

**CRAFTSMANSHIP IN KENYAN INFORMAL CONSTRUCTION:  
A CASE STUDY OF NAIROBI //**

**BY**

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**DECLARATION**

I, James Ouma Okaka, hereby declare that this project is my original work and has not been presented in any other University for any degree,

  
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Signed

30<sup>th</sup> September 2004.  
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## ABBREVIATIONS

APT	Appropriate Technology
CBS	Central Bureau of Statistics (Kenya)
CPD	Continuos Professional Development
DIT	Directorate of Industrial Training
EAMAT	Eastern Africa Multidisciplinary Advisory Team (ILO, Addis Ababa)
ESAMI	Eastern and Southern Africa Management Institution
GOK	Government of Kenya
GTIs	Government Training Institutions
ICEG	International Centre for Economic Growth (Kenya)
ILO	International Labour Organisation
JIT	Job Instruction Training
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KCPE	Kenya Certificate of Primary Education
KCSE	Kenya Certificate of Secondary Education
KTTC	Kenya Technical Teachers College
KREP	Kenya Rural Enterprise Promotion
MRTTT	Ministry of Research, Technical Training and Technology
MSE	Micro and Small Enterprise
MSETTP	Micro and Small Enterprise Training and Technology Project
NGO	Non-Governmental Organisation
NITC	National Industrial Training Council
UK	United Kingdom
SITE	Strengthening Informal Training and Enterprise
SUP	Skills Upgrading Project

## ABSTRACT

The aim of this study is to address the apparent low-level craftsmanship in the Kenyan informal construction sector, which manifests itself in defects due to poor workmanship. The role of the sector in the economy cannot be over emphasised, and it is a foregone conclusion that the sector is here to stay.

The study posits that the level of training craftsmen is the cause of low-level craftsmanship, while taking into consideration other pertinent factors such as education, experience and tools and equipment used as partly contributing.

The objectives of the study are built around the need to assess, examine and establish the adequacy or otherwise of the factors that contribute to the low-level craftsmanship (workmanship) of masons. These factors, as established through the literature review, are not limited to basic training and include; level of education, experience at work, and availability of tools and equipment.

Survey type of research design was adopted for the study. The population included all masons working in informal sites within Nairobi City. The masons' works at the sites also formed part of the population. A questionnaire was administered to randomly sampled masons while a checklist was used to observe the level of workmanship at the sites.

Data presentation and analysis is mainly in the form of non-empirical analysis, though simple percentages have been used to represent the proportions of various outcomes. A simple regression analysis has been carried out, and statistical testing of hypothesis done to allow for generalisation of findings.

The study has found out that apart from basic training and career development, other factors stand satisfactory in the population. The study has also established that the levels of training and workmanship are low, with a causal relationship between the two.

To achieve adequate levels of craftsmanship, the study recommends raising levels of training, keeping in mind the peculiar constraints in the sector. Because the craftsmen are mainly trained through traditional apprenticeship, are already working, and lack time and finances, the training programme proposed should be cost-effective, focused and short in duration. The use of extension field technicians has been recommended, with the training taking the model of a basic training cycle that starts with assessment of training needs and ends with evaluation and certification. However, lack of finances has been found to be a major hindrance to training of the craftsmen and may continue to remain so even with the above proposal. It is therefore further recommended that the stakeholders in the sector should come together and find a sustainable way of financing the training.

Harmonization of training content and context, together with revision of syllabus to produce a competent craftsman who can meet the needs of the informal construction sector at the lowest level of training, has also been found necessary and thus recommended.

## CHAPTER ONE

### INTRODUCTION

#### Background of the problem

The informal construction sector within the Kenyan construction industry has grown since 1970's. This sector gained a crucial momentum with the advent of structural adjustment era beginning early 1980's and the decline in economic growth in the late 1980's and 90's, the period during which the government drastically cut its development expenditure thus leaving the private sector as the leader in construction works.

The informal construction sector has found its niche in the private housing sector after it became apparent that the government could no longer provide adequate and affordable housing to the populace through the department of Housing, the National Housing Corporation and the Housing Finance Company of Kenya. The majority clientele in private housing sector are low and middle level income earners whose access to capital funding is at best erratic and unpredictable, and it is the informal sector that has been able to adapt to this situation. Most of the houses in the private sector are thus built by the informal sector and are relatively in low-cost areas like Kayole, Umoja, Embakasi, Zimmerman, Dondora (in Nairobi) and other middle to low income residential neighbourhoods in urban and peri-urban areas (Wachira, 2001a).

The importance of the informal construction sector can therefore not be overemphasised. The economic Survey 1996-2000 of the Government of Kenya clearly shows that in those five years, the sector was the greatest contributor to the stock of houses in the country and is a significant employer. It can thus not be ignored in the endeavour to achieve national goals particularly employment creation, poverty alleviation and balanced development.

The informal construction sector mainly comprises unregistered, unprotected and unregulated individuals that supply labour and contribute in various other ways to the output of the construction. These individuals are usually artisans with technical skills in various aspects of construction acquired from tertiary institutions or through on-job training by experienced

persons. They are mostly self employed and use simple technology, mainly labour intensive, and they are speedily moving towards dominating the private housing sector (2001b).

### **Problem Statement**

The phenomenon of informal construction is driven by the great desire of the clients to avoid the 'high' cost associated with formal construction processes. These clients therefore engage artisans /craftsmen who are unregistered and unregulated to execute construction works thereby avoiding costs associated with professional fees, taxes and levies, formal contract agreements and registration, preliminaries and overheads, etc. In most cases the client supplies the materials for construction, at the various stages, and hires an artisan / craftsman e.g. a mason or a carpenter to act as a foreman and oversee the works. At times the unskilled labourers are engaged directly by the client through advice of the artisan and at times the artisan engages the unskilled labour. In this arrangement the artisan is seen as a contractor.

The client usually relies on advice from the artisan on issues of quantities of materials required, cost of works, quality specifications and time duration of works. The client, being a layman in construction, uses such information for his planning and as a standard of evaluation as works progress. This is ideal for a successful project, but the success has been rare. There have been constant complaints from the clients about low-level workmanship, wastage of materials and poor management of labour and time at the construction sites.

At the end of construction work, other problems may be forgotten with time but not the defects appearing due to low-level workmanship. Material wastage or time overrun due to poor management of labour may be forgotten after the project is over and the client is utilising the facility, but the defects caused by low-level workmanship will haunt the project for its entire life.

Casually observed cases of low-level workmanship include but are not limited to:

- i) Walls that are not plumbed /straight.
- ii) Intended rectangular/square rooms with none right-angle corners.
- iii) Cracked walls and floors.
- iv) Doors and windows that don't fit well on closing or opening.

- v) Floors draining water in the wrong direction.
- vi) Leaking roofs.
- vii) Leaking pipes in walls.
- viii) Roofs with unacceptable slopes.
- ix) Poor drainage of gutters and down pipes due to wrong setting.
- x) Switches / sockets fitted upside down and in wrong positions.
- xi) Steps with uneven treads and risers/ too steep staircases.
- xii) Foul drainage systems that don't work due to insufficient slope.

The above defects and others arise from the methods of executing the works and tools and equipment utilised. The client may not be in a position to know that the wrong methodology or tools are being used during the construction process. It is the product of the work that indicates the low-level poor workmanship in the form of defects. This low-level workmanship and the accompanying defects are the most telling indication of inadequate craftsmanship among the artisans/craftsmen in the informal construction sector.

Craftsmanship defines the capacity of the artisan/craftsman to execute specific skills of building work diligently within the set limits of available resources and the meeting of the functional and design requirements of the constructed building elements and components. A craftsman is a person with specific task oriented skills e.g. a mason, carpenter, plumber, joiner, etc. A study on the level of craftsmanship of our informal contractors could assist in overcoming the stated problem affecting this fast-growing sector. For purposes of this study, craftsmanship is divided into three levels:- poor, low-level and high-level. Poor craftsmanship represents total failure resulting in a collapsed building. Low-level craftsmanship represents construction work with defects but does not result in total failure. High-level craftsmanship represents construction work without any defects. The problem under study is the case of low-level craftsmanship.

### **Study hypothesis**

It is the hypothesis of this study that lack of proper training is the cause of low-level craftsmanship in the informal construction sector.

## **Study Objectives**

The primary objective of this study is to establish the cause of low-level craftsmanship in the existing construction works being carried out in the informal sector. Pursuant to this objective, the study will therefore attempt to; -

- i) Establish educational level and experience of the masons.
- ii) Establish the availability of tools and equipment used by masons on sites.
- iii) Examine the training content and context given to masons.
- iv) Examine the level of workmanship of masons on sites.
- v) Establish the relationship between the levels of training and workmanship of masons on the sites.

## **Scope of the Study**

For practical purposes, the concept of craftsmanship has been limited in scope to dwell on workmanship. And the workmanship has been viewed from the end product, that is, quality of work already done.

Although there are many craftsmen in a construction process including carpenters, plumbers, electricians, masons, and joiners, etc, the study has further limited its scope to deal with masons. This has enabled the researcher to dig deep into details of training content within the short period allowed for the study.

The literature review section has sought to find theories that have been advanced on methods of training and also to establish the various ways through which masons are trained in Kenya. Content of training for an ideal mason to achieve the optimum level of craftsmanship has also been discussed. But the study has also established, within its defined scope, other factors that are contributory to low-level craftsmanship outside training.

By geographical coverage, the study is limited to the city of Nairobi due to financial and time constraints. Only informal construction sites within the city, with masons working on, have been considered to form the population.

Although other factors have been found to be contributory to the level of craftsmanship, in-depth analysis has only been carried on the relationship between training and craftsmanship: where a simple regression analysis has been applied.

The mentioned limitations on scope were meant to narrow down the study to a manageable level and enable the researcher to carry out focused and in-depth analysis.

### **Justification of the Study**

The importance and role of the informal construction sector in Kenya has already been mentioned, in terms of its contribution to the private housing sector for majority of citizens in the rural and urban areas, employment creation, and reduction of poverty. Also mentioned is the fast rate of growth of this sector and the lack of regulatory framework. But of worrying concern is the quality of final products delivered, which forms the core of this study.

If the cause of low-level craftsmanship can be established and a solution identified, then the problem of poor workmanship can be eliminated or greatly minimised thereby increasing client satisfaction. This, apart from providing quality housing to the public, will uphold the good reputation of the construction industry as a whole. It is worth noting that once a building is completed, it is difficult to know whether the construction was done under the formal or the informal sector and if there is name or face saving, then it affects all parties that claim a stake in the construction industry as a whole, more so, the professionals.

The outcome of this study will assist in reducing the effects of poor to low-level workmanship, such as costs associated with re-work and repairs. Safety risks to users of facilities, so far wholly attributed to the informal construction sector, will also reduce.

### **Study Assumptions**

It is the basic assumption of this study that the informal construction sector is here to stay. It is only through addressing the negative aspects associated with it, especially low-level craftsmanship, that the nation can reap maximum benefit from it.



The study also assumes that proper and systematic training will result in a similar degree of improvement in the level of craftsmanship and competence for all craftsmen. It is on the strength of this assumption that masons have been selected to represent other craftsmen within the construction sector for purposes of this study.

Since Nairobi City has the highest level of construction activity, and it is the capital of Kenya, it is assumed that it would be representative of other regions of the country. Most craftsmen get their experience and training in Nairobi and move to work in other areas of the country.

It has been assumed that content of training as applicable to craftsmen will not change in the near future. But it is worth to note that, as analysed in the literature review, the content for an ideal training for a mason may not hold if changes in curriculum are effected in this country.

### **Organisation of the Study**

The study is organised in four parts. Chapter one gives a general introduction, which includes problem background and statement, study hypothesis, study objectives, study limitations, justification of the study and organisation of the study.

Chapter two forms the theoretical basis of the study. In this part, reviewed literature related to training of masons is noted from textbooks and other publications. This forms the basis of evaluation of the primary data to make research conclusion.

Chapter three outlines the study methodology. This chapter explains the type of research design adopted for the study, the type of sampling used, data collection method and sampling tools, and data presentation and analysis techniques.

Chapter four contains the actual data from the survey. It gives the findings and analysis related to the problem of the study. This chapter critically evaluates facts from the survey and their import noted.

Chapter five is the final part and contains conclusions and recommendations. The reference section follows immediately.

The time allocated for the full study was three months, by the end of which a report was supposed to be ready. However, this was not possible due to various factors, and an extra month was utilised bringing the total duration to four months. A budget for the study could not be formulated as the researcher personally handled most of the work and attaching a monetary value to this would have been misleading.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **01. TRAINING AND DEVELOPMENT**

##### **Introduction**

Human resources are the most dynamic of all resources. They need considerable attention if they are to realise their full potential and deliver optimally in their work. Thus, motivation, leadership, communication, work restructuring, payment systems and training/development may all be included in the issues which have to be faced by management in any organisation. Of all these issues, this discussion will dwell on training and development. But first let us shed some light on three words that may cause confusion in the discussion: Education, training and development.

Education is usually intended to mean basic instruction in knowledge and skills designed to enable people to make the most of life in general; it is personal and broadly based. Training usually implies preparation for occupation or for specific skills; it is narrower in conception than either education or development; it is job oriented rather than personal. Development usually suggests a broader view of knowledge and skills acquisition than training; it is less job oriented than career-oriented; it is concerned more with employee potential than with immediate skill; it sees employees as adaptable resources. Generally, education can be viewed as a matter for the community, while training and development as matters for individual organisations to sort out.

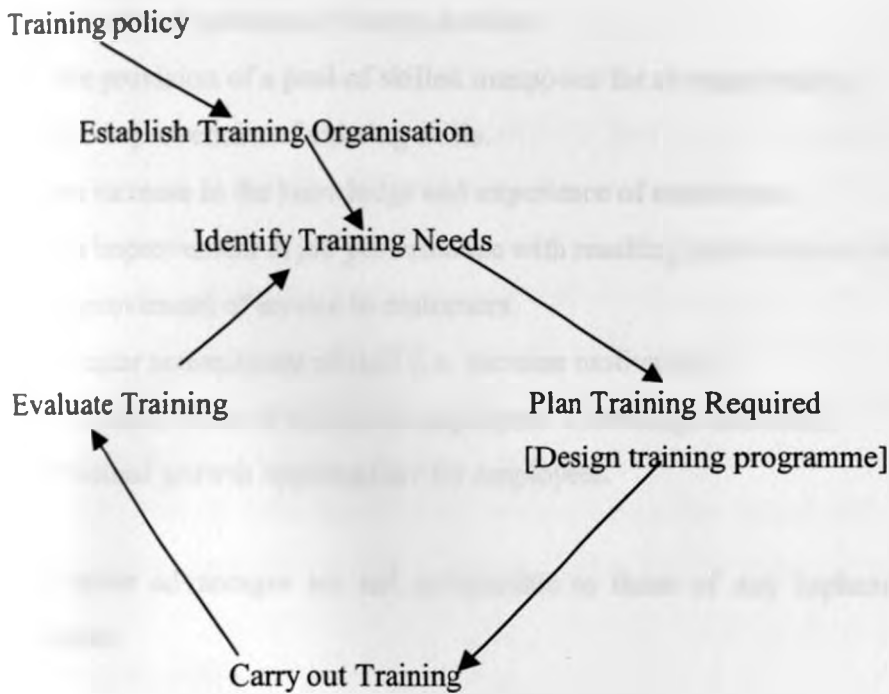
Training is an important activity in an organisation and employees' abilities to function effectively require almost constant exposure to new training programs. For instance, a plumber who fails to develop the skills required to handle plastic tubing will become obsolete and of little value to an organisation. It is for this that Dennis, Michael and Charles (1983) refer to training as "an economic investment in human resource that compares favourably with alternative investments in capital equipment and other resources in an organisation".

## **Basic Framework for Training and Development**

The scope of training and development activities, as in most other activities in any organisation, depends on the policy and strategies of the organisation. There are many organisations in the commercial field that carry out the minimum of staff training and development because, as a matter of policy, they prefer to recruit staff who are already trained or professionally qualified. These organisations are therefore prepared to pay the top market-rates for skilled staff, and what they put into recruitment, selection, pay and benefits, they do not put into training and development.

Other organisations, however, do have a positive policy on training and development. In some cases, the policy may state that “the company will provide resources to ensure that key skills are maintained within the organisation”. In other cases, the policy may refer comprehensively to the various actions it will take to ensure not only a regular supply of skills, but also a high degree of personal motivation through development opportunities provided by the organisation. The basic framework for training and development assumes that organisations see an important role for training and development in the provision of skills and the improvement of employee motivation.

A term frequently used to describe well-organised training (and development) is ‘systematic training’. This can be illustrated diagrammatically as a cycle of events, which is initiated by the organisation’s policy, and sustained by its training organisation as shown in the figure 2.1.



*Figure 2.1: Systematic Training: The Basic Cycle.*

*Source: Handy (1985)*

Once the training organisation has been set up, the first priority is to establish what the training and development needs of the organisation are. This will involve the use of job descriptions, employee appraisal records and other data, which may indicate such needs. The next step is to plan the training required to meet the needs identified. This entails such matters as setting budgets and timetables and deciding on the objectives, content, and methods of training to be employed. The implementation of plans is usually a joint affair between the training specialists and their line and functional colleagues. Having implemented the required training, it is important to evaluate the results, so far as possible, so that subsequent changes to content and methods can be made, if necessary. Events then move on to the identification of new needs, which re-start the cycle afresh.

The benefits of systematic training include:

- The provision of a pool of skilled manpower for an organisation.
- The improvement of existing skills.
- An increase in the knowledge and experience of employees.
- An improvement in job performance with resulting improvement in overall productivity.
- Improvement of service to customers.
- Greater commitment of staff (i.e. increase motivation).
- Increased value of individual employees' knowledge and skills.
- Personal growth opportunities for employees.

The above advantages are not comparable to those of any haphazard or unplanned training programs.

### **Training approaches**

There are a number of ways in which common training programs or approaches can be looked at. However, Dennis, Michael and Charles (1983) choose to examine them in terms of on-the-job and off-the-job approaches. The difference in the approaches appears in the learning theory issues associated with designing a training program and evaluation of training as earlier discussed in the basic framework of training/development. But for purposes of this study, evaluation will be discussed later as a separate issue.

### **On-the-job Training Approaches**

The most common method of training employees is to have the training carried out on the job. That is, the employee reports to his or her work station and, with some form of guidance, begins to perform the tasks, learning while doing so. The on-the-job training has variations on how it is conducted. Four methods can be employed to make it more effective.

#### **a) Coaching**

Coaching means helping people at work to assess their own performance, think through their difficulties and find suitable solutions (Barry, 1997). Therefore, coaching refers to the assignment of a specific person to act as an instructor or resource person for a trainee.

Usually, the training is done by an experienced employee or by the manager. Occasionally, a trainee instructor is assigned to the trainee's job setting, but this is more costly. The coach's task is usually to demonstrate (model) the task operations, answer questions, and provide guidance in developing understanding.

Coaching, without support from other methods, is not particularly effective. That is, coaching is better than not coaching, but it should be used in conjunction with other methods. This is so primarily because observational learning (watching a coach) effectiveness is highly dependent on trainees' internal capacities (sensory, motor and visual capacities). Therefore, some trainees may learn from coaching alone but others will not possess the required capacities. Therefore, on-the-job training must employ other methods to support coaching.

#### b) Apprenticeship

Apprenticeship refers to a combined on-the-job, off-the-job training approach in which the trainee agrees to work for a salary below that of fully qualified employees in exchange for a specified number of hours of formal training by the organisation. This is a common approach used in certain occupations, such as masonry, electrical installation, plumbing, welding, and often co-ordinated with a particular union or certifying agency.

Apprenticeship programs often combine on-the-job coaching by a skilled journeyman with classroom training in applied math, materials and technical knowledge. Because apprenticeship programs employ many of the principles of learning, such as modelling, feedback and appropriate learning sequence, they are often quite effective. However, drawbacks include the length of training at which trainees are paid at the lower rate and an over reliance on the coach who may not be trained in applying reinforcement.

#### c) Job Rotation

Job rotation is the process of training employees by rotating them through a series of related tasks. In this method, trainees are exposed to various coaches, points of views, and task operations. It is not generally useful for training technical skills, such as masonry or programming, since it does not focus on these. However, it is very common for training

managers. The wide exposure to different operations provides them with a general knowledge of company procedures and co-ordination is achieved. In most cases of managerial training, the trainee is assigned to each of the various operations for three to six months and receives a final, managerial assignment in about two years (Dennis, Michael and Charles, 1983). Such training is often combined with coaching and classroom activities.

Primary weaknesses of the approach relate to the difficulty of co-ordinating the various assignments, the fact that some of the coaching managers may not be motivated to spend time with a trainee assigned for only a short period, the fact that different coaches may espouse conflicting viewpoints of company policies and procedures, and the fact that the socialisation of new employees into more or less "permanent" work group is delayed.

#### d) Job Instruction Training

Job Instruction Training (JIT) is a set of co-ordinated procedures for conducting on-the-job training, developed by the War Manpower Commission of United States during the World War II (Handy, 1985). This comprehensive set of procedures incorporates many principles including modelling, practice, feedback, active participation, generalisation and orientation. JIT procedures specify the need to have coaches (trainers) who are trained in giving instructions, an analysis of the job, a measure of what the trainee knows prior to instruction, and a schedule for training activities.

On-the-job training methods are useful to organisations for a number of reasons. They often require little additional effort and no special equipment except that used in the job, and the organisation obtains some production while the employee is learning.

However, on-the-job training methods also involve risks. Production equipment is more likely to be damaged. Instruction may be haphazard (especially in job rotation) and pressures of the work setting may increase trainee's anxiety. Managers must evaluate these advantages and risks, consider the nature of behaviours and attitudes to be learned, and determine whether on-the-job methods are likely to be superior to off-the-job methods.



## **Off-the-job Training Approaches**

Off-the-job training refers to training conducted away from the actual work setting, be this at a special site in the organisation or in an off-site location, such as at a vocational school or university.

According to Dennis, Michael and Charles (1983), off-the-job training is particularly appropriate for certain managerial skills (such as interpersonal abilities), for certain production jobs where machinery controls the pace of work (an assembly line operation), and some technical jobs (programmers) where teaching expertise is found elsewhere. Four common off-the-job approaches are vestibule training, programmed instruction, classroom training, and sensitivity training.

### a) Vestibule training

Vestibule training refers to training that occurs in a special site, usually on the organisation's premises, away from the actual work setting, but using equipment and procedures similar to those used at the work setting. This offers a number of advantages. First, on-the-job pressures are avoided and the rate of learning can be slower and effective. Secondly, a trained trainer is more feasible because several trainees can be taught at once. Third, it tends to reduce training time and maximises skill acquisition. Fourth, there are no problems with breakage of equipment needed for actual production.

However, equipment used for training is often that which has been replaced by newer equipment that is employed in the actual production process. This is because duplicating exact equipment may be prohibitively expensive. Thus, generalisation is sometimes problematic. Also, vestibule training is expensive in other ways. Costs include training space, loss of production from trainees, and the trainer's salary. Still this method is valuable for training in assembly-line type of jobs.

### b) Programmed Instruction

Programmed instruction refers to learning materials that are organised in a sequential fashion so that correct understanding of one set of materials must be indicated before the

trainee can progress to the next set. This method often uses books or manuals, but electronic teaching machines and computer systems may support it. In practice, the trainee reads a set of materials and then responds to questions (usually multiple choice or true or false). If the trainee answers the questions satisfactory, then he or she proceeds to the next section. However, if the answer is not satisfactory, the trainee reads additional information and again responds to questions on that material. This procedure is repeated until the trainee meets the requirements, at which time he or she goes forward.

This method utilises several learning principles, including movement from simplex to complex material and provision of feedback. It is limited in that reinforcement is difficult and interaction with a coach is minimal. However, research has shown it to be one of the most effective methods for building knowledge and retention of that knowledge (Barry, 1997).

c) Classroom Instruction

Classroom instruction is familiar to nearly every individual, as it is the method used in education, and perhaps the most common method of off-the-job training. Only the contents of training, not the method used, are different from those used in educational classrooms, and in some cases the content is similar or identical. This method is particularly useful for imparting cognitive, as opposed to physical, skills. Classroom instruction content runs a wide gamut from technical knowledge (e.g. accounting concepts, engineering concepts) to broader social issues (e.g. human relations concepts, social responsibility concepts).

Classroom instruction may be appropriate for lower-level employees wanting to build skills for advancement purposes, for professionals needing to stay current with technological developments, and for managers needing to build broader perspectives with societal relations (Dennis, Michael and Charles, 1983). Classroom instruction is available from many institutions such as high schools, vocations training centres, colleges, and universities. Also, a number of specialised organisations cater for training needs of an industry and offer a wide range of classroom courses.

The specific methods that may be used in a classroom setting also vary widely. For example, a course may use lectures as its primary method or it may draw on demonstrations, audio-visual aids, case studies, role playing, or in-basket techniques. The technique to be used depends on both the content and the type of trainees. The effectiveness of classroom training varies widely because of the difference in techniques used and the type of skill being developed.

d) Sensitivity Training

Sensitivity training is a process in which several individuals work together for several days for the purpose of building self awareness, understanding of group processes, and greater understanding of interpersonal relationships (Dennis, Michael and Charles, 1983). Under guidance of a qualified trainer, the trainees are encouraged to probe their feelings, abilities, and needs in building interpersonal relationships. The process involves a penetration of their psychological defences, and some emotional reactions are experienced.

Sensitivity training has been criticised because of the emotional responses it can evoke and because it cannot be established firmly that the trainees actually change their interpersonal behaviours when they return to their jobs (Barry, 1997). Still, some organisations firmly believe that such training is an essential aid in the development of their managers. Researches conducted on effectiveness of training methods indicate that this type of training is very effective in changing manager's attitudes and in developing intended interpersonal skills.

Off-the-job training methods are useful because they are cost effective (e.g. one instructor can train many trainees at the same time). They are invaluable in developing cognitive and interpersonal skills but may be weaker in building physical skills. In terms of learning principles, it can be seen that anxiety may be lower in the speed of learning. However, classroom methods are generally weaker than on-the-job methods in providing reinforcement, practice, generalisation, and knowledge of results (as applied to the job).

## Levels of Training

The discussion on the training methods has tended to ignore important issues surrounding differences between various types of employees. Although all the methods have application to most employee groups, the training approach that is most effective will differ considerably. This is because the goals of training and the needs of the employees are widely different. This difference is great, especially between technicians and unskilled employees and between non-managerial and other professional employees.

For lower-level employees, the goals of training deal most often with hands-on skills that relate to current performance. Hands-on skills are those that require physical activity or contact with some object, such as wiring assembly. It should be noted that hands-on skills might also require high levels of knowledge; for example, a machinist must know various metal strengths, cutting speeds, and other complex information.

However, the goals of managerial and professional training relate more often to decision-making skills and leadership skills that are likely to affect future performance or promotion opportunities. And if employees perceive a job to be 'dead-end' from which promotion is unlikely, they are bound to leave and this results in firms experiencing high turnover rates among their young professional and managerial employees.

Thus the goals of managerial and professional training are developmental. Many of the methods described earlier are appropriate means for developing the potential of these employees. It should also be recognised that current performances are generally improved as a result of training, since the employees are likely to put the new knowledge to work in their immediate jobs. Managerial and professional training must be designed around proper job assignments and supervisory coaching.

## **Evaluation of training**

The evaluation of training is part of the control process of training. It might seem that any logically designed training programme must, by definition, accomplish its purpose. However, closer inspection of the complexities of training reveals that even the most logically designed program might not benefit either the trainee or the organisation (Dennis, Michael and Charles, 1983a). We must therefore evaluate the results of a training effort, after completion, to be sure that the intended benefits have been realised.

Evaluation methods aim to obtain feedback about the results or outputs of training, and to use this feedback to assess the value of the training, with a view to improvement, where necessary. Like any other control process training evaluation is firstly concerned with setting appropriate standards of training. These may take the form of policies, objective adherence to external standards, and standards of trainer training and qualifications. Clearly, the more precise the standard set, the easier it is to evaluate the success of training. Therefore, any evaluation procedure should:

1. Be planned at the same time that the learning objectives for the training are outlined
2. Be based on objective information gathered as trainees progress through training.
3. Follow rigorous scientific principles.

Following this rationale, evaluation of training will attempt to answer the following important questions.

1. Did the behaviour of trainees change?
2. If it did change, was this due to the training program or to some other cause?
3. If it did change, is the change consistent with the learning objectives?
4. Has the change improved trainees' performance on the job?

To answer the four questions above, the evaluator must be able to measure the specific results of training. Criteria refer to the measurements of those outcomes. There are four major types of criteria in use: reaction criteria, learning criteria, behavioural criteria, and result criteria. These are often referred to as 'level' of criteria because each one is successively more rigorous, requiring more effort to obtain but yielding a better and more relevant evaluation (1983b).

### **Reaction criteria**

These are the least rigorous of the evaluation criteria. They are simply measures of the trainers or trainee's reactions or impressions about the program. They are usually obtained by questionnaires given at the end of the training program. While it may be useful to know how trainees 'feel' about the training, such information cannot substitute for other criteria.

### **Learning criteria**

These measurements are usually related to tests that cover the training material and are taken at the completion of training. They answer the question: "Did the trainees understand the information provided by training?". In some cases, these may be skill exams (e.g. constructing a masonry wall), but more often they pertain to facts, information, and other conceptual understanding.

### **Behavioural criteria**

These are measures of trainee behaviours on the job. They are an attempt to determine if the things learned in training are being applied on the job. For example, if a manager attended sensitivity training, a behavioural criterion might be the extent to which he or she allows subordinates to participate in making decisions. It should be understood that these criteria relate only to behaviours, not the results of those behaviours. The measures might be obtained by observing the trainees' on-the-job behaviours or by asking co-workers, supervisors, and subordinates for their observations.

### **Results criteria**

These are the most rigorous criteria and pertain to the actual achievement of organisationally desired objectives or results. Such measures might be cost or productivity figures. They might also be employee morale figures, absenteeism rates, profits, and so on. It must be recognised that these criteria are not interchangeable with reaction, learning, or behavioural criteria. For example, it might be that trainees *liked* the training, *learned* what was taught, and have *changed* their behaviours on the job, but achieve poor results because we designed the wrong content. To be sure we instil the right skills is therefore an important reason for evaluating training programs.

*Summary:* Since the choice of a training approach is always a somewhat tenuous decision, it is best to evaluate the results of training. It is necessary to determine if trainees change their behaviours, if the changes are in fact the result of training, and if the changes are consistent with the training objectives. Further, it is important to determine if changes benefited the organisation in terms of improved performance.

It is also worth noting that training is not a one-time experience. The best training program if limited to new employees only, will not yield an effective organisation. Training, designed and evaluated logically, must be provided to employees throughout their careers to suit changing circumstances (Barry, 1997).

## **02. TRAINING FOR THE INFORMAL SECTOR IN KENYA**

### **Introduction**

Kenya is among the relatively more industrialised countries in Africa. At independence (1963) it started with a well-established economic base and the country's industrial sector expanded rapidly between 1963-70. Most of the progress was reversed during the 1980s as a result of economic mismanagement and the structural adjustment policies, which were hesitantly, adopted (Ikiara and Ndungu, 1999a). Un- and under-employment have severely increased a bellowing informal sector as the residual recipient of labour. Earning declined in the 1980s and 1990s, and the conditions of vulnerable groups worsened considerably as the result of reduced access to education, health, housing, water and sanitation. Kenya's relations with major donors remained strained in the wake of concerns about the political climate and incidences of high-level corruption.

The informal sector in Kenya has expanded dramatically in the past 20-30 years: in 1972 self-employment and informal jobs accounted for just over 10% of total employment, which increased to 55% in 1994 (1999b). In the same period public sector employment declined from 36% to 21% and modern private sector employment from 54% to 24%. In 1998, the informal sector, in Kiswahili called *Jua Kali* (hot sun) sector was estimated to employ almost three

million people, or 63.5% of the labour force (Ferej, 1999), and without doubt has continued to expand since.

According to the National Micro and Small Enterprise (MSE) Baseline Survey conducted in 1999, the informal sector in Kenya comprises almost 1.3 million enterprises that employ a total of 2,361,250 workers, including the firm owners. The informal sector employs more people than the formal sector, which employs only 1.6 million people.

Two-thirds of informal enterprises are rural-based. They are especially important in regional centres and small towns where between 35% and 59% of all households are engaged in some form of small-scale non-agricultural activity (CBS/ICEG/KREP, 1999). Over 90% of the informal enterprises are forms of self-employment. The average size of the informal businesses is a mere 1.8 workers – with little difference between rural and urban averages. Less than 2% of the firms have more than ten workers.

Structurally, trade is by far the dominant economic activity in the informal sector: nearly two-thirds of all firms are engaged in small-scale buying and selling of goods. Only 13% of them are engaged in manufacturing activities, and less than 2% in construction. Almost 15% are involved in services. The table below explains this scenario:

*Table 2.1 Economic structure of the informal sector in Kenya (1999)*

<b>Economic Sector</b>	<b>Urban Employment</b>	<b>%</b>	<b>Rural Employment</b>	<b>%</b>
Manufacturing	92,465	11.5	249,738	16.1
Construction	17,720	2.2	25,246	1.6
Trade	417,725	51.8	1,052,885	56.00
Hotels and restaurants	81,334	10.1	103,280	6.7
Transport	25,161	3.1	12,049	0.8
Real estate	34,134	4.2	13,770	0.90
Professional services	140,781	17.5	94,960	6.1
<b>Total</b>	<b>809,320</b>	<b>100</b>	<b>1,551,930</b>	<b>100</b>

*Source: Economic Survey of Kenya, 1996 - 2000*



### **Informal Sector Policy**

Kenya has actively formulated policies to stimulate the development of its *Jua Kali* sector, but it would appear that implementation of these policies is seriously lagging behind (Ikiora, 1996). Recent research points especially to the lack of analytical and implementation capacity at the level of local government in relation to the informal sector (Mullei and Bokea, 1999).

After neglect for the larger part of the past two and half decades, the *Jua Kali* sector has steadily been assuming a more prominent role in Kenya's national development planning. The National Development plan 1989-1993, for instance, sought to create 1.9 million jobs of which one third was to be generated by the small scale and *Jua Kali* sectors, mainly through:

- Provision of technical and business skills training to existing entrepreneurs.
- De-regulation and liberalisation of the sectors.
- Provision of incentives in the form of workshop sheds.
- Encouraging the formation of (geographical) *Jua Kali* associations.

In the sessional paper No. 2 of 1992, the Government of Kenya set out the important position that its role in the development of the *Jua Kali* sector would be one of facilitator rather than interventionist. Since then, "an enormous amount of work has been done to identify various rules and regulations affecting start-ups, operation and growth of informal enterprises in Kenya, ... however, very little positive action resulted" (Karingithi, 1999). A major constraint for the formulation and implementation of policies and programmes for the informal sector has been the fact that the responsibility for the sector has been scattered among various government ministries and agencies. This only changed with the cabinet reshuffle in 1999 when most functions and programmes related to the sector were regrouped under the Ministry of Labour and Vocational Training.

### **Education and Training Policy**

For a number of years efforts at education and training sector planning have been underway but the national policy on vocational training has not yet emerged. The process was hampered by the government reshuffle in 1999. As one of the outcomes of this, the Ministry of Research, Technical Training and Technology (MRTTT), which upto then was responsible for both

technical training and the development of the *Jua Kali* sector was split up, with basic vocational training becoming the responsibility of the Ministry of Labour while the Higher Colleges of Technology went to the Ministry of Education. The result was the large number of training initiatives and the continuing institutional confusion of training responsibilities. But there are two aspects of the current training sector, which represent attempts made to re-orient students towards self-employment: the 8-4-4 system, and the introduction of business skills education.

**a) The '8-4-4' education system**

Since the expanded education opportunities after independence did not result in the expected automatic employment of the primary school leavers, in 1984 a fundamental restructuring of Kenya's education system was decided known as '8-4-4' (replacing the '7-4-2-3' system). It placed emphasis on attitudinal and skills preparation for the world-of-work and self-employment in particular. New subjects such as woodwork, metalwork, leatherwork tailoring and business skills, together with agriculture, home science and art, were added to the curriculum. The new system encountered problems from the start: the implementation was done in a hurry without proper testing; most schools lacked teachers, workshops and equipment to implement practical education; technical subjects still formed only a small part (15% of learning hours) of a broad curriculum offered in primary schools, and the curriculum appeared to have been made in ignorance of the skill needs of the informal sector (Oketch, 1995).

The results are consequently mixed: while the curriculum has a number of useful vocational elements, the students cannot link what they learn directly with employment or production. Only a minority of school-leavers when asked to indicate the source of their skills mention practical subjects taught in school (Shiundi, quoted in Oketch 1995). Other observers feel that the curriculum is too broad and overloaded on core subjects such as English, Mathematics, and Science (McGrath, 1997). It is seen likely that as one of the outcomes of the current debate on education and training in the country, some of the practical subjects will be reduced to optional status or disappear altogether. Indeed this process has already begun. The earlier associated problem of cost to parents has now been addressed with the new government's policy of free primary education as from January 2003.

## b) **Business Education**

Possibly the major change in Kenya's education system in the past decade has been the introduction of business skills education at almost all levels of education and training – in primary and secondary education and from youth polytechnics to national polytechnics. In addition, there is now a Master's programme in entrepreneurship at the Jomo Kenyatta University of Agriculture and Technology (JKUAT) and a Higher National Diploma course at the Kenya Technical Teachers College (KTTC).

This type of education appears to be widespread although its quality is not known. There are indications that it is not actively offered at all institutions due to staffing and other constraints, although a new team of well-oriented trainers and managers has been trained at KTTC and JKUAT (McGrath, 1997). It seems that some vocational training college principals refuse to employ qualified teachers, while the skills of the trainers are very marketable which makes them difficult to be retained by vocational training institutes. The impact of business skill education is not yet clear. Some of the students appear to be more interested in obtaining the credentials than genuinely acquiring the skills and they do not show any innovation in the use of the skills they acquire. They copy existing plans instead of developing their own.

## **Training in Technical Skills**

Practical (hands-on) skills on the real work performance in Kenya are acquired through three main lines:

- Technical Education Programmes
- Industrial (Vocational) Training Schemes
- Traditional Apprenticeship System

**a) Technical Educational Programmes**

These fall under the Ministry of Education as part of the 8-4-4 Education system. The trainees must have at least completed primary education besides meeting other criteria. The levels of training and certification in these programmes are as follows:

(i) Artisan

This level of training is offered to primary school leavers and secondary school leavers. Graduates are awarded Artisan Certificates upon successful completion of the course.

(ii) Craft

This level of training is offered to graduates of artisan courses and secondary school leavers. Graduates are awarded Craft certificates upon successful completion of the course.

(iii) Technician

This level of training is offered to graduates of craft courses and secondary school leavers who have done relevant applied subjects in the secondary education cycle. Graduates are awarded Diploma certificates upon successful completion of the course.

(iv) Technologist

This level of training is offered to graduates of Technician courses. Graduates are awarded a Bachelor of Technology degree upon completion of the course.

**b) Industrial (Vocational) Training Scheme**

This was removed from the Ministry of Labour and taken to the Ministry of Education during the restructuring of government departments in August 2003. The scheme is regulated by the Industrial Training Act (Cap 237) which makes provision for regulation of training for persons engaged in industry. Thus for any person to benefit from the provision of the Act, he has to be already engaged in the industry, as opposed to the technical education programme.

The Act covers the following important areas, which govern all forms of industrial training:

- The Directorate of Industrial Training (DIT), its management, structure, and duties and responsibilities of the Director and his officers.
- The National Industrial Training Council (NITC), its composition, duties and responsibilities.
- Training committees, their composition, duties and responsibilities.
- Training Levy orders, modes of payment and rates, fines for defaulting contributors, Levy Inspectorate and its duties and how the Director may disburse the funds.
- Training schemes and procedures for their administration including certification.
- Trade tests rules and certification procedures.
- Provision for appeals and arbitration through Minister in-charge of Industrial Training.

Of great interest for purposes of this study are the training schedules available:

(i) Indentured learnership

An Indentured learner is defined as a person bound by a written contract to serve an employer for a determined period of time running from 6 months to 5 years for purposes of learning a trade or occupation in which he/she is employed. Any person with the Kenya Certificate of Primary Education (K.C.P.E) or Trade test Grade III certificate and is over 15 years of age may apply to become an indentured learner on condition that he/she is medically and physically fit. A certificate of Indentured Learnership is awarded to mark the end of training.

(ii) Skill-upgrading course

These courses are offered at a fee to those in both formal and informal employment, at National Industrial Vocational Training Centre (Nairobi), Mombasa Industrial Training Centre, Kisumu Industrial Training Centre, Kenya Textile Training Institute (Nairobi) and at National Polytechnics. The courses are being offered on part time basis to suit trainee needs, but a total of 120 hours must be met at each level. These levels are as follows:

1. *Basic Level:* For KCPE holders and/or *Jua kali* Artisans, who may want to sit for Trade Test Grade III.

2. *Intermediate Level:* For those who have undergone the basic training or possess Trade Test Grade III certificates.
3. *Advanced Level:* For those who have undergone the intermediate training or possess Trade Test Grade II certificate.

These courses are also suitable for graduates, technicians and do-it-yourself aspirants who may want to have hands-on skills in any discipline. Courses offered among others include: carpentry/joinery, mechanics, electrical installation, welding, masonry, plumbing, refrigeration and air conditioning, dressmaking/tailoring, weaving, laboratory testing, hand spinning, tie and dye, screen printing, etc.

Certificates of attendance are issued on completion of a course though participants are encouraged to book and sit for Government Trade Tests.

(iii) Craft Apprenticeship

An apprentice is defined in the same way as an indentured learner except for difference in requirements, training mode and certification. A craft apprentice will need to have KCSE (Grade D), enrol for some classes at one of the Industrial Training Centres in Nairobi, Kisumu or Mombasa under craft apprenticeship training scheme. In addition an apprentice is required to take proficiency tests at preliminary (end of first year of training), intermediate (end of second year of training) and final level. Each proficiency test consists of practical test and a written examination, and continuous course-work assessments are also considered. On successful completion of the training a final Certificate of Proficiency is issued.

Courses offered include, but are not limited to; mechanics, panel beating, spray painting, welding, masonry, plumbing, electrical installation, spinning chargehand, weaving chargehand, etc. The apprentice continues to earn wages from the sponsoring employer as he undertakes the training.

(iv) Technician Apprenticeship

This is similar to the craft apprenticeship, only that entry requirements and the level of training are slightly higher. The entry requirement is K.C.S.E (aggregate C- and C- in key subjects of course) apart from the standard age of above 18 years, desire to join the apprenticeship, medical and mental fitness, and employer's sponsorship are requirements to be met. The schemes that require employer sponsorship can only benefit those in formal employment as the training is funded by the levy fund.

There are several courses being offered at this level at the Eldoret Polytechnic and the Jomo Kenyatta University of Agriculture and Technology.

(v) Management and Supervisory Courses (Locally organised and overseas)

This scheme of training was established with the amendment of Industrial Training Act of 1975 in response to Kenyanization of managerial and professional jobs in the industry. This must, however, be distinguished from the technical skills schemes already discussed.

Locally, there are public training institutions offering management and supervisory courses that include the government training institutions (GTIs), national polytechnics, public universities and the Eastern and Southern Africa Management Institution (ESAMI). There are also private firms and institutions approved by the Directorate of Industrial Training to offer these courses.

Training abroad can also be, and has been, arranged before where the need arises. Among other things, trainee needs sponsorship by the employer as this training is also financed by the Levy fund.

**Technical and vocational training certification levels.**

Technical education programmes and industrial (vocational) training schemes have for a long time been running different systems of training with graduates having varying levels of competence. This has not helped the nation to achieve the desired levels of manpower skills as

demanded by changing circumstances. There have been a lot of efforts between the two departments to harmonise training and arrive at common functional definitions of levels of competence. They have come up with the following chart to try and harmonise certification levels between the two training paths:

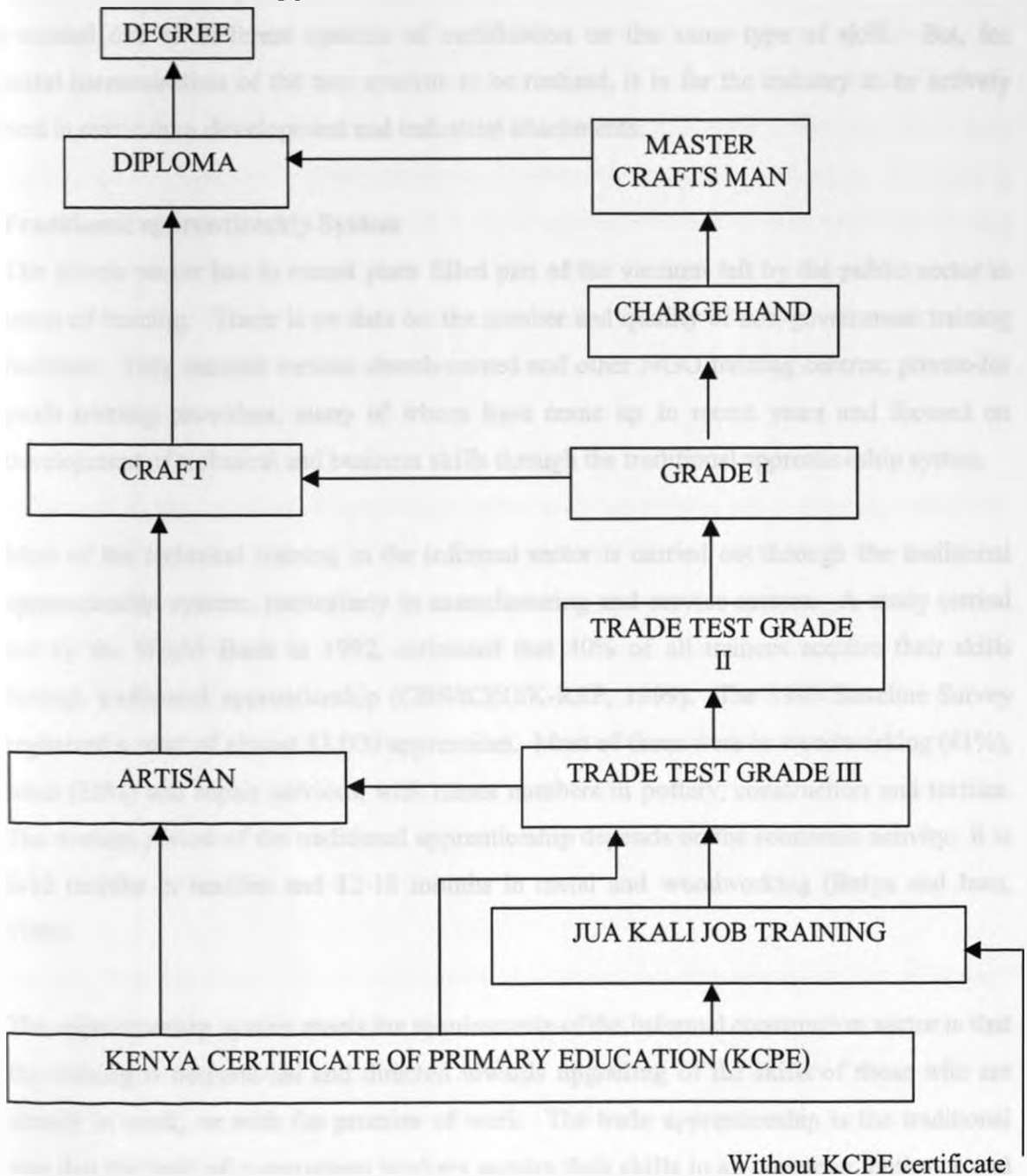


Figure 2.1: Functional definitions of levels of competence.

Source: DIT Newsletter (2001), volume 2.



As seen from the chart, a person may train through either of the systems but on attaining an equivalent certificate be graded as an Artisan, a Craftsman, a Technician, a Technologist or an Advanced Technologist with the relevant performance competence at each level. This would eliminate the biases of employers towards one form of certification and reduce confusion that has since existed due to different systems of certification on the same type of skill. But, for successful harmonisation of the two systems to be realised, it is for the industry to be actively involved in curriculum development and industrial attachments.

### c) **Traditional apprenticeship System**

The private sector has in recent years filled part of the vacuum left by the public sector in terms of training. There is no data on the number and quality of non-government training facilities. They include various church-owned and other NGO training centres; private-for-profit training providers, many of whom have come up in recent years and focused on development of technical and business skills through the traditional apprenticeship system.

Most of the technical training in the informal sector is carried out through the traditional apprenticeship system, particularly in manufacturing and service sectors. A study carried out by the World Bank in 1992, estimated that 40% of all trainees acquire their skills through traditional apprenticeship (CBS/ICEG/K-REP, 1999). The 1999 Baseline Survey registered a total of almost 53,000 apprentices. Most of them were in woodworking (41%), retail (32%) and repair services, with minor numbers in pottery, construction and textiles. The average period of the traditional apprenticeship depends on the economic activity. It is 6-12 months in textiles and 12-18 months in metal and woodworking (Baiya and Jean, 1998).

The apprenticeship system meets the requirements of the informal construction sector in that the training is demand-led and directed towards upgrading of the skills of those who are already in work, or with the promise of work. The trade apprenticeship is the traditional way that the bulk of construction workers acquire their skills in all countries, both rich and poor (ILO, 2001).

In Kenya apprenticeship is entirely informal, as a master craftsman instructs his 'helpers' while at work. The system is self-sustaining, without outside intervention, with the cost of training borne by the trainee – through his labour or through a fee.

However, traditional apprentice training may fail to meet the requirements of the industry for a variety of reasons. Firstly, the quality of training is only as good as the skills of the Master (Fluitman, 1989) and in some cases the master craftsmen themselves have only limited skills. Secondly, a big expansion in demand can strain the system by creating pressure to use apprentices for production, at the expense of training. The traditional system can also be found wanting if there is a demand for higher quality buildings or the introduction of new technologies requiring new skills. In any of these situations there may be a need to inject additional skills into the system, or to streamline apprentice training to make it more efficient and/or enable it to expand.

NGOs and donor agencies have been involved in strengthening the role of the traditional apprenticeship in the informal sector. For example the Kenya NGO SITE (Strengthening Informal Training and Enterprise) together with Appropriate Technology of the United Kingdom (APT-UK) implemented from February 1996 to August 1998 the Skills Upgrading Project (SUP) to: (i) upgrade the technical and managerial skills of mastercrafts(wo)men and trainers to enable them to diversify their production, (ii) strengthen the capacity of mastercraft(wo)men to provide quality training to their apprentices, and (iii) to strengthen the capacity of selected vocational training institutes to support the former on an ongoing basis (SITE, 1999). Much was achieved.

Another example is the World Bank Training Voucher Scheme which has operated since early 1990s, under the World Bank Micro and Small Enterprise Training and Technology Project (MSETTP). The project agreement was signed in 1994, financed with a USD 24 million loan after a lengthy preparation. The main objectives of the project were: (i) providing skills upgrading for 10% of the informal manufacturing sector (some 32,000 enterprises), (ii) increasing access of informal enterprises to technology, marketing information and relevant infrastructure, and (iii) improving the policy and institutional

environment. This system revolutionised the traditional apprenticeship training through the cost reimbursement voucher scheme (Riley and Steel, 2000).

The above two examples have shown a case where the traditional apprenticeship training system can be strengthened and modernised for ease of evaluation and certification. It is the most common method of training in the informal sector, as earlier mentioned.

*Summary:* Since the linkage between formal and informal sectors is becoming increasingly inseparable due to high turnover of labour (especially in the construction industry), those trained in the formal systems find their work in the informal employment and vice versa. There are no restrictions to which sector one works after training. It is, therefore, important to upgrade all systems of training to meet the needs for the worst case scenario for employment, which is the informal sector.

### **03. TRAINING IN THE CONSTRUCTION INDUSTRY**

#### **Introduction**

Structure and practice of the construction industry as it is today in Kenya is fashioned on the old British model, even when there are significant changes that have taken place in Britain. This is attributable to our colonial history.

There are a variety of personnel engaged in any construction process, including the professionals, craftsmen (tradesmen) and businessmen. Each category requires training for development of the requisite skills, and there are three main ways to go about it as already mentioned. The most obvious is by formal education beginning with primary education, secondary education and then higher education including colleges, universities, and higher technical institutes (technical training programmes). Secondly, through on-the-job training by systematic training programmes in employing institutions (industrial/vocational training programmes). A third process is self-development, where individuals seek to acquire greater knowledge, skills or capacity through preparation on their initiative by learning from others through informal contacts (traditional apprenticeship).

Each group of personnel is suited for training in a certain way for effectiveness to be achieved. The following is what happens in the case of Kenya.

### **Training of Professional and Managerial Personnel**

The professionals for the construction industry are trained at the university level. The Jomo Kenyatta University of Agriculture and Technology now offers a degree course in Architecture. But the bulk of training has been done at the College of Architecture and Engineering at the University of Nairobi. From here we get engineers of various disciplines such as structural, civil, electrical and mechanical engineers as well as architects and quantity surveyors. These professionals usually form the design team for a given project. Courses on general principles of management have now been built into the curriculum that these professionals undergo especially at the department of Building Economics and Management, which is responsible for training Quantity Surveyors.

Recently, the same department introduced a Master's course in Construction Management to replace the Building Management programme. The course is meant for professionals already in the practice and pioneers of this course are scheduled to graduate at the end of 2003. This will enable the industry to have effective and locally trained construction project managers/contract managers. With the influence of practices from developed nations shaping the local market, Kenya has relied on managers trained in other countries or on the locals who have not undergone specialised training in construction management.

Once the professionals graduate from the university, they usually serve under qualified and registered practitioners as a requirement for registration. Professional exams/interviews are administered to test their competence before registration as qualified professionals. The Architects and Quantity Surveyors are registered and their professional practice regulated by the Architects and Quantity Surveyors Registration Act (Cap 525), while the Engineers are registered and regulated by the Engineers Registration Act (Cap 530). Under these statutes, the professionals are required to undergo continuous professional development (CPD) programmes to keep them abreast with new ideas and developments in the industry. This is done through seminars, workshops, lectures, etc. The training is, therefore, a continuous process.

### **Training of Craftsmen/Tradesmen**

Craftsmen are skilled labourers whose competence in hands-on skills is high and thus need no supervision in the speciality. These would include masons, electricians, carpenters, plumbers, etc. They are able to supervise the works of artisans and unskilled labourers.

Quality of labour depends on education, skill and experience on the job. Skill is acquired through training. This training plays an important role in developing the required quality. With proper training it is possible to avoid failures and defects related to poor workmanship in a construction project (Ngaruiya, 1988). Also, proper training of labour ensures that the client gets good value for his money and wastage of material and time minimised thereby reducing the cost of the project. In addition, management of the project becomes easier as it is simpler to communicate on technical terms with a trained person.

The high turnover of workers poses a considerable barrier to formal training in the construction industry. Workers are reluctant to invest in their own training because of insecurity of employment and high levels of unemployment. Contractors are reluctant to invest because there is a good chance they will lose trained workers to other firms. The contractors reluctance is also based on the fact that training costs money, which (at least in the short-run) will raise the price of their bids and could make them uncompetitive. The cyclical pattern of construction output adds to the problem – nobody wants to train in a recession and nobody has time to train in a boom. A further difficulty is that the majority of owners (clients) build only once, which means that they will not contribute to training costs that will benefit only future clients (Philips, 2000).

The obstacles to training can be overcome by joint action. Collective agreements between the social partners that all will share in training can ensure that all contractors put training costs in their bids and so avoid the “free rider” problem. In Kenya, 0.25% of the contract price for those over Ksh. 1000,000.00 is channelled to the Training Levy account, overseen by the Directorate of Industrial Training (DIT). But this only benefits those employed in the formal sector of the industry, those in the informal sector do not qualify for such training opportunities.

Even with the Training Levy funding, the training scheme is not utilised by the formal sector. For example, records from DIT indicate that for the last decade (1991 – 2000) out of 2,020 people who benefited from the training as indentured learners none was from the construction industry; out of 5,748 trainees in craft apprenticeship only 295 were from the industry; out of 1,476 technical apprentices only 65 were from the industry; out of 31,250 in local management and supervisory training, only 176 were from the industry; and out of 856 people who benefited from overseas training, none was from the industry. Yet the training levy account had accumulated a credit balance of more than US \$ 850,000 by the end of 1997 (Wachira, 2001). The failure to spend the funds accumulated for training is attributed to the reluctance of the contractors to train and the exclusion of the informal sector. The contractors can only be persuaded to take their workers for training if they are compensated for lost time.

The above scenario has led to a situation whereby construction skills are mainly acquired through an informal apprenticeship system. 85% of craftsmen in Kenya are trained through the traditional apprenticeships (ILO, 2001). However, informal training has limitations, notably a restricted learning opportunity (learning by doing), a narrow and static range of skills and difficulty of instruction in new techniques. And as earlier mentioned, the informal apprenticeship is not well developed and the master craftsmen who do the training may themselves have very limited skills. Also the informal method of skill acquisition can come under particular strain when there is a sudden and or sustained increase in construction activity, or when there is pressure from clients for better quality buildings or more rapid completion. These situations arise during the process of economic growth and social change.

By way of summary, the training of craftsmen in Kenya is not adequate in terms of numbers and content, especially that majority of the training done is through the traditional apprenticeship method. The same cannot cope with the fast growing scenario of informal sector and a proper training policy needs to be developed by and for this industry.

### **Training Needs of the Informal Construction Sector**

The concept of the “informal sector” first emerged in the early 1970’s (Wells, 1998), in the context of debates on industrialisation and development in developing countries. It arose to

describe that part of the urban economy where those not drawing a regular wage from an established employer were able to make a living. Initially, the concept of the informal sector was applied to the manufacturing sector but as it continued to gain currency, it is now being applied to all sectors of the economy, including the construction industry.

The informal construction sector mainly comprises of unregistered, unregulated and unprotected individuals and small enterprises that supply labour and contribute in various ways to the output of construction. According to Wachira (2001), the workforce in the informal construction sector;

- Is mostly self employed
- Has no regulation or protection from the law
- Is employed in unregulated and competitive markets
- Use simple technology, mostly labour intensive
- Acquire skills outside of the formal school system

Although the informal construction sector has proved to serve the interest of the majority of middle and low-income earning clients very well, the product quality of this workforce has been wanting. This could be attributed to lack of interest in the work as the image of construction work is very poor amongst the workers themselves. Those entering the industry do so as a last resort when all else has failed and they exit at the first opportunity (ILO, 2001). And given that unlike in the formal sector, craftsmen and artisans in the informal sector supervise their own work, the level of performance has been very low.

In addition, clients in the informal sector do not enquire into the level of training and education of the *fundi* (craftsmen); the basis of selection is the knowledge that he has done some work successfully elsewhere. No certificates are asked for (Munderu, 1990). This means that the craftsmen are engaged and expected to perform without verification of their competence.

Under the circumstances prevailing in the sector, a *fundi* must be able to offer the following services to his client;

- Estimation of quantities of basic materials for construction e.g. how many bags of cement are required for a given area of wall.

- Estimation of time required to do a task e.g. to build a square meter of a wall.
- Perform his hands-on skills proficiently without supervision, e.g. if he is a mason, then he should be well versed with the trade.
- Advice on basic design issues, as most clients do not even seek professional advice.

Considering the above, the training of persons working in the informal construction sector must be revisited and appropriate training applied. Most of the skills acquired through formal training assist in meeting the above requirements but it is unfortunate that most of those in the informal sector have little or no formal training.

#### **04. TRAINING FOR THE INFORMAL CONSTRUCTION SECTOR IN KENYA: THE CASE OF A MASON**

##### **Introduction**

Masons working in the informal construction sector acquire their operational skills from the already discussed three main sources of training – the technical education programmes, the industrial training schemes and the traditional apprenticeship system. Whatever the line of training, there are minimum requisite practical skills that an accomplished mason needs to possess in order to meet the requirements of the informal construction sector, that is, to satisfactorily accomplish the technical aspects of the work without supervision.

Of the three lines of training, the industrial education scheme offers the best evaluation mechanism of an accomplished mason. This system can be considered as a hybrid of the formal education and the traditional apprenticeship. On one hand it is functional and practical oriented, focussing on those already in the industry, unlike the technical education programme. On the other hand, it provides organised training with a formalised syllabus, programme of training, testing and certification procedures, unlike the traditional apprenticeship. Thus, it is possible to use industrial training testing and certification systems to grade a mason who has acquired his skills through the technical education programme or traditional apprenticeship on practical (hands-on) skills on the real work performance. Certification through industrial training attests to the performance standard of a tradesman.



## **Craft Apprenticeship Level**

A mason who has successfully gone through a craft apprenticeship training is considered as having all the skills and experience a mason needs and therefore can work on his own without supervision. Usually a final certificate of proficiency is issued to show competence.

### **A) Entry requirements**

An apprentice should meet the following minimum requirements:

- (i) 18 years of age
- (ii) K.C.S.E. Certificate / or Artisan Certificate
- (iii) Employer's sponsorship
- (iv) Desire to join apprenticeship
- (v) Medical and mental fitness

A person who is a minor may bind himself with consent of his parents or guardian or, if there is no parent or guardian, with the consent of a District Officer or Labour Officer (section 8(3) of Industrial Training Act, cap 237).

### **B) Programme of training**

Apprenticeship training takes three years, and is divided into two parts:

- (i) Practical training on the job that is undertaken with the employer, under supervision by a senior Industrial Training Officer from DIT (Directorate of Industrial Training).
- (ii) Supplementary craft course training that includes practical training (70%) and theoretical instructions (30%) related to the trade that is conducted at one of the DIT training centres or at any other approved training establishments.

#### **Practical training on the job**

For the practical training on the job, the employer must meet the conditions required by the DIT for effective training. There must be adequate facilities for purposes of training and at least four skilled masons employed on a full time basis. The employer must keep records of the apprenticeship in the form of a logbook of daily activities performed by the apprentice.

Section 22A of Industrial Training Act, CAP 237, provides that an employer, who enters into an apprenticeship contract, will appoint by name from among his employees a person who shall be responsible for the training of apprentices. Where twenty-five or more apprentices are employed at any given time a person so appointed shall devote all his working time to the management of apprenticeship. To oversee the supervision of the programme, section 24 further provides that a person who is an Inspector for the purposes of Industrial Training Act may enter an employer's establishment at any reasonable time where an apprentice has been in the last six months. He may accompany himself with an interpreter or a policeman. While in the premises he may do any of the following:

- A) Interview anybody he finds in the premises.
- B) Arrange for an apprentice / ex-apprentice to meet him at any place of his choice.
- C) Examine records relevant to the Act, and make copies if need be.

#### Supplementary craft course training

The supplementary craft course takes 36 weeks, as per the organised syllabus and programme of learning. The course is arranged such that during the first eighteen weeks, the apprentice is introduced to almost all employable skills and the last eighteen weeks the matter content of the syllabus goes deeper and embraces more about the course and some specialised aspects of the trade.

The whole course is arranged in terms of performance objectives with trade theory and calculations related to practical work being undertaken. This approach ensures positive understanding and relatively easy assimilation of the practice in training the candidate to a higher order of apprenticeship. It is hoped that at the end of the course the trainee should be able to understand and prepare sketches and drawings and undertake practical assignment of any complexity.

The training syllabus is organised in topics that are further broken down into associated synopsis, apparatus, practical assignments and knowledge.

The topics include the following;

1. Introduction to the course (administration, masonry as a craft, structure of the industry, etc)
2. Tools and equipment
3. Safety
4. Common building materials
5. Stonework
6. Blockwork
7. Brickwork
8. Concrete work
9. Site preparation
10. Setting out plans
11. Excavation for building foundations
12. Foundations and construction
13. Floor construction
14. Damp prevention in buildings
15. Levelling
16. Fireplaces, flues and chimneys
17. Scaffolding
18. Fixing and fitting in building
19. Finishes
20. External works (drains, paving, etc)

We can consider topic No. 7, Brickwork for illustration. This topic is to last for one week according to the programme. It involves; *setting and building of walls up to one brick thick using different types of bonds with returns.*

Synopsis under this topic includes;

- *Plumbing, levelling and working to line*
- *Right angle return walls*
- *Right angle function walls (partitions)*
- *Attached piers*

- *Stopped ends*
- *Columns (isolated piers)*
- *Footings (on artificial foundations)*
- *Pointing of brickwork (Flush point, struck joint, weather struck and cut joint, rounded on tooled pointing, coloured pointing)*

The apparatus under the topic are;

- *bricklayers tool kit*
- *Gauging rod*

The practical assignment here reads: *mark out and construct various types of walls up to one brick thick embodying right angle return angles, isolated and attached piers with some footings using English and Flemish bonds on each assignment, with emphases on:*

- *Setting out of walls*
- *Plumbing of walls*
- *Levelling of courses*
- *Care and use of tools*

The associated knowledge is: *the graphic knowledge in sketching of walls.*

As mentioned earlier, only 30% of the time is allocated to the theoretical part of the topic while the remaining 70% is on the practical learning. This applies to all the topics and at the end of the entire course, the trainee will be able to:

1. Select the right tools and equipment for a given building task.
2. Develop safety awareness that is required in the case, care and maintenance of tools in a working environment.
3. Determine work procedures in performing different building tasks.
4. Acquire skills in the preparation of building materials.
5. Acquire skills in handling and application of common building materials in construction.
6. Estimate the quantity and cost of material for various building tasks.
7. Develop positive attitude towards practical work.
8. Communicate effectively on matters related to the job and the environment.
9. Acquire a range of occupational information and training opportunities in the industry.

In brief, the course is expected to impart practical skills to the trainee in order to make him proficient in the masonry trade.

### **C) Assessment of progress and certification**

A proficiency testing system exists and an apprentice is required to take proficiency tests at the preliminary (end of first year of training), intermediate (end of second year of training) and final level. Each proficiency test consists of a practical test and a written examination. Continuous coursework assessments are also considered in arriving at overall grading.

On successful completion of apprenticeship, after passing the final proficiency test and fulfilling other conditions as laid down in the scheme the employer is bound by section 19 of the Act to prepare and sign the Final Certificate of Proficiency/Apprenticeship and then pass it over to the Director of Industrial Training for counter signing. The certificate is finally issued to the apprentice.

Section 19 (2) of the Act empowers the Director to issue the certificate if the employer refuses to do so. It is, however, an offence for the employer to refuse.

It is essential to note that the craft apprenticeship training, however, is not open to the informal sector as it is based on the levy fund financing system though it offers the best framework of training for the sector. But it is possible for a beneficiary of this scheme to find employment opportunity in the informal sector as it is not obligatory that the employer sponsoring an apprentice employs him/her, or that the apprentice is bonded to serve the employer on completion of the apprenticeship.

## **05. THEORETICAL FRAMEWORK**

### **Introduction**

The whole of the literature review has dwelt much on the concept of training. This is so because the study has hypothesised the lack of training and/or low level of training to be the cause of low-level craftsmanship in the informal construction sector in Kenya.

The review has established that there are other factors that contribute to low-level craftsmanship other than training and these include, work experience, education, tools/equipment used and career development programmes. However, it is clear that there is a stronger relationship between training and craftsmanship than between craftsmanship and the rest of the factors. The level of craftsmanship is largely determined by the skills one gets as a result of training. Ngaruiya (1988) says, "with proper training it is possible to avoid failures and defects related to poor workmanship in construction projects". It is on this basis that the research has gone into depth to analyse the nature of relationship between training and craftsmanship, and also establish the proportion of influence of training on the level of craftsmanship. Proper training will result in adequate craftsmanship.

The other factors (education, tools and equipment used, work experience and career development programmes) have also been reviewed and found to have similar relationship with craftsmanship, though of lesser influence. It is on this basis that the researcher has undertaken to study each of these factors vis-à-vis craftsmanship. The review established that: a minimum education level is necessary for a craftsman if a satisfactory level of craftsmanship is to be achieved; lack of proper tools and equipment to perform a task will also result in low-level craftsmanship: a satisfactory level of craftsmanship is achieved after a certain period of handling the work (work experience). Career development, as a factor on its own, has been reviewed and found to be of the least influence on the level of craftsmanship but provides an impetus for improvement of the same.

It was expected that the above factors and relationships would hold true after data collected from the field are analysed.

The above factors have so far been discussed as concepts, and their operational definitions need to be explained for ease of collection, presentation and analysis of data. Its only after doing so that instruments of data collection can be developed and other aspects of the study finalised.

## Concepts and their operational definitions

### **Craftsmanship**

The study problem arises from the concept of craftsmanship. The theoretical definition of craftsmanship has been discussed in the introductory chapter of the study. But this needs to be operationalised for the purposes of this research.

Craftsmanship, in this study, is the dependent variable viewed from the angle of workmanship. Since it is important to establish the level of craftsmanship at the informal construction sites, observable evidence that is recordable is necessary. For this, the existence of defects on work already done by masons on the site serves as a measure of low-level craftsmanship. Commonly observable and easily assessed defects on masonry work have been identified in the introductory chapter as:

- Squareness of rooms,
- Plumbness of walls,
- Consistency of mortar sizing,
- Levelling of floors, and
- Cracks on walls and floors

For each of the above five variables, only presence or absence is considered for measurement, and not the frequency or magnitude. For instance, a wall with a crack is treated similar in defects as that with more than one crack. This is driven by the understanding that adequate or high-level craftsmanship is devoid of defects.

From the objectives of the study and the literature review sections, the following concepts have been identified as independent variables that affect the level of craftsmanship:

- Education level
- Experience on work
- Nature of training
- Career development
- Tools and equipment

## **Education level**

As already defined, education refers to basic instruction in knowledge and skills designed to enable people make the most of life in general. It is, therefore, important that one attains a desirable level of education before specialising in a profession if his level of competence is to reach its optimum. Education prepares one for the acquisition and better understanding of more specific skills.

Each profession may require a minimum level of education. As already discussed, a mason who is competent to work on his own requires a minimum of primary education as per the Kenyan formal education system. This gauging was from the craft apprenticeship training requirements.

To measure the level of training of masons, the level of certification attained as per the Ministry of Education forms the basis. This ranges from KCPE certificate, KCSE certificate to Degree certificate. It is, however, important to note that other masons may have not passed through the formal school system, or dropped out of school in between classes before obtaining certificates of formal education.

The formal education system in Kenya goes hand in hand with age. One is expected to attain a certain level only after achieving at least a certain age in life. An individual will be expected to have achieved KCPE after twelve years, KCSE after 16 years and Degree after twenty-one years. The level of education is, therefore, measured hand in hand with the age of the masons, to verify the relationship.

## **Experience on work**

Theoretically, experience refers to the frequency of utilising an acquired skill for its rightful purpose. In ergonomic terms, experience is important in improving the efficiency of skilled operation. With experience, improvements are achieved in observation, concentration and thought, and sequence of movement of relevant body parts. The skill reaches zenith when the operation becomes automatic without the benefit of conscious control. The optimum level of craftsmanship is attained at this point.



Although a person may attain a higher level of experience in a shorter time than one who has been long with the skills, it is generally believed that time is a good basis for judgement. Since it would be difficult to record the hours over which a mason has been on actual operation, it is preferable to use the calendar days as opposed to the man-hours. The assumption is that all are undergoing the same intensity of operation.

A competent mason, as seen earlier, should have been in the trade for over three years. The practical measurement of experience will be based on and compared with the same. It is expected that with other requirements achieved, experience of three years and above should result in a mason with the desired level of craftsmanship.

But the nature of experience is also important. In the context of masonry, experience in self-employment, formal employment or of interchanging between the two will result in different gains. Masons have varying experiences, willingly or unwillingly, and may prefer one arrangement to another with reasons. The establishment of these details will greatly assist in improving their lot in terms of craftsmanship.

### **Nature of training**

Training implies preparation for occupation or for specific skills e.g. masonry. Basic training is important for performance on the job and, without the required appropriate skills, there is no hope for achieving high-level craftsmanship in any operation.

In this research, training has been considered and hypothesised as the main determinant of the levels of craftsmanship in the informal construction sector. Measurement of training of masons and their levels of craftsmanship, therefore, form the backbone of the research.

The literature review has identified three main ways through which a mason can be trained in Kenya; through Technical Education program, Industrial Training schemes or Traditional Apprenticeship system. Industrial Training scheme has been considered the ideal form for those who work in the informal sector.

The level of training is measurable through certification levels in each of the three ways. Each of the three lines of training has methods of evaluation and certification indicating the competence level of a graduate. Ranking of these certification levels is necessary to enable comparisons to be made. Each mason therefore can be ranked in terms of training from the certificates he possesses in the trade.

### **Career development**

Development usually suggests a broader view of knowledge and skills acquisition and is thus concerned more with employee potential than with immediate skills. Career development programmes seek to enable an operator for the performance of other duties within the overall profession other than just the speciality skills. For instance, a trained mason could develop into a technician and become a foreman, an agent, or site supervisor.

This development of a tradesman enhances his general knowledge and skills thus enabling him to achieve capacity to handle more than just one assignment. The overall motivational effect creates confidence and gives him a niche to develop shortcuts to excellent work.

Career development programmes are set to upgrade one's skills over the working period through workshops, seminars and courses in the desired field, which should be related to the primary profession.

For masons, it is expected that the programmes will expose them to better equipment, higher safety standards, knowledge of new substitute materials, new construction techniques, etc, thereby up-lifting their level of craftsmanship. The way to measure this concept is by finding out their awareness of the existence of such programmes, if they have areas of interest they need to improve on, whether they plan to do so, and what hindrances they face, if any. In general, the exposure to career development opportunities can be gauged against the level of craftsmanship.

## **Tools and equipment**

These are the items of trade that assist a technical person to do his work, but not consumable within the work. For a mason, items such as trowel, plumb bob, square rule, wheelbarrow and concrete mixer will form this category.

There are a number of tools and equipment that a mason needs depending on the kind of work he is performing. The availability and the effectiveness of these items will affect the level of workmanship, thus determining the level of craftsmanship. It is expected that concrete mixed by hand will not have good consistency as that done by machine, and a wall that is set using a plumb bob will be more vertical than that observed by the eye.

Measurement of these items for this research can be limited to access to the right tools and equipment. It must be appreciated that these items are costly and therefore a mason working in the informal sector can be forgiven if he does not own all by himself. Therefore, other ways to access the same through borrowing, hiring and even improvising where possible are acceptable. It may not be possible to measure the effectiveness of these items for purposes of this study.

Summary: The above discussed concepts derived from the literature review form the basis of designing data collection instruments. They have been defined in terms of both theoretical and operational definitions, and an attempt made to describe the type of data that can be applicable. The relationships between the concepts have been established and are expected to reflect in the findings from the field.

## **CHAPTER THREE**

### **STUDY METHODOLOGY**

#### **Introduction**

This chapter describes the procedures followed in conducting the study. While chapter four dwells on data presentation and analysis, the process of planning on how that data was collected and analysed is herein explained.

#### **Research design**

Owing to the kind of problem under study, the most suitable research design, and which has been adopted, is survey research. The problem has a social dimension with a vast population to be observed directly.

Besides, there were more than one variable to be measured as outlined in the study objective and unearthed in the literature review section. Survey was handy, as the problem is a currently existing phenomenon whose relevant information can easily be gathered through interviews or direct observations.

#### **Population, sample and sampling technique**

The accessible population in this study consisted of all on-going informal construction sites within Nairobi City, together with masons working thereon. The level of craftsmanship was observed from work already done on the sites, while other data such as level of training of the masons was obtained from interviews with the masons themselves.

Nairobi as a city has many construction sites at any given moment as the need for constructed facilities continues to grow. It was observed, however, that informal sites are concentrated in certain areas of the city, the middle and low-income residential areas such as Zimmerman, Githurai, Buruburu, Kariobangi North, Riruta, Kayole, Umoja, Dandora, Kibera and Mathare. The central business district had no informal sites while high-class residential areas such as Lavington, Muthaiga, Runda, Westlands and Karen had very few informal construction sites.

Most of such works in those areas were restricted to minor repairs, as opposed to construction of new buildings.

However, the sites that formed the population were those with some level of masonry work done in concreting and stone work to enable fair observation to be made. The masons who also formed the population were the ones who did and were continuing to do the works. These were the defining characteristics of the target population.

To minimize the sampling error, a large sample was desired from the accessible population. However, given the constraints in time and resources, a sample size of sixty (60) sites was considered for data collection. The idea was to have at least double the required minimum number of thirty.

Simple random sampling was used to get a true, representative sample from the accessible population. All the informal construction sites in the city had equal chance of being considered for data collection. And out of a large number of masons that work on these sites, only one per sample site was randomly selected for interview.

### **Data collection procedure and instruments**

Observation and interview have been the methods of data collection for this study. The data on level of craftsmanship at each of the sample sites were collected through observation with the aid of checklist while those on independent variables were collected through questionnaire administered to the masons.

The instruments of data collection were questionnaires and checklists. Questionnaires were given to masons to give their responses on certain questions, while the checklist was used by the researcher to observe the level of workmanship on sites.

For ease of administering the questionnaires and analysing of data, which in effect saves on time, the researcher used a structured (closed-ended) questionnaire. The questions were developed from the objectives of the research and sought to give information on independent variables that

touch on the level of education, experience, and training of masons together with the availability of tools and equipment they use.

This approach was adopted because the secondary data in the literature review showed that the level of workmanship (which represents level of craftsmanship) depends on other factors apart from the content and context of basic training in a particular skill. It was, therefore, necessary to assess the contributing factors in order to find a total and lasting solution to the problem under study.

The dependent variable, workmanship, was measured through a checklist. As earlier mentioned, the level of workmanship indicates the level of craftsmanship in this study. The operational definition of workmanship has been taken as the amount of defects on work done and, therefore, the checklist comprised of possible and easily identifiable defects on masonry work. These include squareness of rooms, plumbness of walls, consistency of mortar sizing, levelling of floors, and cracks on walls and floors. The researcher went to the sites and made observations on the level of workmanship in the checklist by giving a zero (0) mark where a defect was observed and a one (1) mark where a defect was missing.

Each of the visited sites had a checklist and a questionnaire as instruments of data collection. Sample checklist and questionnaire are contained in the appendices section of this report.

### **Measurement of variables**

The independent variables have been stated as levels of education, training, experience and career development of the masons and availability of tools and equipment they use. The measurements of these variables were in an ordinal scale as can be derived from their operational definitions in the theoretical framework section of this study.

This was so due to the descriptive nature of the study. However, the data on levels of training have been coded and transformed into an interval scale for statistical analysis to be carried out. On the other hand the dependent variable, level of workmanship, was measured in interval scale. The marks (0 or 1) on the level of workmanship have been transformed into points such that a

site without defects scores 5 points while that with all the defects observed gets no point. This means that a site loses a point for the presence of each of the five defects.

The researcher coded the data on the level of training by awarding scores in line with expected performance levels depending on the line of training a respondent undertook. These scores were obtained from the ideas in the literature review section, and verbal discussions with the foremen on the sites. Each level of training was given a score of between 1 and 10 as follows:

<u>Level of Training</u>	<u>Scores</u>
--------------------------	---------------

*Industrial Training Scheme:*

- |  |    |
|--|----|
| • Undergone training but no certificate                        | 5  |
| • With Certificate of Attendance in skill-upgrading course     | 6  |
| • With Trade Test Certificate III                              | 7  |
| • With Trade Test Certificate II                               | 8  |
| • With Trade Test Certificate I                                | 9  |
| • With Certificate of Indentured Learnership                   | 8  |
| • With Final Certificate of Proficiency (craft apprenticeship) | 10 |

*Technical Education Programme*

- |   |   |
|---|---|
| • Undergone training but no certificate | 5 |
| • With Artisan Certificate (KNEC)       | 7 |
| • With Craft Certificate (KNEC)         | 9 |

*Traditional Apprenticeship (Jua Kali) Training*

- |                                       |   |
|---------------------------------------|---|
| • Training period of less than 1 year | 1 |
| • With 1 – 2 years of training        | 2 |
| • With 2 – 3 years of training        | 3 |
| • With 3 – 4 years of training        | 4 |
| • With 4 years of training            | 5 |

### Data analysis techniques

### CHAPTER 10

Since this is a qualitative research, data presentation and analysis is mainly in the non-empirical forms. Thus, the study has adopted descriptive analysis with simple percentages to represent the proportions of various outcomes. However, inferential statistics has been applied to assist in testing of hypothesis.

The testing of hypothesis follows regression analysis between the two major variables in the study, that is, level of training of masons and their level of workmanship at the sites. The inferential statistics is applied to help in generalisation of the findings.

A significance test level of 0.05 has been applied in testing the hypothesis using regression procedure.

*[Faint, illegible text, likely bleed-through from the reverse side of the page.]*

Category	No. of masons	Percentage
Category 1	10	10%
Category 2	20	20%
Category 3	30	30%
Category 4	40	40%
Total	100	100%



## CHAPTER FOUR

### DATA PRESENTATION AND ANALYSIS

#### Introduction

Out of the sample of sixty sites that met the criteria, forty-three (43) provided full response. Although the researcher visited, observed the level of workmanship, and gave out a questionnaire to one mason per site, seventeen masons failed to return their questionnaires as they were found already out of the sites when the questionnaires were being collected back. However, this response rate of 72 per cent is reasonable and sufficient for proceeding with the analysis.

#### Findings and Analysis

As already mentioned, the questionnaire was designed to establish the education level, experience, nature of training, career development, and tools and equipment used by the masons in the informal sector. The findings of each of the questions is presented and analysed descriptively in the same sequence as they appeared in the questionnaire. Then the findings of the observation checklist follow before the hypothesis testing.

#### **Education**

*Table 3.1 Education level of masons*

<b>Level of education</b>	<b>No. of masons</b>	<b>Percentage</b>
Did not attend school	2	5
Obtained KCPE certificate	23	53
Obtained KCSE certificate	13	30
Obtained degree certificate	0	0
Others	5	12
<b>Total</b>	<b>43</b>	<b>100</b>

*Source: Field Survey, September 2003*

From the above table, majority of masons at 53 per cent have obtained the KCPE certificate of education while none had obtained a degree certificate. Those with KCPE and KCSE certificates compose 84 per cent. This is the level of requirement for entry to formal training in masonry through the Technical Education Programme and /or Industrial Training Schemes. Therefore, the majority of masons have attained the required level of education for training in masonry.

All the masons under study were over the age of 21 years, and only 14 per cent were over 40 years of age. This means that all the masons working met the minimum age required for employment and were within the youthful working age where their productivity is expected to be high for manual work.

### Work experience

*Table 3.2 Work experience of masons*

Period worked (in years)	No. of masons	Percentage
0 – 0.5	0	0
0.5 – 1	0	0
1 – 2	0	0
2 – 3	2	5
3 – 4	4	9
4 and above	37	86
<b>Total</b>	<b>43</b>	<b>100</b>

*Source: Field Survey, September 2003*

86 percent of masons had over four (4) years work experience while none had less than two years of working experience. Craft Apprenticeship level under the Industrial Training Scheme, which can be considered to produce an accomplished mason with the necessary skills and experience to work on his own without supervision, requires three years of work experience as the minimum standard. From the findings, a total of 95 per cent of masons have over three years working experience. The masons therefore meet the necessary work experience to be self-employed at the informal sites.

On the nature of employment, 40 per cent of masons have been in self employment in the informal sector throughout; 26 per cent were employed in the formal sector before becoming self employed; while 35 per cent still interchange between self employment and formal employment. From this, it can be observed that 60 per cent of the masons have worked at one time or the other, in the formal sector, showing an existing linkage between the two sectors in terms of sharing craftsmen.

On future employment 30 per cent of masons would prefer to remain self employed throughout, 42 per cent would prefer to be formally employed while 28 per cent to be interchanging between self and formal employment as circumstances change. Reasons given for these choices are: to work under no supervision (7 per cent); to earn money (19 per cent); to have regular income (33 per cent), and to gain wider experience and acquire more skills (42 per cent). Therefore majority of masons (74 per cent) desire to have constant income, gain wider experience and acquire more skills.

## Training

*Table 3.3 Nature of training of the masons*

Nature of training	No. of mason	Percentage
Technical Education system	9	21
Industrial Training schemes	9	21
Traditional apprenticeship	24	56
Others	1	2
<b>Total</b>	<b>43</b>	<b>100</b>

*Source: Field Survey, September 2003*

Majority of masons (56 per cent) were trained through traditional apprenticeship. An equal number of masons trained through Technical Education system and Industrial Training schemes, totalling to 42 per cent the number of those who attended formalised training. Only 2 per cent trained through other means, namely through the prisons programme.

74 per cent of masons have no certificates to prove their competence in masonry, leaving only 26 per cent with certificates, although a total of 42 per cent went through formalised training programmes where certificates are issued at different levels of skills acquisition. This may mean that some did not complete the training programme or failed in the final evaluation.

Only 2 per cent of masons achieved the highest level certificate in masonry trade through the Industrial Training Scheme, the Final Certificate of Proficiency in Craft Apprenticeship. 9 per cent have Trade Test certificates while 5 per cent have certificates of attendance in skill-upgrading courses under the same scheme. Through the Technical Education Programme only 2 per cent have the Artisan certificates. This scenario shows that majority of masons (74 per cent) have no certificates to indicate the level of performance or competence, despite undergoing some training.

### **Career Development**

79 per cent of the masons are aware of existing opportunities for further training to improve on their skills, especially at the Industrial Training Centres, while 21 per cent are unaware of the same. But all the masons are lacking in one area or the other in the masonry skills. Out of the possible twenty major topics formalised in masonry training, an average of two topics per mason needs up-grading. The reasons given as hindrances for seeking further training were as follows:

*Table 3.4 Factors hindering masons from seeking further training.*

<b>Reason hindering further training</b>	<b>No. of response</b>	<b>Percentage</b>
Lack of finances	32	64
Lack of time	7	14
Lack of required minimum qualification	6	12
Lack of interest	0	0
Lack of accessible (nearby) training centres	5	10
Others	0	0
<b>Total</b>	<b>50</b>	<b>100</b>

*Source: Field Survey, September 2003*

From the above table, only four factors have hindered the masons from taking up courses that can improve their skills in masonry: lack of finances (64 per cent), lack of time (14 per cent), lack of minimum qualifications (12 per cent), and lack of nearby training centres (10 per cent). Zero response for lack of personal interest shows that they all have interest in developing their careers in masonry. No other factor has been given as hindrance apart from the above. When asked if they would attend training courses in case the hindrance factors are addressed, 95 per cent gave a response of *YES*, while 5 per cent gave a response of *NO*. This further reaffirms the desire for further training and career development among the masons in the informal construction sector.

When asked if they would prefer field technicians frequenting their places of work to refresh them on new techniques in masonry trade, 79 per cent responded *YES* while 21 per cent responded *NO*. Those who did not prefer this suggestion preferred more training centres to be established in another question, and did not consider time as a hindrance factor to attending training. Given a chance to recommend other ways, through which the government can assist them in enhancing their skills, the masons responded as follows:

*Table 3.5 Recommended government intervention to enhance masons' skills*

<b>Recommendation</b>	<b>Response Percentage</b>
Financing their training	39
Increasing demonstrating (skill-upgrading) centres	26
Allowing artisans to form trade unions	7
Discouraging contractors from employing on casual basis	15
Encouraging employment to be based on certification	9
Others	4

*Source: Field Survey, September 2003*

The other recommendation was that the government reduces taxes on building materials to encourage more construction work. It is worth to note that those who wanted the government to increase more skill-upgrading centres did not approve of the idea of field technicians visiting them at their places of work, and are also the same ones who did not mention time as a hindrance

factor to further training. And those who have wanted the government to encourage employment based on certificates are the ones who possess certificates.

### **Tools and Equipment**

33 per cent of masons indicated that they possess all the necessary tools and equipment they require for their work, while 67 per cent indicated they do not have all that they need. Those who lacked some tools and equipment listed the following to be lacking: levelling instruments, concrete mixers, excavators, compressors, vibrators, drilling machines, rollers, plumb bobs, trowels, steel tape measures, block-making machines and tile cutters among others. However, they have been able to carry on with their work through borrowing from their friends, hiring and improvising where applicable. Improvising of tools and equipment has been reported to take the following form by the said masons when the circumstances demand:

- Using transparent hosepipe in lieu of theodolite level.
- Using a stone and string in lieu of plumb bob.
- Using a hammer in lieu of concrete vibrator.
- Using more labourers to mix concrete in lieu of a mixer.
- Using manual moulds in lieu of block making machine.

From the above findings, lack of tools and equipment does not prevent them from carrying on with the works, as there are the three options to adopt. However, it is worth to note that default with the tool/equipment or lack of knowledge in using the same or appropriately improvising may result in poor workmanship.

### **Level of workmanship**

A check-list was prepared and for each site visited, presence or absence of defects on the above variables were observed and zero (0) mark was awarded where a defect was observed while one (1) mark awarded where a defect was not observed. Since there were five variables, a site without any defect on the variables scored a maximum of 5 points, while a site with defects on all the variables scored 0 marks, the lowest. The degree of defects did not render itself to easy analysis and, therefore, a site scored zero or one on each of the variables. Table 3.5 below shows the findings.

*Table 3.6: Level of workmanship at sites*

<b>Score</b>	<b>No. of sites</b>	<b>Percentage</b>
0	1	2
1	4	9
2	12	28
3	17	40
4	5	12
5	4	9
<b>Total</b>	<b>43</b>	<b>100</b>

*Source: Field Survey, September 2003*

A score of 5 is the highest mark showing no defect, that is, the required level of (high-level) workmanship. Only 9 per cent meet this requirement showing that the level of workmanship, and by extension craftsmanship, is low. 91 per cent of the sites have at least a defect on the variables. But it is important to note that only 2 per cent of all the sites visited scored zero. This indicates that majority of sites need improvement of workmanship in only certain areas, represented by the variables with defects.

### Regression Analysis

In order to establish a causal relationship between the two variables under study, as expressed in the hypothesis, i.e. training and adequacy of craftsmanship, a simple regression between levels of training of masons and levels of workmanship in their respective sites is hereby carried out.

Regression analysis is developed from properties of a straight line graph,  $y = a + bx$ . In this study, the dependent variable  $y$  is the level of workmanship while the independent variable  $x$  is the level of training.  $a$  represents the constant or intercept, while  $b$  represents the rate of change or gradient.

The sample size  $n$  is 43. For each site, the corresponding levels of workmanship and training levels of masons have been registered and other useful parameters calculated to assist in the analysis as represented in table 3.7 that follows.

**Table 3.7 Regression analysis parameters**

Site No	Levels of Training of mason (X)	Level of workmanship (Y)	X <sup>2</sup>	Y <sup>2</sup>	XY <sup>2</sup>
1	5	2	25	4	10
2	3	1	9	1	3
3	5	1	25	1	5
4	5	3	25	9	15
5	6	4	36	16	24
6	5	2	25	4	10
7	4	2	16	4	8
8	5	3	25	9	15
9	9	5	81	25	45
10	5	3	25	9	15
11	5	2	25	4	10
12	7	3	49	9	21
13	5	3	25	9	15
14	5	2	25	4	10
15	5	2	25	4	10
16	3	1	9	1	3
17	5	3	25	9	15
18	6	3	36	9	18
19	5	2	25	4	10
20	5	3	25	9	15
21	5	3	25	9	15
22	4	2	16	4	8
23	4	1	16	1	4
24	4	3	16	9	12
25	5	3	25	9	15
26	5	4	25	16	20
27	10	5	100	25	50
28	8	4	64	16	32
29	4	3	16	9	12
30	6	3	36	9	18
31	9	5	81	25	45
32	4	4	16	16	16
33	4	3	16	9	12
34	3	0	9	0	0
35	5	3	25	9	15
36	5	2	25	4	10
37	4	2	16	4	8
38	5	3	25	9	15
39	5	3	25	9	15
40	3	2	9	4	6
41	7	4	49	16	28
42	4	2	16	4	8
43	8	5	64	25	40
<b>Total</b>	<b>224</b>	<b>119</b>	<b>1276</b>	<b>385</b>	<b>681</b>
	<b>ΣX</b>	<b>ΣY</b>	<b>ΣX<sup>2</sup></b>	<b>ΣY<sup>2</sup></b>	<b>ΣXY</b>

Source: Field Survey, September 2003



The values of intercept, **a**, and gradient, **b**, can be calculated as follows:

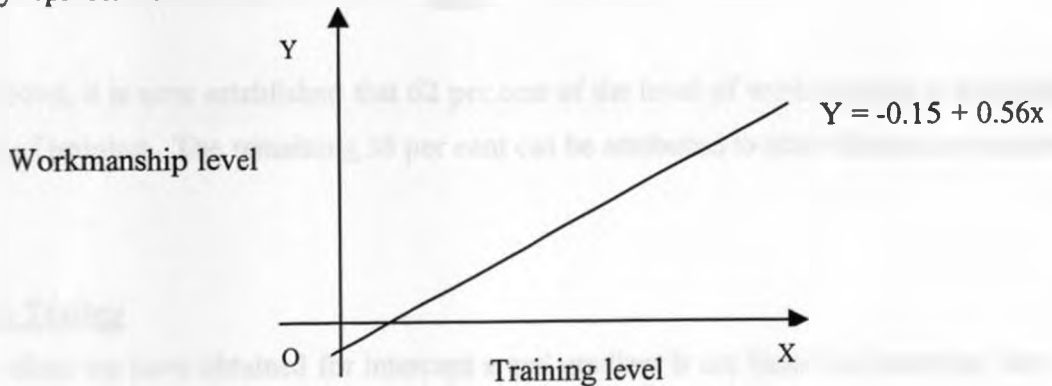
$$\begin{aligned}
 b &= \frac{n \sum x y - \sum x \sum y}{N \sum x^2 - (\sum x)^2} \\
 &= \frac{43 \times 681 - 224 \times 119}{43 \times 1276 - (224)^2} \\
 &= \underline{\underline{0.56}}
 \end{aligned}$$

$$\begin{aligned}
 a &= \frac{\sum y - b \sum x}{n} \\
 &= \frac{119 - 0.56 \times 224}{43} \\
 &= \underline{\underline{-0.15}}
 \end{aligned}$$

The equation for line of 'best fit' in this study is thus

$$Y = -0.15 + 0.56x$$

Graphically represented it will look as follows:



*Figure 3.1 Graphical representation of relationship between sample's levels of training and workmanship*

The line has a positive gradient, rising from left to right. This proves that there is positive relationship between level of training and level of workmanship. As the level of training rises, so does the level of workmanship and the lower the level of training the lower the level of workmanship.

However, it is necessary to establish the proportion of change in the level of workmanship that can directly be attributed to the level of training. This is so because, as already been seen, there are other factors that may cause the change e.g. experience at work, equipment used, education level, etc. To establish the effect of the level of training alone, a coefficient of determination,  $r^2$ , is calculated below:

$$\begin{aligned}
 r^2 &= \frac{(n \sum xy - \sum x \sum y)^2}{[n \sum x^2 - (\sum x)^2] \times [n \sum y^2 - (\sum y)^2]} \\
 &= \frac{(43 \times 681 - 224 \times 119)^2}{[43 \times 1276 - (224)^2] \times [43 \times 385 - (119)^2]} \\
 &= \frac{6901129}{11232648} \\
 &= 0.615 \\
 r^2 &= \underline{\underline{62\%}}
 \end{aligned}$$

From the above, it is now established that 62 per cent of the level of workmanship is attributable to the level of training. The remaining 38 per cent can be attributed to other factors as mentioned before.

### Hypothesis Testing

Since the values we have obtained for intercept  $a$  and gradient  $b$  are based on a sample, they are only estimates of the true values of the population regression coefficients, usually denoted by  $\alpha$  (alpha) and  $\beta$  (beta).

In order to generalise the findings to the whole population, sampling errors associated with the estimates **a** and **b** must be established. The first step towards this is to calculate the standard error of regression, **Se** which is given as follows:

$$\begin{aligned} \text{Standard error of regression, Se} &= \sqrt{\frac{\sum y^2 - a\sum y - b\sum x y}{n - 2}} \\ &= \sqrt{\frac{385 - (-0.15 \times 119) - (0.56 \times 681)}{43 - 2}} \\ &= \sqrt{\frac{21.49}{41}} \end{aligned}$$

$$\text{Se} = 0.72 \text{ level of training}$$

The above value (**Se**) can be used to establish the population value for the intercept (**α**) and the population value for gradient (**β**) as follows:

$$\text{For intercept: } \alpha = a \pm t \times S_a$$

$$\text{For the gradient: } \beta = b \pm t \times S_b$$

Where **S<sub>a</sub>** and **S<sub>b</sub>** are standard deviations (Standard errors) for the sample intercept and gradient respectively.

(i) Test significance based upon  $n - 2$  degree of freedom for  $\alpha$

$$\begin{aligned}\text{Standard error of intercept, } S_a &= S_e \sqrt{\frac{\sum x^2}{n \sum x^2 - (\sum x)^2}} \\ &= 0.72 \times \sqrt{\frac{1276}{43 \times 1276 - (224)^2}} \\ &= \underline{\underline{0.38}}\end{aligned}$$

The 95% confidence interval of the intercept is

$$\begin{aligned}\alpha &= -0.15 \pm 2.020 \times 0.38 \\ &= -0.15 \pm 0.768\end{aligned}$$

which gives an upper limit of 0.618 and a lower limit of  $-0.918$

Significant test for the intercept:

$$H_0 : \alpha = 0$$

$$H_1 : \alpha \neq 0$$

$$t = \frac{a - \alpha}{S_a}$$

$$= \frac{0.15 - 0}{0.38}$$

$$= \underline{\underline{0.394}}$$

Since  $0.821 < 2.020$  (the value from t tables),  $H_0$  can be accepted. This shows that the intercept for the population,  $\alpha$  is zero and not any value, unlike the sample intercept  $a$  which is  $-0.15$ .

(ii) Test significance for  $\beta$

$$\begin{aligned}\text{Standard error of gradient (slope), } S_b &= \frac{S_e}{\sqrt{\frac{\sum x^2 - (\sum x)^2}{n}}} \\ &= \frac{0.72}{\sqrt{\frac{1276 - (224)^2}{43}}} \\ &= \frac{0.72}{10.45} \\ &= \underline{\underline{0.069}}\end{aligned}$$

The 95% confidence interval for the slope is

$$\begin{aligned}\beta &= 0.56 \pm 2.020 \times 0.069 \\ &= 0.56 \pm 0.139\end{aligned}$$

which gives the upper limit of 0.699 and a lower limit of 0.421.

Significance test for slope:

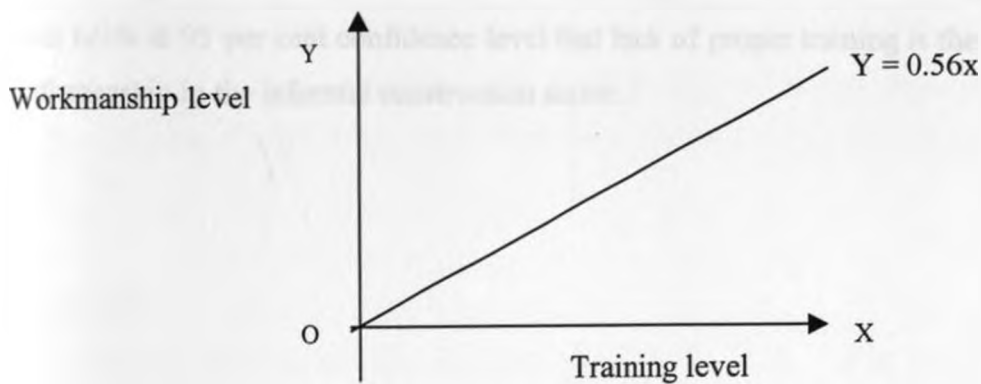
$$H_0 : \beta = 0$$

$$H_1 : \beta \neq 0$$

$$\begin{aligned}t &= \frac{b - \beta}{S_b} \\ &= \frac{0.56 - 0}{0.069} \\ &= \underline{\underline{8.116}}\end{aligned}$$

Since  $8.116 > 2.020$  (the value from  $t$  tables),  $H_0$  can be rejected. This shows that the population gradient  $\beta$  cannot be zero and therefore there is causal relationship between level of training and workmanship.

On the basis of the outcomes above, the regression equation of the sample,  $y = -0.15 + 0.56x$  will have to be modified to  $y = 0.56x$  to apply for the population. Its intercept will be at zero, but the change relationship between the two variables  $x$  and  $y$  will remain similar. The line of 'best fit' for production within the population will graphically look as follows:



*Figure 3.2 Graphical representation of relationship between population's levels of training and workmanship*

### Discussion

From the findings it has been established that the level of workmanship on masonry work on a site is by a large extent (62 per cent) dependent on the level of training of the mason performing the work. There are other factors such as education, experience on the work, career development programmes, tools and equipment used that also contribute in one way or the other to make up the remaining 38 per cent on the level of workmanship.

The study has established that the general level of education of the masons is upto the required entry standards for formal training of a mason. This also applies to work experience. The masons, in one way or the other, have access to tools and equipment through borrowing, hiring

or improvising. Concern may be raised on the accuracy and efficiency of these tools/equipment. This is because a wrong or defective measuring tool will always give wrong measurements despite the level of competence of the users. On the issue of career development, there is a major problem as none of the masons have taken steps to develop their skills through further training, citing various hindrances, which range from lack of finances to lack of time.

The levels of training of masons have been found to be low with only a few having undergone the necessary evaluation and received their certificates to prove their competence. The level of workmanship has been observed to be equally low with many defects appearing on works. And the analysis has proven that there is causal relationship between the two. Thus, the study hypothesis holds at 95 per cent confidence level that lack of proper training is the cause of low-level craftsmanship in the informal construction sector.

## **CHAPTER FIVE**

### **CONCLUSION**

#### **Introduction**

The aim of this study is to improve the level of craftsmanship in the informal construction sector. Low levels of training in the requisite skills were hypothesised as the cause of the apparent inadequate craftsmanship. Objectives were also set at the beginning along which the research was to be carried out.

The related literature has been reviewed and data has now been collected from the field and analysed. It is only logical to compare the findings against the set objectives and make conclusions. But first, it is the wish of the researcher to briefly state limitations that affected this study.

#### **Study limitations**

There were two constraints attendant to this research: time and funds. As for time, the study was planned to last for only three months, by the end of which a report was to be submitted. Financial constraints played a very significant part in limiting the geographical coverage and depth of the research exercise as it was not possible to engage enough research assistants for the exercise, and the researcher neither desired nor had the ability to exceed the budget of the research as estimated by the university. This left the researcher in the unenviable position of handling the bulk of the work by himself.

The above two are the major limitations that dictated the scope of the study. While it was the intention of the researcher to conduct the research throughout Kenya, it was not practical given the constraints. For that, the geographical scope was limited to Nairobi.

Also, the limitations reduced the scope of the craftsmanship trade to be studied to masonry. Ideally, more tradesmen ought to have been included in the research. The two effects on the scope, however, have been positively embraced to come up with a narrow but in-depth study.



### **Findings on study objectives**

The first objective of the study was to establish the education level and experience of the masons. A majority of masons at 84 per cent have attained primary school education and above, with relevant education certificates obtained. A minimum of primary school education was found to be a requirement for entry into formal training for a mason during the literature review session.

On work experience, it was found that 95 per cent of masons had experience of at least three years of practice, the minimum established in literature review section as adequate to enable a mason to possess adequate craftsmanship.

The second objective was to establish the availability of tools and equipment used by masons on sites. The findings from the field show that only 33 per cent of masons possess all the tools and equipment they require for their trade. However, all the masons have access, in one way or another, to the necessary tools and equipment whenever they require them. They obtain them through borrowing, hiring or improvising as the situation may demand, but it must be noted that the effectiveness of the tools and equipment was not within the scope of the study.

The third objective was to examine the training content and context given to masons. Review of related literature helped to achieve this objective. Masons in Kenya have been found to be trained through three main lines: Technical Education Programmes, Industrial (Vocational) Training Schemes and Traditional Apprenticeship System. The Industrial Training Scheme was found to offer the best training to meet the needs of the informal construction sector, as it is both formal and practical in approach. A mason who has successfully gone through a craft apprenticeship level of training is considered as having all the skills and experiences a mason needs and therefore can work on his own without supervision. Findings from the field show that only 2 per cent of masons have achieved this level of training.

Majority of masons at 56 per cent have been trained through the traditional apprenticeship system with no certificates to prove their levels of competence. It, therefore, emerges that majority of masons working in the informal sites are under-trained for the job. This was also

confirmed by the unanimous response of the respondents that they were lacking in one area or another in masonry skill, and would be glad to upgrade their skills in such areas.

Examining the level of workmanship of masons on sites was the fourth objective of the study. The findings show that only 9 per cent of informal sites are free of the assessed defects and are thus to the desired level of craftsmanship. The remaining 91 per cent of sites had at least one of the defects that included: squareness of rooms, plumbness of walls, consistency of mortar sizing, levelling of floors, and cracks on walls and floors. The findings are proof of low-level craftsmanship.

The fifth and last objective of the study was to establish the relationship between the levels of training and workmanship of masons on the sites. Field data on levels of training of masons and workmanship on sites were analysed through simple regression analysis and a positive relationship was established. Higher level of workmanship was observed on sites with masons with higher levels of training and vice versa. It was also established that the level of training of masons contributed a great proportion of the level of workmanship, at 62 per cent. The remaining 38 per cent can, therefore, be attributed to other factors such as the level of experience, tools and equipment used, and the level of education.

The outcome of hypothesis testing confirmed that, at 95 per cent confidence level, lack of proper training is the cause of low-level craftsmanship in the informal construction sector. This outcome can now be generalised to the whole population and thus apply to all informal construction sites in Kenya and all associated craftsmen in the sector.

### **Implication of findings**

The study has discounted other factors and attributed the cause of low-level workmanship to the low levels of training. The other factors that would otherwise have contributed to the situation have been found to be at the desired levels in support of high-level craftsmanship.

The implication of the findings is that low-level craftsmanship in the informal construction sector in Kenya will continue unless training of the craftsmen is enhanced. Therefore, to reverse the trend, all efforts should be aimed at provision and improvement of the content and context of training to enable craftsmen acquire sufficient skills that match the task.

### **Recommendations**

1. From the findings of this study and its implications, the researcher hereby recommends additional training for craftsmen in the informal construction sector. It is recommended that on-the-job training method be adopted to upgrade their skills to the requisite levels. Use of extension field technicians is proposed as this would be preferable to setting up more training centres. These field technicians can visit the craftsmen at their working sites, identify their training needs, train them and evaluate their performance. Since a majority of craftsmen were found to have acquired their skills through traditional apprenticeship, this recommendation will also have the effect of improving the skills of future trainers.
2. Lack of finance has been quoted as the ultimate obstacle to the craftsmen's pursuit of further training to enhance their skills, and a recommendation on the same is vital. The researcher recommends that the stakeholders in this sector should discuss and come up with ways of raising funds for training the craftsmen. The government as suggested by the craftsmen under study should spearhead this initiative.
3. The training content and context for craftsmen in both the Technical Education Programme and the Industrial Training Schemes should speedily be harmonised and geared towards meeting the needs of the informal construction sector. The syllabus, programme of training, testing and certification procedures should be revised to produce competent craftsmen at the lowest levels of training.

It is the hope of the researcher that the above recommendations will assist in uplifting the level of craftsmanship in the informal construction sector.

### **Suggested areas for further research**

1. The appropriate content of training for the informal construction craftsmen.
2. The effect of poor (improvised) tools and equipment on workmanship in the Informal Construction Sector.
3. The clients' satisfaction with craftsmanship in the Informal Construction Sector

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**APPENDIX A**

**QUESTIONNAIRE TO BE ADMISTEDED TO MASONS**

**SURVEY ON MASONS WORKING IN INFORMAL CONSTRUCTION SITES.**

**Introduction**

I am carrying out a study on masons working in the informal construction sector in Nairobi. This study is done through the University of Nairobi. The research is to find out the problems that you encounter especially those dealing with your training in masonry trade. Your honest answers to these questions will help us find ways of improving your situation in the industry. The data collected will be used in research and names of the interviewees will be treated with strict confidence.

**Question 1: Education**

a) How old are you [Tick where appropriate]

15-20 years

21-25 years

26-30 years

31-35 years

36-40 years

Over 40 years

b) What is your level of education? [Tick where appropriate]

Did not attend school

Obtained K.C.P.E certificate

Obtained K.C.S.E certificate

Obtained Degree certificate

Others, [specify].....

**Question 2: Period and nature of employment**

a) For how long have you worked as a mason?[Tick where appropriate]

- Less than 6 months
- 6-12 months
- 1-2 years
- 2-3 years
- 3-4 years
- Over 4 years

b) What has been the nature of your employment during this period? [Tick where appropriate]

- Self employment throughout
- Formal employment before self employment
- Interchanging between self and formal employment

c) What would be your wish on employment? [Tick where appropriate]

- To remain self employed throughout
- To be formally employed throughout
- To be interchanging between self and formal employment

d) Why is your wish as above? [Tick where appropriate]

- To work under no supervision (your own boss)
- To earn more money
- To have a regular income
- To gain wider experience and acquire more skills

Others [specify].....  
.....

**Question 3: Nature of training**

a) How did you train in masonry skills? [Tick where appropriate]

- Through Technical Education program
- Through Industrial Training schemes
- Through traditional apprenticeship

Others [specify].....

B) Do you have certificate[s] showing your level of training?

Yes

No

C) If yes, then which one[s]? [Tick where appropriate]

Certificate of attendance in skill-upgrading course

Trade test certificate

Certificate of indentured learnership

Final certificate of proficiency [craft apprenticeship]

Artisan certificate [KNEC]

Craft certificate [KNEC]

Others [specify].....

**Question 4: Career development**

A) There are opportunities for further training and certification in your career. Are you aware of the existence of these opportunities? [Tick where appropriate]

Yes

No

B) Which areas in the trade of masonry do you feel in lacking and would like to upgrade your skills? [Tick where appropriate]

Tools and Equipment

Safety at work

Building materials

Stonework

Block work

Brickwork

Concrete work

Site preparation

Setting out of plans

Excavation for building foundations

Construction of upper floors

*(Continues)*

- Damp prevention in buildings
- Levelling and use of levelling instruments
- Construction of fireplaces, flues and chimneys
- Scaffolding [Erection of work platforms]
- Fixing and fittings in buildings
- Finishes [plastering, rendering, bag washing, screeding, coping, tiling, etc]
- External works [Drains, manholes, paving, etc]
- Others, [specify]
  - 1.....
  - 2.....
  - 3.....
  - 4.....
  - 5.....

C) Why haven't you sought further training in this /these area[s]? Because of, [Tick where appropriate]

- Lack of finances
- Lack of time
- Lack of required minimum qualifications
- Lack of interest
- Lack of accessible[nearby] training centre
- Others, [specify]
  - 1.....
  - 2.....
  - 3.....
  - 4.....

D) If the hindrance factors affecting you above were addressed, would you enrol to polish your skills? [Tick where appropriate]

- Yes
- No

E] Would you prefer extension field technicians to frequent the places you work (construction sites) to refresh you on new techniques (tools/skills) of your trade?

Yes

No

G] Apart from (E) above, how else do you think the government can assist to enhance your skills?

Financing

Increasing demonstrating (skill-upgrading) centres

Allow artisans to form trade unions

Discouraging contractors (employers) from employing on casual basis

Employment to be based on certification

Others[specify].....

.....

**Question 5: Tools and equipment**

A] Do you have access to all the tools and equipment you need for your trade?

Yes

No

B] If No, then which ones?

1. ....

2. ....

3. ....

4. ....

5. ....

C] Briefly explain how you do your work without such tools and equipment.

.....

.....

.....

**APPENDIX B**

**CHECKLIST OF MASONRY DEFECTS IN INFORMAL CONSTRUCTION SITES**

A mark of zero (0) is awarded where a defect has been observed, and a mark of one (1) where defect has not been observed.

<b>Site No.</b>	<b>Squareness of rooms</b>	<b>Plumbness of walls</b>	<b>Consistency of mortar sizing</b>	<b>Levelling of floors</b>	<b>Cracks on walls and floors</b>