further supported by Energy Regulatory Commission and Lewis et al. (2013) who proposed; introduction of building standards, setting energy management targets with industry, negotiating with industry players, research and development initiatives, all of which can be realized by enforcing the Energy Management Regulations of 2012.

Manufacturing sector in Kenya

The Kenya’s manufacturing sector is the third largest consumer of energy in Kenya (Moraa et al., 2011). This is the sector that leads all other sectors in electricity consumption and the second largest consumer of petroleum products should embrace energy efficient practices. The study further notes that continuous use of electricity and petroleum products has been rising, resulting in increased costs in terms of energy bills and production expenses (Moraa et al., 2011). The findings are supported by earlier studies carried out by Energy Regulatory Commission (ERC) (2016) in Kenya which noted that the shortage of fuel and high electricity prices remain the major problems to the manufacturing sector. The sector uses up to 35% of their total revenues on energy resources. The report also indicates that the country’s annual loss of energy due to inefficiencies is between 10 and 30% (ERC, 2016). Manufacturing processes involves conversion of raw materials into finished goods and in this case, there are opportunities to exercise energy management improvement in order to reduce costs and reduce environmental impact (Contet and Konig, 2012).

In Kenya, there is lack of persistent coordinated national strategy on energy management despite the Energy Management Regulations of 2012 being established (Mbogori et al., 2013; GOK, 2015). In a research commissioned by the Kenya Energy Regulatory Commission, it was revealed, “Energy management is a relatively new concept amongst engineers and facility

managers, with little known about the potential for saving energy and even less is done". This is despite the fact that the overall aim of energy management is to reduce consumption without affecting productivity or increase utility costs (Oimeke, 2013).

Energy Management Regulations (2012)

The Kenya Energy Regulatory Commission (ERC) published the Energy Management Regulations, 2012 to enable consumers carry out energy audits on their firms or households with guidance from licensed auditors recommended by Energy Regulatory Commission. The Energy Bill, 2015 contains a significant clause where the Energy Regulatory Authority is mandated with the authority to coordinate, develop and implement a prudent national energy management and conservation programme (GOK, 2015). This mandate enables the authority advice and conduct energy audits for purposes of advising consumers of electrical energy appropriately. The same bill also stipulates penalties for non-compliance such as; fine of not less than two hundred and fifty thousand shillings, or to a term of imprisonment of not less than nine months, or to both for failure to comply with the authority requests for energy utilization data of their premises. Energy users are also required to develop energy investment plan, conservations measurers, and implementation reports.

The audits are scheduled to take place every three years. The regulations require that the targeted companies have to set up a committee and appoint an Energy Officer in addition to developing and submitting organizational energy management guidelines to The Energy Regulatory Commission for approval. Companies are also required to submit audit reports and implementation plans to the commission for consideration. The Energy Management Regulations of 2012 highlights four key issues to be considered by energy management practicing firms.

The policy enumerates the following as initiatives to be undertaken by firms:

- i) That the owner or occupier shall develop an energy management policy for the facility.
- ii) That the owner or occupier shall within one year of classification file the energy management policy for every designated facility with the Commission for approval before implementation.
- iii) That the owner or occupier of a facility shall designate an Energy Officer for every designated facility, who shall be responsible for the development and implementation of energy management and conservation.
- iv) That the owner or occupier of a facility shall maintain records of information for every designated facility for a minimum period of five years from the date of occupation of the facility, which shall include – monthly and annual electricity, fuel and water consumption. It also includes;

Monthly production data or occupancy levels; and up to date building plans, infrastructure plans and floor area drawings.

In addition to the above requirements, Energy Regulatory Commission also imposed a fine of KES.1 million, a year imprisonment for the facility head or both if they delay in submitting the implementation report. Firms that delay to submit are to be fined also KES. 30,000 per day (Kosgei, 2015).

This refers to Policy Implementation, Energy Audits, Energy Investment Plan, and Energy Management Measures. These are all well-articulated in the energy (energy management) regulations, as designated under The Energy Act, 2006. The Act directs manufacturers and other consumers of electricity and petroleum products to adopt the energy management practices specified, failure to which, penalties will be enforced on non-compliant firms. The effect of not complying is a fine of KES. 1 Million or KES. 30,000 per day.

MATERIALS AND METHODS

The study was carried out in Nairobi County. The study adopted a mixed methods approach, with a descriptive survey research design. The descriptive survey method was used to gain tangible information using structured questionnaires. The questionnaires were administered through drop and pick. Both quantitative and qualitative data collected was analysed using both content analysis for qualitative and descriptive and inferential statistics for quantitative data. It was then presented using Tables. The study selected a random sample of 399 respondents from all the employees of the 14 companies chosen purposively. However, 314 respondents returned the questionnaires. This was considered appropriate since it was above appropriate threshold of 55.6% (Baruch, 1999). Reliability tests results was greater than the minimum accepted Cronbach's alpha coefficient of 0.70 which was the predetermined cut off point. This method enabled collection of facts and relevant information regarding the effect of energy management regulations on sustaining competitive advantage among manufacturing firms (Hussey and Hussey, 1997).

RESULTS AND DISCUSSION

Intensity of Energy Management Regulations (Chi-Square Goodness-of-Fit Test)

The study objective had 9 questions that the study sought to gather responses to. In order for the study to obtain adequate feedback from respondents, the 5-Likert scale items were presented to the respondents and their responses analysed and presented in Table 1.

From Table 1, membership to ERC and Implementation of Energy Management Regulations was statistically significant Chi-Square ($\chi^2 = 349.981^a$ at $p < 0.05$). This indicated that there was a statistically significant difference of agreement among manufacturing firms on whether membership to Energy Regulatory Commission

Table 1. Intensity of energy management regulations.

S/N	Variable	Test Statistics							
		SD(%)	D(%)	NS(%)	A(%)	SA(%)	Chi-Square	df	Asymp. Sig.
1	Member of ERC and Implementation of Energy Management Regulations	2(0.6)	25(8)	178(56.7)	96(30.6)	13(4.1)	349.981 ^a	4	0.000
2	Has Documented Policy with ERC		44(14)	140(44.6)	82(26.1)	48(15.3)	75.350 ^b	3	0.000
3	Has Energy Officer and Keeps Records of Energy Consumptions	11(3.5)	24(7.6)	138(43.9)	117(37.3)	24(7.6)	227.497 ^a	4	0.000
4	Carried At least One Energy Audit		62(19.7)	92(29.3)	113(36)	47(15)	33.592 ^b	3	0.000
5	Submitted Audit Report to ERC		88(28)	85(27.1)	92(29.3)	49(15.6)	15.096 ^b	3	0.002
6	Developed and Submitted Energy Management Investment Plan	7(2.2)	33(10.5)	99(31.5)	130(41.4)	45(14.3)	161.541 ^a	4	0.000
7	Reviews its Energy Management Investment Plan	12(3.8)	22(7)	152(48.4)	127(40.4)	1(0.3)	320.745 ^a	4	0.000
8	Prepared and Submitted Energy Management Implementation Report		57(18.2)	139(44.3)	106(33.8)	12(3.8)	118.484 ^b	3	0.000
9	Firm Audited and Awarded Compliance Certificate	23(7.3)	23(7.3)	149(47.5)	94(29.9)	25(8)	207.019 ^a	4	0.000

^a 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 62.8. ^b 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 78.5.

led to attaining competitive advantage among manufacturing firms, hence facilitating further analysis. The finding showed that manufacturing companies had diverse opinions on the contribution of membership to Energy Regulatory Commission in attaining competitive advantage, with majority of the respondents having a positive preference. As such, membership to Energy Regulatory Commission should be a consideration in attaining competitive advantage (Energy Regulatory Commission, 2012).

Documentation of policy with ERC was statistically significant Chi-Square ($\chi^2 = 75.350^b$ at $p < 0.05$). This indicated that there was a statistically significant difference of agreement among manufacturing firms on whether documentation of company energy management policy led to attaining competitive advantage among manufacturing firms, hence facilitating further analysis. The finding showed that manufacturing companies had diverse opinions on the contribution of documented energy

management policy in attaining competitive advantage, with majority of the respondents having a positive preference. The findings agree with UNIDO (2008) which noted that nations with an emerging and fast increasing manufacturing sector have a particular prospect to increase their competitiveness by applying energy-efficient best practices from the onset in their industrial facilities.

Having an Energy Officer that keeps records of energy consumptions was also statistically significant ($\chi^2 = 227.497^a$ at $p < 0.05$). This indicated that there was a statistically significant difference of agreement among manufacturing firms on whether presence of Energy Officer and record keeping on energy consumptions data led to attaining competitive advantage among manufacturing firms, hence facilitating further analysis. The finding showed that manufacturing companies had diverse opinions on the contribution of presence of Energy Officer and record keeping on energy consumptions data in

attaining firm competitiveness. The results showed that the presence of a company Energy Officer or staff that monitors energy expenses and consumption led to significant improvement in attaining competitive advantage among manufacturing firms. The study also noted that there was positive preference on the presence of a company Energy Officer or staff as a practice that can lead to attainment of competitive advantage through continued monitoring of energy consumptions. IEA, in its study of South Africa supports the current study finding by recommending capacity building and behaviour change among industry players to sustain energy management gains (IEA, 2017).

Energy audits was statistically significant ($\chi^2 = 33.592^b$ at $p < 0.05$). This indicated that there was a statistically significant difference of agreement among manufacturing firms on whether conducting at least one energy audit led to attaining competitive advantage among manufacturing firms, hence facilitating further

analysis. The finding showed that manufacturing companies had diverse opinions on the contribution of carrying out at least one energy audit in attaining firm competitiveness, with the respondents showing a preference for such practice. This indicated that if manufacturing company carried out energy audits, the resultant effect is a significant improvement in attaining competitive advantage among manufacturing firms. Price and Wang (2007) as cited by (UNIDO, 2008) agrees with the study findings that energy audits remained as one of the key strategies in promoting energy management practice so as to enable the company control deviations that might impede organizational efforts in energy management efforts. Their study further stated that, collecting data on all major energy-consuming processes, collecting data on equipment and other related machinery in a plant, documenting technologies used in all production processes, and identifying opportunities for energy management improvement by a company assists in preparing detailed report with appropriate recommendations for the company to adopt. It concludes its report by supporting energy management audits as the essential first step in identifying opportunities that can contribute to an organization's energy management targets.

Submission of audit reports to ERC was statistically significant ($\chi^2 = 15.096^b$ at $p < 0.05$). This indicated that there was a statistically significant difference of agreement among manufacturing firms on whether submission of audit report to the ERC led to attaining competitive advantage among manufacturing firms, with the respondents showing a preference for such practice, hence facilitating further analysis. This indicated that the submission of such reports contributed a significant improvement in attaining competitive advantage among manufacturing firms. IEA (2017) agrees with the study findings and recommends that, "behaviour change can offer unique and hard to replicate competitive advantages and is necessary in a world of ubiquitous technology which can no longer be relied on to maintain a cutting edge". Hence, it becomes imperative that manufacturing companies in Kenya also become obligated in creating awareness among staff, training and present its yearly reports to Energy Regulatory Commission for verification and recommendations on how to better energy management efforts.

Having an energy management investment plan was statistically significant ($\chi^2 = 161.541^a$ at $p < 0.05$). This indicated that there was a statistically significant difference of agreement among manufacturing firms on whether developing and submitting energy management investment plan to Energy Regulatory Commission led to attaining competitive advantage among manufacturing firms, with respondents showing a preference for such practice, hence facilitating further analysis. This indicated that the submission of energy management plan to ERC

contributes a significant improvement in attaining competitive advantage among manufacturing firms. UNIDO, in its study findings carried out in the USA and Mexico further agreed with the study finding by stating that evaluations of energy management efforts and action plans helped firms to focus their attention on energy management and identify low-cost energy management options within a commonly agreeable investment benchmarks (UNIDO, 2008).

Review of energy management investment plan was statistically significant ($\chi^2 = 320.745^a$ at $p < 0.05$). This indicated that there was a statistically significant difference of agreement among manufacturing firms on whether reviewing energy management investment plan led to attaining competitive advantage among manufacturing firms, with respondents showing a preference for such practice, hence facilitating further analysis. This indicated that compliance in continued revision of energy management plan does contribute to improvement in attaining competitive advantage among manufacturing firms. Studies by UNIDO albeit agrees with the findings but recommends typical reviews of energy management practices by an independent third party and be updated as need arises in response to changes over time. UNIDO further argued that energy reviews should focus on company's energy usage and uses, its energy management measures, a timeframe for implementing energy management measures and expected results (UNIDO, 2008).

Having an energy management implementation report was statistically significant ($\chi^2 = 118.484^b$ at $p < 0.05$). This indicated that there was a statistically significant difference of agreement among manufacturing firms on whether preparing and submission of energy management implementation report led to attaining competitive advantage among manufacturing firms, with respondents showing a preference for such practice, hence facilitating further analysis. This indicated that the preparation and submission of energy management implementation report contributes a significant improvement in attaining competitive advantage among manufacturing firms. The study finding agrees with UNIDO which recommended that certification of compliant organization enhances the practice of energy management among manufacturing organizations (UNIDO, 2008). Hence, this should be a requirement among all manufacturing firms in Kenya.

Being awarded compliance certificate was statistically significant ($\chi^2 = 207.019^a$ at $p < 0.05$). This indicated that there was a statistically significant difference of agreement among manufacturing firms on whether firm auditing and awarding of compliance certificate led to attaining competitive advantage among manufacturing firms, with respondents showing a preference for such practice, hence facilitating further analysis. This indicated that auditing of manufacturing firms and awarding of

compliance certificate contributed to improvement in attaining competitive advantage among manufacturing firms. Natural Resource of Canada (2002) supports the study finding by noting firms should carry out energy audits since it remained a fundamental step in developing organizational energy management program. It further states that energy audit varies widely from one organization to another but the ultimate goal is to improve energy management and decrease energy costs. The guidelines acknowledge that external consultants usually carry out energy audits and organizations have a great opportunity in utilizing internal personnel. In its summary, Natural Resource Canada (2002) notes with great emphasis that energy audits enable a firm to verify effectiveness of its energy management opportunities.

The summary result for the study objective is supported by the Energy Management Regulations, 2012, which requires that all manufacturing companies enforce and adopt the Energy Management Regulation (Energy Regulatory Commission, 2012). Studies in Australia agrees with the current result by establishing that energy management practices are compulsory for large energy using firms while in Denmark and Netherlands, which is a voluntary initiative (IEA, 2012). The Government of South Africa (2004) report also points out that the world energy assessment leads to a cost reduction of up to 35% over a period of 20 years, if the appropriate policies are implemented in support of existing energy management practices. In Kenya, energy management practices also are a voluntary exercise since the governments seem to lack capacity in enforcing Energy Management Regulations, 2012; and this explains why the sector still incurs high cost on petroleum and electricity as shown in Table 4, with an average Expenses of 10.5% of their revenues.

The report by ERC (2016) shows that 268 company energy management policies were approved for implementation by the end of 2016. However, the current study findings show that most employees in manufacturing companies are “not sure” if it is being implemented in their companies. This implied that due to the stiff penalties of KES. 1 Million Levied if a company does not submit the guidelines for approval, most companies were fulfilling the requirement without the desire of implementation in their companies. This disagrees with the findings in Kenya which showed that the Kenya Energy Efficiency Accord launched in September 2011, saw 19 KAM member companies sign up voluntarily committing themselves to reduce their energy consumption of between 5 and 15% by 2016 with 10 more companies registering in 2012. However, by 2016 the consumption in the manufacturing sector had increased by 2.9% for electricity and 8.9 for petroleum products with a likelihood of more increase in consumption (KNBS, 2017).

The findings by Fischer (2013) support the results of the current study that in 2013, the U.S. was just 39%

efficient in energy use. This implies that 61% of the firms and households did not practise energy management and the same scenario is not different in Kenya. The current study findings are also supported by studies in South Africa (Mlamo, 2004) who established that energy management opportunities in Africa are often disregarded owing to the simple fact that users of such resources are unaware that they exist.

However, the study shows that a few companies that participate in the yearly energy management awards organized by Kenya Association of Manufacturers (KAM) are able to implement such guidelines (Kiema, 2014; Laurea, 2015). In addition, findings from a report presented by Sarah and Louise (2005) resolved that companies need to; provide an energy management policy to all staff, and promote awareness campaign on energy management practices which is not so, in the current situation in Kenya.

Correlation and regression analysis

The objective of the study was to determine the effect of implementation of energy management regulations on attaining competitive advantage among manufacturing firms in Kenya. The indicators of energy management regulations mean scores were used to test the first hypothesis. Respondents were also asked to indicate the extent to which energy management regulations had affected competitive advantage among manufacturing firms in Nairobi. The correlation results as shown in Table 2 revealed a moderate and positive relationship which showed that implementing energy management regulations has a positive effect on competitive advantage. The correlation result was statistically significant at $p = 0.05$.

The aggregate mean score of competitive advantage (dependent variable) was also regressed on the aggregate mean score of implementing energy management regulations (Independent variable) and the relevant results presented in Table 3. The regression results revealed a statistically significant relationship at 5% significance level between energy management regulations and competitive advantage (p -value = 0.05). The null hypothesis that (H01: Implementation of energy management regulations has no significant effect on attaining competitive advantage among manufacturing firms) was rejected since p -value was less than 5% significance level as shown in Table 3. The regression results showed that a one-percentage increase in energy management practices led to an increase of competitive advantage by 35.7% (coefficient of 0.357). This change is significantly beneficial to the manufacturing sector in attaining competitive advantage.

These findings are consistent with Kiema (2014) who noted that one unit of energy saved, corresponds to a saving of three units generated. The report further

Table 2. Correlation analysis.

Correlations		Dependent Variable-CA-Weighted Means for 9 Sub Variables	Objective 1: EMR-Weighted Means for 9 Sub Variables
Pearson Correlation	Dependent Variable-CA-Weighted Means for 9 Sub Variables	1.000	0.431
	Objective 1:EMR-Weighted Means for 9 Sub Variables	0.431	1.000
Sig. (1-tailed)	Dependent Variable-CA-Weighted Means for 9 Sub Variables	.	0.000
	Objective 1:EMR-Weighted Means for 9 Sub Variables	0.000	.
N	Dependent Variable-CA-Weighted Means for 9 Sub Variables	314	314
	Objective 1:EMR-Weighted Means for 9 Sub Variables	314	314

Table 3. Regression analysis.

Model Summary									
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	0.431 ^a	0.186	0.183	0.07766	0.186	71.309	1	312	0.000

^a Predictors: (Constant), Objective: Energy Management Regulations.

ANOVA ^b							
Model		Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	0.430	1	0.430	71.309	0.000 ^a	
	Residual	1.882	312	0.006			
	Total	2.312	313				

^a Predictors: (Constant), Objective: Energy management regulations.

^b Dependent Variable: Dependent Variable-Competitive advantage.

Coefficients ^a											
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	2.894	0.142		20.381	0.000					
	Objective: Energy Management Regulations	0.357	0.042	0.431	8.444	0.000	0.431	0.431	0.431	1.000	1.000

^a Dependent variable: Dependent variable-Competitive advantage.

Source: Research Data.

Table 4. Average Energy Expense (Petroleum and Electricity)

	Costs on Energy	σ
Annual Petroleum and Electricity Costs	10.5%	1.25797

indicates that in Kenya, energy costs and reliability has remained the biggest challenge to be overcome. The report also states that with the Kenya Association of Manufacturers (KAM) decision to establish Centre for Energy Management and Conservation (CEEC), gains in energy management are yet to be achieved. The Government of Kenya has also undertaken initiatives to address energy management issues. For instance, the Global Fuel Economy Initiative (GFEI) pilot study by the Energy Regulatory Commission provided recommendations and policy instruments to manage the national vehicle fleet and imports with regard to vehicle fuel economy (consumption litres per 100 km), and vehicle emissions (gCO₂/km) in the country (ERC, 2014).

Conclusion

The objective of the study was to determine the effect of implementation of energy management regulations on attaining competitive advantage among manufacturing firms in Kenya. The significant positive relationship between energy management regulations and competitive advantage implied that implementing energy management regulations had a significant influence on competitive advantage among manufacturing firms in Nairobi (Table 3). This showed that manufacturing firms stand to benefit competitively if they implement energy management practices in their firms.

These results are in agreement with International Project Management Office (OGPI) (2013) which argues that Kenya is yet to establish an Energy Research Institute or Energy research labs that can carry out energy use and energy management studies. This therefore puts the country at risk of not attaining its energy management initiatives despite the presence of energy management policy and institutions mandated to promote the same. On the same note, the government of Kenya has planned to set minimum energy management standards for certain machines and to increase awareness of energy management and related technologies so as to improve organizational energy management practices. However, this is yet to be realised fully as a pivotal strategy in enhancing energy management practices among the manufacturing firms in Kenya.

The Kenya Association of Manufacturers has taken up the role of promoting energy management practices through the Centre for Energy Efficiency and Conservation and has been providing training and energy audits on energy management to manufacturers in Kenya. It also oversees the yearly Energy Management

Awards (EMA), which recognizes major and attainable gains in energy management, energy and cost reductions among participating companies (Laurea, 2015). If the government support is not realized, then the manufacturers may not realize anticipated organizational performance and manufacturers will continue shifting base to other countries (Olingo, 2016).

Based on the overall study results obtained from the study results, the study concludes that there is a positive significant relationship between energy management practices in attaining competitive advantage among manufacturing firms. The dimensions of energy management practices (Energy Management Regulations, Company Energy Management Policy, Energy Efficient Technology and Energy Expenses) have a significant effect on competitive advantage and that there is need for deliberate, concerted effort by the manufacturing firms in enforcing energy management practices themselves so as to attain firm competitiveness and reduce the risk of business closure or migration to other countries (Olingo, 2016; Wakiaga, 2017).

RECOMMENDATIONS

While this study produced meaningful results, it was subject to several limitations that in turn provided avenues for further research. First, the study focused only on the direct and indirect effects of energy management practices on attainment of competitive advantage. In view of this, the study recommends that future studies can be conducted on the moderating effects of competitive advantage such as the macro-environmental factors such as inflation and taxation.

ABBREVIATIONS

UNIDO, United Nations Industrial Development Organization; **ERC**, Energy Regulatory Commission of Kenya; **KAM**, Kenya Association of Manufacturers; **KNBS**, Kenya National Bureau of Statistics; **BAT**, British American Tobacco; **GOK**, Government of Kenya; **KES**, Kenya Shillings; **IEA**, Institute of Economic Affairs; **CEEC**, Centre for Energy Management and Conservation; **GFEI**, Global Fuel Economy Initiative; **EMA**, Energy Management Awards; **OGPI**, International Project Management Office.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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