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Artisan Gaps in the Construction Industry in Zambia

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Abstract

The construction industry in Zambia grew rapidly in the last decade. The growth in infrastructure development resulted in construction boom. The boom had catalysed increased demand for construction artisans. Hiring artisans with the right skills, and experience has been an ongoing challenge. Contractors need good skilled artisans to effectively deliver projects of high quality. The purpose of the study reported in this paper was to develop a training model that enhances effective skilled labour supply to the Zambian construction industry by establishing factors that lead to shortage of artisans and how that contributes to construction defects. During the study, apprenticeship training was considered and evaluated as mitigation pathway of increasing number of artisan labour in the industry. Interviews, a questionnaire survey and three case studies were used to collect data. Stratified random sampling was used to treat biasness in sample selection. The study established shortage of artisan in Zambia's constructions industry among tilers, shop fitters, air-conditioners technicians, plasterers, carpenters, plumbers, electricians, steel fixers, and steel fabricators. Identified causes of artisan shortages included: low number of trade schools and unattractive conditions of service in the industry. The impacts of artisan shortages were poor workmanship, low efficiency and reduced effectiveness of construction industry workforce.

Apprenticeship Skills Flow Chart Model (ASFM) was developed and apprenticeship has been recommended as a possible approach to alleviating artisan shortages. Implementation of ASFM could lead to more skillful artisan labour availability in the industry and better productivity improvements in project delivery.

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The creation of new talents through apprenticeship in the industry would contribute to construction sector growth because apprenticeship germinates confidence in artisan skills that result in innovations. Future research should be extended to manufacturing industry of construction related materials.

Keywords: Artisans; Skills; Shortages; Workmanship; Apprenticeship.

1. Introduction

Construction industry in Zambia has been experiencing a trend of poor workmanship on most projects because of skills shortages. The industry grew rapidly in last decade, with Gross Domestic Product (GDP) of Zambia estimated at US$ 26.8 billion in 2014 [1]. The good economic growth rate in the last decade; recorded a construction boom that has caused artisan's shortages because of increased infrastructure development in terms of construction of roads, schools, hospitals and housing. The country needs more infrastructures to meet the demand of the growing population standing at 14,373,601 [2]. The development status of any country has a direct relationship with the role and the size of the construction industry. According to [3] when construction is booming, so too is the economy and when the economy is busts, it also affects construction performance.

The Technical Vocational and Entrepreneurship Training Authority (TEVETA) system in Zambia produce very low number of construction related crafts and technician graduates without matching industry artisan skills requirements [4]. The effect of skills shortages in construction has resulted in unqualified persons being hired on most projects in order to fill vacancies because of high demand of construction activities. The practice of employing unqualified artisans increased poor workmanship on a number of constructions projects.

The aim of the study reported in this paper was to develop a training model that enhances effective artisan supply to mitigate the shortage of artisan workers in the Zambian construction industry. To achieve the main objective, the study was intended to:

- establish shortage of required artisans;
- determine factors that contribute to artisans shortage; and
- evaluate apprenticeship training as a mitigation pathway for shortage of artisans in the Zambian construction industry.

Purposive sampling for structured interviews and stratified random sampling for the questionnaire survey were used as methods to collect data for artisan gaps in the construction industry.

1.1. Artisan shortage

Skills shortages in construction are pressing concerns for policy makers in several countries [5]. According to [6] *skills gaps* occur when employers are hiring workers who are considered under-skilled relative to the desired levels of qualification; while *shortage* occurs when the demand for workers' particular occupation is greater than the supply of those who are qualified. Author [7] reported that skills gaps in knowledge influence productivity levels of workers; eventually it contributes to poor workmanships because lack of experience and

competency levels of the workforce is affected [8]. According to [9], the level of skills and experience of the workforce on site is the most important aspect for site productivity in the construction industry. Experience and good skills of artisan improves both the intellectual and physical abilities of labour and contribute to increased productivity and efficiency on construction site. To increase the performance of labour, training and good management practices are some of the tools used for enhancing construction labour productivity and quality control improvements that coul improve further through better remuneration.

1.2. Remuneration

Irregular remuneration was a contributing factor for shortage of artisans in the Ghana construction industry [10]. Without a proper payment structure in the construction industry, artisans were hired on temporary basis and on a daily wages. Good remunerations levels were reported as the main employment factor for retention of good artisans. Failure to offer good pay leads to high usage of temporary and un-skilled labour force by construction firms. Some artisan labour shortage experienced on projects: bricklayers and carpenters in the Nigeria construction industry was also studied. It was found that the most severe factors responsible for the skilled labour shortage were scaling down of craftsperson training programmes [11]. The number of young people who were joining construction trades was reported to be very low [11]. The lack of interest by young people to take up courses like bricklaying and carpentry as vocational trades was a contributing factor for the shortage of artisan skills. Artisans training through apprenticeship methods, increased number of artisans in the industry.

1.3. Apprenticeship

The well-known approach to mitigation of shortage of skilled artisan in the industry was through the apprenticeship training method. According to [12], there are always misunderstandings around the definition and the use of the word *apprenticeship*. In other countries *mentoring, traineeship, learnership and internship* are used to refer to workplace training or job on training. Each country has its own terminology and relevant legislation.

Regulated apprenticeship is formal and is guided by legislation. The apprentices are paid wages; while learning takes place at both work place and off the job for the specific duration of two to three years [13]. Apprenticeships teach a wide range of tasks that include classroom training in theory as well as practical applications. Apprentices in the construction industry are introduced to multiple skills and specialised tasks. The countries that place exclusive emphasis on college training only end up with weaker human capital than those with a mixed strategy of college and apprenticeships programmes because adaptation to the requirements of the construction industry, which is still a labour intensive industry in many countries, takes long to achieve [14].

The training of skills through apprenticeship improves competency and knowledge in the execution of projects to international standards. German is a country with a long standing and very well developed apprenticeship system which has been successful. Its apprenticeship success is attributed to a ‘dual’ education system. According to [15], the dual education system law supports the close co-operation among the government, private firms and trade unions. It strengthens and enables apprentices to gain exposure and deep experience to

meet the demands of work and increased prospects for good performance. Author [16] reported that the future effectiveness of the construction industry of any country depends on the quality of the workforce it educates and trains.

1.4. Low number of enrolments

Trade school institutes are vocational colleges offering tertiary education under TEVETA in Zambia. Graduates from these institutions are needed by contractors to competently execute various projects in the country. The National Council for Construction during the 2014 registration period registered 4,000 contractors and 96% of the companies were Zambian, while 4% were foreign owned [5]. In comparison, the number of registered contractors exceeds the annual enrolment of students in trade schools. Very few young people take up courses that are related to construction. Despite the overwhelming employment opportunities existed in construction sector, there was still shortage of skilled workers in the industry. The factors that contribute to low number of enrolment of students in trade schools and skills shortages in Zambia's construction industry were established by conducting a research reported in this paper.

2. Research Methodology

Mixed method of inquiry shapes data collection accuracy for the research [17]. Structured interviews, a questionnaire survey and three case studies were used to collect data. A purposive, non-probability sampling method was adopted for interviews in order to get an in-depth understanding of the extent of the problem. Ten professionals with 10 to 35 years experience, working for contractors, consultants and TEVETA training schools were identified purposively based on their qualifications and experience. The sample of the interviewees was selected from the Association of Consulting Engineers of Zambia (ACEZ), Zambia Institute of Architects (ZIA), National Council for Construction (NCC) and TEVETA Schools. Interview questions were piloted on an engineer, an architect and a trade school lecturer before the final instrument was adopted.

The results of interviews formed part of the information utilised in developing of the wider survey for the self administered questionnaire. A stratified random sample was used in the questionnaire survey to ensure that the sample was adequately representative. The population was divided into strata or groups: contractors registered with NCC in the building category; consultants; and TEVETA trade schools. The questionnaire survey elicited information on: artisan shortages; factors that cause shortage of artisan skills; and an evaluation of the apprenticeship training system.

2.1. Sample Design

Stratified random sample was adopted to treat biasness in sample selection, by first dividing the population into groups of similar elements called strata. Then conducted a separate simple random sampling (SRS) in each stratum, thereafter, the combined SRS formed the full sample. According to [18] , the size of the sample is the most important parameter of a sample design, because it affects precision, cost and duration of the survey more than any other factor. The sample size was considered both in terms of the available time and budget.

2.2. Population.

According to [17] population in research it is a collective term used to describe the total quantity of things that have a similar characteristic and are subject of the study. The population in this study was all contractors registered with National Council for Construction in Zambia in building category, consultants, and TEVETA schools, offering training to artisans. The sampling frame was prepared in the form of a physical registered list of contractors from NCC. Population was divided into; contractors in Grade 1 to 6.in building category. The population "register" was randomly sampled to get 20 contractors for each Grade. The totals were added to form 120 population of first strum for contractors .The second strum was 35 registered consultants and the last strum was 20 registered TEVETA schools also randomly sampled from the respective registers. The total population of study became 175 elements.

2.3 Sample size,

The sample size was selected as the parameter for stratification to ensure sampling elements was homogeneous and divided into three groups or strata based on their sub sector in construction industry. Proportionate stratified sampling was found suitable. Standard normal deviation for 95 percent confidence with five-percent marginal error was acceptable for this study. The sample was determined using the following bio statistical formula to estimate sample in a survey

$$N = \frac{Z^2 P\,(100\% - P)}{(E)^2} \qquad (1)$$

Source: Sample size calculation; [19]

From equation 1: N is sample size required; P is estimated proportion of sample, E: is marginal error and Z: standard normal deviation with factor ''1.96"; relating to 95 percent confidence. The sample was estimated to be fifty (50.) From the total sample of 175, a proportionate fraction was calculated, by dividing total population into sample size. The strum sample was then computed as presented in Table 1.

Table 1: Sampling frame for different strata of surveyed respondents

Stratum	**Population**	**Sample size**
Contractor	120	35
Consultant	35	10
TEVETA school	20	5
Total	175	50

For the survey, a total of 50 questionnaires were distributed to the target respondents. Thirty nine completed questionnaires were received, giving a response rate of 78 percent. The collected data was coded and analysed using the Statistical Package for Social Sciences (SPSS) software. The results were presented as percentages after frequency tabulations and interpretations were based on statistical significance. Three case studies were also conducted to verify the authenticity of the results regarding shortage of artisan skills and causal factors.

2.4. Geographical area of study

The study was conducted in Lusaka. Table 2 highlights the distribution of contractors across the country. Lusaka has a population of 2,491,054 [2], representing 17 % of the total population of Zambia. Most construction companies, consultants and trade schools are registered and based in Lusaka compared to other parts of the country

Table 2: Distribution of contractors in Zambia.

Province	Percentage "%" distribution of contractors
Lusaka	45%
Copperbelt	28%
Eastern	1%
Luapula	3%
Central	6%
North western	4%
Northern	3%
Muchinga	1%
Western	2%
Southern	7%
Total	100%

Source: [20]

3. Results and Discussion

3.1. Artisan shortage

The findings of the study infer that there were artisan shortages in the Zambian construction industry, among the shortages were tilers, shop fitters, plasterers, carpenters, plumbers, electricians, steel fixers and steel fabricators. The survey revealed 64% percent of the respondents indicated that the shortage of tilers was high, while 20% said it was medium. The respondents further indicated 59% high shortage of shop fitters, while 23 percent pointed out it was medium. The findings of the survey revealed that shortage of plasterers had 49% high in the industry. The findings of the study are highlighted in Figure 1 that gives the overall picture of the shortage of artisans in the construction industry in Zambia.

The findings of artisans' shortages in Zambia's construction industry were consistent with other findings, reported in different research papers. Author [21] concluded that there was twelve percent shortage of artisan skills on the projects sites in Malaysia. It was also reported that 62 percent of total labour force in the Indonesia construction industry was un-skilled [22]. Therefore certification and training were recommended as mitigation factors. The shortage of required artisans' skills in Zambia had resulted in unqualified persons to being hired for most projects, in order to fill vacancies on construction projects [6]

The results of study s showed majority of secondary school leavers at both senior and junior secondary leaving school certificate levels joined construction industry as general workers, and learned skills from friends and relatives, then gradually became *self-made* craft persons without any form of recognised training.

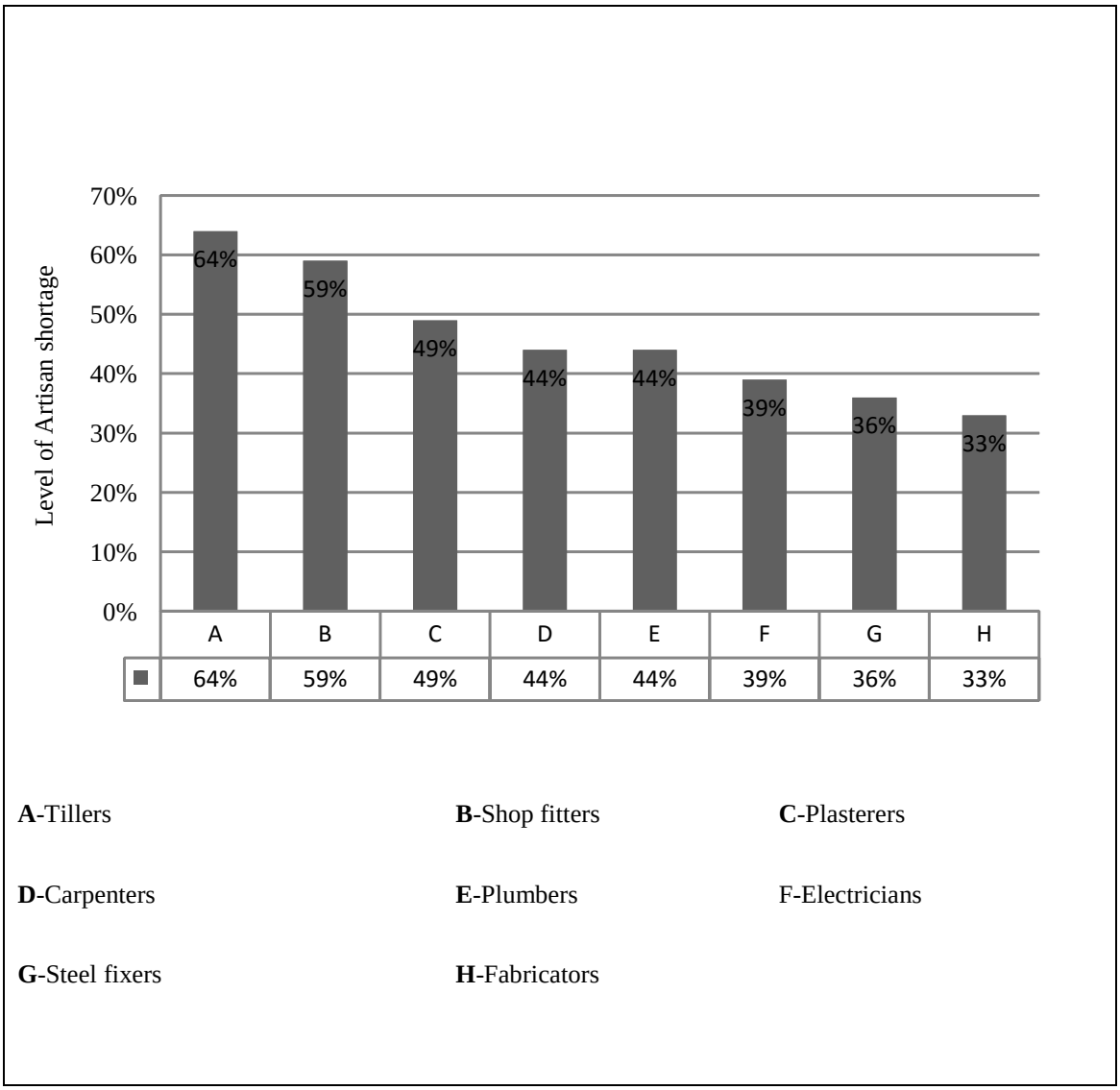

Figure 1: Artisan shortage

The impacts of employing labour without training background; resulted in high frequency of poor workmanship on a number of projects in the country. The majority of artisans hired were those with no formal qualifications, who required close supervision to achieve intended results on construction sites. The level of supervision needed

to manage these types of work force was so demanding. It needed more effort and consumed more time than any other management functions required on projects.

The results of the findings also showed that reduced number of artisans in the construction industry was mainly due school leavers only interested to train in white collar careers jobs related to business courses. Young people perceived jobs in construction to be dirty. Institutions providing training for white collar career jobs had a lot of applicants, compared to the trade schools institute offering crafts courses, where enrolment has been reducing year by year. The low level of enrolments had forced some vocational schools to close certain departments; because it became costly to sustain the training without students' enrolment. Most government vocational schools were not well financed coupled with the reduced enrolments in technical programs it resulted in scaling down some programmes. Author [23] did an insight into implications of skills shortage in South Africa and found that the shortage was attributed to not allowing skilled foreigners work with local South Africans; to bring about expertise in the workforce for learners to acquire critical skills that would enable them to be self-reliant and obtain a place in the labour market.

3.2. Factors that lead to shortage of artisans

Various factors in this study were established, and those that contribute to the skills shortage included: low number of trade schools and unattractive condition of service for artisans. Figure 2, highlights some factors associated with the skills shortages. The findings of the study revealed high number of informally trained artisans was attributed to few trade schools offering quality education in the country.

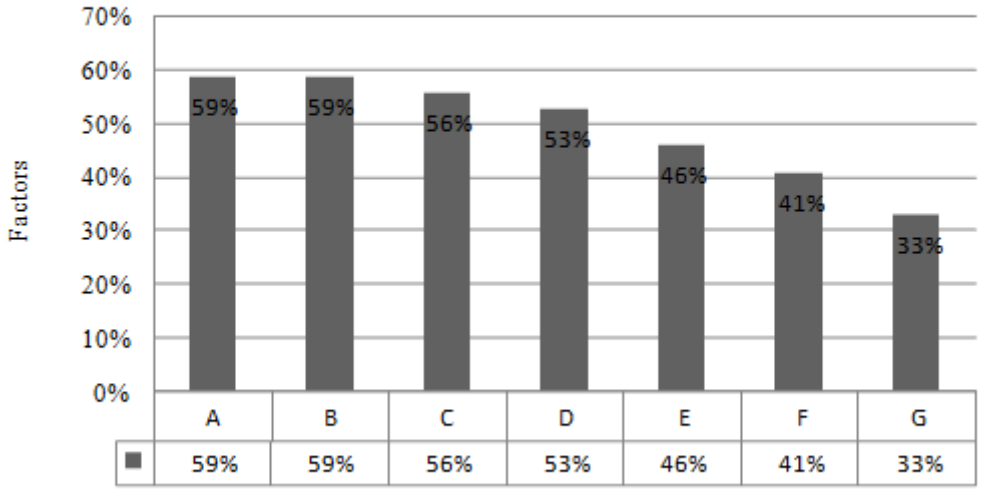

Figure 2: Factors that contribute to artisan shortage

A-Few number of trade school

B-Un willingness of young people to join construction jobs

C-Low wages

D-Casual contract employments

E-Change in technology

F-Poor social security

G-Aging of artisans

The study also revealed that wages earned by informal artisans were not attractive to qualified personnel in construction industry. Qualified artisans preferred self employment to regular monthly salaried engagement because of better returns associated with working on their own. Most school leavers shunned the artisan profession in preference to white collar jobs. This resulted in low entry into training programmes [11] and contributed to the shortage of skills in the construction industry. The gaps created by lack of formal artisans joining the industry were taken up by those who held informal qualifications. The wages for informally trained artisans were lower compared to those demanded by trade school graduates.

Most construction firms did not to pay competitive wages for good skills, but instead promoted a culture of cheap labour. This development discouraged those trained artisans with trade school qualifications not to practise due to poor wages. The structure of re-numeration in the construction industry in Zambia was deemed to be poor. Firms, as a consequence paid the same wages for both good and poor skilled artisans. These poor conditions made young people less interested to train in construction related careers. There was no difference in wages or motivation between those who held trade school qualifications and the informally trained artisans. The motivation was low and this was compounded by less career progression prospects for practicing artisans. Other studies have shown that artisan shortage is associated with acquisition of new technology and equipment due to globalisation [6, 10]. Technological advancement was at a faster rate with high influx of modern tools, equipment and materials which affect most artisans who have limited knowledge and skills to handle modern technology in the market; this contributes to shortage of skills. To mitigate the shortages of artisans, apprenticeship training was evaluated.

3.3. Apprenticeship

Majority of young people in Zambia experienced of lack of employment, low skills and low income. TEVETA formal of training system has only been giving few opportunities to the youths, because of high barriers in terms of entry qualifications, cost and accessibility. Therefore, *apprenticeship* remains the one of the methods to provide skills for construction industry. It is the easiest path for career development, particularly for school drop outs and those from poor families who cannot progress academically. The apprenticeship makes it's an important source of innovation and productivity for the construction industry workforce. The study findings revealed that apprenticeship would take two years minimum for the apprentices to be exposed to different work

environment. The period of apprenticeship training was consistent with study by [13] that recommended two to three years for the training programme.

It was also noted that spending 20 percent of the time learning theory was enough for the apprentices to study important construction topics. Study findings revealed that, work place training could offer a very high quality learning environment, allowing students to acquire practical skills on latest equipment on the market and most recent working methods in the industry. Similarly apprentices could be helped to develop key soft skills such as dealing with clients on site environment. Recruitment becomes much more effective and less costly because good artisans are identified during training period itself before they are employed. The findings of the study revealed apprentices should be examined and this received response rate of 92 percent in agreement. The results of the findings were used in development of the training model.

3.4. Training Model: ASFM

The aim of the study reported in this paper was to develop a model that alleviates shortage of artisan in construction industry. The development of the Apprenticeship Skills Flow-chart Model (ASFM) was based on the results obtained from interview, questionnaire survey findings and consolidated list of significant factors gathered that were perceived to affect artisan shortages. The ASFM was built around the theoretical framework of addressing current heavily dependent on informally trained artisans working in Zambian construction companies, because of low level of artisan graduates from trade schools.

This model was designed to use different pathways of apprenticeship training. According to [24], an educational programme should seek to develop links to vocational training with certification and competences evaluation. It should be aimed towards the development of a gradual process of acquiring knowledge, values, and skills. Author [25] reported that some of the skills can be acquired at school, while others may only be acquired in industry. Craft competency is related to knowledge, altitude, skill and personal characteristics that affect major performance of a job [26].

Apprenticeship training builds up skills in the industry and create loyal workforce that brings about growth in skills base for construction companies. The creation of new talents through apprenticeship in the industry results in increased innovation and productivity. This made [27] conclude that shortage of experienced skilled labour; increases idle time because of prolonged learning curve by un skilled labour that result in low performance.

A creatively thinking artisan can contribute to increased productivity. Often it is the workers who come up with the best solution to a problem on the construction site. According to [28], encouraging mentoring by mixing experienced workers with new employees is the most preferred approach of improving skills of artisan in the work environment.

Many artisan employers; particularly those in informal construction sector regarded informal apprenticeship skill as larger in capacity with superior practical skills than those from the formal vocational education system [29]. The quality of skills becomes better for those who combine informal and formal apprenticeship training. Apprenticeship method allows trainees to learn not only trade principles in a real-world situation, but also to

observe the on-site application of productivity and quality standards. These are topics that are more difficult to understand or convey in a traditional classroom format of education [30].

There are several benefits that go with apprenticeship training. It teaches practical skills which help improve quality and productivity of work; because of emphases on responsibility and good work culture for employees. Apprenticeship benefits companies in reducing labour costs. According to [13], apprenticeship training activities take place within the company and apprentices receive structured training along side with general education in Technical Vocational schools. Previous research has shown that apprenticeship is common in many countries but with varying duration and skill levels of those who are involved in training [13].

Evidence and lessons drawn from findings, provide motivation for making apprenticeship a more attractive, efficient pathway to productivity. Apprenticeship help create jobs for more young people and contribute to productivity in a firm; reduce costs and at the same time provide high levels of expertise in skills. The developed ASFM is presented in Figure 3

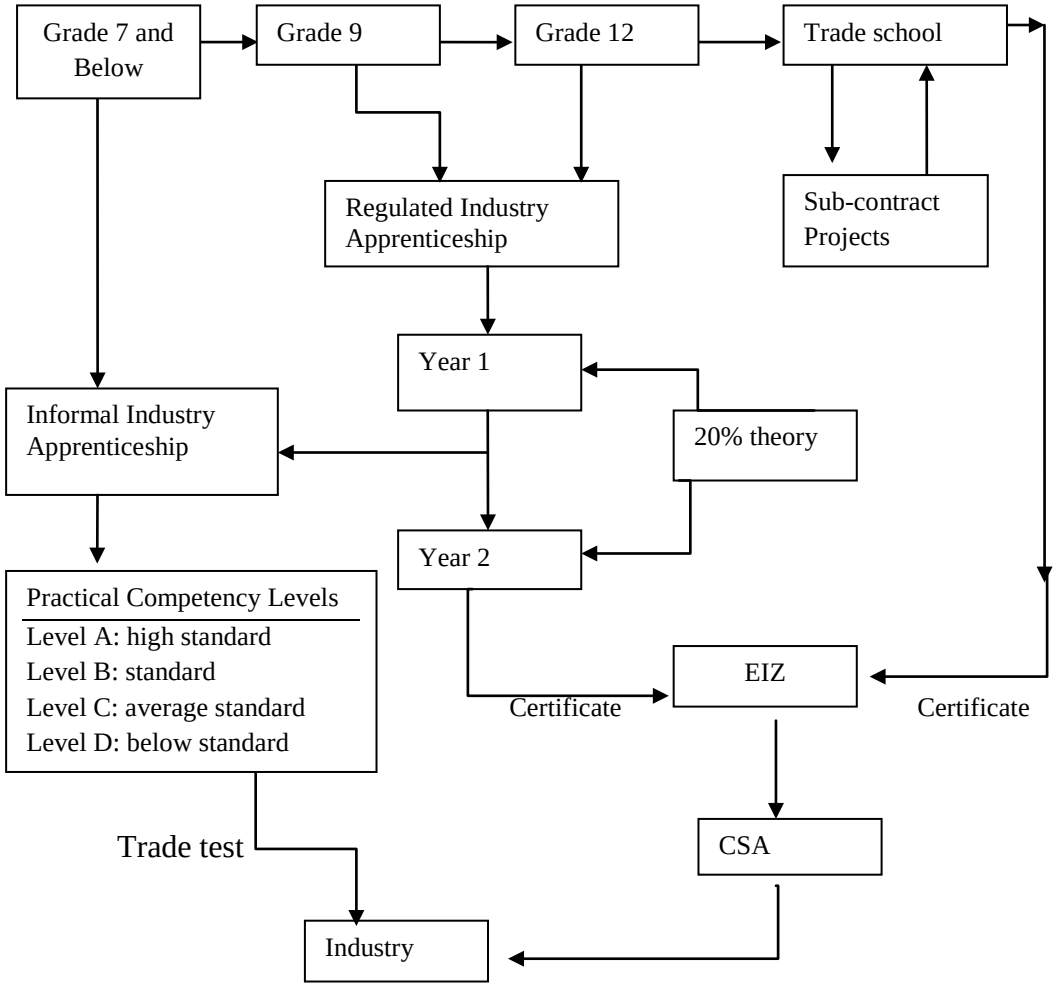

Figure 3: Apprenticeship Skill Flow chart Model

Grade 7: Leaving Certificate of Primary Education

Grade9: Leaving Certificate of Junior Secondary Education

Grade 12: Leaving Certificate of Senior Secondary Education

Trade school: Vocational Training Institute offering Craft and Technician Education

EIZ-Engineering Institution of Zambia, Professional Body Regulating Engineering Practice

CSA-Construction Standards Authority

3.5. Explanation of Model

The ASFM was based on the 3-pathway training method for artisan skills: Informal apprenticeship, regulated apprenticeship and trade school training. The entry qualification for informal apprenticeship would be Grade 7 drop outs and below, and for regulated apprenticeship; Grade 9 or 12, while trade school training would enroll those who cannot be admitted into the universities.

3.6. Path 1: Informal apprenticeship

Informal apprenticeship is one of the training pathways that provide skills for construction industry. It is the easiest path for career development, particularly for school drop outs and those from poor families who cannot progress academically.

Grade 7 drop outs and below, could enroll for informal apprenticeship that is 100 percent hands-on career. The apprentices would be guided by artisan trainers during training and their progress would be monitored before they could be hired for employment by contractors. The apprentices should be tested for practical trade tests at the end of the apprenticeship levels to determine competency and suitability as established by TEVETA procedures. The levels would range from Level D as a starting point in the industry to level A, which is final and highest standard level for informal apprenticeship. The testing would be frequent and mandatory for continuous assessment of training progress of apprentices before reaching acceptable competency levels recommended by the Construction Standards Authority (CSA) in the country.

3.7. Path 2: Regulated apprenticeship

Grade 9 or 12 school certificate holders, who fail to proceed because of dropping or through financial constraints along the way in their education career, could enroll into regulated or formal industrial apprenticeship .The path gives chance to those who did not do well at Grade 9 to improve and at the same time broaden enrolment, to increase capacity for artisan training. The program would have emphasis on 80 percent practical lessons of the allocated time. From the questionnaire survey findings, regulated apprenticeship, apprentices should learn 20 percent theory of important construction topics during time allocated for training. After first year, assessment examinations should be taken to evaluate the progress of the learners. Formal

apprenticeship is a structure of training that is both school and work-based, which leads to recognised formal qualifications [31]

On completion, apprenticeship graduates are awarded industrial accredited qualification by TEVETA; the qualification is recognized by EIZ for craft membership .Those apprenticeship graduates who become member of EIZ, are issued with practicing licenses before they are employed in the construction industry. The mandate of CSA is to inspect quality of work performed by artisans. This was consistent with [32] that reported regulators should closely monitor project implementation to avoid any unethical behaviour among the construction players from happening.

3.8. Path 3: Trade school training

Trade school entrants would enroll according to TEVETA enrolment procedures. In additional trade school institution would be mandated to register for sub-contract works on government projects. The sub contracts projects are meant to increase practical skills for student in the trade schools. The findings had 85 percent of the respondents agreeing to this assertion. Previous research findings reported industry had raised a concern on the caliber of graduates who were coming from the various TEVETA training providers; most of them did not meet the needs of the industry [33, 4]. Through, introduction of sub contract projects the, students would have gained practical knowledge on hands-on skills to enhance, capacity. The advantages of apprenticeship programme in trade schools makes students acquire practical skills on latest equipment on the market and most recent working method in the industry. Similarly students develop key soft skills such as dealing with clients in the industry. The vocational schools at time of the study, concentrated more in teaching theoretical subjects than practical works. This contributed to low practical skills in artisan graduates.

3.9. Role of Engineering Institution of Zambia (EIZ) in a Model

Engineering institution of Zambia should issue practicing license only to artisans who qualify through apprenticeship and trade school training. Practicing license should contain terms of reference for quality control of works on the project which should be implemented by Construction Standard Authority.

3.10. Construction Standards Authority (CSA)

The study revealed, articulated strategy that should be implemented to improve the skills of construction artisans was certification. Certification is the assessment process which is part of qualification to gain recognition through competency testing and examinations. The purpose of certification is to provide a guarantee of artisan skills, quality and work ability, so as to produce construction works that meet established quality standards in the country. All construction artisans would have practising license prior to employment. The role of CSA is to inspect quality of work performed by artisans and develop standard of practise for the construction industry in Zambia.

3.11. Validation of Model: ASFM

Validation of model for alleviation of skills supply to the construction industry was done. Having developed the model, it was essential that it be validated. According to [34] model verification and validation are essential parts of the model development process for it to be accepted and used to support decision making. Validation is used by researchers to help improve accuracy and credibility of data obtained. Validation should be done by people who are experts in area of study [35]. The proposed model was found suitable after validations and its implementation would go a long way in addressing the artisan shortage in Zambian construction industry. During training, apprentices should be blended with highly skilled personnel; so that there was gradual transfer of artisan skills from one group to the other.

4. Conclusion and Recommendation

This paper has provided various artisan gaps in construction sector and highlighted number of factors that contribute to the artisan shortage in the Zambian construction industry. Few young are interested to train in construction related careers because of limited number training vocational schools coupled with un-attractive condition of service in the construction industry. The majority of eligible trainees are interested in business related courses. The overall impact of artisan gaps resulted in high poor workmanship and cheap labour in construction. To mitigate the artisan shortages, apprenticeship of *three pathways* was found to provide the answer. Therefore, apprenticeship training has been recommended as a possible approach to alleviating artisan shortages in the construction industry. Its implementation would strengthen level of artisan skills in construction industry because more skills would be developed and create loyal workforce that brings about growth in skills base for construction companies. The creation of new talents through apprenticeship in the industry should contribute to growth of the construction sector. Apprenticeship germinates confidence in artisan skills that result in growth of productivity, quality improvements and innovations in project delivery.

Limitations and suggestions for further work should be considered. The research focused on construction artisans' skills for the construction industry. The findings might vary from construction to manufacturing industry using same type of artisan's category highlighted in this study. Another limitation encountered during the survey was that experienced and qualified non English speaking respondents, most of whom were foreign contractors, had a language barrier to understand the questionnaires done in English, thereby, making it impossible for them to fill in and return questionnaires in most instances. Future research should be extended to manufacturing industry of construction related materials and development of curriculum that could help implement ASFM model of apprenticeship training in Zambia to meet the current needs of the industry.

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