The effect of quality standards on Jua Kali metal products sales (a case of steel products made in Kariobangi Light Industries)

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Abstract- This study entails investigation on the quality problems facing informal industry particularly the fabricated metallic products sales, a case of Jua Kali industry in Kenya Kariobangi light industries with aim of assisting in establishing possible sustainable solution. The area under investigation has a population of 300 artisans who are distributed along the streets of Kariobangi light industry located in Nairobi East lands, off outer ring road. The study builds on a success case in South Africa Steel industry which has benefited from application of Total quality management practices. Using purposive sampling method, a sample size of 100 artisans will be selected.

Descriptive research design was adopted and therefore data is quantitative in nature. Data collection tool is closed ended questionnaires and data collection procedure will involve engaging a research assistant tasked to deliver the questionnaires, leave the respondents to fill in and pick them or come for them later as applicable. Upon completion of the questionnaires, the information was compiled and summarized in spread sheet for farther processing. The data was analyzed using descriptive statistical where the data was coded into quantitative variables and analyzed as quantitative data. Upon research analysis, the main recommendations include government intervention by applying ensuring closer monitoring by the quality regulation agency, consolidation of artisans to enable them manage quality challenges and application of modular production strategies that harnesses the advantage of specialization.

Index Terms- Quality standards, Quality management practices, sustainable solution, Total Quality Management, KEBS (Kenya Bureau of Statistics)

I. INTRODUCTION

As emphasized by Singh and Shrivastava (2012), total quality management (TQM) is a crucial aspect on production of all products and services. This involves standardization and quality control processes which seek compliance with international standards such as ISO 9000 and ISO 9001. In the global scenario, many nations have enjoyed the economic benefit of quality adherence . Japan is one popular nation that has stood out to be a beneficairy and a heralds of quality mamagement indicating clearly that there is much to gain from quality compliance .

Sonobe Otsuka(2006) points that: entrepreneurs within the subsaharan Africa, and East Asia become increasingly motivated to make multifaceted innovations that increase profitability. It is difficult to achieve growth and profitability as long as the entreprise remain higly informal. As a result, we have cases where items particulalry made of steel are bought from the region, exported to the complying industries overseas, processed farther and eventually imported back selling at much higher price at the expense of local economic benefit associated with industrialization (Krista, 2006).

In Kenya, Kinyanjui (2006) established that: the Jua kali industry has been experiencing a bottle neck in terms of growth due to the challenges most of which are to do with how business is undertaken particularly in regard to total quality management. The industry is characterized by quality noncompliance which puts the industry in a disadvantaged position in market edge. This leads to a situation where there are over 50% imported competitor products in the same industry.

A new education system namely: 8-4-4, was introduced in Kenya in January 1985, following a recommendation by Mackay (1982) with an objective of equipping the scholars of primary and secondary school level with skills to enable them survive economically through self-employment and farther discussed by King and McGrath (2002): the policy arose out of the concerns that; a basic academic education might lack the necessary content. The system accompanied by the enrichment with trade craft courses as a part of the syllabus. The impact was felt in form of emergence of many informal business units composed of weak and highly unstructured production units and products outlets common in business set up like Kariobangi light industries dealing in steel products and others. They mainly deal in steel products including: wheel barrows, household furniture, agricultural tools and steel confectionary equipment. A number of the artisans are class 8 drop out and appear to have just a little attention given to quality in terms of production processes and presentation. This has led to stagnation of the industry which affects the ability to have an impact in the economic growth.

A standards regulation body namely: Kenya Bureau of Standards (KEBS) has been in operation in the country since it was established in July 1974 by an act of parliament - CAP 496 of the laws of Kenya. The institutions core business was development and enforcement of consumer goods standards with the aim of protecting the consumer. However, in the past, the institution has been very effective in managing the formalized sectors as opposed to the informal Jua kali sector .With the growing demand of compliance to total quality management philosophy; they diversified their operations and started adopting ISO compliance roles which entails certifying business organizations on the same as local agent. This sought to bring the

formal and informal sectors to a level where overall performance can be measured and rated against the international bench marks. In Kariobangi light industries, located in Kenya Nairobi county, there are about 100 steel products workshops operating in a common business environment and has about 300 artisans working in them (Akoten and Otsuka , 2007). They are characterized by informal set up consisting of artisans who are insufficiently trained and produce substandard products which are then sold to the other parts of the country. The study endeavors to investigate the effect of standardization of the said products on the market demand, analyze the findings and come up with possible sustainable solutions to the limitations facing the industry.

Kenyan steel industry quality case

A study undertaken by Muchoke (2013) was focused on: application of design processes on production, its impact on quality and standardization. It was established that, majority of the entrepreneurs in Jua kali industry lack high level formal education, the artisans do not use design processes in the production of goods and services and that has led to poor quality, low standard goods and lack of precision. This was farther supported in study done by Lundvall and Battese (199) which attributed poor quality, lack precision and standardization to low level education.

Muchoke (2013) recommended that the government should dedicate its efforts to training, enforcement of quality policies and promote use of high level education if the Jua kali sector is to grow.According to the above studies, it is clear that the current situation has been brought about by the practices, attitude and skills of the artisans currently operating in Kenyan industry which affect production processes.

II. RESEARCH ELABORATIONS

From study by Akoten and Otsuka (2007), there are about 100 steel fabrication units in Kariobangi light industries .These are distributed along the four streets which in this study, are coded as A,B,C and D . Out of the 100 units, 30 shops were sampled using systematic sampling technique whereby every 1 was considered after skipping every 2 shops. All of the artisans were served with questionnaires in each unit and therefore a total population of 300 persons was subject to investigation in this study.

Purposive sampling technique was applied since it is effective when studying behavioral phenomena with knowledgeable individuals within (M.A. Dolores. C. Tongoco, 2007). It is ideal for this study because the information is coming from the artisans within. In this study, there were 300 respondents distributed among the four streets as shown above. Out of the 100 shops in the site, 30 shops were picked using systematic sampling which constituted the 30% of the total shops. Out of the total shops, all the respondents in the shops were involved. 100 respondents were subjected to the study which also translated to 30% of the total respondent population.

Quantitative data analysis will be used in this study. According to Abeyesakera (2000), it allows the reporting of summary results in numerical terms given with specific degree of confidence .As per the researcher, some qualitative information can be code into binary variables and analyzed as quantitative data. This is also applicable in this particular study where there are questionnaires formatted to give: Yes or No answers. In this study, the results are recorded in tabled with and coded in scales of 1 to 4 which represent the answers to the questions in the Appendix 1, 2, 3 and 4. The results are in appendix 7 which reprensent the coded and quantified answers. The table in appendix 7 shows how the ratings are converted for the purpose of analysis.

III. RESULTS AND DISCUSSION

Sales level distribution

The various artisans were grouped according to the shops they operate from. They were farther grouped according to the sales level categories as shown in the table below and summarized in terms of the frequency. Based on the actual sales values, the groups were coded in ratings from 1 to 4. The sales levels for the various operating sites (shops) were grouped in ascending order and coded as 1 to 4 form lowest brackets to the highest. The answers to the questions in the respective questionnaires were also tabulated and coded in terms of ratings from 1 to 4 for the purpose of analysis. The coded rating representing sales were plotted and compared to the coded and quantified results as per the various questions. The kind of graphs adopted helped in cascading the profile of sales over the respective elements addressed in each questions to get a quantified comparison.

Quota - Sales bracket(Ksh.)			Frequency	
Ratings	Sales values (brackets)	Number of centers	Artisans frequency	Distribution in %
1	1-200000	26	156	52%
2	200001 - 500000	12	72	24%
3	500001 - 1000000	8	48	16%
4	1000001 - 2000000	4	24	8%
Total	50		300	100%

Table: Sales Quota (Sales Bracket) and frequencies

From the table, it is observed that majority of the artisans are in sales bracket 1 representing 52 percent of the artisans. Whereas 24 percent were in sales bracket 2, 16 percent in sales bracket 3, only 8 percent were in sales bracket 4. The answers are converted to numeric figures for the purpose of analysis.

KEBS quality compliance analysis

The KEBS quality compliance analysis was measured in terms of percentage of products in the business that are registered by KEBS; whether the artisans consider KEBS mark of quality important in sales promotion; their perception on whether products with KEBS mark are of better quality than those without and whether it is possible and economical to invest in quality compliance. The results are as presented in the table below:

sales bracket	% products registered with the KEBS	% of artisans that consider KEBS mark of quality important in improving sales	% that think products with KEBS mark are better quality	% that believe it is possible and economical to invest in quality compliance
1	48	46	44	50
2	7 6	60	70	65
3	84	78	80	74
4	92	100	95	100

The results indicate that most of the businesses in the lower bracket have majority of their products not registered with KEBS (48%). On the other hand, most of the businesses in sales bracket 4 have their products registered with KEBS (92%). This, therefore, shows that most of the registration with KEBS may have an effect on the number of products that are sold (sales volume) by a respondent. Mainly, the respondents with most of their products registered with KEBS are likely to have more sales. This supports the argument by Temtime and Solomon (2002) that businesses registered with a Standards Body are likely to observe quality as compared to others and hence they will tend to produce products of high quality which will attract more customers. As a result, this indicates that registration of products with KEBS will tend to enhance quality of the products. It is also observed that the artisans operating in level 1 sales group strongly believe that compliance to KEBS doesn't improve sales(46%). The Sales levels happen to graduate to higher magnitude as the opinion towards the quality compliance tends to improve positively to the climax whereby the respondents who strongly believe (100%) that the compliance promote sales operates at the peak sales level. As illustrated in the Fig 4.1c, the respondents in the lower sales level don't believe at all whether the KEBS compliance has anything to do with actual quality of their products. As the respondents groups shift from lower to higher sales level, there is notable positive change in the opinion towards the significance of KEBS quality compliance in actual products quality.

In regard to believe in feasibility and need to invest in quality compliance efforts, the operators in higher level of sales bracket strongly believe (100%) it is possible to invest and there is need to invest in safety. This shows a connection in the opinion towards the need to invest in quality compliance and sales levels.

It is observed from the table, that the artisans operating in the shops in the level 1 sales level have lowest magnitude of KEBS compliance while those operating in higher sales levels have high compliance. This shows an improvement in sales with improvement in compliance level. It is also true that majority of artisans have not complied with the KEBS quality standards and therefore the institutional impact is unfelt among them and thus the benefit. This indicates a resultant loss of potential sales and productivity among the metal product fabricators in Kariobangi Light industries.

Quality continuous improvement analysis

Quality continuous improvement analysis was measured in terms of percentage of artisans who found it necessary to keep improving the quality of their product; percentage of those who improved the quality your products for the last one year and by how much did the sales improve following the improvement. The results are as in the table below:

Sales bracket	% that agree it is necessary to continually improve quality of products	% of those who have improved quality of products in the last one year	% of improvement for those who put effort to improve quality of products
1	20	8	70
2	50	25	75
3	68	100	90
4	100	100	95

Although most of the businesses in sales group 4 agree that it is necessary to keep improving the quality of their products

(100%), a number of respondents in the lower bracket do not agree with statement as illustrated in the table (20%).

Similarly, most of the businesses in the sales brackets 3 and 4 have improved the quality of the products (100%). However, very few businesses in the lower sales bracket 1 and 2 have improved the quality of their products in the last one year (8 and 25 % respectfully).

The table also shows that most of the businesses in sales bracket 4 (95%) experienced an improvement of sales after they improved the quality of products as compared to the businesses in other sales group. This indicates that quality monitoring tends to improve sales of the products and hence it is a necessary venture for the businesses if they want to improve their profitability.

Poor technical training and the poor attitude towards quality continuous improvement is accompanied with lower frequency and magnitude of actual quality improvement and eventually low sales and vise versus. In this analysis,

improvement on the technical training is associated with highly positive attitude and magnitude of actual quality improvement. High quality improvement is associated to actual gain in sales level and thus the income for the artisans.

Product quality monitoring analysis

Product quality monitoring analysis was measured using percentage of artisans who found it important to monitor the product quality; comparison of quality of their products with other equivalent from others; whether they monitor the quality of product at every stage of production and percentage of the produced items that are returned due to poor quality.

sales bracket	% importance of monitoring quality	% quality comparison with others	% of quality monitoring done	% returned due to poor quality
1	31	32	8	52
2	75	62	25	24
3	86	78	94	14
4	100	90	94	8

Results from the table above indicate that only 8% of the respondents agree that they do any monitoring at sales bracket 1. At level 2 only 25% monitor their quality. All Level3 and level 4 respondents do monitor their quality (94%).

According to the table, it is clear that there are products that are returned due to poor quality. This is more prevalent in the businesses in sales group 1 which receive highest percentage of returned products due to poor quality (52%). It is also worthy pointing that returning of products may be an expense to the businesses since they artisans will have to spend more time correcting the product or they may be required to give their customers other products. If the rate of returning is high, then the business reputation may be ruined. As a result, most of the businesses in lower sales grouping will experience losses due to this.

Most of the businesses support the claim that it is important to monitor the product quality. This statement also supports the previous findings since monitoring the quality of the products will increase the sales.

More importantly, most of the businesses in higher sales grouping claimed that they monitor the quality of their products

at every stage of production (94%). This is not the case for the respondents in lower sales group which have less quality monitoring procedure (8%). Hence, it is prudent to claim that monitoring of quality of products is directly related to increased sales.

Quality planning analysis

The properties of quality planning philosophy used were percentage of the artisans that have any plans in place dedicated to ensure high products quality; whether quality planning is important in steel product production; percentage average material wastage out of the spent materials in production, average percentage rejection of finished products on account of quality the percentage of time spent on correcting defective products out of the whole production time in a week. Results to the questioned were tabulated, coded into numerical figures and re-tabulated against sales levels which were coded in a similar manner.

sales bracket	% that have quality plans	% importance of quality plans	% average material wastage	% average rejection rate	% time spent correcting defects
1	15	48	86	50	52
2	17	78	54	34	45
3	57	86	16	14	12
4	100	92	8	8	7

From the table above, the results indicate that: presence of quality plans and appreciating importance of quality plans translate into more sales. The results also indicate that taking these steps results into less material wastage, less rejection rate due to defects and less time wasted correcting defects.

Most of the businesses in sales bracket 1 and 2 do not have plans that are dedicated to ensure high quality of products (15 and 17 % respectively). On the other hand, businesses in sales bracket 4 have plans for ensuring high quality products (57 and 100% respectively). Moreover, majority of the businesses in the sales bracket 4 strongly agree (92%) that it is important to have quality planning in steel product production which varies significantly with response by the businesses in lower sales bracket (48%). The average material for wastage for the businesses in the lower sales bracket (1 and 2) is very high in the range of 54-86 percent whereas the wastage percentage of materials by businesses in the higher sales bracket is very low (8-16%). The businesses in the lower bracket also reports higher rejection rates (34-50%) of the finished products on the account of quality as compared to the businesses in the higher bracket which reports significantly low percentage 8-14%). Moreover, businesses in higher sales bracket spend less time correcting defective products (7-12%) but on the other hand, businesses in the lower sales bracket spend a lot of time correcting (45-52%). The time spent in correction would otherwise be used in doing other economically significant activities and also a lot of materials and other resources may be used during correction. This illustrates that businesses that are neither quality compliant, nor do they have plans regarding quality achievement, monitoring or improvement will tend to experience less sales as compared to businesses which have invested in quality compliance.

IV. CONCLUSION

This study shows the need for the businesses to abide with the quality strategies as well as engage in quality monitoring, improvement, and planning in order to improve their profitability. The industry under investigation consists of a majority who do not applying the quality practices and this is responsible for poor sales. The virtue that the majority artisans operate in the lower level sales bracket which constitutes 52% of the entire population hints that the impact of the KEBS is lower among the lower bracket and more felt in the higher bracket. It is therefore accurate to conclude that the institution penetrates better in formal set up than in less formal ones.The industry has a great potential to generate wealth and the investors have a chance to benefit by engaging in metal products fabrication as long as they adhere to sound practices since already there is 8% of the population in level 4 sales bracket and level 3 sales bracket both of which report over Ksh. 1000 000 per month worth of sales per shop.

The government through the agency such as KEBS has a majority (52%) who have they have not impacted in well in the particular industry. The majority of the artisans groups operating in the lower bracket have similar kind and sizes of ventures and therefore they appear to disintegrate their efforts and resources to highly thinned scale as opposed to those operating in higher sales level bracket who not only make huge sales but they also employ highly skilled staff.

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