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Electrical Safety challenges in the Kenyan Informal Sector: A Case Study of Eldoret Jua Kali.

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This research was aimed at developing a comprehensive electrical safety programme for the Eldoret Jua Kali sector. It was carried out within the area covered by Eldoret Jua Kali association. The subjects comprised 65 electrical workshops/premises, which was about 75% of the registered electrical/electronic workshops/premises in Eldoret Municipality. The study was both quantitative by the use of self-administered questionnaire, and qualitative by use of interview discussions and observations. Descriptive statistics, Chi-Square was used to analyze the collected data. The results showed that over 70% of the Jua Kali operators did not adhere to the electrical safety regulations and requirements established by the ministry of labour and the Kenya Bureau of Standards.

Key words: "Jua Kali", Workshops, Electrical safety and Safety regulations

Introduction

Electricity has proved to be the most convenient source of energy and it is now becoming very popular in domestic, industrial, agricultural, and commercial sectors of economy (Kenya Institute of Education (K.I.E, 1991). It is used to provide energy for electrical machines, portable tools and equipment, as well as lighting. Electrical power tools relieve the workman of most of the physical effort in performing his work, enabling him to work much faster and with less fatigue, and to do work that he could not do without them, owing to the power they provide.

The Kenyan informal sector, also known as Jua Kali, is currently expanding the electrification of its operations. This sector, which emerged as a result of a high rate of unemployment in the country, is involved in the manufacture of a wide range of items which include farm implements, household utensils, office furniture, electrical appliances, and specialized machine parts.

According to Andy (1999); Adam (1999); King (1996); Ondiege (1991); and Okaka (1991), however, most of the operators in this dynamic sector work under certain constraints which include inadequate infrastructure, limited opportunities for financial assistance, limited vocational and managerial skills, as well as relevant technological skills and competence,

lack of designated work area, prohibitive local authority by-laws, lack of markets, comparatively low quality products and services, and inability to gain access to new suitable technologies.

This, therefore, meant that the Jua Kali operators work in temporary premises where electrical safety regulations could be difficult to observe. The only supplier of grid electricity in Kenya is Kenya Power and Lighting Company (KPLC) and it has certain conditions which a consumer must satisfy before grid electricity is supplied to the premises. The Ministry of Labour and Kenya Bureau of Standards have also come up with electrical safety requirements and regulations which apply to the generation, transformation, conversion, switching, controlling, regulating, distribution and use of electrical energy in any factory and any premises.

Some observations revealed illegal electrical power extensions to unauthorized Jua Kali premises. Apart from being illegal, these extensions did not comply with the electrical safety regulations established by the ministry of labour and the Kenya Bureau of Standards, regarding both the domestic and industrial installations, and the electrical appliances. This indicated that the Jua kali operators were more vulnerable to the potential dangers of electricity which include electric shock, electric fires, electric explosions, and electric burns.

The research sought to address, in a focused manner, the safety issues pertaining to the informal sector by establishing the level of awareness of the dangers of electricity use, and the general safety management measures in the informal sector within Eldoret municipality, Kenya. It also sought to provide an overview of electrical safety concerns and to conduct a survey of typical electrical safety practices in Eldoret Jua Kali sector.

Materials and Methods

Data collection and research site

The survey method of data collection was used in the study. Data were collected through questionnaires designed by the researcher, interviews and participatory observation. The questionnaires had self-administered questions and Kuder-Richardson formula was used to calculate the reliability coefficient of the questionnaires. Owners/employees of some of the workshops/premises were interviewed and open-ended questions were used to enable the researcher collect more information in greater depth.

The research object was the Eldoret *jua kali* association premises and operation area and all the 300 registered *jua kali* workshops/premises in Eldoret municipality formed the population for the study. Questionnaires were administered to 80 of them who offered electrical and electronic services. The sample was chosen by systematic random sampling method. Out of the 80, 25 were chosen for interviews and 53 for participatory observation.

Answers to the questionnaire were analysed using descriptive methods. The chi-square formula was used as the general framework for evaluating whether there was significant difference between (i) the electrical tools and equipment used by *jua kali* operators and those expected of an electrician in the formal sector; (ii) the electronic tools and equipment used by *jua kali* operators and those expected of an electronic engineer in the formal sector; (iii) the safety regulations in *jua kali* and those recommended by the Ministry of Labour and Kenya Bureau of Standards.

Status of Kenyan electrical safety requirements and regulations

Different countries in the world have established different electrical safety regulations and requirements. Although there could be some slight differences, unique to each of the countries, these regulations and requirements have all been derived from those of the institution of electrical engineers (I.E.E.).

In Kenya, the ministry of labour and the Kenya Bureau of Standards, among others, have come up with some electrical safety requirements and regulation documents which apply to the generation, transformation, conversion, switching, controlling, regulating, distribution and use of electrical energy in any factory or in any other premise. Every occupier shall comply with the rules, and every agent, workman and person employed shall conduct his work in accordance with these requirements and regulations. The ministry of labour document goes by the name " THE FACTORIES (ELECTRIC POWER) (SPECIAL) RULES" while that of the Kenya Bureau of Standards is called " KENYA STANDARD SPECIFICATION FOR SAFETY REQUIREMENTS FOR DOMESTIC AND SIMILAR ELECTRICAL APPLIANCES". In this research, the two documents were used as the basis for judging the level of electrical safety management in the Jua Kali sector.

Results and Discussions

Results indicated that 36.9%, 58.5% and 4.1% had primary, secondary and university respectively as the highest level of education. Concerning professional qualifications, the results are summarized in **Table 1**.

Table 1: Professional Qualifications of Jua Kali Operators

Highest Qualification	Number	Percentage
On-job training	37	57.8
Trade test	8	12.5
Artisan	6	9.4
Craft	5	7.8
Diploma	7	11.1
Degree	0	0.0

It was noted that 84.6% of the workshops were temporary while 15.4% were permanent Table 4 shows the significance of the various electrical safety requirements and regulations as practised by the Eldoret *jua kali*. It can be said that, at 5% level of significance, there is a significant difference between the electrical safety management in the *jua kali* premises and that recommended by the Ministry of Labour and Kenya Bureau of Standards.

Table 4: Chi-square analysis of electrical safety management in Eldoret Jua Kali sector

Safety requirements and regulations		Significance level
	Cables secured at plugs	0.074
2	Cables Not Frayed	0.000
3	Cables with mechanical protection	0.000
4	Use of earthed metal work	0.000
5	Circuit Not over-fused	0.000
6	Good or Unbroken earth connections	0.004
7	Sound electrical joints	0.000
8	Authorized additions to final circuits	0.039
9	Protected/Earthed socket outlets	0.039
10	No use of two-pin adapter where earthing is required.	0.001
11	No bell wire used to carry mains voltage	0.891
12	Use of Sound welding machine	0.011
13	Use of Unbroken connectors e.g. plugs	0.009
14	No signs of heating at socket outlets contacts	0.039
15	Correct cable size for lighting cct	0.891
16	Correct cable size for heating cct	0.002
17	Correct cable size for power cct	0.039
18	Correct cable size for sockets	0.009
19	Presence of protective goggles	0.680
20	Presence of face shield	0.028
21	Presence of fire extinguisher	0.000
22	Presence of hand gloves	0.000
23	Use of Sound battery charger	0.008

Level of Significance = 0.05

From interviews carried out in *jua kali workshops*/premises, it emerged strongly that most operators lacked financial assistance which, they claimed, contributed greatly to their poor quality services. They never hesitated to blame the government for lack of commitment as far as the implementations of jua kali sector policies were concerned. They said promises for financial assistance were made to them by the Ministry concerned with *jua kali* but has not been implemented so far.

Lack of market for their products was another problem the operators faced. They also cited the Eldoret municipal council and KPLC personnel as harassing them in both the place of work and the electric power they used. The municipal council officers wanted them to pay levies for the premises they work in, yet the operators claimed that they pay money to individual owners of the plots in which they operate.

Application and supply of electrical power was mentioned as very expensive and hence the operators connected their supplies from their friends who had managed to get power through the right channel. Most operators also said that due to the temporary nature of their workshops/premises they saw no need of proper electrical installations. They also cited the high cost of electrical accessories and materials as the other factor that made them not go for proper installations.

The operators also accused the technical training colleges for providing only theoretical knowledge to their students and no practical skills. They said that *jua kali* trained operators work faster and more accurately than the ones trained in formal institutions. However, it was

found that personnel trained in formal institutions were more aware of the existence and proper use of the essential tools and equipment and safety procedure.

Conclusion

It was noticed that the operators were never keen on electrical safety issues. They were also not aware that they were exposed to dangers of electricity and even if at all they were aware, they did not care. Most of cables used to supply power to electrical appliances were frayed and some of them even used bread wrappers and other polythene materials to insulate conductors. It was also sad to note that the operators used any size of cable to extend power from one point to another.

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