APRIORI DETERMINANTS OF PERFORMANCE OF ENTREPRENEURS IN JUA KALI SECTOR: THE CASE OF NAIROBI EASTLANDS

BY

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A MANAGEMENT SCIENCE RESEARCH PROJECT
SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER
OF BUSINESS AND ADMINISTRATION
FACULTY OF COMMERCE
UNIVERSITY OF NAIROBI

JUNE 1989

This Research Project is my original work and has not been presented for a degree in any other University

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This Research Project has been submitted for examination with my approval as University Supervisor.

MR. GITURO WAINAINA

To my parents Wangui and Kariuki, my wife Wanjiru, and my children Kui, Kiki and Nduta.

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ACKNOWLEDGEMENT

The list of people who contributed, in one way or another, to the production of this report is long. I extend my sincere gratitude to all, even if I fail to mention some by name.

First, I wish to thank, most sincerely, my supervisor Mr. Gituro Wainaina for his invaluable comments and guidance at all the stages of this project.

I must also thank the lecturers of the Faculty of Commerce and the MBA students whose comments and suggestions during the proposal presentation stage laid a firm foundation for the project.

Sincere thanks go to the Jua Kali entrepreneurs for their cooperation and for providing the relevant information without which the project would not have taken off.

Special thanks go to my wife Wanjiru for her love and encouragement especially during the study. My children Kui, Kiki and Nduta for their patience. They were able to live for two years with a father who was too near, and yet too far.

Finally, but not by any means the least, my appreciation go to Ms. Eudias Ochola for having accepted to type this work even when there was pressure of time.

ABSTRACT

This study sought to determine the background socio-economic characteristics that have a significant influence on performance of entrepreneurs in Jua Kali sector. The need for the study was aroused by the common claim that the sector is characterised by ease of entry, yet the entrepreneurs therein perform variably even when they are exposed to the same sectorial endogeneous environment.

To achieve the objectives of the study, a sample of 120 entrepreneurs, divided into three Jua Kali subsectors (metal work, motor vehicle and carpentry) was selected from the eastlands of Nairobi. Primary data was collected through a questionnaire.

Fifteen background socio-economic characteristics were identified for analysis. They included: age of the entrepreneur at entry; level of formal education; handicraft at primary school; number of years elapsed after formal schooling before entry; father or elder close relative's occupation; formal technical training; length of technical training; previous employment in the formal sector; attitude towards Jua Kali entrepreneurship; market consideration at entry; initial capital; source of initial capital; distance to entrepreneur's ancestral home; size of entrepreneur's family; and parental family size.

Multiple linear regression and correlation analyses were used for the data analysis and the analysis indicated that:

(i) Primary school handicraft, formal technical training, number of years of technical training, previous employment in the formal sector, and initial capital had significant association with the performance of entrepreneurs in the metal work subsector.

(ii) level of formal education, the entrepreneur's family size, preference for formal employment at entry, and distance to entrepreneur's ancestral home had significant association with the performance in the motor vehicle subsector and

(iii) formal technical training, initial capital, parental family size, preference for formal employment at entry, distance to ancestral home, primary school handicraft, and market consideration had significant influence on performance of entrepreneurs in the carpentry subsector.

Most of the identified socio-economic characteristics, however, did not show any significant influence on performance in the Jua Kali sector.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Population projections in Kenya indicate that by the year 2000, Kenya will have about 35 million people with a total labour force of about 14 million. In essence this requires creation of at leat 6 million jobs by the turn of the century, at the rate of 500,000 jobs every year. This means that over 1000 jobs will have to be created daily.[1]

Based on the 3.4 per cent average annual rate of employment growth, the level of unemployment in Kenya is expected to increase from the present one million to 3 million people by the year 2000. Even if the economy creates jobs at the target rate, the unemployment rate would still increase substantially. It is estimated that even with the investment rate of 25 per cent of Gross Domestic Product (GDP), the country will have only Kenya pounds 23 billion to invest during the period 1984-2000. Because it takes approximately Kenya pounds 16,000 to create one new job in the modern wage-earning sector (formal sector), only 1.4 million new jobs would be created by the year 2000.[2]

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1. Amakoye S., Kenya Grapples with unemployment, Inside Kenya Issue No. 6, December 1988, p17

2. Government of Kenya, A Strategy for Small Enterprise Development in Kenya towards the year 2000, Centre project, Nairobi 1988.

This would have approximately 40 per cent of the labour force without jobs in the year 2000. With this realisation that the modern wage-earning sector will not be able to absorb the huge workforce, there is an imperative need to develop the informal sector so that it can absorb the extra labour force over and above what the formal sector will be able to accommodate

* Development policies in the first two decades of Kenyan independence were biased to the development of the formal sector where the budding commerce and industry required middle level skill personnel. Even emphasis at school was on white collar jobs. However, given the current realities, there has now been a shift of policy to favour Jua Kali and other informal activities because of their absorption capacity. It is estimated that the formal sector will generate only 20 per cent of the required jobs while the Informal sector will shoulder the rest of the burden as the economy moves into the 21st century.[3]

Hitherto, Jua Kali entrepreneurs have largely developed without much formal policy guidelines depending, as it were, on ad-hoc apprenticeship. Much of the growth of the sector has been spontaneous rather than as a result of deliberate strategies within an overall government policy framework. The International Labour Organization's (ILO) Employment Mission to Kenya's report of 1972 emphasized the importance of the informal sector in job creation and recommended that the Government constitute policies which would encourage the growth

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3. Amakoye S. , Op.Cit. p17

of the sector to absorb the growing army of the unemployed. However it took the government over a decade to come up with serious policy guidelines on the sector.

In recent years, the government has awoken to the innevitability of the informal sector in general and Jua Kali sector in particular. The government recognizes that the sector can contribute significantly to the country's economic growth particularly in the provision of employment and development of entrepreneurial skills. Some official support has began to be targeted to uplifting the economic status of those who are in the Jua Kali sector.

The importance that the government attaches to Jua Kali sector is evidenced by the prominence accorded to the sector in the sessional paper No. 1 of 1986 and in the fifth 1984 - 1988 and sixth 1989 - 1993 development plans.[5] According to the sessional paper No. 1 of 1986, which is a blue print for 1989-1993 development plan, Jua Kali sector has an enormous potential for job creation in both urban and rural areas. This is because its initial capital outlay is relatively manageable and it is highly labour-intensive unlike the formal sector which is capital intensive and does not therefore generate employment as it expands.

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4. ILO, Employment, Incomes and Equality: A strategy for increasing productive employment in Kenya, Geneva 1972, p503

5. Government of Kenya, Sessional Paper No 1, 1986 p 54; Fifth development plan of 1984-88 p8; Sixth development plan of 1989 - 1993 p164

The adoption, in 1984, of the 8-4-4 system of education whose emphasis is on practical and vocational training is meant to prepare people for employment and/or self-employment in the informal sector including Jua Kali. The provision of "Nyayo" Jua Kali sheds in many towns and small market centres since 1986 is a further measure of the government's seriousness in the sector. Even more pertinent is the creation of the new ministry of Technical Training and Applied Technology (MTTAT) whose portfolio extends to, among other things, the development and promotion of Jua Kali sector.

The government's commitment to the development of the Jua Kali sector is also reflected in the financial and technical support it gives the sector. The Kenya Commercial Bank has a special credit line to the Jua Kali sector. The interest shown by various organisations, for instance, Kenya Industrial Estates, Industrial Development Bank, Industrial and Commercial Development Corporation, United Nations Development Programme, British American Tobacco, Kenya Ltd., among others, through sponsoring seminars, workshops, projects and exhibitions to promote and revitalise Jua Kali sector is still a further testimony of the prominence that Jua Kali sector is currently enjoying in Kenyan economy.

From the foregoing discussion it is clear that Jua Kali sector is now no longer simply a valve through which to channel school dropouts, but has in the recent past assumed a central position with regard to socio-economic development of Kenya. This recognition of the importance of the informal sector in general and Jua Kali sector in

particular makes it imperative for all those concerned with the development and promotion of the sector to be aware of determinants of success or performance of both practising and prospective Jua Kali entrepreneurs, among other things. This study is in particular concerned with the characteristics and/or factors that a potential Jua Kali entrepreneur should have for a "successful" future career in the sector.

1.2 DEFINITION OF JUA KALI SECTOR

Many Kenyans do intuitively know the meaning of Jua Kali sector, but at present, there is no explicit legal definition for the term Jua Kali sector. The term "Jua Kali" literary means "Hot Sun", so Jua Kali sector may be understood to include those enterprises where people work under hot sun. However, available definitions go alittle further than this original meaning which was meant to indicate the "Open air" conditions under which most Jua Kali sector enterprises operate.

The authors who have taken interest in Jua Kali sector give differing definitions of the sector because of their differing approaches. Some define Jua Kali in terms of volume of labour, amount of capital employed, level of government protection, working conditions or functional characteristics. Otieno defined Jua Kali sector as consisting of "firms comprising furniture manufacturing, welders, mechanics, panel beaters and other fabrication works." He continues to say that Jua Kali industries are established firms operating in

fixed locations and whose workshops are either permanent, semi-permanent or temporary and owners must have one or more employees controlled by the owner.[6]

The MTTAT, in its october 1988 policy document proposal, defined Jua Kali industry as "a rural-urban non-farm small enterprise usually comprising of 0 - 9 employees specialising in general servicing and production of a variety of items using indegeneous technology." They go on to say that the term is difficult to define but that there are distinctive characteristics that distinguish Jua Kali informal sector from the formal sector. Some of these characteristics include:- ease of entry and exit to the sector; low capital requirements; labour intensive which is predominantly manual; dependence on local resources and recycling of waste; use of innovative technologies; low cost of skill acquisition or training; and working under unfavourable conditions.[7]

The diversity nature of the sector makes it difficult to develop a fully encompassing definition. For the purpose of this study, a Jua Kali enterprise is defined as "a technical craft manufacturing or servicing firm, managed by a self-employed entrepreneur (Jua Kali entrepreneur) and operates in open air (without roof, except for

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6. Otieno T. Sources of Finance for Nairobi based Jua Kali Business firms, MBA Management Project, unpublished, 1988, p3

7. Government of Kenya (MTTAT), Draft Jua Kali Development Programmes, Policy document Proposal, October, 1988.

those that have benefited from the recently government built "Nyayo" Jua Kali sheds, as at Gikomba and Kamukunji in Nairobi) or in temporary structures, with zero or more employees. They may or may not have licences from local authorities for carrying out their activities. This definition covers a wide range of technical craft areas, but this study primarily deals with the Jua Kali firms in carpentry, metal work and automotive crafts in the Eastlands of Nairobi.

1.3 SIGNIFICANCE OF THE JUA KALI SECTOR

The most important contribution of Jua Kali sector to Kenyan economy and indeed to the economies of developing countries is employment creation. A research in Peru by Hernando de Soto found that between 40 and 60 per cent of the workforce in Peru is in the informal sector.[8] Although Soto's study was carried out in Peru, his findings are relevant to Kenya and most of the developing countries.

The employment potential of Jua Kali sector is unquestionably recognized in Kenya, however little statistical data is available, and usually refers to the entire informal sector. Based on a survey by the ministry of Planning and National Development, it is estimated that there are approximately 600,000 persons employed in 350,000 informal sector enterprises. Approximately 50 per cent of these are located in rural areas and 50 per cent are in urban areas.[9] The informal sector covers many different types of productive activities that respond to a wide range of market opportunities; this makes it difficult to

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8. The Standard Informal sector is here to stay, Nairobi, April 26th 1989, p 6

9. Government of Kenya, Centre Project, op. cit. p6

establish any universal categorization or ready comparison of employment potential between informal sub-sectors. Analysing the employment ability of the Jua Kali sector in Kenya is further complicated by differences and ambiguities in the terminologies used.

When opening a meeting of the World Assembly of Small and Medium Enterprises (WASME) in Nairobi in April 1989, the minister for Industry asserted that the surest way of tackling unemployment in Kenya is to give more attention and resources to informal sector industries. He went further to emphasise that the government has given greater priority to the development of small and medium enterprises in the newly launched 1989 - 1993 development plan because that is the area where employment opportunities can be created.[10] In a workshop on entrepreneurial motivation and skill improvement for Jua Kali artisans at Mombasa in April 1989, the permanent secretary, MTTAT, noted that Jua Kali industry was the answer to the unemployment problem facing school leavers in Kenya. The sixth development plan (1989-1993) emphasises that the largest addition to the number employed will come from Jua Kali sector and other small firms hence the rise of Jua Kali sector is the most important labour sponge in Kenya.

The importance of Jua Kali sector in employment creation was also echoed in a centre project sponsored by the government of Kenya in 1988 in Nairobi. In the centre project report it was rieterated

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10. Standard Reporter, Minister: Small firms the answer, The Standard April 20, 1989 p 9

11. Republic of Kenya, Development Plan1989 - 1993, Government Printer, Nairobi, 1989.

that the Jua Kali sector will have to make a major contribution if the anticipated six million new jobs by the year 2000 will be created. The urban informal sector is expected to create 1.267 million of the six million jobs.[12]

The challenge of creating millions of new jobs by the year 2000 and beyond is impossing. However, heavy reliance on Jua Kali and other informal sectors to create these jobs may be unrealistic unless the government and other concerned parties among other things, get the necessary information about the sector and the people who are in this sector. This is a key motivation for this study.

In addition to employment creation, other reasons for focussing on the Jua Kali sector are among others:

(i) it fosters a more equitable distribution of income by creating jobs at relatively low capital cost. The sector thus leads to wider democratisation of the economy and greater participation of low income groups in sharing the benefits of economic growth.

(ii) it conserves foreign exchange since it does not depend on imports or even on the formal financial sector. The sector relies primarily on family savings.

(iii) it exhibits imagination and creativeness by making use of resources that may otherwise not be drawn into the development process. The sector generally employs workers with limited

12. Government of Kenya, Centre Project, Op. Cit. p5

formal training who learn their trade on the job and who perhaps could not be absorbed elsewhere. It also uses waste scrap which could probably not be put to any other use.

(iv) the Jua Kali enterprises tend to use less capital per worker than formal sector enterprises. Their labour -intensive character is consistent with the relative abundance of labour and the shortage of capital and foreign exchange in Kenya. They are capable of using capital productively and show higher return on capital invested than return available in modern sector.[13]

(v) the sector provides "cheap" goods and services for the low income and to some extent middle income people. Although the sector apparently has its own market with specific clientele, their goods and services are now gaining popularity in the local and Preferential Trade Area (PTA) market. The permanent secretary, MTTAT, in a workshop on entrepreneurial motivation and skill improvement for the Jua Kali artisans revealed that the government is planning to make the Jua Kali industry a foreign exchange earner, as soon as the industry is able to manufacture competitive and high-quality goods.[14]

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13. Child F.C. Small-Scale Rural Industry in Kenya, Operational Paper No. 17, IDS, University of Nairobi, Los Angeles, Californian 1977, p 17

14. Standard Reporter, Government plans to boost Jua Kali Industry, The Standard, April 1989.

(vi) the sector acts as a "breeding ground" for new and future African entrepreneurs, hence promotes indigenisation of the economy. This is a major contribution since the critical shortage of entrepreneurial and managerial talents is often a great handicap to economic development.

Clearly, while the Jua Kali sector entrepreneurs appear to operate under shoddy conditions, they, nonetheless, provide legitimate goods and services and contribute significantly in socio-economic development of the country. The awareness of the important significance of this sector has inspired the government of Kenya to consider implementing new strategies and programmes for Jua Kali sector development. Information should therefore be sought to establish further understanding of the sector and its operators

1.4 STATEMENT OF THE PROBLEM

Most people, including researchers and policy makers, argue that Jua Kali sector, and informal sector in general, is characterised by ease of entry and that it is a place for school drop-outs who have failed to obtain employment in the formal sector. On the other hand it has been established that some Jua Kali entrepreneurs do generate profits and thrive while others do poorly, all other endogenerous variables being equal. [15] A question then arises whether those who

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15. Noormohamed S.O. Informal Business in Kenya, unpublished paper University of Nairobi, 1989, p 20

perform well have some background characteristics different from those who perform poorly. There is therefore a need to establish the background or pre-entry socio-economic characteristics of Jua Kali entrepreneurs that will have a significant impact on their performance. This will enable us to distinguish the potential entrepreneurs with high chances of success in Jua Kali sector from those likely to perform poorly.

Entrance into Jua Kali entrepreneurship has been solely an individual affair. There has not been much government involvement in form of material or advisory assistance. However, the Kenya government has recently seen the need to develop programs for stimulating the emergence of latent entrepreneurial talent, produce a training dossier for prospective Jua Kali entrepreneurs, and establish an information centre from where all pertinent information about Jua sector will be available.

For successful implementation and subsequent fruitfulness of these programs, it is imperative to determine the entrepreneurial characteristics of the potential beneficiaries. This will allow the resources, both financial and advisory, to be directed to those who have the greatest potential for success. There is therefore a need for a study to determine the background socio-economic determinants of performance in Jua Kali industry.

Many previous researchers in Jua Kali sector and informal sector in general have highlighted the likely importance of the background socio-economic characteristics in determining performance in the sector

but no empirical evidence is available. House (1977) asserted that the level of performance of an informal enterprise is likely to be positively related to proxies for difficulties at entry.[16] Wright (1987) argued that the empirical measures that represent background characteristics are presumed to exert some effect upon work performance.[17]

With this recognition of the importance of the background characteristics of the Jua Kali entrepreneurs, it is the specific purpose of this study to attempt to answer the question:

"Which entrepreneurial background socio-economic characteristics have a significant impact in determination of performance of Jua Kali entrepreneurs?"

1.5 OBJECTIVES OF THE STUDY

This study is aimed at identifying the socio-economic characteristics of people who should be encouraged to venture into Jua Kali entrepreneurship. In line with this therefore, the objectives of this study are:

1. To identify the background socio-economic characteristics (variables) that would be used to determine the level of performance of a prospective entrepreneur in Jua Kali sector or industry.

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16 House W.J., The potential for Income and Employment Generation in Kenyan's urban informal sector, Working Paper No. 310, IDS, University of Nairobi. p5

17. Wright R, Jr et.al, Job satisfaction among black female managers A casual approach, Human Relations Jnl. vol.40 No.3, 1987, p496

2. To determine a regression model that would be used in predicting the performance of a prospective entrepreneur in Jua Kali sector.

1.6 IMPORTANCE OF THE STUDY

It is hoped that the results of this study will be useful to:

1. Educational and Manpower planners when deciding on the areas to emphasise when preparing people for employment and/or self-employment especially in Jua Kali sector;

2. City council of Nairobi when issuing licences to prospective Jua Kali entrepreneurs - could encourage people to enter areas where they will most likely succeed;

3. Financiers and donors when deciding on the prospective Jua Kali entrepreneurs who would most likely benefit from loans or donations.

4. People wishing to venture in Jua Kali sector and their advisors.

1.7 ORGANIZATION OF THE REPORT

This study report is presented in six chapters

Chapter one which has just been concluded consists of the Introduction. Chapter two surveys the empirical literature that is available in Kenya and elsewhere. The second section of chapter two gives a few methods and/or models used in predicting career performance.

Chapter three presents the apriori presumptions of the nature of the effect on performance of Jua Kali entrepreneurs of the selected background socio-economic characteristics. The second section of the chapter outlines the predictive model that is estimated in chapter five.

Chapter four describes the population, study areas, sampling design, data collection procedures and data analysis techniques.

Chapter five gives the empirical results and interpretations of the data analysis.

Chapter six presents summary of the findings, policy recommendations, limitations of the study, and suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 SURVEY OF EMPIRICAL LITERATURE

From the definition of Jua Kali, it would be argued that its activities have existed in Kenya since stone-age when the traditional blacksmiths were making the necessary implements of their time. The activities have however gone through developmental stages to reach the present form of the sector. While the sector has existed this long, the concern with its role and nature was not explicit until the 1972 International Labour Organization (ILO) mission to Kenya during which the concept of "informal sector" was virtually coined. Since then numerous studies have been conducted on the informal sector.

The available studies were conducted mainly on informal sector in general with only a few directed specifically to Jua Kali sector. In particular, no study has been done to specifically identify the apriori (background) determinants of performance or proxies of performance of Jua Kali entrepreneurs. The previous studies have mainly dealt with factors influencing informal sector in general; relationship between informal and formal sectors; and the economic implications of the informal sector with particular emphasis to employment creation. The studies have been fairly general in the sense that they have been concerned with the informal sector as a whole with little evidence of disaggregation. Consequently the conclusions therein have been generalised to cover the entire informal sector in the regions of study. It has been only in rare cases where studies

were specifically on Jua Kali sector or its subsectors. The studies have mainly looked at the sector from a macro-point-of-view. This study has taken a micro-approach aimed at understanding the potential Jua Kali entrepreneur himself or herself.

The rest of this section will highlight some of the landmark studies which have been conducted on informal sector and their relevant findings. It is assumed that the findings of these studies are relevant to Jua Kali sector since it is a major subsector of the informal sector.

The 1972 ILO mission to Kenya observed that:

> "One great hinderance to development of the informal sector is the way in which this sector is neglected or even harassed. It may also be due to a feeling that informal sector is a sort of sewer in the economy, collecting all the drop-outs, the shady characters who have failed to make good, and acting as a drag on economic progress or any way of modernization. May also be due to negative reference of output from informal sector, with formal sector taken to have a more superior status."[18]

Indeed this feeling may have been prevalent then given the stage of socio-economic development at the time. Almost everyone with high school education and above could easily get his way to formal employment leaving informal sector employment to those who could not make it in school.

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18. I.L.O Op.Cit.p506.

In recent years, however, things have changed, thus by and large, the attitude of the society towards the informal sector and the people earning their livelihood therein has improved tremendously. Today we have people of diverse background getting into the sector, both those who drop out from school and those with reasonably high level of education who fail to get employment in the formal sector. Time has therefore come when there is eminent need to identify those background characteristics which should be enhanced for a successful future career in the informal sector.

Child F.C and Kempel M. in their 1973 study of small enterprises in Kenya observed that the respondents had, among other characteristics, varied background factors.[19] They however did not insinuate nor establish any functional relationship between these background factors and performance in the sector.

In his 1973 and 1974 descriptive studies of Kenya's informal sector, specifically carpentry, metal work and automobile mechanics enterprises (Jua Kali in this study),Kenneth King emphasised that the background factors, inter alia, family heritage, formal education, apprenticeship experience, industrial and workshop experience, are all important in shaping the small-scale enterprises.King asserted that "------- only those prepared to work hard and long in dirty conditions need think or encouraged towards entering the informal sector."[20]

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19. Child F. C. and Kempel M., Small Scale Enterprises, Operational paper No. 6, IDS University of Nairobi, 1973

20. King K., Skill acquisition in the informal sector of an African economy: The Kenya case 1973 p 116

He did not, however, establish any empirical relationship between these factors and entrepreneurial performance.

Rempel M. in March 1974 hypothesised that the informal sector incorporates two very different groups of people, both in terms of attitude and motivation. He labelled the first group as the "community of the poor" who he claimed view their plight as temporary and consider themselves as potential employees of the formal sector, hence are not commited to their enterprises, therefore perform poorly. The second group was labelled the "intermediate sector" which consists of those who take their current conditions as permanent and therefore work hard to improve their enterprises.[21] Child F.C. later reiterated that it is the intermediate sector that has the greatest development potential hence the one that should be encouraged and helped.[22] Rempel did not, however, establish more elaborate discriminants between the two subsectors.

Child F.C. in his 1977 study of small-scale rural industry in Kenya obtained responses from technical craft artisans (Jua Kali today) concerning their literacy levels, technical education background, age, initial capital, among other background factors, but no measure of their effect on performance was explored. He

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21. Rempel H., The informal sector, Interdisplinary urban seminar March 1974,

22. Child F.C., Small Scale rural Industry in Kenya, operational paper No. 17, IDS, Los Angeles, 1977, p13

however, argued that profitability was expected to be positively correlated with the quality of management, and willingness to adopt good management practice was in turn associated with particular prior experience or certain personal characteristics of the entrepreneurs. Child summarised that success and failure in business is partly a function of a persons inherent talents; partly a function of experience and education; and partly a function of cultural values and ethical norms.[23] There was, however, no evidence of confirmation of these preconceptions. Child concentrated on issues and features characteristic of the Jua Kali sector in a descriptive way. He did not identify statistically measureable background characteristics which distinguish the successful entrepreneurs from those who fail.

House W. J. in his proposal for a 1977 study on the "potential for income and employment generation in Kenya's urban informal sector" noted that informal sector was claimed to be characterised by ease of entry, yet a good deal of heterogeneity exists in the sector. He presupposed that the level of income of the entrepreneurs would be positively related to proxies for the difficulties at entry, such as initial capital, education and training of the entrepreneurs, sex, preference for self-employment, attitude towards himself and the authority, among other factors. He also suggested that income in the sector could be affected by such endogeneous variables as age of business, degree of harassment by authorities, sector activities and type of labour force employed. In his 1978 study he established

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23. Child F.C. Ibid p 88

that age was functionally related to weekly earnings by a log-linear function.[24] The thrust of House's study, however, was mainly on the current entrepreneurial situation much more than the situation at the entry point. This study is mainly concerned with situations at entry. It may be worthwhile to note that the bulk of House's study was on "Jua Kali" (manufacturing trade, construction and automobile service) although it was not identified by this title then.

Ndua and Ngethe in their 1984 study of informal sector in Nakuru, developed using regression analysis, a model of a functional relationship between income and some sectorial endogeneous variables such as capital investment, age of the respondent, experience in the business, among others. Though they did no concentrate on the exogeneous variables, including pre-entry or background characteristics of the entrepreneurs, they underscored their importance as determinants of performance in the sector. This is evidenced by their concluding remarks that:

> "Factors that affect the growth and hence the dynamics of informal sector like the respondents background, possibility of acquiring a formal job etc. were omitted in the functional analysis and should in future be incorporated. The determinants of the growth of the informal sector are largely exogeneous ie. performance is largely dependent on ---------- and

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24. House W. J. Nairobi's Informal sector, Working paper No. 347, IDS, University of Nairobi, Dec. 1978.

the socio-economic background of the entrepreneurs -----."[25] Ndua and Ngethe reiterated that the effect of these background characteristics should be analysed to establish the factors which should be emphasised in preparing and helping the would be informal sector entrepreneurs.

Ngethe and Wahome (1987) in their study of the rural informal sector in Kenya, among other things, sought information about the socio-economic characteristics of informal sector entrepreneurs, inter alia, age, sex, number of dependents, education attainment, and migrant status. They established through regression analysis a significant relationship between initial capital and current capital.[26] This study like the earlier ones took a general approach to the sector hence did not address itself specifically to the effect of background socio-economic characteristics on performance in the sector.

Kiriti (1987) in her study of both employees and employers in the motor vehicle mechanics enterprises in Nairobi established that earnings were significantly related to entrepreneur's experience, his family size, age, value of the tools at the time of the study.[27] This study was again concerned with the current situation of employees and employers and not the characteristics at entry point.

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25. Ndua N.,Ngethe,The role of the informal sector in the development of small and intermediate size cities, Working paper No. 416, IDS, University of Nairobi, Nov. 1984,p30

26. Ngethe N, Wahome J.G.,The rural informal sector in Kenya, Consultancy report No.16,IDS, Univeristy of Nairobi, 1987, p100.

27. Kiriti T.G. Determinants of Earnings in the urban informal sector, MA research paper, unpublished, University of Nairobi 1987,p75

Noormohamed (1989) in his paper on informal business in Kenya observed that some informal sector businessmen do generate profits and thrive while others do not yield much surplus for ploughing back into the businesses and therefore stagnate.[28] This classification agrees with Rempel's classification into community of the poor and intermediate subsectors. Noormohamed like the others before him did not suggest and/or develop a quantative measure of distinguishing between the two subsectors of the informal sector.

Elsewhere, outside Kenya, studies on informal sector have also been done. In their 1976 study on the informal sector in Latin America, Souza and Tokman showed the sector to be highly dependent on age, sex, and education of the entrepreneurs.[29] Merrick (1976) in his study on employment and earnings in the informal sector in Brazil estimated earnings as a function of age, sex and education.[30] Uthoff (1978) in his study of earnings in metropolitan Santiago gives earnings as a function of experience, among other explanatory variables.[31]

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28. Noormohamed S.C., Informal Business in Kenya, unpublished, University of Nairobi, 1989, p20.

29. Souza P.R., Tokman V.E., The informal urban sector in Latin America, International Labour review, Vol.114 No.3 Nov.-Dec. 1976.

30. Merrick T.W., Employment and Earnings in the informal sector in Brazil, Jnl. of Developing areas, vol 10 No.3, April 1976 p337

31. Uthoff A.W., Changes in earnings inequality and labour market segmentation in metropolitan Santiago, 1969-1978, Jnl. of Development Studies, vol. 12, No.2, 1986, p300.

Clearly from the foregoing discussion, very little attention has been given to the effect of pre-entry characteristics on the performance and/or success of the entrepreneurs in the informal sector. This study is therefore aimed at determining the background socio-economic characteristics of Jua Kali entrepreneurs which are likely to have a significant influence on performance in the sector.

2.2 METHODS OF PREDICTING CAREER PERFORMANCE

Career performance can be defined in terms of a wide variety of variables depending on the nature of the career being considered or the person measuring the performance. When we consider a career in wage-earning employment we would definitely look at different measures of performance from when we consider self-employment venture. Careers which do not involve direct financial benefits would again call for their own measures of performance.

In the case of wage-earning employment we would be inclined to think of performance as measured by, for instance, amount of salary earned, hours of input in a given period of time, number of years of continuous employment in one firm of even number of times that one has changed jobs. For a career which does not involve direct financial benefits, for example schooling, we may consider grades, trophies or their proxies as convenient measures of performance. On the other hand, careers in self-employment, for instance Jua Kali entrepreneurship, performance may be measured by, among other variables, number of employees, amount of capital invested, revenue or gross profits earned in a given period of time, number of consecutive years in the business,

and number of units sold or serviced in a given period of time.

The studies which have been so far conducted on determinants of performance and/or success in business have mainly used either earnings in a given period of time or capital accumulated at the time of the study. In this study gross profits and number of employees were used as measures of performance of a Jua Kali entrepreneur.

Regression analysis has been the most widely used tool of analysis in the studies involving determination of the factors which significantly influence performance and/or success in the informal sector. A few of such studies are reviewed in the rest of this section.

Kiriti (1987) developed a predictive model of earnings by regressing earnings per month on certain defined explanatory variables. She used the Cobb-Douglas multiplicative model expressed as follows:

$$Y = \alpha_o x_1^{\alpha_1} x_2^{\alpha_2} \text{ -------- } x_n^{\alpha_n} e^u \text{ where}$$

α_i's stand for regression constants

e is the natural number

u is the a random term

x_i are the defined explanatory variables

To estimate the constants the model was transformed to logarithmic form:

$$\ln Y = \ln \alpha_o + \alpha_1 \ln x_1 + \text{ --------- } + u$$ [32]

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32. Kiriti T. G. Op.Cit. p40.

The multiplicative model is attractive in the sense that the explanatory variables do not affect earnings independently. However, if one of the explanatory variables takes on a value of zero, the model collapses.

Ngethe and Wahome (1987), to establish whether there were some significant factors that influence current capital, first regressed initial capital as a linear function of rent, age and formal education. They used the linear equation:

$$I = B_1x_1 + B_2x_2 + B_2x_3 + \cdots + \varepsilon \text{ where}$$

I is the initial capital

B_i's are the regression constants

x_i's are the defined explanatory variables.

Current was then regressed as alinear function of initial capital, age of the business and amount of rent.[33]

The linear model is appropriate when, among other restrictions, the response variable is assumed to follow a linear relationship with each of the explanatory variables and this assumption is not violated by the data used in the analysis. Besides it may be the only way out when some of the explanatory variables take on a value of zero.

Ngethe and Wahome also estimated output (production) by regressing output as a multiplicative function of capital and labour inputs. The model they used was

$$\ln(\text{output}) = \ln B_o + B_1 \ln(\text{capital}) + B_2 \ln(\text{labour input}) + u$$

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33. Ngethe N, Wahome J.G. Op.Cit. p103

In their study they observed a higher coefficient of determination (R^2) with Cobb-Douglas model than with the linear model.

Chiswick (1976) in his study on estimating earnings function for less developed countries estimated the earnings function using regression model.

$$\log Y = b_o + b_1 S + b_2 T^2 + b_4 P + \varepsilon \quad 34$$

where

Y = annual income; S = years of formal schooling; T = years of post-schooling experience; P = profit as a fraction of annual income; and ε = error term.

Chiswick developed this model after trying several forms.

Svejnar (1984) in his study of determinate of wages (W) in industrial Senegal used a model which incorporated dummy variables. The model he used was:

$$\ln W = A \ln W_{oa} + N \ln W_{na} + S \ln W_s$$

where A, N, and S are dummy variables taking on a value of 1 if other africans, non-africans, and Senegalese respectively and 0 otherwise.[35]

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34. Chiswick C.V. "on estimating earnings functions for LDC's" Jnl. of development Economics Vol.4, No.31 1976,p66.

35. Svejnar J. "The determinants of industrial Earnings in Senegal," Jnl. of Development Economics, Vol 15, Nos. 1, 2, 3, 1984, p289

While this model may have worked in this case consisting of only one categorical variable (nationality), it may turn out to be rather too complex in a case of many dummy variables as is the case in this study.

From the foregoing, it is apparent that regression models of various forms have been a popular tool of predicting performance. The form of the model chosen will however depend on the nature of the data and whether rationality implies such a relationship. The utility of the model will depend on whether the significant predictor variables have been identified and whether the resulting equation has a significant fit. When this conditions are fulfilled, the model thus developed can be used for predictive purposes.

CHAPTER THREE

THE EMPIRICAL MODEL

3.1 FACTORS THAT AFFECT PERFORMANCE IN JUA KALI SECTOR

The Jua Kali sector is generally regarded as a place where people go whose options are worse elsewhere. Nonetheless the enttrepreneurs therein perform variably, presumably because of the heterogeneity in nature and composition of the people in the sector. In this study the performance dispanties within the sector is examined by identifying and analysing the background socio-economic factors that may have a significant effect on performance of the entrepreneurs in the Jua Kali enterprises.

It is not possible to include all the pre-entry factors that would have some effect on performance of Jua Kali entrepreneurs. In the study, some relevant factors may have been left out. Effort has however been made to include as may of the relevant factors as possible. The following are the background socio-economic factors used in the determination of performance of Jua Kali entrepreneurs:

Factor	Symbols used in Model formulation
1. Age of the entrepreneur at the time of starting the business	AGE
2. Level of formal education at entry	ED
3. Whether or not entrepreneur did handicraft at Primary School	PSC
4. Number of years elapsed after formal schooling before starting the business	AFY

5. Whether or not father or an elder close relative was an artisan — FBR

6. Whether or not the entrepreneur had formal technical training before entry — FTEC

7. Number of years of technical training (formal or informal) — TAY

8. Whether or not entrepreneur had employment in formal sector before starting his Jua Kali entreprise — EMP

9. Attitude on entrepreneurship in Jua Kali sector or whether entrepreneur choose formal employment at entry instead of his Jua Kali enterprise — FJOB

10. Whether the entrepreneur was influenced by market or demand of goods or services of his enterprise — MKT

11. Amount of initial capital in Ksh. — INC

12. Source of initial capital (personal saving or otherwise),

13. Distance to entrepreneur's ancentral home — HOD

14. Entrepreneur's own family size at entry — FAM

15. Parental or father's family size at entry — PFAM.

Age at the time of starting the business (AGE) was hypothesized to have a positive effect on performance in Jua Kali sector.

Generally, as one gets older, he gets to learn more things. Consequently he is equiped with more alternatives of solving the problems that may confront him. In addition, he gains more experience in dealing with people and adjusting to his environment. In the case of Jua Kali sector, with time, a person will know more of the sector's products and their demand through hearing and observing. As a result, he is more likely to make an appropriate choice of business if he decides to venture there.

The level of formal education (ED), was hypothesized to have a positive effect on performance. As levels of education increase, those who are likely to set up Jua Kali sector activities tend to gain more confidence. Alternatively, they are likely to appreciate the need for investing in somehow sophisticated business equipment so as to try and capture some of the untapped market. Exposure to formal education also enhances communication ability. The ease of communication will help an entrepreneur to attract customers and therefore build a clientele. Communication ability is particularly necessary in urban areas where there are people of different social and ethnic backgrounds.

Primary school handicraft (PSC) was hypothesized to have a positive effect on performance. PSC is basically a manual activity and Jua Kali activities fall under the same category. If one is exposed to manual training at this early stage of life, he is likely to develop a positive attitutde towards manual related activities. If such a person enters Jua Kali entrepreneurship, he is likely to do well.

The number of years that elapse after finishing school before venturing into Jua Kali entrepreneurship (AFY) was hypothesized to have a negative effect on performance. From an earlier discussion, it was mentioned that, Jua Kali sector is often asserted to be characterised by ease of entry. A person who stays for many years after finishing school without venturing into the sector may, therefore, have been on the lookout for a job in the formal sector. If such a person eventually enters the sector, it will only be due to lack of formal employment hence may not be motivated to perform well.

If one's father or an elder close relative was in a Jua Kali related undertaking (FBR), he is likely to perform well in the sector. FBR was therefore hypothesized to have a positive effect on performance of Jua Kali entrepreneur. A good example is a Nyeri artisan, Morris Tito Gachamba, who in late 1970's made and flew his own aircraft. His father was an artisan and his mother came from a family of artisans.[36] Acquitance with Jua Kali activities through observation or assistance in one way or another in a relative's business may encourage someone to have interest in the sector's activities, hence perform well if he enters the sector.

- Formal technical training (FTEC) was hypothesized to have a positive effect on performance. Although entrepreneurship cannot perhaps be taught, training to impart the necessary skills, especially both technical and academic is necessary for launching of a Jua Kali

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36. Waigwa Kiboi, Nyeri Inventor aims at the Sky, Daily Nation, September 28, 1988, p13.

enterprise. Formal technical training offers both technical knowhow and the theory that goes with it. A person who has gone through FTEC would therefore have a deeper understanding of the what, how and why of the products and services of the Jua Kali sector. He would be better prepared to take advantage of new inventions and to improve on the current ones. This would earn him reputation which in turn would help him attract more customers. It should however be noted that those who go through polytechnics view them as institutions for entry into formal employment. If, however, a polytechnic graduate decides to go to Jua Kali sector he would be expected to perform better than those without formal technical training.

Number of years of technical training (TAY) was hypothesized to have a positive effect on performance. It is assumed that the longer one is trained, the more diverse will be the skills acquired. This will enable someone to learn how to approach problems multi-dimensionally hence be able to take advantage of new inventions and markets.

Formal employment before entering Jua Kali entrepreneurship(EMP) was hypothesized to have a positive effect on performance of Jua Kali entrepreneurs. Previous employment in the formal sector before venturing into self-employment in Jua Kali sector would serve as a means of generating initial capital which is necessary for launching a Jua Kali enterprise. If the activities of EMP were similar to those of the Jua Kali enterprise opened, EMP would also act as a means of acquiring skills required in the Jua Kali activities. The customers of the formal sector enterprise which had offered the formal employment, who had confidence in the person's job tend to follow him wherever he

goes. In such a case EMP would act a source of customers for the Jua Kali entrepreneur. One author asserted that:

> "--------- the best chances of creating entrepreneurs lies with the manufacturing and service sectors (Jua Kali), most of whom were previously employed in a similar profession and quit because: they wanted to be self-employed; of insufficient pay or benefits"[37]

When such people join Jua Kali sector entrepreneurship, they have a fierce determination to do better than they did in the formal sector.

Preference for a wage employment over Jua Kali sector entrepreneurship (FJOB) was hypothesized to have a negative effect on performance in the sector. The general view is that the Jua Kali sector suffers a negative public image. It has of necessity sprung up as a response to lack of formal employment opportunities especially in towns. A number of people therefore join the sector for lack of formal employment. Such people would not be motivated to perform well, for they may be there waiting for a chance in the formal sector employment.

Those entrepreneurs who consider or evaluate demand for the products of the enterprises they intend to start, are likely to do well when they enter. Influence by market availability (MKT) was therefore hypothesized to have a positive effect on performance of Jua Kali entrepreneurs. Those new entrants who are influencial by market opportunities will most likely have done proper evaluation of demand. For such entrants, search for profit may be a driving force.

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37. Ngethe N. Wahome J.G. Op.Cit. p164

Consequently they will most likely choose a subsector or location with high demand for the intended products and no problem of availability of inputs. This would lead to good performance.

Amount of initial capital outlay (INC) was hypothesized to have a positive effect on performance. Initial capital investment constitutes the foundation on which the present worth of the business was founded. A business will require a big capital outlay for take-off, and thereafter sustain itself for future growth.

Personal savings as a source of initial capital (SIN) was hypothesized to have a positive effect on performance. When one obtains the initial capital from a source outside his personal savings, he may not be tuned to put the necessary effort towards hard work. This is because he may not have the experience of the hardship involved in earning money, in particular if he had not worked before. On the other hand, one who has earned his initial capital through personal savings is likely to have the necessary experience in making money and is therefore likely to work harder to earn more.

Distance to one's ancestral home (HOD) was presumed to have a negative effect on performance. When one's home is far from his entreprise he is likely to have a feeling that he could perform better if he was operating from where his people are. Whenever something goes wrong, he may be inclined to imagine that his people could help him out if they were near. In addition, he may spend too much money and time on travelling. These elements would in turn hamper the growth of his business.

The entrepreneur's family size (FAM) and his parental family size (PFAM) at the time of entering the Jua Kali entrepreneurship, were both hypothesised to have a positive effect on performance of the entrepreneur. When one's own family, and indeed that of his parents is large, he is likely to work with vigour so that he can cope with his own needs and those of his dependants. This would lead to high performance.

3.2 THE EMPIRICAL MODEL

The relationships hypothesized above will be tested using linear multiple regression analysis and the associated correlation analysis.

Regression and correlation analyses are statistical tools for quantifying the relationship between a response variable and one or more predictor variables. The technique may be used for two main purposes:

(i) to predict the response variable based on specified values for the predictor variable (s) and

(ii) to understand how the predictor variable(s) influence or relate to the response variable.[38] In this study we have emphasized the objective of "understanding". That is the primary objective of the study is to determine and describe relations between variables as precisely and accurately as possible.

The functional form of the model that will be used is:

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38. Wittink D.R. The application of Regression Analysis, Boston, Allyn and Bacon Inc., 1988 p2.

$$Y = B_o + B_1 (AGE) + B_2(ED) + B_3(PSC) + B_4(AFY) + B_5(FBR) + B_6(FTEC)$$
$$B_7(TAY) + B_8(EMP) + B_9(FJOB) + B_{10}(MKT) + B_{11}(INC) + B_{12}(SIN)$$
$$B_{13}(HOD) + B_{14}(FAM) + B_{15}(PFAM) + \varepsilon$$

where

Y represents the response variable

(i) the monthly profit (PRT) earned by a Jua Kali entrepreneur

and

(ii) number of workers employed by the entreprise (WORKERS);

B_o is a constant;

B_i's are partial regression coefficients; in the brackets are the predictor variables defined in section 3.1 and ε is the random error term.

The linear multiple regression model was chosen to determine the apriori determinants of performance of Jua Kali entrepreneurs because most researchers who have ventured into similar research have used this model, among others, and came out with useful conclusions. This model, however, was used bearing in mind certain assumptions which must hold for the validity, reliability and utility of the results to be implied. These assumptions are summarised below.

1. The correct form of the regression equation has been selected. In this study, it was assumed that all the predictor variables were linearly related to the response variable for each regression equation analysed. With the correct form of the regression model, it implies

that whatever variability in the response variable that cannot be accounted for by the equation is due to random error.

Once the correct model is selected the task is to determine estimates for the parameters B_i of the model. A widely accepted techniques for this purpose is the least squares (LS) method. This method finds estimates for the parameters in the selected equation by minimizing the sum of squared deviations of the observed values of the response variable from those predicted by the equation. These values are known as the least squares estimates (LSE) of the parameters.

Least square estimates are robust but the ensuing assumptions must hold to determine them.

2. The observed data are typical in the sense that they represent a cross-section of an environment (population) about which the investigator wishes to generalise. If the researcher knows that the data are not typical then he cannot generalise his results beyond the sample that is used.

3. The observed values of the response variable are statistically uncorrelated. Each observed value is assumed to be made up of a true value, t, and a random component , ε. That is $Y = t + \varepsilon$. The random component consists of an unobservable randon variable called the randon error. This implies that the covariance between any two observations Y_i and Y_j or between the corresponding random errors, ε_i and ε_j, is zero for all $i \neq j$. That is

$$\text{cov}(Y_i, Y_j) = \text{cov}(\varepsilon_i, \varepsilon_j) = 0 \text{ for all } i \neq j.$$

4. For all i = 1, 2, ---- n, the random error is normally distributed with mean zero and its variance constant (homoskedastic) denoted σ^2 and called "error variance". Symbolically $E(\varepsilon_i) = 0$ and $\text{var}(\varepsilon_i) = \sigma^2$ for all i = 1, 2, ---- n.
Since predictor variables are not random variables, the variance of Y_i is also σ^2 for all i, independent of the point of observation. Thus dispersion of population values from regression line must be constant.

5. The points of observation of the predictor variables are fixed or selected in advance and are measured without error. In many practical situations, both conditions may not hold. Fortunately, the LS procedure remains valid provided the errors in the predictor variables are small when compared to the random errors and provided they do not depend on the parameters of the model.

6. The selected model should be linear in parameters. The phrase "linear in parameters" means that no parameter in the model appears as an exponent, or is multiplied or divided by another parameter. That is, no predictor variable is a perfect linear combination of another. When this assumption is violated, we say there is a problem of multicollinearity. When high multicollinearity exists, it becomes difficult to obtain reliable estimates of the separate effects of the predictor variables.

7. It is desired that the number of observations (n) be substantially greater than the number of predictor variables (m). However, the

minimum requirement is that the number of degrees of freedom $n - (m + n)$ be at least one.[39]

All these assumptions and their implications can and as much as possible should be confirmed for any regression analysis, by using the relevant statistical tests.

With the satisfaction of the foregoing assumptions, LSE are the best linear unbiased estimators (BLUE). That is, "unbiased" because their expected value is equal to the parameter being estimated, "Best" because they have minimum variance among all possible estimators, and "linear" because they are linear functions of the random variables Y_i.[40]

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39. Canavos G. C. Applied probability and Statistical Methods, Little Brown & Company, 1984 p414-415

40. Mood A. M. et. al., Introduction to the theory of statistics, New York, McGraw-Hill Inc., 1974, p499

CHAPTER FOUR

RESEARCH DESIGN

4.1 THE POPULATION

The population of interest in this study consists of all Jua Kali entrepreneurs operating in the Eastlands of Nairobi, divided into three categories. The categories are:

(i) motor vehicle mechanic artisans

(ii) metal work artisans

(iii) Carpentry artisans.

The subsectors are considered independently because subsectoral requirements are different. For instance, initial capital requirements might be of differenct magnitude across the subsectors. It is possible that it might require much more initial capital investment to start a manufacturing undertaking (as for metal work and carpentry) than it would if one was to be in service industry (as in motor vehicle repairs).

Motor vehicle mechanics are normally involved in automobile engine repairs, panel beating and painting. The metal work artisans are engaged in tinsmithing and blacksmithing works. They make metal products such as cooking pans, rain gutters, charcoal stoves, steel window frames, metal furniture or anything that can be fabricated from metal. Carpentry artisans on the other hand, produce wooden furniture such as chairs, tables, carboards, beds, coffins, desks, among other items.

Most of the Jua Kali entrepreneurs operate in the eastlands of Nairobi, hence the reason why the area was deemed appropriate for this study. The reasons why they operate in eastlands may be that: most of their clients dwell there; land plots on which to operate are more readily available; and residential units are cheaper and available.

4.2. SAMPLING DESIGN

The sampling frame was not avaible by the time of this study. The sample was therefore drawn from the major Jua Kali concentration locations in the eastlands of Nairobi. The concentration locations were identified before the time of conducting the actual survey.

The concentration locations which were identified for:

(a) Metal work subsector entrepreneurs included:

(i) Kamukunji blacksmiths and general metal works (Kamukunji)

(ii) Dandora

(iii) Kariobangi

(b) Motor vehicle subsector entrepreneurs included:

(i) Nyayo engineering works (Gikomba)

(ii) Ngara

(iii) Burma

(c) Carpentry subsector entrepreneurs included:

(i) Gikomba

(ii) Kariobangi

(iii) Dandora.

4.2.1 Description of the study areas

Gikomba is the area bounded by Racecourse road, Quarry road, Digo road, Kamukunji street, Meru road and Nairobi river. It stretches for about one kilometer along the river from the bridge on Racecourse road. The carpentry entrepreneurs in Gikomba, who number about thirty, were found just opposite the country bus station (Machakos), on the section stretching along the river bank between Pumwani road and Meru road. The motor vehicle mechanic entrepreneurs in Gikomba operate in the area bounded by Quarry road, Kombo Munyiri road and Popo road. The carpentry entrepreneurs in this area work under makeshift structures while the motor vehicle entrepreneurs, who number about five hundred, had Nyayo Jua Kali sheds constructed for them in 1986. The sheds are enclosed in an area with a big gate marked "Nyayo engineering Works" leading from Quarry road.

Ngara is the area bounded by Muranga road, Ngara road, Quarry road, Racecourse road and Nairobi river. The motor vehicle entrepreneurs in this area operate under open air conditions along Jodongo road and Quarry road. Unlike the entrepreneurs at Nyayo engineering works who have licences, those at Ngara operate often without licences. They do, however, get a good share of customers especially because they operate in an area where many people have vehicles. The motor vehicle entrepreneurs in this area number about fifteen.

Kamukunji tinsmiths and blacksmiths were found in the area bounded by Landhies road, Sakwa road and Lorian road, about half a kilometer from the country bus station (Machakos) along

Landhies road. The metal work entrepreneurs in this area, who number about three hundred, like the motor vehicle entrepreneurs at Gikomba Nyayo engineering works, operated under the shelter of Jua Kali sheds, also build in 1986. This location has the highest concentration of metal work entrepreneurs who are specialised in a wide variety of metal work fabrication technologies. Any kind of metal fabricated product is therefore likely to be found in this location.

Burma is the area bounded by Landhies road, Jogoo road, Ruaha road, Kartoum road, Ambira road and Ahero street. It stretches for about one kilometer along Jogoo road, from Jogoo road, Landhies road and Lusaka road round-about. The motor vehicles entrepreneurs in Burma also operate under open air conditions like those in Ngara. They number about fifteen.

Dandora and Kariobangi are way out in the east of Nairobi. They are low cost residential areas about six and five kilometers, respectively, from the city centre through Juja road. Kariobangi is bounded by Outer Ring road, Nairobi and Gitathuru rivers. Both the metal work and carpentry entrepreneurs interviewed in this area were found along Kamunde road. About fifteen metal work and six carpentry entrepreneurs were found in the area. Dandora is further on from Kariobangi across Nairobi river along Koma Rock road. In Dandora there were about fifteen carpentry and ten metal work entrepreneurs who operate mainly along the main street that circles through the estate. In both Kariobangi and Dandora, the entrepreneurs are more scattered than those nearer the city centre.

4.2.2 The Sample

A sample of size fourty was selected from each category defined in section 4.1. The number of entrepreneurs found in the less concentrated locations was small, and therefore, they were all included in the samples. However, in the area of high concentration, the required number was randomly selected. The composition of the samples was as follows:

The metal work entrepreneurs sampled included all the nine found in Dandora, all the eleven from Kariobangi and the remaining twenty were randomly selected from Kamukunji. A sampling frame was available at Kamukunji, so with the help of the chairman of "Kamukunji Blacksmiths and metal works" group, a random sample was selected.

The sample of motor vehicle subsector entrepreneurs consisted of all the eleven found in Ngara, nine from Burma, and twenty who were randomly selected from Nyayo engineering works at Gikomba.

The carpentry subsector sample consisted of all the fourteen entrepreneurs found in Dandora, six found in Kariobangi and twenty found in Gikomba.

By the term "found" it is meant that the entrepreneur was found physically there and he agreed to be interviewed. Some entrepreneurs, though physically present in their enterprises at the time the interviewer got there, categorically refused to cooperate, in which case, the interviewer had no alternative but to proceed to the next entrepreneur.

4.3 DATA COLLECTION PROCEDURE

Primary data was used in this study. The respondents were interviewed by the researcher with the help of research assistants. The partinent information was filled in a predesigned questionnaire (see annex 1B) as the interview was going on. The questionnaire was designed to tap information in two major areas:

(i) the background socio-economic characteristics of the entrepreneurs and

(ii) the enterprise itself as regards revenue and profits earned per month, amount and source of initial capital, and the nature and number of people employed.

It was difficult to obtain data on income because the people concerned rely almost purely on memory. For this reason questions on number of units sold or serviced in an appropriate period of time, the revenues obtained from each unit sold or job done, and the cost for each unit sold or service rendered were asked as a cross-check.

4.4 DATA ANALYSIS TECHNIQUES

The data was analysed using multiple linear regression analysis and correlation analysis. The analyses were conducted for each Jua Kali subsector independently since the subsectors have some factors unique to themselves.

The coefficient of determination, R^2, and F-ratios were used to determine the explanatory power of the models, while t-ratios were used to test the significance of the predictor variables.

The correlation matrix of all the included variables was used to determine the predictor variables which had multicollinearity effect on the models.

Autocorrelation was not a serious problem in this study. The study used cross-sectional data, and the validity of the assumption of "no autocorrelation or homoskedasticity" is virtually assumed for cross-sctional data because of random sampling.[41] However, the residual plots and the Durbia-Watson statistic were used to confirm the validity of the assumption.

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41. Hamburg M., Statistical analysis for decision making, 3rd Edition, New York, Harcourt Brace Jovanovich,, Inc., 1983, p431.

CHAPTER FIVE

DATA ANALYSIS AND FINDINGS

5.1 INTRODUCTION

Regression models for each Jua Kali subsector were developed by using the variables identified in section 3.1 as the predictor variables. For each subsector the profit earned per month by the sectorial entrepreneurs and the number of workers employed by the enterprise were used as the response variables. Therefore for each subsector an attempt was made to identify significant background socio-economic characteristics by developing two models, one based on profit and the other on number of workers.

In developing the models, each variable was identified by a 1, 2 or 3 depending on whether the variable related to metal work, motor vehicle or carpentry subsectors respectively. For instance AGE1, AGE2, and AGE3 refers to age variable for metal work, motor vehicle and carpentry entrepreneurs respectively. Where a code was used in place of actual variable value, a second number (a 2) was added. For instance PRT12, ED12, HOD12, and INC12, stand for the codes used for the respective variables defined in chapter three.

Coding for the variables was done as follows:

EDi1(actual)	No Schooling	Std 1-4	Std 5-8	Form 1-2	Form 3-4	Above Form 4
EDi2(code)	1	2	3	4	5	6

INCi1(actual)	0-500	501-1000	1001-2000	2001 3000	3000 4000	4001 5000	Above 5000
INCi2 (code)	1	2	3	4	5	6	7

figures for INCi1 in Ksh

HODi1 (actual)	0-30	31-60	61-100	101-150	151-200	over 200
HODi2 (code)	1	2	3	4	5	6

figures for HODi1 in miles. Miles were used because people conceive distance better in miles than in kilometers.

PRTi1 (actual)	0-1000	1001-2000	2001-3000	----------
PRTi2 (code)	1	2	3	----------

where i = 1, 2, 3 stands for metal work, motor vehicle and carpentry subsector respectively.

Where too. few values were observed above a certain class of PRTij, they were grouped together in the class immediately above and given the code for that class. For instance, there were only four observations with profit (PRT11) above Ksh 12,000 in metal work subsector, hence they were grouped together in the PRT11 class, 12001 - 13000, and given the code PRT12 of 13.

The categorial variables, including PSCi, FBRi, FTECi, EMPi, FJOBi, and MKTi were identified as dummy variables in the model, taking a value of 1 or 0 where 1 stood for a "YES" response and 0 for a "NO" response. SINi was also used as a dummy variable where 1 stood for personal savings as the source of initial capital and 0 for other sources. There were very few cases with other sources of initial capital besides personal savings, thus the reason why they were grouped together.

The data on the responses obtained from the respondents interviewed are displayed on annex 2A, 2B, and 2C for metal work, motor vehicle and carpentry entrepreneurs respectively.

The models were developed in three stages. In stage one, the response variables were regressed on all the identified predictor variables. In stage two, further regressions were performed, but this time with a reduced number of predictor variables. The variables were reduced on basis of multicollinearity and their significance (based on t-ratios) in the model. Finally stepwise regressions (forward selection) were performed using all the predictor variables. Stepwise regression is useful in the sense that predictor variables enter the model according to the strength of their contribution, with those with higher contribution entering first.

5.2 METAL WORK SUBSECTOR

5.2.1 Regression analysis (all predictor variables included)

For a preliminary examination of the joint effect of all the predictor variables, two regressions were performed, one taking monthly profits earned by the entrepreneurs as the response variable, and the other taking number of workers employed by the enterprise as the response variable. The outputs for these regressions are shown on tables 1(a) and 1(b) respectively.

None of the predictor variables is significant at 95, 90 or 80 per cent confidence levels[42] in predicting performance in terms of monthly profits (PRT12) as indicated by the results shown on table 1(a). The results also show a low coefficient of determination $R^2 = 0.22$ (adjusted $R^2 = 0$ or Adj. $R^2 = 0$).

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42. t-ratios at 95, 90 and 80 per cent levels and 40-15-1 = 24 degrees of freedom are 2.04, 1.70 and 1.31 respectively.

Besides, some of the variables have their regression coefficients having a sign opposite from what was expected on basis of the hypotheses in chapter three. This unexpected results could be due to the effect of multicollinearity or even the subjectivity in the data. However, since the results do not suggest any useful implications, we need not worry much about their form.

The regression of number of workers (WORKERS 1) on all the predictor variables, shown on table 1(b), indicate that formal technical training (FTEC1) is significant at 95 percent level while primary school handicraft (PSC1), and number of years of technical training (TAY1) are significant at 80 per cent level. These variables have positive coefficients supporting the expected nature of their effect on performance.

The model fit, as indicated by the R^2 value of 0.49 (adj. R^2 = 0.18), is better in this case than when the monthly profit is used as the response variable. This suggests that number of workers may be a better measure of performance than profit. This can be supported by the fact that number of workers is likely to be a more accurate figure than profit. The entrepreneurs are more likely to know off head the number of their employees than the profit they earn. Profit is also a more sensitive factor than number of workers.

At this point, technical education related variables seem to be the only ones with significant effect on performance of entrepreneurs in the metal work subsector. Further regression analysis will however be done for more information.

5.2.2 Regression analysis (reduced number of predictor variables)

To remove the effect of multicollinearity, the predictor variable in the highly correlated pairs of predictor variables with lower t-ratio was removed from the model under consideration. Also removed from the model were those predictor variables with insignificant t-ratios and low correlation with the response variable in the model. To achieve this, the correlation matrix shown on table 2 was obtained. This matrix gives the pair-wise correlation coefficients of the variables relevant to the development of the models.

For the regression model with monthly profit (PRT12) as the response variable, the predictor variables AGE1 and AFY1 were removed from the model because of their insignificant t-ratios and multicollinearity effect, both evident from the tables 1(a) and 2 respectively. On the other hand predictor variables SIN1, PSC1, INC12 and TAY1 were removed because of their highly insignificant t-ratios and low correlation with the response variable PRT12.

The results of the regression of PRT12 on the reduced number of predictor variables are shown on table 3(a). Evidently there is not much improvement in the model fit. While ED12 and FTEC1 have t-ratios which are significant at 80 per cent level, R^2 value of 0.18 (adj R^2 = 0) is rather too low for any useful conclusions to be implied from the results. Moreover the sign of the coefficient of the variable FTEC1 is opposite of what was expected.

The second regression on reduced number of predictor variables used the number of workers (WORKERS1) as the response variable. In this case, the predictor variables EMP1 and FAM1 were removed from the model because of their insignificant t-ratios, low correlation with the response variable (WORKERS1) and multicollinearity effect. Further, FJOB1, HOD12, FBR1 and PFAM1 were removed because of insignificant t-ratios and low correlation with the response variable.

The results of this regression are shown on table 3(b) and indicate that AGE1, PSC1, AFY1, FTEC1,TAY1 and INC12 are all significant at 80 per cent level. However, initial capital,INC12,shows a negative effect on performance. This may mean that too much initial capital may have a negative effect, perhaps due to the inexperience of the entrepreneur in managing funds. This model has also a better fit (R^2 = 0.47, adj. R^2 = 0.31) than the one with PRT12 as the response variable. The same reason given earlier may also apply here.

5.2.3 Stepwise regression - forward selection

Stepwise regressions were performed at 95, 90 and 75 per cent levels of confidence with corresponding F-ratios of 2.11, 1.78 and 1.46 respectively, based on 15 and 24 degrees of freedom.

None of the confidence levels was able to yield any entrants into the model, that is,no variables were significant at these levels, with PRT12 as the response variable. However when the regressions were performed using the number of workers as the response variables (outputs shown on tables 4(a), 4(b) and 4(c)) the predictor variables INC12, EMP1, FTEC1 , PSC1 and TAY1 entered the model in that order, at all the three levels of confidence.

The model fit was reasonable since R^2 is 0.43 (adj. R^2 = 0.34). While all the other entered variables had signs of their coefficients as expected, the coefficient of INC12 was negative, which was against what was expected. This again may be due to the same reason explained earlier.

5.2.4 Conclusion

From the foregoing discussion, it is evident that formal technical edication (FTEC1), primary school handicraft (PSC1), number of years of technical training (TAY1) and initial capital(INC12) are the only background socio-economic characteristics, among the ones being analysed, that show consistent significant effect on performance of entrepreneurs in metal work Jua Kali subsector. Initial capital has however, indicated a negative effect contrary to what was expected. The results also suggest that formal education (ED12), age of the entrepreneur at entry (AGE1) and formal employment before entry (EMP1) do have some effect on performance in the subsector.

Since the number of workers seems to be a better measure of performance, an optimal model for predicting performance of the Jua Kali entrepreneurs in the metal work subsector was obtained by performing a multiple regression with number of workers (WORKERS1) as the response variable and the identified significant variables FTEC1,PSC1, TAY1, INC12, ED12, AGE1 and EMP1 as the predictor variables. The results of this regression are shown on tables 5(a) and 5(b). The model that was obtained by regressing WORKERS1 on the named predictor variables is:

WORKERS1 = -0.828 + 0.71 AGE1 + 0.096 ED12 + 2.205 PSC1 + 3.047 FTEC1
+ .997 TAY1 + 1.977 EMP1 - .701 INC12

with R^2 value of 0.437 (adj R^2 = 0.314).

Age (AGE1) and formal education (ED12) do however have coefficients which are not significant at 80 per cent level. The optimal model was therefore obtained by removing these variables. Table 5(b) shows the results of this regression, which gives the optimal model as;

WORKERS1 = 1.21 + 1.993 PSC1 + 2.844 FTEC1 + 0.021 TAY1 + 2.642 EMP1
-0.710 INC12

All the variables in the optimal model have significant coefficients We can therefore conclude that primary school craft (PSC1), formal technical training (FTEC1), number of years of technical training (TAY1), formal employment before entry (EMP1) and initial capital (INC12) do have a significant effect on performance of Jua Kali entrepreneurs in the metal work subsector.

Table 1(a): Regression analysis (metal work) - profit on all predictor variables.

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	6.082176	7.940318	.7660	.4483
AGE1	0.026788	0.354356	.0756	.9401
ED12	1.015611	0.955021	1.0634	.2941
PSC1	0.607487	1.569309	.3871	.7008
AFY1	0.079024	0.306076	.2582	.7976
FBR1	1.224858	1.706821	.7176	.4773
FTEC1	-2.837392	2.338711	-1.2132	.2323
TAY1	0.484648	0.958931	.5054	.6161
RMP1	1.394409	3.147976	.4430	.6602
FJOB1	-0.904646	1.787735	-.5060	.6157
MKT1	-1.483385	1.562319	-.9495	.3482
INC12	-0.154042	0.428506	-.3595	.7212

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
SIN1	0.481382	2.081245	.2313	.8183
HOD12	-0.233185	0.567879	-.4106	.6836
FAM1	-0.493138	0.635562	-.7759	.4425
PFAM1	-0.349894	0.364217	-.9607	.3426

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	118.10978	15	7.87399	.45995	.93900
ERROR	410.86522	24	17.11938		
TOTAL (CORR.)	528.97500	39			

R-SQUARED = 0.22328
R-SQUARED (ADJ. FOR D.F.) = 0
STND. ERROR OF EST. = 4.13756

Table 1(b): Regression analysis (Metal Work) - Number of workers on all predictor variables.

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	-6.662114	6.443772	-1.0339	.3076
AGE1	0.364018	0.287569	1.2658	.2131
ED12	-0.686992	0.775024	-.8864	.3808
PSC1	1.896832	1.273535	1.4894	.1444
AFY1	-0.321345	0.248389	-1.2937	.2034
FRR1	1.107179	1.385129	.7993	.4289
FTEC1	4.249998	1.897924	2.2393	.0309
TAY1	1.018472	0.778197	1.3088	.1983
EMP1	0.456465	2.554663	.1787	.8591
FJOB1	0.055466	1.450793	.0382	.9697
MKT1	-0.211569	1.267862	-.1669	.8683
INC12	-0.436364	0.347743	-1.2548	.2170

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
SIN1	1.284236	1.688984	.7604	.4516
HOD12	-0.024368	0.460848	-.0529	.9581
FAM1	0.326843	0.515775	.6337	.5300
PFAM1	0.107429	0.295571	.3635	.7182

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	263.38991	15	17.55933	1.55745	.16160
ERROR	270.58509	24	11.27438		
TOTAL (CORR.)	533.97500	39			

R-SQUARED = 0.493263
R-SQUARED (ADJ. FOR D.F.) = 0.176552
STND. ERROR OF EST. = 3.35773

Table 2: Correlation Matrix - Metal Work Subsector

	PRT12	WORKERS1	AGE1	ED12	PSC1	AFY1	FBR1	FTEC1	TAY1	EMP1	FJOB1	MKT1	INC12	SIN1	HOD12	FAM2	PFAM2
PRT12	1.0000																
WORKERS1	.2098	1.0000															
AGE1	-.0253	.0920	1.0000														
ED12	.1493	.1790	-.1995	1.0000													
PSC1	.1790	.2345	-.2042	-.0751	1.0000												
AFY1	-.0870	-.0814	.8841*	-.4303	-.2097	1.0000											
FBR1	.1047	.0159	.0056	-.0724	-.0260	.0895	1.0000										
FTEC1	-.1148	.4010	-.0890	.4040	-.1143	-.1610	-.0464	1.0000									
TAY1	.0669	.1861	-.0161	.1719	.0918	.0321	-.0439	.3075	1.0000								
EMP1	.0313	.2497	.6335*	.0032	-.0453	.4203	-.3232	.2068	.1025	1.0000							
FJOB1	-.1463	-.2130	.0233	.0475	-.3477	.1067	.2436	-.1067	.0099	-.3516	1.0000						
MKT1	-.1031	.1574	.0144	.1941	.0000	-.1080	-.1549	.2993	.1324	.1502	.0000	1.0000					
INC12	.0331	-.1836	.2256	-.0179	.0175	.2990	-.0748	.1053	.5035*	.3879	-.0061	-.0193	1.0000				
SIN1	.1707	.1936	-.0373	.2863	.1741	-.1542	-.1491	-.1037	-.1710	.2023	-.1816	.1155	-.2342	1.0000			
HOD12	-.1576	-.0784	.0702	-.0872	-.2033	.0671	.1741	-.0807	-.4632	.0000	-.0353	-.1686	-.2280	-.0778	1.0000		
FAM1	-.1099	-.0222	.7682*	-.3202	-.2025	.8105*	-.1647	-.2551	-.0692	.4708	-.0393	-.2126	.1038	-.0175	.1706	1.000	
PFAM1	-.0593	.0748	.0798	.2148	.0163	.0406	.1851	-.1204	.0969	-.0660	.2448	-.1850	-.0281	.1201	.1403	.0264	1.000

* Multicollinearity effect considered

Table 3(a): Regression analysis (Metal Work) - Profit on reduced Number of predictor variables

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	8.177174	3.583523	2.2819	.0280
ED12	0.934015	0.614596	1.5197	.1366
FRR1	1.481873	1.351393	1.0966	.2796
FTRC1	-2.225156	1.644577	-1.3530	.1838
FJOB1	-1.61268	1.326267	-1.2160	.2313
MKT1	-0.871633	1.298466	-.6713	.5060
HOD12	-0.460414	0.41971	-1.0970	.2794
FAM1	-0.066925	0.269305	-.2485	.8050
PFAM1	-0.224273	0.306935	-.7307	.4693

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	95.347681	8	11.918460	.852050	.565676
ERROR	433.62732	31	13.98798		
TOTAL (CORR.)	528.97500	39			

R-SQUARED = 0.18025
R-SQUARED (ADJ. FOR D.F.) = 0
STND. ERROR OF EST. = 3.74005

Table 3(b): Regression analysis (Metal Work) - Number of workers on reduced number of predictor variables.

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	-6.149196	3.553642	-1.7304	.0915
AGE1	0.410502	0.173463	2.3665	.0230
ED12	-0.589352	0.6033	-.9769	.3346
PSC1	1.870932	1.06677	1.7538	.0873
AFY1	-0.255762	0.154578	-1.6546	.1060
FTEC1	4.06386	1.39494	2.9133	.0059
TAY1	1.099912	0.616358	1.7845	.0821
MKT1	-0.64591	1.056646	-.6113	.5446
INC12	-0.488555	0.233635	-2.0911	.0431
SIN1	1.395226	1.288103	1.0832	.2854

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	251.95619	9	27.99513	2.97801	.01177
ERROR	282.01881	30	9.40063		
TOTAL (CORR.)	533.97500	39			

R-SQUARED = 0.47185
R-SQUARED (ADJ. FOR D.F.) = 0.313405
STND. ERROR OF EST. = 3.06604

Table 4(a), 4(b), 4(c): Stepwise Regressions (Metal Work) - Number of Workers on all predictor variables at 95, 90, 75% levels

Table 4(a) - 95 Per cent level

STEPWISE REGRESSION

SELECTION: FORWARD — CONTROL: AUTOMATIC

F-TO-ENTER = 2.11 — MAX STEPS = 50 — F-TO-REMOVE = 2.11

STEP 5

R-SQUARED = 0.427912

R-SQUARED (ADJ.) = 0.343781 — MSE = 8.98473 WITH 34 D.F.

VARIABLES CURRENTLY IN MODEL			VARIABLES CURRENTLY NOT IN MODEL		
VARIABLE	COEFF.	F-REMOVE	VARIABLE	PARTIAL CORR.	F-ENTR
7. TAY1	1.02051	2.9495	5. FRR1	.1814	1.123
3. PSC1	1.99285	4.2324	15. PFAM1	.1250	.523
6. FTEC1	2.84410	5.2573	1. AGE1	.1211	.491
8. EMP1	2.64218	6.1590	9. FJOB1	.0582	.112
11. INC12	-.70887	9.2577	10. MKT1	-.0570	.107
			12. SIN1	.0546	.098
			14. FAM1	.0291	.028
			4. AFY1	.0276	.025
			13. HOD12	.0255	.021
			2. ED12	.0135	.006

Table 4(b) - 90 Per cent level.

STEPWISE REGRESSION

SELECTION: FORWARD — CONTROL: AUTOMATIC

F-TO-ENTER = 1.78 — MAX STEPS = 16 — F-TO-REMOVE = 1.78

STEP 5

R-SQUARED = 0.427912

R-SQUARED (ADJ.) = 0.343781 — MSE = 8.98473 WITH 34 D.F.

VARIABLES CURRENTLY IN MODEL			VARIABLES CURRENTLY NOT IN MODEL		
VARIABLE	COEFF.	F-REMOVE	VARIABLE	PARTIAL CORR.	F-ENTR
7. TAY1	1.02051	2.9495	5. FRR1	.1814	1.123
3. PSC1	1.99285	4.2324	15. PFAM1	.1250	.523
6. FTEC1	2.84410	5.2573	1. AGE1	.1211	.491
8. EMP1	2.64218	6.1590	9. FJOB1	.0582	.112
11. INC12	-.70887	9.2577	10. MKT1	-.0570	.107
			12. SIN1	.0546	.098
			14. FAM1	.0291	.028
			4. AFY1	.0276	.025
			13. HOD12	.0255	.021
			2. ED12	.0135	.006

Table 4(c): 75 Per cent level

STEPWISE REGRESSION

SELECTION: FORWARD CONTROL: AUTOMATIC
F-TO-ENTER = 1.46 MAX STEPS = 16 F-TO-REMOVE = 1.46

STEP 5

R-SQUARED = 0.427912
R-SQUARED (ADJ.) = 0.343781 MSE = 8.98473 WITH 34 D.F.

VARIABLES CURRENTLY IN MODEL			VARIABLES CURRENTLY NOT IN MODEL		
VARIABLE	COEFF.	F-REMOVE	VARIABLE	PARTIAL CORR.	F-ENTR
7. TAY1	1.02051	2.9495	5. FRR1	.1814	1.123
3. PSC1	1.99285	4.2324	15. PFAM1	.1250	.523
6. FTEC1	2.84410	5.2573	1. AGR1	.1211	.491
8. EMP1	2.64218	6.1590	9. FJOB1	.0582	.112
11. INC12	-.70887	9.2577	10. MKT1	-.0570	.107
			12. SIN1	.0546	.098
			14. FAM1	.0291	.028
			4. AFY1	.0276	.025
			13. HOD12	.0255	.021
			2. RD12	.0135	.006

Table 5(a): Regression analysis (Metal Work) - Preliminary optimal model

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	-0.828156	3.289131	-.2518	.8025
AGR1	0.07111	0.099282	.7162	.4781
ED12	0.095943	0.468989	.2046	.8390
PSC1	2.204886	1.033345	2.1337	.0392
PTRC1	3.047268	1.403022	2.1719	.0360
TAY1	0.997448	0.610919	1.6327	.1106
RMP1	1.976761	1.436394	1.3762	.1766
INC12	-0.701203	0.239129	-2.9323	.0056

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	233.36905	7	33.33844	3.54893	.00620
ERROR	300.60595	32	9.39394		
TOTAL (CORR.)	533.97500	39			

R-SQUARED = 0.437041
R-SQUARED (ADJ. FOR D.F.) = 0.313894
STND. ERROR OF EST. = 3.06495

Table 5(b): Regression analysis (Metal work) - Optimal model

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	1.205828	1.103228	1.0930	.2811
PSC1	1.992848	0.968678	2.0573	.0464
FTEC1	2.844104	1.240406	2.2929	.0273
TAY1	1.020506	0.594212	1.7174	.0938
EMP1	2.642177	1.064648	2.4817	.0175
INC12	-0.708874	0.232979	-3.0426	.0042

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	228.49423	5	45.69885	5.08628	.00138
ERROR	305.48077	34	8.98473		
TOTAL (CORR.)	533.97500	39			

R-SQUARED = 0.427912
R-SQUARED (ADJ. FOR D.F.) = 0.343781
STND. ERROR OF EST. = 2.99745

5.3 MOTOR VEHICLE MECHANICS SUBSECTOR

5.3.1 Regression analysis (all predictor variables included)

As in the case of metal work subsector, two regressions were performed, one taking the monthly profit, (PRT22), as the response variable and the other taking the number of workers (WORKERS2) as the response variable. The outputs of these regressions are shown on tables 6(a) and 6(b) respectively.

The regression with PRT22 as the response variable does not show any of the predictor variables as significant either at 95, 90 or even 80 per cent level of confidence. $R^2 = 0.27$ (adj $R^2 = 0$) is also too low for any useful purpose to be attached to the model. Like in the case of the metal work subsector, some of the predictor variables have signs of their coefficients which are not consistent with the hypotheses. However, since none of them is significant, the hypotheses need not be an issue in this case.

The regression results from the number of workers as the response variable indicate that, preference for formal employment at entry (FJOB2) and distance to ancestral home (HOD22) are the the only significant predictor variables. These significant variables have signs of their coefficients which are consistent with the hypotheses. R^2 is 0.35 (adj $R^2 = 0$), meaning that, as in the case of metal work subsector, the number of workers is perhaps a better measure of performance in this subsector .

5.3.2 Regression analysis (reduced number of predictor variables)

Correlation matrix displayed on table 7 was obtained so as to be able to identify the variables which are highly correlated. The effect of multicollinearity was then isolated from the models by removing the variable in the highly correlated pairs ($r \geq 0.5$) which had a low t-ratio. The predictor variables with highly insignificant t-ratios and low correlation with the response variable in the model were also removed from the model.

For the regression model with PRT22 as the response variable the predictor variables AFY2 and FAM2 were removed from the model because of multicollinearity effect and insignificant t-ratios as indicated in tables 7 and 6(a) respectively. Further the predictor variables ED22, INC22, EMP2, FTEC2 and FBR2 were removed because of their highly insignificant t-ratios and low correlation with the response variable PRT22.

The output of the regression of PRT22 on the reduced number of predictor variables is shown on table 8(a). At this stage the number of years of technical training (TAY2) and the distance to ancestral home (HOD22) show significant effect on performance at 80 per cent confidence level. TAY2 has however a negative effect on PRT22 contrary to what was expected. This is not strange as was explained under the presumptions in section 3.1. R^2 value of 0.24 (adj R^2 = 0.04) is nevertheless too low for the model to be considered as valid.

The results of the regression model with number of workers as the response variable are shown on the table 8(b). To obtain these results, the predictor variables AGE2, AFY2 and FAM2 were

removed because of their highly insignificant t-ratios, low correlation with the response variable (WORKERS2) and multicollinearity effect. On the other hand, the predictor variables PSC2, FTEC2, TAY2, INC22, SIN2, and PFAM2 were removed because of their small t-ratios and low correlation with the response variable.

The results of this regression indicate that formal education (ED22), market consideration (MKT2), preference for formal employment (FJOB2), and distance to ancestral home (HOD22), all have significant t-ratios at 80 per cent level. ED22 and HOD22 do however have the signs of their coefficients contrary to the hypotheses. R^2 value of 0.30 (adj: R^2 = 0.17) indicates a stronger model fit than in the case of PRT22. The model fit is, however, still abit too low for much reliability to be attached to the model.

5.3.3 Stepwise regression - forward Selection

The results of stepwise regressions with PRT22 as the response variable are shown on tables 9(a), 9(b) and 9(c) for 95, 90 and 75 per cent confidence levels respectively. At 95 and 90 per cent levels, only HOD22 and TAY2 qualified to enter the model. At 75 per cent level, one more predictor variable, AGE2, entered the model. The model fit as indicated by the values of R^2 is however too low in both cases.

The results of the stepwise regressions with number of workers as the response variable are shown on the tables 10(a), 10(b) and 10(c) for 95, 90 and 75 per cent levels of confidence respectively.

At all the three levels, only HOD22, ED22, FAM2 and FJOB2 qualified to enter the model. R^2 value of 0.26 (adj. R^2 = 0.18), though slightly higher than in the case of PRT22 as the response variable, is still too low for any practical feasibility to be implied on the model.

5.3.4 Conclusion

This subsector has yielded regression models which do not reflect much empirical meaning. There is however, an indication that preference for formal job at entry (FJOB2), the distance to ancestral home (HOD22) and number of years of technical training (TAY2) do have significant effect on performance. Most of the models developed in this section consistently showed these variables as significant determinants of performance of entrepreneurs in the motor vehicle Jua Kali subsector. There was also some evidence that formal education (ED22), market consideration (MKT2), and entrepreneur's family size (FAM2) do have some effect on performance.

Like in the case of metal work subsector, number of workers as the response variable produced better fit on the models than the monthly profit. Once again for this reason, an optimal model for predicting performance of the Jua Kali entreprenuers in the motor vehicle mechanic subsector was obtaine by performing a multiple regression with number of workers (WORKERS2) as the response variable and the identified significant variables FJOB2, HOD22, ED22, MKT2 and FAM2 as the predictor variables. The output of this regression is shown on table 11(a). The resulting model developed for this subsector is therefore:

$$WORKERS2 = 5.70 - 0.896\ (ED22) - 0.096(TAY2) - 1.311(FJOB2) + 0.738(MKT2) + 0.548(HOD22) + 0.479(FAM2)$$

with R^2 value of 0.280 (adj. R^2 = 0.149).

Since TAY2 and MKT2 were insignificant at 80 per cent, the optimal model was obtained with these variables excluded (shown on table 11(b)). This model is of the form:

$$WORKERS2 = 5.510 - 0.882\ (ED22) - 1.347(FJOB2) + .595(HOD22) + 0.569(FAM2)$$

with R^2 value of 0.263 (adj. R^2 = 0.179). This model indicated that only formal education (ED22), preference for formal job (FJOB2), distance to ancestral home (HOD22) and nuclear family (FAM2) do apparently show significant effect on performance of Jua Kali entrepreneurs in the motor vehicle subsector.

Table 6(a): Regression analysis (motor vehicle) - Profit on all Predictor variables

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	17.442409	10.777154	1.6185	.1136
AGE2	-0.43965	0.480409	-.9152	.3657
ED22	0.39218	1.459366	.2687	.7896
PSC2	-1.636784	2.888822	-.5666	.5742
AFY2	0.094528	0.54626	.1730	.8635
FRR2	-0.561747	2.462453	-.2281	.8207
FTEC2	2.151847	3.816624	.5638	.5761
TAY2	-0.97212	0.93085	-1.0443	.3028
EMP2	0.590623	3.222056	.1833	.8555
FJOB2	-1.158519	2.402118	-.4823	.6323
MKT2	2.261737	2.612221	.8658	.3919
INC22	-0.051688	0.835871	-.0618	.9510

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
SIN2	3.823752	4.527431	.8446	.4035
HOD22	-0.795936	0.73635	-1.0809	.2864
FAM2	0.350798	1.273765	.2754	.7845
PFAM2	0.313318	0.549046	.5707	.5715

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	412.37101	15	27.49140	.60123	.84546
ERROR	1097.4040	24	45.7252		
TOTAL (CORR.)	1509.7750	39			

R-SQUARED = 0.273134
R-SQUARED (ADJ. FOR D.F.) = 0
STND. ERROR OF EST. = 6.76204

Table 6(b): Regression analysis (Motor Vehicle) - Number of workers on all predictor variables

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	7.415894	4.712555	1.5736	.1236
AGE2	0.015921	0.21007	.0758	.9400
ED22	-0.830903	0.638141	-1.3021	.2005
PSC2	0.691025	1.263203	.5470	.5875
AFY2	0.011902	0.238864	.0498	.9605
FAR2	-1.07055	1.076763	-.9942	.3262
FTEC2	-0.743354	1.668905	-.4454	.6585
TAY2	-0.277888	0.407035	-.6827	.4988
EMP2	0.871698	1.408917	.6187	.5397
EJOB2	-1.44198	1.050381	-1.3728	.1777
MKT2	0.694025	1.142253	.6076	.5470
INC22	-0.151645	0.365503	-.4149	.6805

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
SIN2	-0.76914	1.979722	-.3885	.6998
HOD22	0.44007	0.321986	1.3667	.1795
FAM2	0.228737	0.556983	.4107	.6836
PFAM2	-0.047746	0.240083	-.1989	.8434

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	112.14329	15	7.47622	.85511	.61550
ERROR	209.83171	24	8.74299		
TOTAL (CORR.)	321.97500	39			

R-SQUARED = 0.348298
R-SQUARED (ADJ. FOR D.F.) = 0
STND. ERROR OF EST. = 2.95685

TABLE 7: Correlation matrix - Motor Vehicle Subsector

	PRT22	WORKERS2	AGE2	ED22	PSC2	AFY2	FBR2	FTEC2	TAY2	EMP2	FJOB2	MKT2	INC22	SIN2	HOD22	FAM2	PFAM2
PRT22	1.0000																
WORKERS2	.2093	1.0000															
AGE2	-.1714	.0701	1.0000														
ED22	.0219	-.2000	.3078	1.0000													
PSC2	-.2040	.0597	.2848	.3009	1.0000												
AFY2	-.1477	.1357	.7769*	.0500	.2774	1.0000											
FBR2	.0602	-.2152	-.0941	.0412	-.0504	-.1800	1.0000										
FTEC2	.0570	-.1939	.0913	.3932	.2135	-.1311	-.1048	1.0000									
TAY2	-.2821	-.0668	.0162	-.1485	.2250	.2269	-.2073	-.0238	1.0000								
EMP2	.0157	.1407	.3553	.1247	.2325	.3295	-.0682	.2753	-.0694	1.0000							
FJOB2	-.1628	-.2482	.1187	-.0066	-.0567	.0748	-.1113	.1770	.0787	.1089	1.0000						
MKT2	-.0041	.2203	.1988	.0787	.0534	.1908	-.1048	-.1250	.0317	-.1502	-.0506	1.0000					
INC22	-.0818	-.0124	.2493	.2407	.1015	.0079	-.0434	.0827	-.1065	.1615	.1129	1820	1.0000				
SIN2	.1180	-.0617	.1093	-.1311	-.0534	.1868	.0699	-.2500	.1185	.1502	-.1180	-.3333	-.2481	1.0000			
HOD22	-.2444	.2735	-.0720	.0740	-.0375	-.1701	-.1314	-.0895	.0146	.1193	.0564	.1515	.1971	-.2158	1.0000		
FAM2	.1170	.1468	.6518*	.2365	.0812	.5770*	-.1001	.0265	-.2286	.3383	-.1306	.2123	.1492	.1297	-.2549	1.0000	
PFAM2	.1939	-.0586	-.1117	.1238	-.2531	-.2005	.1490	-.0050	-.2486	.3240	-.0166	-.2088	.1866	.0033	.1064	.0208	1.000

* Multicollinearity effect considered

Table 8(a): Regression analysis (Motor Vehicle) - Profit on reduced number of predictor variables.

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	15.938866	7.714859	2.0660	.0455
AGE2	-0.246797	0.231203	-1.0674	.2923
PSC2	-0.961597	2.294172	-.4191	.6774
TAY2	-1.022567	0.727772	-1.4051	.1679
FLOR2	-1.030424	2.034591	-.5065	.6154
MKT2	1.994623	2.210391	.9024	.3724
SIN2	3.071105	3.656914	.8398	.4061
HOD22	-0.884374	0.553545	-1.5977	.1182
PFAM2	0.37984	0.417617	.9095	.3687

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	359.69146	8	44.96143	1.21192	.32459
ERROR	1150.0835	31	37.0995		
TOTAL (CORR.)	1509.7750	39			

R-SQUARED = 0.238242
R-SQUARED (ADJ. FOR D.F.) = 0.041659
STND. ERROR OF EST. = 6.09093

Table 8(b): Regression analysis (Motor Vehicle) - Number of workers on reduced number of predictor variables

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	6.22151	2.00011	3.1106	.0035
ED22	-0.749622	0.441757	-1.6969	.0977
FRR2	-1.026563	0.888976	-1.1548	.2552
EMP2	1.106786	0.86198	1.2840	.2067
EJOB2	-1.682914	0.849924	-1.9801	.0548
MKT2	1.142002	0.860607	1.3270	.1922
HOD22	0.363013	0.235366	1.5423	.1311

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	95.152955	6	15.858826	2.307277	.057092
ERROR	226.82205	33	6.87340		
TOTAL (CORR.)	321.97500	39			

R-SQUARED = 0.295529
R-SQUARED (ADJ. FOR D.F.) = 0.167443
STND. ERROR OF EST. = 2.62172

Table 9(a), 9(b), 9(c): Stepwise regression (Motor vehicle) - Profit on all predictor variables

Table 9(a): 95 per cent level

STEPWISE REGRESSION

SELECTION: FORWARD CONTROL: AUTOMATIC
F-TO-ENTER = 2.11 MAX STEPS = 16 F-TO-REMOVE = 2.11

STEP 2

R-SQUARED = 0.137341
R-SQUARED (ADJ.) = 0.0907113 MSE = 35.2005 WITH 37 D.F.

VARIABLES CURRENTLY IN MODEL			VARIABLES CURRENTLY NOT IN MODEL		
VARIABLE	COEFF.	F-REMOVE	VARIABLE	PARTIAL CORR.	F-ENTR
13. HOD22	-.81355	2.4772	1. AGE2	-.1988	1.481
7. TAY2	-1.20452	3.3281	15. PFAM2	.1681	1.046
			3. PSC2	-.1662	1.022
			4. AFY2	-.1408	.728
			9. FJOB2	-.1377	.695
			12. SIN2	.1102	.442
			11. INC22	-.0708	.181
			10. MKT2	.0449	.072
			5. FRR2	-.0324	.037
			6. FTEC2	.0312	.035
			8. EMP2	.0272	.026
			14. FAM2	-.0090	.002
			2. ED22	-.0019	.000

Table 9(b): 90 per cent level

STEPWISE REGRESSION

SELECTION: FORWARD CONTROL: AUTOMATIC
F-TO-ENTER = 1.78 MAX STEPS = 16 F-TO-REMOVE = 1.78

STEP 2

R-SQUARED = 0.137341
R-SQUARED (ADJ.) = 0.0907113 MSE = 35.2005 WITH 37 D.F.

VARIABLES CURRENTLY IN MODEL			VARIABLES CURRENTLY NOT IN MODEL		
VARIABLE	COEFF.	F-REMOVE	VARIABLE	PARTIAL CORR.	F-ENTR
13. HOD22	-.81355	2.4772	1. AGE2	-.1988	1.481
7. TAY2	-1.20452	3.3281	15. PFAM2	.1681	1.046
			3. PSC2	-.1662	1.022
			4. AFY2	-.1408	.728
			9. FJOB2	-.1377	.695
			12. SIN2	.1102	.442
			11. INC22	-.0708	.181
			10. MKT2	.0449	.072
			5. FRR2	-.0324	.037
			6. FTEC2	.0312	.035
			8. EMP2	.0272	.026
			14. FAM2	-.0090	.002
			2. ED22	-.0019	.000

Table 9(c): 75 Per cent level

STEPWISE REGRESSION

SELECTION: FORWARD CONTROL: AUTOMATIC
F-TO-ENTER = 1.46 MAX STEPS = 16 F-TO-REMOVE = 1.46
STEP 3

R-SQUARED = 0.171443
R-SQUARED (ADJ.) = 0.102396 MSE = 34.7482 WITH 36 D.F.

VARIABLES CURRENTLY IN MODEL			VARIABLES CURRENTLY NOT IN MODEL		
VARIABLE	COEFF.	F-REMOVE	VARIABLE	PARTIAL CORR.	F-ENTR
1. AGE2	-.24450	1.4817	14. FAM2	.1753	1.110
13. HOD22	-.85885	2.7820	15. PFAM2	.1512	.819
7. TAY2	-1.19074	3.2938	12. SIN2	.1323	.623
			9. FJOB2	-.1166	.482
			3. PSC2	-.1163	.480
			8. EMP2	.1106	.433
			10. MKT2	.0909	.291
			2. ED22	.0668	.156
			5. FBR2	-.0543	.103
			6. FTEC2	.0494	.085
			4. AFY2	.0293	.030
			11. INC22	-.0175	.010

Tables 10(a), 19(b), 10(c): Stepwise regression (Motor vehicle): Number of workers on all predictor variables.

Table 10(a): 95 per cent level

STEPWISE REGRESSION

SELECTION: FORWARD CONTROL: AUTOMATIC
F-TO-ENTER = 2.11 MAX STEPS = 16 F-TO-REMOVE = 2.11
STEP 4

R-SQUARED = 0.263266
R-SQUARED (ADJ.) = 0.179067 MSE = 6.77743 WITH 35 D.F.

VARIABLES CURRENTLY IN MODEL			VARIABLES CURRENTLY NOT IN MODEL		
VARIABLE	COEFF.	F-REMOVE	VARIABLE	PARTIAL CORR.	F-ENTR
9. FJOB2	-1.34675	2.5686	5. FBR2	-.1811	1.152
14. FAM2	.56888	3.2680	3. PSC2	.1556	.843
2. ED22	-.88241	3.8628	10. MKT2	.1392	.671
13. HOD22	.59534	6.3093	4. AFY2	.1014	.353
			12. SIN2	-.1007	.348
			15. PFAM2	-.0852	.248
			8. EMP2	.0798	.217
			1. AGE2	.0525	.093
			7. TAY2	-.0400	.054
			11. INC22	-.0398	.053
			6. FTEC2	-.0119	.004

Table 10(b): 90 per cent level

STEPWISE REGRESSION

SELECTION: FORWARD CONTROL: AUTOMATIC
F-TO-ENTER = 1.78 MAX STEPS = 50 F-TO-REMOVE = 1.78

STEP 4

R-SQUARED = 0.263266
R-SQUARED (ADJ.) = 0.179067 MSE = 6.77743 WITH 35 D.F.

VARIABLES CURRENTLY IN MODEL			VARIABLES CURRENTLY NOT IN MODEL		
VARIABLE	COEFF.	F-REMOVE	VARIABLE	PARTIAL CORR.	F-ENTR
9. FJOB2	-1.34675	2.5686	5. FRR2	-.1811	1.152
14. FAM2	.56888	3.2680	3. PSC2	.1556	.843
2. ED22	-.88241	3.8628	10. MKT2	.1392	.671
13. HOD22	.59534	6.3093	4. AFY2	.1014	.353
			12. SIN2	-.1007	.348
			15. PFAM2	-.0852	.248
			8. EMP2	.0798	.217
			1. AGE2	.0525	.093
			7. TAY2	-.0400	.054
			11. INC22	-.0398	.053
			6. FTEC2	-.0119	.004

Table 10(c): 75 per cent level

STEPWISE REGRESSION

SELECTION: FORWARD CONTROL: AUTOMATIC
F-TO-ENTER = 1.46 MAX STEPS = 16 F-TO-REMOVE = 1.46

STEP 4

R-SQUARED = 0.263266
R-SQUARED (ADJ.) = 0.179067 MSE = 6.77743 WITH 35 D.F.

VARIABLES CURRENTLY IN MODEL			VARIABLES CURRENTLY NOT IN MODEL		
VARIABLE	COEFF.	F-REMOVE	VARIABLE	PARTIAL CORR.	F-ENTR
9. FJOB2	-1.34675	2.5686	5. FRR2	-.1811	1.152
14. FAM2	.56888	3.2680	3. PSC2	.1556	.843
2. ED22	-.88241	3.8628	10. MKT2	.1392	.671
13. HOD22	.59534	6.3093	4. AFY2	.1014	.353
			12. SIN2	-.1007	.348
			15. PFAM2	-.0852	.248
			8. EMP2	.0798	.217
			1. AGE2	.0525	.093
			7. TAY2	-.0400	.054
			11. INC22	-.0398	.053
			6. FTEC2	-.0119	.004

Table 11(a): Regression analysis (Motor vehicle) - preliminary optimal Model

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	5.697732	2.198111	2.5921	.0134
ED22	-0.896053	0.459315	-1.9508	.0583
TAY2	-0.09624	0.306643	-.3139	.7553
FJOR2	-1.3109	0.857484	-1.5288	.1344
MKT2	0.738434	0.883653	.8357	.4084
HOD22	0.547882	0.247571	2.2130	.0328
FAM2	0.479592	0.338655	1.4162	.1647

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	90.052211	6	15.008702	2.135569	.075371
ERROR	231.92279	33	7.02796		
TOTAL (CORR.)	321.97500	39			

R-SQUARED = 0.279687
R-SQUARED (ADJ. FOR D.F.) = 0.148721
STND. ERROR OF EST. = 2.65103

Table 11(b): Regression analysis (Motor vehicle) - Optimal model

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	5.50979	1.958688	2.8130	.0076
ED22	-0.882409	0.44897	-1.9654	.0565
FJOB2	-1.346748	0.840314	-1.6027	.1171
HOD22	0.595338	0.237014	2.5118	.0163
FAM2	0.568876	0.314687	1.8078	.0784

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	84.764960	4	21.191240	3.126737	.026711
ERROR	237.21004	35	6.77743		
TOTAL (CORR.)	321.97500	39			

R-SQUARED = 0.263266
R-SQUARED (ADJ. FOR D.F.) = 0.179067
STND. ERROR OF EST. = 2.60335

5.4 CARPENTRY SUBSECTOR

5.4.1 Regression analysis (all predictor variables included)

For this subsector, like for the previous two, two regressions were performed, taking the monthly profit (PRT32) and number of workers (WORKERS3) as the response variables respectively. The outputs for these regressions are given on tables 12(a) and 12(b) respectively.

The regression with PRT32 as the response variable indicates that years that elapse after school before entry (AFY3), initial capital (INC32), distance to ancestral home (HOD32), entrepreneur's family size (FAM3) and parental family size (PFAM3) have significant t-ratios at 95 per cent confidence level. Besides, all their coefficients concur with the hypotheses in chapter three. Formal technical training (FTEC3) has a significant coefficient at 90 per cent level and the sign of its coefficient agrees with the hypothesis relating to the variable. Primary school handicraft (PSC3) and market consideration (MKT3) have significant coefficients at 80 per cent level but the signs for their coefficients do not agree with the hypotheses relating to the variables. The resulting model has stronger fit than all the earlier models as indicated by the higher R^2 value of 0.60 (adj. R^2 = 0.34)

The results from WORKERS3 as the response variable do, to a large extent, yield the same results with PRT32 as the response variable. INC32, HOD32, PFAM3, and MKT3 are all significant at 95 per cent level and signs of their coefficients agree with the hypothesised ones. FTEC3, and FJOB3 are significant at 80 per cent level with the signs of their coefficients concurring with the

hypotheses. PSC3 is significant at 90 per cent level but the sign of its coefficient is opposite of what was expected. This may perhaps be due to some respondents saying they did not do handicraft in primary school when they actually did it. Some respondents, it was noted, did not actually see primary school handicraft as having any bearing on what they did.

R^2 value of 0.68 (adj. R^2 = 0.48) again implies a stronger fit of the model than in the case of other subsectors and that with PRT32 as response variable as well. This is a further evidence that WORKERS is most likely a better measure of performance than profit in Jua Kali sector.

5.4.2 Regression analysis (reduced number of predictor variables)

As in the case of the other two subsectors, the number of predictor variables was reduced on basis of multicollinearity effect, value of t-ratios, and their correlation with the response variable in the model. The correlation matrix for this subsector is given on table 13.

The regression output from PRT32 as the response variable had the predictor variables AGE3, EMP3, and ED32 removed because of multicollinearity effect, highly insignificant t-ratios and low correlation with PRT32. In addition, the predictor variables FBR3, TAY3, FJOB3, and SIN3 were removed because of their highly insignificant t-ratios and low correlation with PRT32.

The results of the regression of PRT32 on the reduced number of predictor variables is shown on table 14(a).

The R^2 reduced slightly from 0.60 to 0.54 (adj. R^2 = 0.42). This is however compensated for by the increased significance of the t-ratios of the included variables. The years that elapse after school before entry (AFY3), initial capital (INC32), entrepreneur's family size (FAM3) and parental family size (PFAM3), all have significant coefficients at 95 per cent confidence level, and have the signs of their coefficients agreeing with the hypotheses. Formal technical training (FTEC3) is significant at 90 per cent level and the sign of its coefficient agrees with the associated hypothesis. On the other hand, primary school handicraft (PSC3) is significant at 95 per cent level while market consideration (MKT3) is significant at 90 per cent level but the signs of their coefficients do not concur with the hypotheses.

Table 14(b) shows the regression results of the WORKERS3 on the reduced number of predictor variables. The predictor variables AGE3, AFY3, EMP3, FAM3 and ED32 were removed because of their multicollinearity effect, highly insignificant t-ratios and low correlation with the response variable, WORKERS3. FBR3, TAY3, and SIN3 were removed because of highly insignificant t-ratios and low correlation with the response variable.

The results of the regression of WORKERS 3 on the reduced number of predictor variables show that INC32, HOD32, and PFAM3 are significant at 95 per cent level (infact they are significant at 99 per cent level) and the signs of their coefficients are in agreement with the hypotheses. FJOB3 and FTEC3 are significant at 90 and 80 per cent levels respectively and the signs of their coefficients concur

with expected form. PSC3 and MKT3 are significant at 95 per cent level but have signs of their coefficients inconsistent with the expectation. The reason for this deviation from expectation was explained earlier for PSC. For the MKT, it may happen that one has high hopes initially but the actual turn of events frastrate the person hence performs poorly.

R^2 value of 0.63 (adj. R^2 = 0.54) is again higher than in the case of PRT32 as the response variable.

5.4.3 Stepwise regression-forward selection

Tables 15(a), 15(b) and 15(c) show the stepwise regression results for 95, 90 and 75 per cent confidence levels respectively with PRT32 as the response variable. At all the three levels, only INC32, HOD32, and PFAM3 entered the model in that order. The strength of the model fit is low as indicated by the R^2 value of 0.32 (adj. R^2 = 0.26)

The results of the stepwise regressions with the number of workers (WORKERS3) as the response variable are shown on the tables 16(a), 16(b) and 16(c) for 95, 90 and 75 per cent confidence levels respectively. At all the three levels the predictor variables INC32, PFAM3, HOD32, MKT3, PSC3, FJOB3, and FTEC3 enter the model in that order. R^2 value of 0.63 (adj. R^2 = 0.54) again confirms further, the strength of number of workers (WORKERS) over monthly profit (PRT) as a measure of performance in all the three subsectors of Jua Kali sector.

5.4.4 Conclusion

From the regression analysis performed in section 5.4, it is evident that initial capital (INC32), distance to ancestral home (HOD32), parental family size (PFAM3), formal technical training (FTEC3), and preference for formal employment at entry (FJOB3), are all significant background socio-economic characteristics in predicting performance of entrepreneurs in carpentry Jua Kali subsector. Primary school craft (PSC3) and market consideration before entry (MKT3) are also significant but the signs of their coefficients in the models fail to concur with the set hypotheses. Number of years after school before entry (AFY3), also did show some significance in some of the models.

As in earlier cases, the final predictive model for performance in this subsector was developed using the number of workers (WORKERS3) as the response variable. The predictor variables identified above as significant, were all included in the final model. The results of this regression are shown on table 17(a). The final model that was developed for this subsector is therefore:

$$\begin{aligned} \text{WORKERS3} = {} & 2.007 - 1.483\,(\text{PSC3}) + 0.032(\text{AFY3}) + 0.997(\text{FTEC3}) \\ & - 1.483(\text{FJOB3}) - 1.733(\text{MKT3}) + 1.060\,(\text{INC32}) \\ & - 0.677\,(\text{HOD32}) + 0.519(\text{PFAM3}). \end{aligned}$$

with an R^2 value of 0.636 (adj. R^2 = 0.54). In this case, only years that elapse after school (AFY3) does not have a significant coefficient. However an optimal model was obtained

without including it in the model. From the results shown on table 17(b), the resulting regression model is:

$$\text{WORKERS3} = 2.169 - 1.572(\text{PSC3}) + 0.980(\text{FTEC3}) - 1.43(\text{FJOB3}) - 1.834(\text{MKT3}) + 1.032(\text{INC32}) - 0.651(\text{HOD32}) + 0.536(\text{PFAM3}),$$

$R^2 = 0.656$ (adj.$R^2 = 0.544$), which implies that in this subsector, primary school craft, formal technical training, consideration for formal employment, market consideration, initial capital, distance to ancestral home and parental family size do show a significant impact on performance in this Jua Kali Subsector.

Table 12(a): Regression analysis (Carpentry) - Profit on all predictor variables

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	3.050059	3.290011	.9271	.3596
AGE3	0.142373	0.146407	.9724	.3368
ED32	-0.392963	0.46163	-.8513	.3998
PSC3	-1.432149	0.900263	-1.5908	.1197
AFY3	-0.275515	0.115737	-2.3805	.0223
FRR3	-0.672741	0.893178	-.7532	.4559
FTEC3	1.386827	0.815143	1.7013	.0968
TAY3	-0.310603	0.331245	-.9377	.3542
EMP3	-0.472272	0.91392	-.5168	.6082
FJOB3	-0.841086	0.96491	-.8717	.3887
MKT3	-1.33774	0.811895	-1.6477	.1075
INC32	0.51622	0.233615	2.2097	.0331

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
SIN3	0.447271	1.206002	.3709	.7127
HOD32	-0.579208	0.243243	-2.3812	.0222
FAM3	0.61574	0.256414	2.4013	.0212
PFAM3	0.457729	0.159441	2.8708	.0066

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	175.68069	15	11.71205	2.36022	.02936
ERROR	119.09431	24	4.96226		
TOTAL (CORR.)	294.77500	39			

R-SQUARED = 0.595982
R-SQUARED (ADJ. FOR D.F.) = 0.343471
STND. ERROR OF EST. = 2.22761

Table 12(b): Regression analysis (Carpentry) - Number of workers on all predictor variables

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	2.305554	3.2767	.7036	.4858
AGE3	-0.016529	0.145814	-.1134	.9103
ED32	-0.241668	0.459762	-.5256	.6021
PSC3	-1.659	0.896621	-1.8503	.0719
APY3	-0.017764	0.115269	-.1541	.8783
FRR3	-0.613482	0.889565	-.6896	.4945
FTEC3	1.079349	0.811846	1.3295	.1914
TAY3	-0.027332	0.329905	-.0828	.9344
EMP3	-0.791158	0.910222	-.8692	.3901
EJOB3	-1.606338	0.961007	-1.6715	.1026
MKT3	-1.868927	0.80861	-2.3113	.0262
INC32	1.141251	0.23267	4.9050	.0000

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
SIN3	1.155576	1.201122	.9621	.3419
HOD32	-0.707023	0.242259	-2.9185	.0058
FAM3	0.276118	0.255377	1.0812	.2862
PFAM3	0.568434	0.158796	3.5797	.0009

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	250.84242	15	16.72283	3.39744	.00376
ERROR	118.13258	24	4.92219		
TOTAL (CORR.)	368.97500	39			

R-SQUARED = 0.679836
R-SQUARED (ADJ. FOR D.F.) = 0.479733
STND. ERROR OF EST. = 2.2186

Table 13: Correlation matrix - Carpentry Subsector

	PRT32	WORKERS3	AGE3	ED32	PSC3	AFY3	FBR3	FTEC3	TAY3	EMP3	FJOB3	MKT3	INC32	SIN3	HOD32	FAM3	PFAM3
PRT32	1.0000																
WORKERS3	0.5066	1.0000															
AGE3	-.1202	.0354	1.0000														
ED32	.2315	.1173	-.4306	1.0000													
PSC3	.1001	.0746	-.1540	.4536	1.0000												
AFY3	-.2479	.0096	.8981*	-.6015*	-.2258	1.0000											
FBR3	.1568	.1173	-.0936	.1976	.1951	-.2033	1.0000										
FTEC3	.1354	.1445	-.1337	.2004	.1431	-.0592	-.0218	1.0000									
TAY3	-.1749	.0146	.0156	-.0048	.1251	.0437	.1357	0.1832	1.0000								
EMP3	.0975	.0616	.4314	-.2376	-.0129	.3690	.0138	-.1054	-.1048	1.0000							
FJOB3	-.1175	.2755	.2755	-.1539	-.1951	.1155	.0256	-.3051	-.0901	-.0138	1.0000						
MKT3	-.0135	-.0903	-.1700	.2575	-.0076	-.1706	.0513	.1239	-.1178	-.2481	.0567	1.0000					
INC32	.3350	.5202	-.1140	.3833	.2547	-.2389	.2320	-.0392	.0448	-.0744	-.1735	.1616	1.0000				
SIN3	-.0383	-.0218	.2397	-.1932	.0568	.2075	-.0605	.0000	.1696	.1366	.2219	-.1338	-.2539	1.000			
HOD32	-.3252	-.1943	.0793	-.2638	-.2907	.1871	-.0008	.0681	.1720	-.0587	-.1287	-.1142	-.0389	.0287	1.0000		
FAM3	.0960	.1442	.7179*	-.3082	.0751	.7049*	.0417	-.1035	-.0032	.4966*	.0485	-.0716	-.0061	.1837	.0042	1.0000	
PFAM3	.2820	.3279	.1188	-.0117	.0106	.1257	.2938	.0945	-.0294	.0961	.0499	.1338	-.0705	.0951	.0798	.1040	1.0000

* Multicollinearity effect considered

Table 14(a): Regression analysis (Carpentry) - profit on reduced number of predictor variables

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	4.013844	1.655352	2.4245	.0201
PSC3	-1.672622	0.773451	-2.1625	.0368
ABY3	-0.161816	0.052229	-3.0982	.0036
FTRC3	1.282639	0.704373	1.8210	.0763
MKT3	-1.412707	0.709643	-1.9907	.0536
INC32	0.494513	0.197873	2.4991	.0168
HOD32	-0.598314	0.216791	-2.7599	.0088
FAM3	0.601008	0.216093	2.7812	.0083
PFAM3	0.40766	0.137078	2.9739	.0050

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	159.69388	8	19.96174	4.58105	.00092
ERROR	135.08112	31	4.35746		
TOTAL (CORR.)	294.77500	39			

R-SQUARED = 0.541748
R-SQUARED (ADJ. FOR D.F.) = 0.42349
STND. ERROR OF EST. = 2.08745

Table 14(b): Regression analysis (Carpentry) - Number of workers on reduced number of predictor variables

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	2.168842	1.819138	1.1922	.2404
PSC3	-1.57213	0.738233	-2.1296	.0396
FTEC3	0.979715	0.727867	1.3460	.1861
FJOB3	-1.431402	0.772995	-1.8518	.0716
MKT3	-1.833898	0.700002	-2.6198	.0125
INC32	1.031638	0.194123	5.3143	.0000
HOD32	-0.651249	0.215986	-3.0152	.0045
PFAM3	0.535981	0.135438	3.9574	.0003

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	230.96685	7	32.99526	7.65062	.00002
ERROR	138.00815	32	4.31275		
TOTAL (CORR.)	368.97500	39			

R-SQUARED = 0.625969
R-SQUARED (ADJ. FOR D.F.) = 0.54415
STND. ERROR OF EST. = 2.07672

Table 15(a), 15(b), 15(c): Stepwise regression (Carpentry) - Profit on all predictor variables

Table 15(a): 95 per cent level

STEPWISE REGRESSION

SELECTION: FORWARD
F-TO-ENTER = 2.11
MAX STEPS = 16
CONTROL: AUTOMATIC
F-TO-REMOVE = 2.11

STEP 3

R-SQUARED = 0.31967
R-SQUARED (ADJ.) = 0.262976
MSE = 5.57068 WITH 36 D.F.

VARIABLES CURRENTLY IN MODEL

VARIABLE	COEFF.	F-REMOVE
15. PFAM3	.36411	5.8136
13. HOD32	-.55695	6.0116
11. INC32	.51418	6.2725

VARIABLES CURRENTLY NOT IN MODEL

VARIABLE	PARTIAL CORR.	F-ENTR
10. MKT3	-.1909	1.324
4. AFY3	-.1838	1.224
6. FTEC3	.1714	1.059
7. TAY3	-.1510	.816
9. FJOB3	-.1465	.768
3. PSC3	-.1178	.492
1. AGE3	-.1151	.470
8. EMP3	.0872	.268
14. FAM3	.0790	.219
12. SIN3	.0345	.041
5. FRR3	-.0283	.028
2. ED32	.0081	.002

Table 15(b): 90 per cent level

STEPWISE REGRESSION

SELECTION: FORWARD
F-TO-ENTER = 1.78
MAX STEPS = 16
CONTROL: AUTOMATIC
F-TO-REMOVE = 1.78

STEP 3

R-SQUARED = 0.31967
R-SQUARED (ADJ.) = 0.262976
MSE = 5.57068 WITH 36 D.F.

VARIABLES CURRENTLY IN MODEL

VARIABLE	COEFF.	F-REMOVE
15. PFAM3	.36411	5.8136
13. HOD32	-.55695	6.0116
11. INC32	.51418	6.2725

VARIABLES CURRENTLY NOT IN MODEL

VARIABLE	PARTIAL CORR.	F-ENTR
10. MKT3	-.1909	1.324
4. AFY3	-.1838	1.224
6. FTEC3	.1714	1.059
7. TAY3	-.1510	.816
9. FJOB3	-.1465	.768
3. PSC3	-.1178	.492
1. AGE3	-.1151	.470
8. EMP3	.0872	.268
14. FAM3	.0790	.219
12. SIN3	.0345	.041
5. FRR3	-.0283	.028
2. ED32	.0081	.002

Table 15(c): 75 per cent level

STEPWISE REGRESSION

SELECTION: FORWARD
F-TO-ENTER = 1.46
MAX STEPS = 16
CONTROL: AUTOMATIC
F-TO-REMOVE = 1.46

STEP 3

R-SQUARED = 0.31967
R-SQUARED (ADJ.) = 0.262976

MSE = 5.57068 WITH 36 D.F.

VARIABLES CURRENTLY IN MODEL

VARIABLE	COEFF.	F-REMOVE
15. PFAM3	.36411	5.8136
13. HOD32	-.55695	6.0116
11. INC32	.51418	6.2725

VARIABLES CURRENTLY NOT IN MODEL

VARIABLE	PARTIAL CORR.	F-ENTR
10. MKT3	-.1909	1.324
4. AFY3	-.1838	1.224
6. FTRC3	.1714	1.059
7. TAY3	-.1510	.816
9. FJOB3	-.1465	.768
3. PSC3	-.1178	.492
1. AGE3	-.1151	.470
8. EMP3	.0872	.268
14. FAM3	.0790	.219
12. SIN3	.0345	.041
5. FBR3	-.0283	.028
2. ED32	.0081	.002

Tables 16(a), 16(b), 16(c): Stepwise regressions (Carpentry) - Number of workers on all predictor variables

Table 16(a): 95 per cent level

STEPWISE REGRESSION

SELECTION: FORWARD
F-TO-ENTER = 2.11
MAX STEPS = 16
CONTROL: AUTOMATIC
F-TO-REMOVE = 2.11

STEP 6

R-SQUARED = 0.604792
R-SQUARED (ADJ.) = 0.532936

MSE = 4.41884 WITH 33 D.F.

VARIABLES CURRENTLY IN MODEL

VARIABLE	COEFF.	F-REMOVE
3. PSC3	-1.43326	3.7521
9. FJOB3	-1.74424	5.4633
10. MKT3	-1.67288	5.7418
13. HOD32	-.62841	8.3132
15. PFAM3	.54937	16.1453
11. INC32	.99273	26.1031

VARIABLES CURRENTLY NOT IN MODEL

VARIABLE	PARTIAL CORR.	F-ENTR
6. FTRC3	.2315	1.811
12. SIN3	.2292	1.774
14. FAM3	.1836	1.116
4. AFY3	.1559	.797
5. FBR3	-.1515	.751
2. ED32	-.1397	.636
1. AGE3	.1177	.449
7. TAY3	.0545	.095
8. EMP3	-.0528	.089

Table 16(b): 90 per cent level

STEPWISE REGRESSION

SELECTION: FORWARD
F-TO-ENTER = 1.78
MAX STEPS = 16
CONTROL: AUTOMATIC
F-TO-REMOVE = 1.78

STEP 7

R-SQUARED = 0.625969
R-SQUARED (ADJ.) = 0.54415
MSE = 4.31275 WITH 32 D.F.

VARIABLES CURRENTLY IN MODEL			VARIABLES CURRENTLY NOT IN MODEL		
VARIABLE	COEFF.	F-REMOVE	VARIABLE	PARTIAL CORR.	F-ENTR
6. FTEC3	.97971	1.8117	12. SIN3	.2259	1.667
9. FJOB3	-1.43140	3.4290	14. FAM3	.2151	1.504
3. PSC3	-1.57213	4.5351	2. ED32	-.1851	1.099
10. MKT3	-1.83390	6.8636	4. AFY3	.1664	.882
13. HOD32	-.65125	9.0916	5. FRR3	-.1454	.669
15. PFAM3	.53598	15.6610	1. AGE3	.1295	.529
11. INC32	1.03164	28.2423	8. EMP3	-.0328	.033
			7. TAY3	.0154	.007

Table 16(c): 75 per cent level

STEPWISE REGRESSION

SELECTION: FORWARD
F-TO-ENTER = 1.46
MAX STEPS = 50
CONTROL: AUTOMATIC
F-TO-REMOVE = 1.46

STEP 8

R-SQUARED = 0.645063
R-SQUARED (ADJ.) = 0.553467
MSE = 4.22461 WITH 31 D.F.

VARIABLES CURRENTLY IN MODEL			VARIABLES CURRENTLY NOT IN MODEL		
VARIABLE	COEFF.	F-REMOVE	VARIABLE	PARTIAL CORR.	F-ENTR
12. SIN3	1.37366	1.6677	14. FAM3	.1859	1.074
6. FTEC3	.94104	1.7034	2. ED32	-.1578	.766
9. FJOB3	-1.66734	4.4934	4. AFY3	.1387	.588
3. PSC3	-1.73466	5.4741	5. FRR3	-.1324	.535
10. MKT3	-1.72875	6.1415	1. AGE3	.0949	.272
13. HOD32	-.67370	9.8671	8. EMP3	-.0603	.109
15. PFAM3	.52323	15.1538	7. TAY3	-.0233	.016
11. INC32	1.08871	30.4962			

Table 17(a): Regression analysis (Carpentry) - Preliminary Optimal Model

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	2.006632	1.830647	1.0961	.2797
PSC3	-1.48254	0.745715	-1.9881	.0539
AFY3	0.03227	0.03435	.9394	.3533
FTRC3	0.997186	0.729443	1.3671	.1794
FJOB3	-1.483483	0.776399	-1.9107	.0634
MKT3	-1.732795	0.7095	-2.4423	.0192
INC32	1.060027	0.196814	5.3859	.0000
HOD32	-0.676784	0.218084	-3.1033	.0036
PFAM3	0.519212	0.136856	3.7939	.0005

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	234.78703	8	29.34838	6.78004	.00004
ERROR	134.18797	31	4.32864		
TOTAL (CORR.)	368.97500	39			

R-SQUARED = 0.636322
R-SQUARED (ADJ. FOR D.F.) = 0.54247
STND. ERROR OF EST. = 2.08054

Table 17(b): Regression analysis (Carpentry) - Optimal Model

MODEL FITTING RESULTS

VARIABLE	COEFFICIENT	STND. ERROR	T-VALUE	PROB(>|T|)
CONSTANT	2.168842	1.819138	1.1922	.2404
PSC3	-1.57213	0.738233	-2.1296	.0396
FTEC3	0.979715	0.727867	1.3460	.1861
FJOB3	-1.431402	0.772995	-1.8518	.0716
MKT3	-1.833898	0.700002	-2.6198	.0125
INC32	1.031638	0.194123	5.3143	.0000
HOD32	-0.651249	0.215986	-3.0152	.0045
PFAM3	0.535981	0.135438	3.9574	.0003

0 CASES WITH MISSING VALUES WERE EXCLUDED.

RESIDUALS PLACED IN VARIABLE: RESIDUALS

ANALYSIS OF VARIANCE FOR THE FULL REGRESSION

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	PROB(>F)
MODEL	230.96685	7	32.99526	7.65062	.00002
ERROR	138.00815	32	4.31275		
TOTAL (CORR.)	368.97500	39			

R-SQUARED = 0.625969
R-SQUARED (ADJ. FOR D.F.) = 0.54415
STND. ERROR OF EST. = 2.07672

5.5 ANALYSIS OF THE RESIDUALS

To determine the validity of the final regression models developed for the performance of Jua Kali entrepreneurs, analysis of the residuals was done. In the analysis of the residuals an attempt is made to detect the problem of autocorrelation.

Two methods were used in the analysis of residuals. First the residuals were plotted against the predicted values of the response variable. These plots are shown on the tables 18(a), 18(b) and 18(c) for the final models developed for metal work, motor vehicle and carpentry Jua Kali subsectors respectively. The results indicate that the residuals are fairly evenly distributed around the regression equations. This implies that the regression model assumptions were satisfied in the three cases.

Also Durbin-Watson statistic was used to supplement the residual plots. This is a more formal approach than plotting of residuals. Durbin-Watson statistics calculated for the respective models are given at the bottom of the corresponding residual plots.

For metal work subsector's final model with 40 observations for each variable and 5 predictor variables, the table gives the upper Durbin-Watson value $d_u = 1.58$ and the lower value $d_L = 1.05$ at 99 per cent level. The calculated value $d = 1.89$.
Since $d > d_u$, we fail to reject the null hypothesis that "no

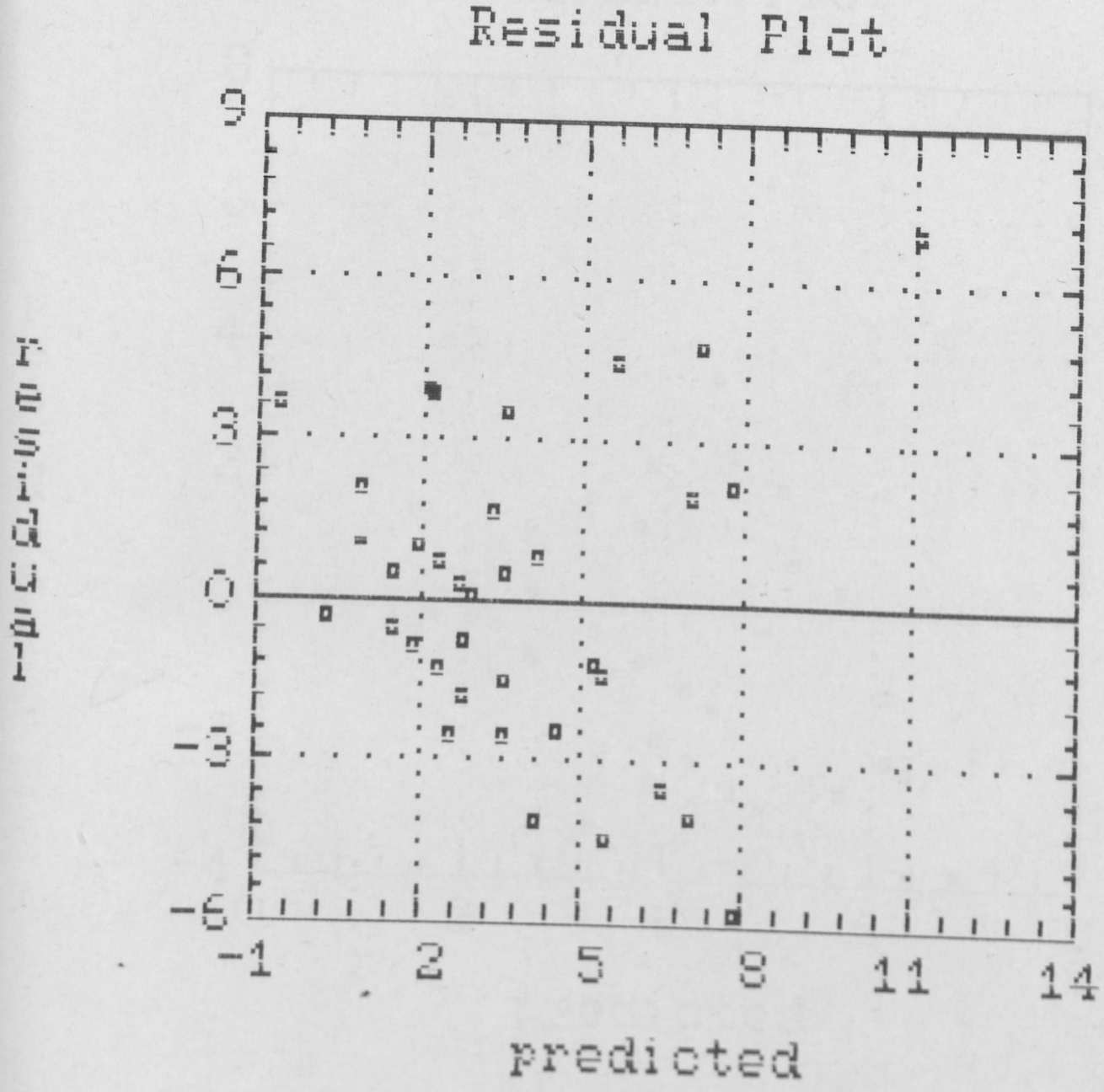
autocorrelation is present" and conclude that there is no autocorrelation.

Motor vehicle subsector's final model had 40 observations for each variable and 4 predictor variables, therefore $d_u = 1.52$ and $d_L = 1.10$ at 99 per cent level. The calculated value $d = 1.70$. Since $d > d_u$, we conclude that there is no autocorrelation.

The final model for carpentry subsector was based on 40 observations for each variable and 7 predictor variables, hence $d_u = 1.58$ and $d_L = 1.05$ at 99 per cent level. Since $d = 2.31 > d_u$, we again conclude that there is no autocorrelation.

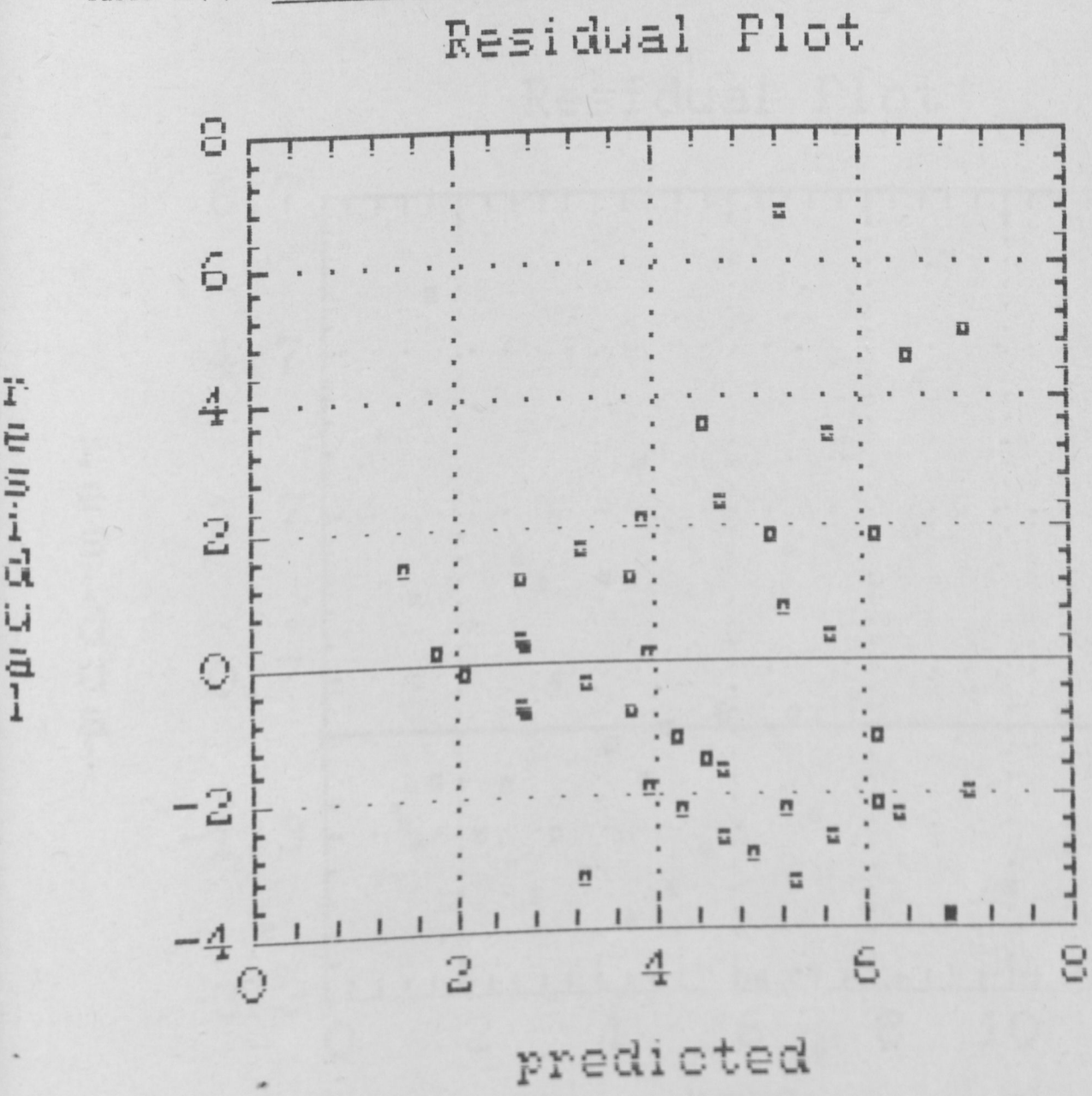
The conclusions based on Durbin-Watson statistic tests concur with those based on the residual plots.

Table 18(a): Residual Analysis (Metal Work)



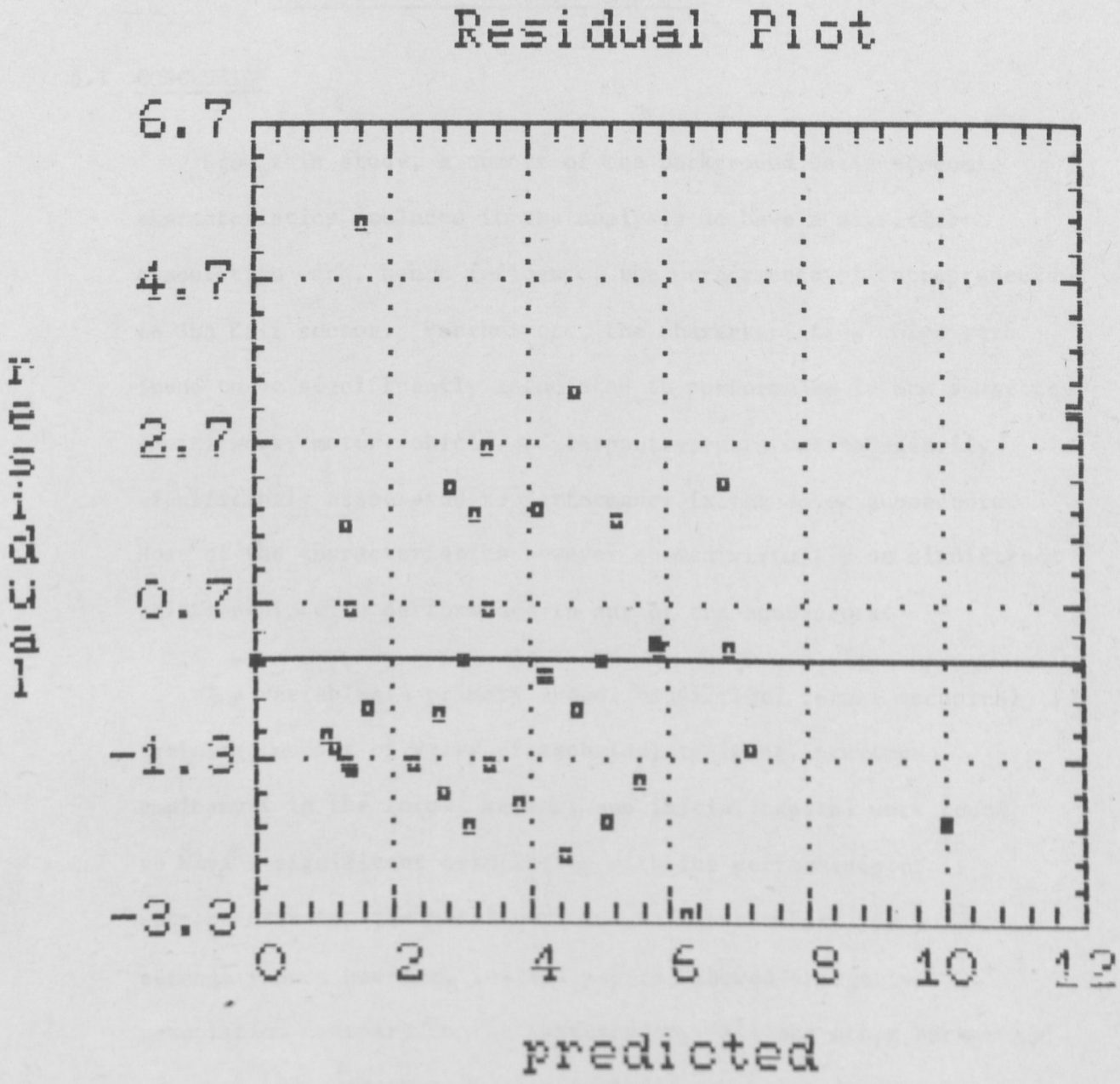
NUMBER OF RESIDUALS = 40
SAMPLE AVERAGE = 1.67644E-15
SAMPLE VARIANCE = 7.83284
SAMPLE STANDARD DEVIATION = 2.79872
COEFF. OF SKEWNESS = 0.280431 STANDARDIZED VALUE = 0.724071
COEFF. OF KURTOSIS = 2.80027 STANDARDIZED VALUE = -0.257855
DURBIN-WATSON STATISTIC = 1.88501

Table 18(b): Residual Analysis (Motor Vehicle)



NUMBER OF RESIDUALS = 40
SAMPLE AVERAGE = 1.53211E-15
SAMPLE VARIANCE = 6.08231
SAMPLE STANDARD DEVIATION = 2.46623
COEFF. OF SKEWNESS = 0.695351 STANDARDIZED VALUE = 1.79539
COEFF. OF KURTOSIS = 3.04785 STANDARDIZED VALUE = 0.0617734
DURBIN-WATSON STATISTIC = 1.70155

Table 18(c): Residual Analysis (Carpentry)



NUMBER OF RESIDUALS = 40
SAMPLE AVERAGE = -1.35447E-15
SAMPLE VARIANCE = 3.53867
SAMPLE STANDARD DEVIATION = 1.88114
COEFF. OF SKEWNESS = 0.743927 STANDARDIZED VALUE = 1.92081
COEFF. OF KURTOSIS = 3.14524 STANDARDIZED VALUE = 0.187508
DURBIN-WATSON STATISTIC = 2.31419

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

From this study, a number of the background socio-economic characteristics included in the analysis do have a significant association with, hence influence, the performance of entrepreneurs in Jua Kali sector. Furthermore, the characteristics which were found to be significantly associated to performance in one subsector (metal work, motor vehicle and carpentry) were not necessarily significantly associated to performance in the other subsectors. Most of the characteristics however showed virtually no significant relationship with performance in any of the subsectors.

The variables: primary school handicraft, formal technical training, number of years of technical training, previous employment in the formal sector, and initial capital were found to have a significant association with the performance of entrepreneurs in the metal work Jua Kali subsector. By a strange reason however, initial capital showed a negative association contrary to the expectation. All the other background socio-economic characteristics included in the study showed low or insignificant association with performance in the subsector.

The performance in the motor vehicle subsector seemed to be the least influenced by the background socio-economic characteristics of the entrepreneurs. Only preference for formal employment at entry, distance to ancestral home, the entrepreneur's family size, and level of formal education were found to have a significant

relationship with performance in the subsector. The first two factors showed negative association and the third positive association as was expected. Level of formal education showed negative association contrary to what was expected.

In the Carpentry subsector the results were as follows: formal technical training, initial capital and parental family size were found to have a significant positive relationship with performance, while preference for formal employment at entry and distance to ancestral home were found to have a significant negative relationship with performance in the subsector. These results were in agreement with what was expected. On the other hand, primary school handicraft and market consideration at entry were also significantly related to performance but the relationship was negative contrary to what was expected.

From this study it is clear that,the technical related background factors, that is, formal technical training and primary school handicraft, have significant effect on performance of Jua Kali entrepreneurs in the manufacturing subsectors (metal work, and carpentry) but not those in service subsector (motor vehicle). Initial capital was also significant with respect to manufacturing subsectors. The other background factors did not show any consistent relationship to the performance across the subsectors.

While the various socio-economic characteristics mentioned above had statistically significant association with performance in the respective subsectors, the explanatory power of the associated models

was low, especially for the models relating to metal work and motor vehicle subsectors. This was evidenced by the coefficient of determination (R^2) values of 0.428 and 0.263 associated with the regression models developed for the two subsectors respectively. The model developed for the Carpentry subsector, however, had a stronger explanatory power ($R^2 = 0.656$).

The low explanatory power of these models is an indication that other variables need to be considered. For instance, the factors which emanate from the sectorial environment itself could be incorporated. These factors do however, fall out of the set of entrepreneurial background socio-economic factors which were the subject of this study.

6.2 POLICY RECOMMENDATIONS

At the time of this study, there was no censuring policy for those wishing to enter Jua Kali entrepreneurship and the author does not wish to recommend formulation of one. However, based on the findings of this study, the following recommendations are suggested:

Formal technical training and the other technical related background factors were found to have a significant influence on performance of entrepreneurs in the manufacturing subsectors of Jua Kali. In light of this, there is need for more emphasis on technical and vocational related courses in our school curriculum. Technical skills are necessary to facilitate the choice of the enterprise to venture into, adaptation and innovative use of productive processes and services. Technical training, management

and business skills are needed to initiate and successfully manage the Jua Kali sector enterprises.

Preference for formal employment at entry was found to have a significant negative effect on performance in two of the subsectors, that is, motor vehicle and carpentry. This may be due to the negative attitude that the society holds on the Jua Kali sector. It would therefore be necessary to initiate promotional programmes with an aim of giving positive information regarding self-employment in the sector as a good career option. During pre-entry stage, people need to be made aware that entrepreneurship in the sector provides a reasonable average monthly income. In this study, for instance, it was found that the average monthly profit for the entrepreneurs included in the study was about seven thousand shillings. This kind of information will make entrepreneurs in the sector more committed to becoming self-employed.

The distance to entrepreneur's ancestral home was found to be a significant determinant of performance in two subsectors. On basis of this, people who wish to start Jua Kali businesses should be encouraged to do so near their homes. In addition to the likely improved performance on the part of the entrepreneur, this would also reduce the migration to urban cnetres.

Most researchers have found initial capital as a hindrance to performance in Jua Kali sector. In this study, however, it was found to have a positive significance in only one subsector. Infact, most people interviewed indicated that they needed only alittle initial capital outlay to start. Loans may therefore be useful to those who have been in the sector for sometime.

Even though formal education did not show much influence on performance, it was found that most of the entrepreneurs were at least primary school graduates. Besides, technical training cannot be meaningfully accomplished without some basic education. For a successful venture into Jua Kali sector, there is therefore a need for the government to continue encouraging people to have some basic education.

The Jua Kali subsectors, to some extent, reacted differently to the factors examined. This suggests that any attention directed to the sector, need to be directed to the subsectors independently. The manufacturing subsector, for instance, may require more training and more initial and working capital than service subsectors. This calls for more supportive resources towards this subsector.

Finally, the findings of this study indicate that most of the background socio-economic characteristics do not have any significant influence on performance of Jua Kali entrepreneurs. This agrees with the view held by most previous researchers in this area, that anybody can venture into this sector and perform well depending on his initiative and the conditions in the sector. None of the entrepreneurs interviewed cited any of his pre-entry socio-economic characteristics being of any hindrance to his performance. Rather, they cited factors from within the sector, such as, lack of stable operating premises, harassment by authorities, lack of market information hence exploitation by middlemen, and inadequate infrastructure, among others. Based on these observations, it would be worthwhile to conduct a study towards this direction.

6.3 LIMITATIONS OF THE STUDY

The limitations of this study were as follows:

(1) Time period: the measures of performance used did not consider the time period that one has been in the business. Performance of an entrepreneur who has been running his business for, say one year, was measured on the same scale as that for an entrepreneur who has been in business, say for ten years. This is a limitation in the sense that performance is likely to improve as one stays longer in the business, cateris paribus.

(2) Records: data collected from Jua Kali sector is limited in that the entrepreneurs rarely keep records. They rely mainly on memory for information. Furthermore a number of them demonstrated fear that the researcher was an agent from tax department, even when the reason for the study was clearly explained.

(3) Locations: the areas of study were not uniform. For instance, some locations had Nyayo Jua Kali sheds, others were under constant harassment by authorities, yet others were far out of the city centre. This heterogeneity was not considered in the analysis. This may have affected the representativeness of the sample.

6.4 SUGGESTION FOR FURTHER RESEARCH

From the findings of this research, it is clear that further research is needed. For example, the following areas could be explored.

A similar study could be done but restrict the population of study to entrepreneurs who have been in operation for approximately the same time period, and who operate under similar sectorial environment.

Another area is for a study seeking opinions of Jua Kali entrepreneurs themselves, on what they feel should be done to prepare people for a future career in Jua Kali sector. Having had some experience in the sector, they may be better placed to know what is required to prepare someone for entrepreneurship in the sector.

Also, since this study was on entrepreneurs in Eastlands of Nairobi, similar studies on entrepreneurs in other urban locations and rural areas can be done.

And lastly, it may be necessary to conduct a study on the post-entry factors that influence performance. This study may identify the sectorial endogeneous variables which may also explain performance in the Jua Kali sector.

ANNEX 1A

A NOTE TO THE RESPONDENT

RE: SURVEY OF JUA KALI SECTOR IN NAIROBI

Hello,

I am Mr. Kariuki, a postrgraduate student in the Faculty of Commerce at the university of Nairobi. I am conducting a survey on the subject named above for my final research project. It is for this reason that I am kindly requesting you to give me a few minutes of your time to fill in the blanks in the attached questionnaire to the best of your knowledge as applies to yourself and your enterprise.

The results of this study will enable the government and the donors identify the entrepreneurial qualities which should be developed and given subsequent support and appraisal.

The information you provide will be treated as strictly confidential, therefore I am not recording your name nor that of your business.

Your cooperation will be highly appreciated.

ANNEX 1B

QUESTIONNAIRE

1. Describe the main activities of your business.

   Automotive ( ) Metal Work ( ) Carpentry ( )

2. Which year did you start your business? ----------

3. Which year did you end your formal schooling? ----------

4. What class did you reach in your formal schooling?

   No schooling ( )

   Std 1 - 4 ( )

   Std 5 - 8 ( )

   Form 1 - 2 ( )

   Form 3 - 4 ( )

   Above Form 4 ( )

5. How old were you when you ended your formal schooling? ----------

6. Did you do any manual (handicraft) subjects in Primary school?

   Yes ( ) No ( )

7. Did you have any formal technical training?

   Yes ( ) No ( )

8. Was the formal technical training you had related to the activities of your business?

   Yes ( ) No ( )

9. How many years was the formal technical training you had? ----------

10. Which institution did you attend for your formal technical training?

Village Polytechnic ( )

Technical High School ( )

Harambee Institute ( )

Other (specify) ( )

11. How many years of apprenticeship did you have before you opened your own business? ---- ----------

12. Did your father or an elder brother practice the same trade as you are in?

Yes ( ) No ( )

13. Did you have any formal employment in the formal sector before you opened up your own business?

Yes ( ) No ( )

14. When deciding to start this business, would you say that you were

very interested ( )

interested ( )

not interested ( )

or any other ( )

15. Did you consider market availability of the goods or services of your enterprise before entry?

Yes ( ) No ( )

16. Suppose you were given a job in the formal sector before you started your business, would you have taken it instead?

Yes ( ) No ( )

17. How much (Ksh) did you have to start your business?

0 - 500	( )
501 - 1000	( )
1001 - 2000	( )
2001 - 3000	( )
3001 - 4000	( )
4001 - 5000	( )
Over 5000	( )

18. What was the source of the money you used to start your business?

Personal savings	( )
Loan from bank or other financier	( )
Both Loan and personal savings	( )

19. How many regular employees do you have in your business?

_____

20. How many apprentices do you have in your business?

_____

For Motor Vehicle mechanics

21. How many customers on average do you serve per day?

_____

22. How much do you charge per customer served on average?

_____

23. How much does it cost you on average to serve each customer ?

_____

For Metal Work and Carpentry

24. Name the different units that are made at your enterprise, their selling price, cost price and number sold per day on average:

Name of Unit	No. Sold	Sp	Cp
A			
B			
C			
D			

For all Subsectors

25. How much in sales (Ksh.) on average do you make per day?

0 - 50	( )
51 - 100	( )
101 - 150	( )
151 - 200	( )
Over 200	( )

26. How far is it from Nairobi to your home in miles?

0 - 30	( )
31 - 60	( )
61 - 100	( )
101 - 150	( )
151 - 200	( )
Over 200	( )

27. Were you married when you started your business? Yes/No

28. How many children did you have when you started your business? ------

29. How many brothers and sisters did you have when you started your business?

THANK YOU VERY MUCH FOR YOUR CO-OPERATION

ANNEX 2A

FACTORS RELATING TO METAL WORK JUA KALI

ENTREPRENEURS

Respondent	REV	PRT	REG	APP	WORKERS	BAGE	AGE	ED	PSC
1	12,050	6,250	0	0	0	14	20	3	0
2	18,100	2,840	1	2	3	8	20	3	1
3	23,400	2,810	0	6	6	3	22	5	0
4	7,050	3,250	0	4	4	4	22	6	0
5	7,500	3,000	1	1	2	2	27	3	1
6	10,500	4,500	6	4	10	7	25	5	1
7	2,120	540	0	0	0	1	21	5	0
8	13.500	4,500	0	2	2	1	30	3	0
9	12,600	4,650	0	1	1	1	21	3	1
10	21,000	4,800	2	0	2	4	28	3	0
11	5,400	2,700	2	0	2	2.	24	6	1
12	43,000	10,600	2	1	3	6	31	4	1
13	180,000	66,000	2	1	3	4	41	4	1
14	4,500	1,500	0	0	0	3	37	2	0
15	4,700	670	0	1	1	3	20	3	1
16	82,300	11,550	2	1	3	10	18	3	1
17	19,200	12,120	0	1	1	6	16	3	0
18	38,100	16,700	5	2	7	11	24	5	1
19	12,700	5,775	2	1	3	1	24	3	1
20	21,500	4,500	0	3	3	7	52	1	0
21	19,260	6,750	1	0	1	7	24	3	1
22	30,460	8,210	2	1	3	1	29	5	0
23	7,100	2,640	3	0	3	1	28	3	0
24	33,300	3,250	2	3	5	1	37	4	0
25	21,600	10,350	2	0	2	4	21	4	0
26	9,110	3,870	0	4	4	12	31	6	0
27	30,000	7,440	4	5	9	5	36	4	0
28	5,040	2,010	0	1	1	11	22	2	0
29	5,780	2,480	1	3	4	4	20	5	0
30	5,200	2,810	1	0	1	4	21	3	1
31	41,100	3,900	6	4	10	6	31	3	1
32	9,000	1,580	1	0	1	4	24	3	1
33	11,090	3,580	1	1	2	11	21	3	1
34	37,500	4,500	1	0	1	1	31	3	1
35	61,600	5,400	10	2	12	3	25	3	1
36	38,700	14,300	5	1	6	5	24	5	1
37	19,000	9,350	2	2	4	7	19	3	1
38	7,500	2,590	3	2	5	3	28	3	1
39	29,800	7,500	8	10	18	21	24	3	1
40	2,400	960	0	1	1	17	27	2	0

ANNEX 2A (Continued)

Respondent	AFY	FBR	FTEC	TEN	TAY	INS	EMP	FJOB	MKT	INC	SIN	HOD	FAM	PFAM
1	2	0	0	0	2	4	0	1	1	1	0	6	1	10
2	2	0	0	0	0.25	4	0	1	1	1	1	6	3	5
3	4	0	1	1	3	1	0	1	0	7	0	6	1	10
4	1	1	1	0	2	4	0	1	1	1	1	5	1	7
5	7	1	0	0	1	4	0	1	1	2	0	6	1	7
6	1	0	1	1	0.5	3	1	0	1	2	1	5	1	6
7	2	0	0	0	0.5	4	0	1	1	2	1	6	1	11
8	11	1	0	0	2	4	1	1	1	7	1	6	3	10
9	4	0	0	0	1	4	0	0	0	1	1	3	1	10
10	6	0	1	1	2	1	1	1	0	6	0	5	1	6
11	5	0	1	1	4	2	1	0	1	7	1	3	1	8
12	8	0	0	0	2	4	1	0	0	2	1	6	4	8
13	19	0	0	0	2	4	1	0	1	7	1	4	6	6
14	22	0	0	0	1	4	1	1	0	1	1	2	8	7
15	4	1	0	0	4	4	0	1	0	7	0	3	1	8
16	4	0	0	0	4	4	0	1	1	7	1	1	1	8
17	1	1	0	0	1	4	0	0	0	1	1	6	1	5
18	1	1	0	0	1	4	0	1	0	1	1	5	1	12
19	6	0	1	0	2.5	3	1	0	1	6	0	6	4	7
20	52	1	0	0	2	4	1	1	0	7	0	6	12	9
21	4	1	0	0	1	4	1	0	0	7	1	6	1	8
22	3	0	0	0	3	4	1	1	1	7	1	2	1	8
23	10	0	0	0	0.5	4	1	1	0	7	1	6	4	10
24	12	0	0	0	1	4	1	0	1	1	1	6	4	7
25	4	0	0	0	1	4	0	1	0	1	1	6	3	4
26	6	0	0	0	2	4	1	1	0	1	1	6	8	12
27	13	1	1	1	1	1	1	1	1	1	1	6	3	11
28	3	0	0	0	1	4	0	0	0	1	0	6	5	7
29	1	1	1	1	2	1	0	1	1	1	0	5	1	8
30	1	0	0	0	1	4	0	1	0	1	1	6	1	9
31	13	1	0	0	3	4	0	1	0	1	1	6	4	12
32	6	0	0	0	1	4	0	1	1	2	1	3	3	8
33	1	1	0	0	1	4	0	0	0	1	1	6	1	12
34	12	0	0	0	1	4	1	1	1	2	1	6	3	9
35	3	0	0	0	2	4	1	0	1	1	1	6	4	9
36	1	1	0	0	1	4	0	1	0	3	0	3	1	9
37	1	1	0	0	1	4	0	1	0	1	1	6	1	8
38	10	0	0	0	1	4	1	0	0	5	1	6	6	5
39	1	0	1	1	3	1	1	0	1	1	1	2	1	6
40	7	1	0	0	1	4	0	1	1	1	0	5	1	4

ANNEX 2B

FACTORS RELATING TO MOTOR VEHICLE JUA KALI

ENTREPRENEURS

Respondent	REV.	PRT	REG	APP	WORKERS	BAGE	AGE	ED	PSC
1	12,000	7,200	2	0	2	8	25	5	1
2	10,500	6,000	0	0	0	1	23	3	0
3	4,500	2,700	0	2	2	4	24	3	1
4	36,000	18,000	2	1	3	6	25	3	1
5	27,000	18,000	2	3	5	11	24	3	0
6	18,000	6,000	1	2	3	9	25	3	1
7	60,000	7,500	2	6	8	8	23	4	1
8	12,000	5,400	1	2	3	4	29	3	1
9	30,000	6,000	2	4	6	18	23	3	1
10	13,500	9,000	2	1	3	12	23	4	1
11	18,000	12,000	2	1	3	7	18	3	1
12	60,000	18,900	3	2	5	3	20	3	0
13	9,000	3,000	2	3	5	4	20	4	1
14	27,000	16,200	3	2	5	9	19	4	0
15	9,000	4,500	1	1	2	16	21	4	1
16	45,000	18,000	2	2	4	16	20	3	0
17	7,500	4,500	1	1	2	14	20	4	1
18	27,000	13,400	0	4	4	24	23	3	1
19	33,000	6,000	0	2	2	5	26	5	1
20	6,300	4,500	2	1	3	11	24	4	0
21	31,000	4,500	2	1	3	10	20	5	1
22	7,500	3,000	0	6	6	10	20	3	1
23	9,600	6,000	1	6	7	17	19	3	0
24	36,000	21,600	4	3	7	14	29	5	1
25	27,000	13,500	1	2	3	13	19	3	0
26	60,000	24,000	1	3	4	6	21	5	1
27	36,000	24,000	1	8	9	2	17	3	0
28	7,200	3,600	4	7	11	3	42	4	1
29	12,000	6,000	3	3	6	13	23	3	0
30	15,000	9,000	2	2	4	15	29	4	1
31	6,000	4,800	1	1	2	8	24	5	0
32	12,000	8,400	4	4	8	15	24	3	1
33	22,500	15,000	1	1	2	15	36	6	1
34	15,000	7,500	2	0	2	1	23	5	1
35	6,000	3,000	3	0	3	3	27	3	0
36	22,500	15,000	0	12	12	10	19	3	1
37	36,000	13,500	0	12	12	12	25	5	1
38	37,500	15,000	2	1	3	4	22	5	0
39	18,000	12,000	1	2	3	3	22	5	1
40	12,000	6,000	1	1	2	5	25	6	1

ANNEX 2B (Continued)

Respondent	AFY	FBR	FTEC	TEN	TAY	INS	EMP	FJOB	MKT	INC	SIN	HOD	FAM	PFAM
1	3	1	1	1	1.5	2	0	1	1	1	0	4	1	8
2	5	1	0	0	0.7	4	0	1	0	1	1	2	1	8
3	7	0	0	0	8	4	0	1	1	1	1	1	1	7
4	8	1	0	0	2	4	0	1	1	3	1	1	1	7
5	4	0	0	0	1	4	1	1	0	1	1	2	1	14
6	5	1	0	0	1	4	1	1	1	4	1	4	1	7
7	4	0	0	0	4	4	0	0	1	1	1	6	1	9
8	11	0	0	0	5	4	1	1	0	3	1	6	1	3
9	8	1	0	0	4	4	1	0	0	1	1	3	1	10
10	5	0	0	0	4	4	0	0	0	1	1	2	1	9
11	2	0	0	0	1.5	4	0	0	1	3	1	3	1	10
12	1	0	0	0	1	4	0	0	0	1	1	6	1	10
13	5	0	0	0	2	4	1	0	1	3	1	6	1	10
14	1	1	0	0	1	4	0	0	0	4	1	2	1	10
15	1	1	0	0	1	4	0	0	0	1	1	4	1	6
16	1	1	0	0	1	4	1	0	0	3	1	2	4	14
17	1	1	0	0	1	4	1	1	0	2	1	5	3	11
18	0	0	1	1	1	2	1	1	0	1	1	1	1	7
19	2	0	0	0	2	4	0	0	1	5	1	5	1	6
20	2	0	0	0	1	4	0	1	1	6	0	5	1	11
21	2	0	1	1	2	4	1	1	1	4	0	5	1	11
22	2	0	0	0	2	4	0	1	0	3	1	3	1	9
23	2	0	0	0	2	4	0	0	0	1	1	2	1	6
24	9	0	1	1	2	1	1	0	1	3	1	1	6	6
25	3	1	0	0	2	4	0	0	1	1	1	2	1	8
26	2	0	0	0	2	4	1	1	0	4	1	6	1	14
27	2	0	0	0	2	4	0	1	1	1	1	6	1	7
28	16	0	0	0	1	4	1	1	1	6	1	4	6	9
29	3	0	0	0	2	4	1	1	1	1	1	6	1	9
30	5	1	1	1	3	3	1	0	0	4	1	6	1	13
31	2	0	1	1	2	1	1	1	0	3	1	6	1	12
32	5	0	0	0	3	4	1	1	0	1	1	4	1	9
33	18	0	0	0	0.5	4	1	0	1	1	1	1	6	9
34	5	0	1	1	4	1	1	1	0	4	1	3	1	6
35	9	0	0	0	3	4	0	1	1	1	1	6	3	6
36	2	0	0	0	2	4	0	0	1	3	0	6	1	5
37	3	1	0	0	1	4	1	0	1	1	1	6	1	9
38	3	1	0	0	3	4	0	1	1	4	1	4	1	11
39	2	0	1	1	1	2	0	1	0	1	1	2	1	7
40	3	1	0	0	2	4	0	1	0	2	1	4	1	8

ANNEX 2C

FACTORS RELATING TO CARPENTRY JUA KALI

ENTREPRENEURS

Respondent	REV	PRT	REG	APP	WORKERS	BAGE	AGE	ED	PSC
1	4,000	1,150	0	2	2	3	21	2	0
2	14,300	5,850	2	2	4	8	21	5	1
3	5,800	1,310	0	0	0	4	19	3	1
4	11,220	2,250	2	1	3	3	19	5	1
5	6,000	3,000	1	0	1	2	23	3	0
6	30,000	7,500	5	1	6	5	21	2	0
7	36,000	4,500	1	0	1	3	25	3	0
8	30,000	6,000	1	2	3	5	19	5	1
9	504,000	63,000	4	1	5	2	29	4	0
10	20,600	4,000	4	0	4	7	20	5	0
11	29,400	4,500	3	3	6	2	24	5	1
12	18,000	4,500	5	0	5	3	33	2	0
13	315,000	45,000	6	2	8	5	30	3	0
14	18,000	4,500	1	0	1	4	22	5	0
15	6,300	1,090	1	3	4	2	22	3	0
16	27,000	4,500	2	3	5	2	39	3	1
17	48,000	6,000	2	1	3	1	21	5	0
18	30,000	6,000	2	2	4	5	23	3	0
19	16,050	1,840	3	2	5	3	43	3	0
20	37,450	12,850	4	2	6	3	24	3	1
21	14,400	2,850	4	2	6	19	40	1	0
22	19,750	2,600	1	1	2	6	21	5	1
23	45,000	6,000	5	2	7	9	30	6	1
24	36,600	7,560	4	2	6	5	20	5	1
25	33,340	5,360	2	2	4	1	45	4	1
26	7,000	1,400	0	0	0	6	19	3	1
27	30,000	4,850	8	1	9	6	22	5	0
28	15,000	3,000	0	0	0	6	27	3	0
29	9,900	3,240	3	4	7	1	24	3	1
30	21,000	3,000	2	0	2	7	31	2	0
31	33,500	4,500	7	0	7	7	30	3	0
32	10,000	1,200	0	1	1	1	31	3	1
33	35,000	5,000	2	6	8	1	20	5	1
34	21,500	3,500	2	0	2	4	26	3	1
35	8,600	2,100	1	1	2	1	29	4	1
36	9,800	2,540	2	2	4	22	45	1	0
37	19,400	4,750	2	1	3	8	19	3	0
38	6,000	4,500	0	0	0	3	29	5	1
39	11,900	3,500	0	0	0	1	31	3	0
40	43,000	10,840	5	10	15	20	21	4	1

ANNEX 2C (Continued)

Respondent	AFY	FBR	FTEC	TEN	TAY	INS	EMP	FJOB	MKT	INC	SIN	HOD	FAM	PFAM
1	4	1	0	0	5	4	0	1	0	1	1	6	1	9
2	1	1	1	1	2	2	0	0	0	3	0	6	1	9
3	1	1	0	0	0.5	4	0	1	0	2	1	6	1	5
4	1	0	1	1	1	3	0	1	1	1	1	6	1	11
5	6	0	1	1	1	3	1	0	1	2	0	6	1	4
6	5	0	1	1	2	3	1	1	0	1	1	6	1	13
7	5	0	0	0	3	4	0	1	0	3	1	5	1	4
8	0	0	1	1	4	2	0	0	0	3	0	6	1	8
9	2	1	0	0	1	4	0	1	1	4	1	6	5	11
10	2	0	1	1	1	3	0	0	1	3	1	6	1	7
11	4	0	0	0	2	4	0	1	1	6	1	3	1	8
12	20	0	0	0	2	4	0	1	1	4	1	6	4	7
13	17	0	0	0	4	4	1	0	0	1	1	6	6	10
14	3	1	0	0	0.5	4	0	1	1	1	1	5	1	12
15	4	0	1	1	2	3	0	1	1	1	1	2	1	7
16	23	0	1	1	2	1	1	1	1	4	1	6	8	8
17	3	0	0	0	1	4	1	1	0	6	0	6	1	6
18	3	0	1	1	2	3	0	1	0	3	1	6	1	7
19	25	0	0	0	2	4	1	1	0	1	1	6	1	10
20	6	0	1	1	1	3	1	0	0	2	1	2	1	9
21	40	0	0	0	1	4	1	0	0	1	1	6	8	9
22	2	0	1	1	4	2	0	0	0	1	1	6	1	5
23	3	0	0	0	2	4	0	1	0	5	1	1	1	6
24	1	1	1	1	3	3	0	1	1	2	1	2	1	8
25	27	1	1	1	3	2	1	1	0	3	1	3	9	8
26	5	0	0	0	2	4	0	0	0	2	1	5	1	3
27	2	1	1	1	2	2	0	0	1	6	0	6	1	6
28	14	0	0	0	2	4	0	1	1	1	1	6	1	10
29	5	0	0	0	1.5	4	0	1	0	3	1	6	3	6
30	8	1	0	0	1	4	1	1	0	2	1	5	1	8
31	9	0	0	0	1	4	0	1	0	4	1	6	1	8
32	14	1	0	0	5	4	1	1	1	5	1	6	4	7
33	2	1	1	0	3	2	0	0	1	7	1	6	1	13
34	8	0	0	0	1	4	0	0	1	4	0	5	3	9
35	9	1	0	0	1	4	1	1	0	1	1	5	4	12
36	45	0	1	1	2	4	0	1	0	1	1	6	6	10
37	2	0	0	0	1	4	0	1	1	1	0	1	1	7
38	8	0	0	0	0.5	4	1	1	1	1	1	2	5	8
39	14	0	0	0	1	4	1	1	0	2	1	5	6	3
40	2	1	0	0	1	4	1	0	0	7	1	2	5	10

ANNEX 2D

KEY TO ANNEX 2A, 2B & 2C

REV	= revenue earned per month
REG	= number of regular workers employed
APP	= number of apprentices employed
WORKERS	= total number of employees (REG + APP)
BAGE	= Age of business in years at the time of the study
TEN	= Whether technical training, if any, was related to the business activities.
INS	= Institution where technical skills were learned (1 if Harambee or Technical institute; 2 if technical high school; 3 if village polytechnic; and 4 if at Jua Kali)

All the other abbreviations are explained in chapters THREE and FIVE

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