DETERMINANTS OF SMALL-SCALE MANUFACTURING ENTERPRISE PERFORMANCE IN TANZANIA

D. Mahadea* and A. Mkocha**

***School of Economics and Finance /**Iringa University, Tanzania**
(Pietermaritzburg Campus)

University of Kwazulu-Natal

SOUTH AFRICA

E-mail: Mahadead@ukzn.ac.za

ABSTRACT

Small firms and their associated entrepreneurship are currently the focus of considerable policy and academic interest globally. They are major contributors to job creation, economic growth and development in an economy.

Previously Tanzania pursued a socialist approach to development. This has failed there, as in most other countries. Consequently, since the 1990s Tanzania has started to focus on actively promoting entrepreneurship at the SME level as a way of fast-tracking its economic growth and development.

Human capital is a critical input to the development of firms and nations. A lack of human capital can hinder development just as a shortage of physical capital. This is more so in the new economy that is increasingly knowledge based. Investment in education and training improves individual and organizational efficiency, with positive externality benefits to the economy. This study examines the influence of human capital elements of entrepreneurs and workers on the performance of small-scale manufacturing firms in Tanzania over the period 1997 – 2001. Relevant data was collected by means of questionnaires administered to a nationally-drawn sample of 200 firms, obtained through a random selection procedure. Performance is measured in terms of growth in real output. Multivariate regression and Cobb-Douglas production function analyses were undertaken and these confirm that the firm cannot be 'entrepreneurless,' human capital of both labour and the entrepreneur together with physical capital are critical predictors of performance, with evidence of increasing returns.

The results show that small manufacturing enterprises with more educated and trained entrepreneurs are more productive in generating output and demand for labour than their less educated or trained counterparts. The policy implications are clear. If Tanzania wants more output and employment, this would not happen through the socialist route. Instead the way forward is through vigorous entrepreneurship and quality human and physical capital, as partially reflected by a strong small-firm manufacturing sector with synergistic learning and training concerns for empowerment of both labour and the entrepreneur.

INTRODUCTION

Tanzania adopted a socialist approach to its development after gaining independence from Britain in 1961. Manufacturing industries, banks, insurance, wholesale trading, medical care and agriculture and other activities were nationalized and farms organsied as collectives. With its implementation of the 'ujamaa' development strategy, living conditions in Tanzania did not progress as originally expected. Government ownership of most enterprises coupled with a distrust of private sector initiatives led to a collapse of the Tanzanian economy in the 70s and part of the 80s and to rising poverty (Paulson and Gavin, 1999: 61). Macroeconomic instability, rising unemployment and worsening living conditions forced the Tanzanian government to abandon its socialist strategy and adopt reforms coupled with World Bank structural adjustment programmes to revive its economy. An important measure of the revival strategy was the promotion of entrepreneurship which began in the 1990s. Tanzania thus started to focus on developing SME entrepreneurship as a way of fast-tracking its economic development.

There can be no private entrepreneurial activities without entrepreneurs and it is through their value-adding activities that individual and national prosperity can be obtained, particularly in terms of economic growth, development, innovation, tax revenue and employment generation. Entrepreneurship flourishes in a market-oriented environment, favourable to employment of human and physical capital by entrepreneurs, and in which there is respect for law and order, property rights, good governance and incentives to risk-taking activities. A lack of human capital can hinder development just as a shortage of physical capital. Against this background, this paper examines the influence of human capital elements on the development of small and micro manufacturing firms in Tanzania.

The paper consists of five sections. Section one briefly covers the nature and significance of human capital to development. Section two examines the research design. Sections three and four present a discussion of the findings and this is followed by some policy recommendations.

HUMAN CAPITAL ELEMENTS

Human capital plays an important role in the economic and social development of a nation. It enhances workers' and entrepreneurs' ability to exploit business opportunities, to work smarter and to improve business performance. According to Schultz (1975: 833), human capital enhances the individuals' efficiency in responding to changes when they work for the market or even carry out household activities. Employees who invest in education and training will raise their knowledge and skill, be more productive, and earn higher wages than the less skilled (Becker, 1993:24). Better knowledge and human capital improves individual and organizational efficiency and this generates positive externality benefits to economy.

In the traditional Keynesian analysis, much emphasis was placed on physical capital, relative to human capital, as the driving force behind output growth. Entrepreneurship

was regarded as part of the residual factor in the growth analyses. In recent times, however, the literature based on the pioneering works of Theodore Schultz, Jacob Mincer and Gary Becker, together with those of other economists and management scientists have shown that investment in human capital is critical to the generation of economic growth and productivity of nations. In effect the endogenous growth models have further brought the human capital to the forefront of wealth creation process (Romer, 1966; Lucas, 1988; Hall and Jones, 1999; Artadi and Sala-i-Martin, 2003).

Physical capital is therefore necessary but not sufficient to generate economic growth. Skilled workers, managers, and entrepreneurs are needed to operate machines, manage the production and distribution of goods and services, develop new products and new production methods, and utilize innovations (Becker, 1995: 1). The pouring of physical capital into developing countries during their post-independence years did not show much positive results. This implies that at a certain level, human capital needs to be matched with non-human capital; otherwise a low level of human capital development becomes a limiting factor in economic growth.

Researchers have been somewhat reluctant to analyse the contribution of human capital to organizational performance and economic growth, due to measurement difficulties Schultz (1961:7). Measurement of business performance often varies from one firm to another. Financial and physical measures as well as time frames are used in varying ways. Although measurement issues of human capital are problematic, it is important to specify key human capital dimensions, assess their characteristics, and examine their impact on organizational performance.

Human capital encompasses learning, education, training, health care expenditure and any other form of expenditure that increases productivity of an individual and the performance of the firm (Burger, 2003). Becker (1993:43) claims that human capital can take the form of skills and abilities, personality, appearance, reputation and appropriate credentials.

Certain skills may be acquired while an individual performs an activity, such as a production process, or solves a problem – learning by doing (Arrow, 1962: 156). Human abilities can be either innate or acquired. Griffin and Knight (1990:38) stress that through long-term human resource policies, countries can enhance the capabilities of their people to do more things and lead fuller lives. In this regard, emphasis should be placed not only on national income per head or its distribution, but also on investment on relevant education and training.

Lucas (1988) and Shane (2003:75) argue that human capital formulation is a spin-off effect of production, and experience is the major source of acquiring knowledge and skills. Experiential learning contributes to enhanced productivity (learning effect). The learning effect, taking place consciously or unconsciously, manifests itself when the time expended in production is a decreasing function of the cumulative number units produced. Schultz (1963:8) identifies five main elements of human capital: health, migration, on-the-job training, formal education, and experience.

A 'new' aspect of capital in the modern entrepreneurship literature relevant to venture development is social capital. This refers to the entrepreneurial competence in terms of networking relationships, exercise of trust, reciprocity, conflict resolution, focus on team goals, and exchange relations with others (Bridge et al, 2003:95). While acknowledging the significance of social capital, this study does not examine this variable. However, the influence on another variable on enterprise performance is considered- n-Ach level of the entrepreneurs. N-Ach is described as a desire to do well so as to obtain an inner feeling of personal accomplishment or to be successful in competitive situations (Mahadea, 1994: 95). McClelland (1961) associates n-Ach with a desire for personal responsibility, problem-solving, moderate goals and risk-taking, and concrete feedback on performance. The n-Ach levels of individuals and hence the supply of effective entrepreneurs can be enhanced through appropriate training, experience and schooling (Holmes and Schmitz, 1990; Shane, 2003).

For the purposes of this study, human capital is defined as the knowledge, skills, competence, and other attributes embodied in entrepreneurs and workers, through education, training and experience that are relevant to economic activity. An entrepreneur is regarded as someone who has, individually or jointly, started up a business enterprise and is running the venture (for at least 5 years).

METHODOLOGY

Relevant data were gathered through interviews and questionnaires administered to a sample of 200 small-scale manufacturing entrepreneurs. They were randomly selected from the list of registered firms operating in Tanzania and proportionately drawn from 18 regions of mainland Tanzania. The data were analysed using SPSS.

The subjects were 200 indigenous business persons, 173 males and 27 females, aged between 19 and 65. Of the surveyed entrepreneurs, 33 engaged in tailoring and sewing, 43 in edible food, another 43 in woodwork, 51 in metalwork, 24 in leatherwork and 6 in animal food processing. The subjects' n-Ach level was measured by using the Mehrabian scale of achieving tendency (1975). This instrument consists of a set of 26 questions that is administered to male and female respondents, measured on a nine-point scale from +4 to – 4. The overall n-Ach score of each surveyed entrepreneur was obtained by adding up the scores of each question. A higher positive value indicates a greater n-Ach level, and the reverse is also true.

This study uses multiple regression analyses and a Cobb-Douglas production function to examine venture performance, with output, proxied by real sales (after discounting for inflation) as the dependent variable and the entrepreneurs' n-Ach, education, training, experience, and employees' education and training as well as physical capital, as the independent factors. Generally firms with more physical and human capital tend to perform better than those with less of these inputs. Education, training and experience

were measured in years, and output and physical capital were expressed in the Tanzanian currency (Tzs).

The independent variables were initially regressed on output growth using OLS. A parsimonious model was initially arrived at , but it did not satisfy the assumptions of OLS, and the role of the entrepreneur was found to be apparently insignificant to enterprise development, making the firm seemingly entrepreneurless. Accordingly, to overcome this limitation, the set of data relating to the dependent and independent variables was transformed logarithmically, and an alternative model based on a Cobb-Douglas production was developed. Residuals of the predictors after transforming the data logarithmically were also plotted. The model gave a better fit, which seems not to violate the 'homoskedasticity' assumption.

FINDINGS

Parsimonious multiple regression model

In accordance with economic theory, it is hypothesized that physical capital and the human capital of workers and entrepreneurs coupled with physical capital can predict venture performance and the beta coefficients of the independent variables are, therefore, expected to be positive.

SPSS's backward linear regression approach was used to arrive at an initial model that 'best' explains enterprise performance. This entails entering all the independent variables in the model, and then removing the 'weaker' ones in subsequent stages, according to certain criteria. The basic criterion is to retain the independent variable that has a high explanatory influence, usually shown by a t-value that is statistically significant. Koop (2000: 88) argues that it a common practice to initially use as many explanatory variables as possible, and then discard those that are not statistically significant.

Using the above approach, four variables were found to be significant: capital, employee education, employee experience, and employee training. The results of the fitted regression model are summarized below.

Sales = -120857.2 + 0.308(Capital)$_{t=4.661}$ + 0.290(Employee education)$_{t=4.802}$ + 0.292(Employee experience)$_{t=4.93}$ + 0.154(employee training)$_{t=2.36}$

R-square	= 0.343
Adjusted R-square	= 0.329
F-value	= 25.4
N	= 200

t = t-value, statistically significant at the 5 % level of significance

The role of the entrepreneur is critical to the formation and performance of any firm. But the above model, although explaining about a third of the variation in output, does not capture the influence of the prime decision-maker (entrepreneur) in the development of

the manufacturing firms. It simply shows the influence of employee human capital and physical capital as significant predictors of venture performance.

To overcome this limitation, an alternative and preferred regression model was developed based on a Cobb-Douglas production function. The absence of the significance of entrepreneurs in a model is tantamount to 'Hamlet without the Prince of Denmark'.

The preferred model

Parametric methods assume that the sample is drawn from a population where values have a normal distribution. The above regression model did not satisfy the OLS assumptions of normality and homoskadasticity (error terms having equal variances). This is evident from the shape of the histogram of residuals.

To overcome the technical inadequacy and heteroskedastic limitation, an alternative model was developed to predict venture performance, with the earlier data relating to the dependent and independent variables, being transformed logarithmically.

Using OLS method, the double-logarithmic transformation gives a regression model of the following form:

$\mathbf{Log\ Y = \alpha + \beta_1 log(X_1) + \beta_2 log(X_2) + \beta_3 log(X_3) + ... + \beta_n log(X_n) + e}$, where

Y	= Output
α	= Intercept
$\beta_1, \beta_2, ... \beta_n$	= Elasticities of output with respect to independent variables
$X_1, X_2, X_3, ... X_n$	= Independent variables, and
e	= error term

The new model could be viewed as a multiplicative relationship between sales and the selected variables. Considering sales of the surveyed manufacturing ventures as a proxy of output, the above logarithmic function could be converted into a power function, often referred as the standard Cobb-Douglas production function.

$Q = aX_1^{\beta_1}X_2^{\beta_2}...X_n^{\beta_n}$ where
Q = Total output (real value of sales)
$X_1, X_2, ..., Xn$ = Independent variables
$\beta_1, \beta_2, ..., \beta_n$ = Output elasticities of X_i

To arrive at the preferred model, all independent variables were again initially entered, and then through the backward elimination procedure, sequentially a weaker variable was excluded until all the remaining predictors are found to have statistically a significant contribution to venture performance. In this case, the entrepreneurs' n-Ach and experience, employee education, and number of employees were found to be not significantly contributing to the model, and were thus excluded in stages until the 'best' model was reached (presented in table 1).

[Insert Table 1 here]
The developed model can be presented as follows:

$$\text{Log(Output)} = .243 + .481\log(\text{capital})_{(t = 7.409)} + .571\log(\text{entrepreneur education})_{(t = 2.851)} + 1.039\log(\text{employee experience})_{(t = 9.551)} + .221\log(\text{employee training})_{(t = 1.929)} + .135\log(\text{entrepreneur training})_{(t = 2.189)} + \text{error term}$$

R-squared = 0.511
Adjusted R-squared = 0.499
F-value = 40.495

The results clearly indicate that output is found to be influenced by physical capital, entrepreneur education, entrepreneur training, employee experience, and employee training. A summary of the preferred model with collinearity diagnostics is presented in table1. The estimated coefficients 0.481, 0.571, 1.039, 0.221, and 0.135 refer, respectively to output elasticities of capital, entrepreneur education, employee experience, employee training, and entrepreneur training

From the above, the following deductions can be made:

- Output is likely to increase by about 5% for a 10% change in capital
- Output is likely to change by about 6% for a 10% change in entrepreneur education
- Output is likely to increase by about 10% for every 10% increase in employee experience
- Output is likely to increase by about 2% for every 10% change in employee training and
- Output is likely to change by about 1% for every 10% change in training of the entrepreneur.

Since the sum of elasticities (2.447), is greater than 1, there is evidence of increasing returns to scale in manufacturing firms. This implies that an increase in capital, entrepreneur education and training, employee experience and employee training by 10% is likely to cause output to increase by a greater amount, almost 25%.

The developed multiple regression model has the following strengths:

- It explains more than 50% of the variation of sales (R square = 0.511, adjusted R square = 0.498).
- Overall, the model is statistically highly significant (F = 40.495; p = 0.000).
- The elasticities of almost all variables are significant at 5% level.
- The histogram of residuals shows a normal curve, implying that the technique used and OLS assumptions for multiple regression analyses were satisfied.
- The model captures human capital elements of both the entrepreneur and labour, and physical capital- all found to be significant predictors of manufacturing enterprise performance.
- The model can be converted into a power function, allowing marginal production of a given predictor to depend on all other variables in the model, a condition that usually holds in real life situations.
- Overall the results accord with and support the human capital theory.

HUMAN CAPITAL AND CONDUCT OF MANUFACTURING VENTURES

With regard to conduct aspects of enterprise development, the results also show that small manufacturing enterprises with more educated and trained entrepreneurs tend to employ more educated workers, keep more business records and have greater access to finance from banks than their counterparts with lower levels f human capital. Further, business individuals with more accumulated human capital tend to be more entrepreneurial in that they are more likely to own another business.

RECOMMENDATIONS AND CONCLUSION

This study clearly shows that physical capital is necessary but not sufficient for the development of manufacturing firms. Critical also is the knowledgeable, skilled and experienced human factor. The combination of the talents of the entrepreneurs and of their workers bonded together can produce impressive results. The firm can go so far as its human capital goes. The accumulation of entrepreneurs' and workers' capital operating jointly in a production function with physical capital can propel the small Tanzanian manufacturing firms into a virtuous spiral of sustainability and success, so long as they competitively meet the needs of the market. Increasing returns to output are likely to emerge from an increase in investment in human and physical capital.

If Tanzania wants more output, income and employment expansion, this would not happen through the socialist route. Instead, the way forward is through entrepreneurship, as partly reflected by a strong manufacturing sector with caring concerns for capital investment and human empowerment. An educated or trained entrepreneur is a more productive business person. Likewise a skilled workforce is a more productive labour, capable of adjusting fast to industrial and technological changes in a global environment. In order to enhance its economic growth, Tanzania cannot afford to neglect neither physical capital nor human capital. Evidently this has wider implications with respect to education, training and experience and institutions at the firm and national level.

Table 1: Summary for the developed model (Cobb-Douglas production function)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.715	.511	.498	.47742

ANOVA of the preferred model (Cobb-Douglas production function)

Model		Sum of Squares	Df	Mean Square	F	p
1	Regression	46.150	5	9.230	40.495	.000
	Residual	44.218	194	.228		
	Total	90.369	199			

Coefficients of the preferred model (Cobb-Douglas production function

	Unstandardised coefficients		Standardised Coefficients	T	p	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.214	.424		.506	.614		
Log(capital)	.481	.065	.412	7.360	.000	.806	1.240
Log(entrepreneur education)	.571	.201	.159	2.843	.005	.811	1.233
Log(entrepreneur training)	.135	.060	.119	2.252	.025	.899	1.113
Log(employee training)	.221	.118	.101	1.881	.062	.879	1.138
Log(employee experience)	1.039	.110	.497	9.464	.000	.916	1.092

Predictors: (Constant), Log(employee experience), Log(entrepreneur training), Log(employee training), Log(entrepreneur education), Log(Capital).
Dependent Variable: Log(Output)

REFERENCES

Arrow, K. J. (1962): The economic implications of learning by doing. *Review of economic studies*, 29, 155-173.

Artadi, E. and Sala-i-Martin (2003): *The Economic Tragedy of the 20th Century*. Massachusetts, Cambridge.

Becker, G. S. (1995) *Human capital and poverty alleviation* [online]. Available from: http://www.worldbank.org/html/extdr/hnp/hddflash/hcwp044.html [Accessed on August 27, 2001].

Becker, G. S. (1993): *A treatise on the family (enlarged ed.).* USA, Harvard University.

Becker, G. S. (1976): *The economic approach to human behavior*. Chicago, University of Chicago.

Becker, G. S., Murphy, K. M. and Tamura, R. (1990) Human capital, fertility and economic growth. *Journal of political economy*, 98(5), S. 12-37.

Black, S. E. and Lynch, L. M. (1996): Human capital investment and productivity. *The American economic review*, 86(2), 263-267.

Bridge, S., K.O'Neill, and S. Cromie (2003): *Understanding enterprise, entrepreneurship and small business*. New York, Palgrave Macmillan.

Burger, P. (2003): Human Capital Development and the Net Worth of Government: A Review. *The South African Journal of Economics*, 71(2): 215-240.

Griffin, K. and Knight, J. (1990): Human development: The case for renewed emphasis. In: Griffin, K. and Knight, J. (eds.). *Human development and International development strategy for the 1990s.* London, McMillan academic, 9-40.

Hall, R.E and Jones, C. I. (1999): Why Do Some Countries Produce So Much More Output per Worker than Others? *Quarterly Journal of Economics*, 114 (1): 83-116.

Koop, G. (2000): *Analysis of Economic Data*. England, John Wiley.

Lucas, R. E (1988): On the mechanics of economic development. *Journal of monetary economics*, 22, 3-42.

Mincer, J. (1997): The production of human capital and the life cycle of earnings: Variation on a theme. *Journal of labour economics*, 15(1), Part 2, 26-47.

Mahadea, D. (1994): Achievement motivation and small business success in Transkei. *Development Southern Africa,* 11(1), 93-97.

Paulson, J. A. and Gavin, M. (1999): *Changing role of the State in formerly Socialist economies of Africa,* London, Macmillan.

Schultz, T. W.: (1961): Investment in human capital. *American economic review,* 51(1), 1-18.

Schultz, T. W. (1963): *The economic value of education*. New York, Columbia University.

Schultz, T. W. (1975): The value of the ability to deal with disequilibria. *The journal of economic literature*, 13(3), 827-846.

Schultz, T. W. (1980): Investment in entrepreneurial ability. *Scandinavian journal of economics* 82(4), 436-463.

Schultz, T. W (1981): *Investing in people: The economics of population quality*. Berkerley, University of California.

Shane, S. (2003): *A general theory of entrepreneurship.* UK, Edward Elgar Publishing Ltd.