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HUMAN CAPITAL ATTAINMENT AND PERFORMANCE OF SMALL AND MEDIUM SCALE INDUSTRIES IN MALAYSIA

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Abstract

In Malaysia, the small and medium scale industries (SMIs) comprise more than 90 percent of the total establishments in the manufacturing sector. One of the pertinent issues related to industrial development in Malaysia is less competitiveness among the SMIs as compared to the large-scale industries (LSIs). This subsequently leads to lower contribution of the SMIs to the value added of the manufacturing sector. Competitiveness is closely related to human capital possession like education, training and experience among workers in an organization. This paper attempts to examine the impact of human capital variables on SMIs' output or value added and labor productivity. The analyses will be based on the data of 138 SMIs collected in 1997 through a field survey. The data covers six major industries in SMIs, namely, food and beverage, wood-based, rubber-based, plastic-based, metal-based and electrical electronic. In this survey workers were grouped into various levels of education to cover the non-schooling, primary, secondary and tertiary education. They were also categorized into five groups to represent professional, technical, administrative and managerial, supervisory and production workers. To achieve the objective of this paper, a Cobb-Douglas production function is estimated by incorporating human capital variables as independent variables in the output, value added and productivity functions. The study shows that year of schooling amongst workers, workers training and job categories have a significant positive relationship with SMIs' output and value added growth. Capital-labor ratio and tertiary education have a positive impact on the labor productivity growth.

Keywords: *small and medium scale industry, human capital, labor productivity*

INTRODUCTION

In the Malaysian manufacturing sector, small and medium scale industries (SMIs) play an important role in generating employment and supporting the large-scale industries (LSIs). With a small capital requirement and a medium level of technology, SMIs can attract many new entrepreneurs to venture into new business. In other words, SMIs act as a platform to the young and aspiring entrepreneurs.

SMIs can generate a massive desired route for employment due to the fact that their production techniques are still or medium levels and they are more labor intensive. The role of SMIs as supporting industries to the LSIs can be viewed from interdependency between them. SMIs provide inputs, parts and components to LSIs. In fact, in the Second Industrial Master Plan (IMP2), 1996, a strong linkage between SMIs and LSIs was emphasized by the Malaysian government, which was aimed to be achieved through the development of cluster industry. If linkages can be strengthened, the dependency on the import market for obtaining intermediate inputs can be lessened, hence contributing positively to the Malaysian balance of payment.

The Ministry of International Trade and Industry (MITI) of Malaysia in 1994 underlined four major roles of SMIs. They are as follows:

a. Act as a catalyst to economic growth through their contribution to output, value added and employment. To make this role more effective, SMIs must produce a high quality sustainable output to compete in the international market.
b. SMIs development can reduce the problem of sector and regional growth imbalances. This can be achieved through promoting SMIs in the industrial zones where economic growth is still moderate or low.
c. Create many job opportunities through relatively labor intensive production techniques.
d. Increase sector value added through processing natural resources and primary commodities locally before exporting them. This can be done through promoting agro-based industries.

In Malaysia, the majority of the manufacturing establishments are small and medium in size. Based on the Annual Survey of Manufacturing Industries 1999 conducted by the Department of Statistics (DOS), SMIs establishments were 15,297 or 69.9 percent of total manufacturing establishments in 1999 at 21,891. Of these, 9,262 (42.3 percent) were small-scale industries (SSIs), 6,035 (27.6 percent) were medium scale industries (MSIs). The tiny enterprises comprised of 2,802 (12.8 percent).[1]

Even though SMIs are large in terms of number, their contribution to value added and value of fixed assets are far less than that of the large enterprises. For example, in 1999, SMIs' value added comprised only 29.8 per cent of the total manufacturing value added and 23.4 per cent of fixed assets of this sector, while employment contribution was 15.6 per cent (DOS 2000). The detail distribution is shown in detail in Table 1.

A low level of productivity and input quality may attribute to low level of value added in the SMIs. This can be related to low skills amongst workers as well as inappropriate skill composition. The correct skill composition would produce an optimum efficiency in the production process.[2]

[1] Definition of enterprises using data from DOS is based on number of full-time workers. SSIs are defined as enterprises of full-time workers of 5-49, whereas, MSIs as enterprises having workers of 50-199. Enterprises having workers of less than 5 workers are defined as tiny industries.

[2] MIDA defines skilled workers as those who obtain certificate from the vocational schools or Industrial Training Institutes. The Ministry of Human Resource defines skilled workers as those who receive training for a period of more than 6 months, whereas semi-skilled workers are those who receive 3-6 months training. The Department of Statistics defines skilled workers as those who receive formal training for their specific job (either in service training or other type e.g. formal training in an institution). Unskilled workers are those who have not received any formal training for job they are performing. While semi-skilled workers are those who are not classified as skilled or unskilled workers.

Table 1: Contribution of SMIs 1999 (%)

	SSIs	MSIs	SMIs
Number of Firms	9262 (42.3)	6035 (27.6)	15297 (69.9)
Total Output (RM million*)*	19970251 (5.5)	67344268 (18.6)	87314515 (24.1)
Total Value Added (RM million)	58733769 (6.7)	15931363 (18.1)	21805133 (24.8)
Employment	123953 (9.1)	288428 (6.5)	412381 (15.6)
Fixed Asset (RM million)	10728776 (7.4)	23057659 (16.0)	33786435 (23.4)

Source: Department of Statistics Malaysia 2000

REVIEW OF LITERATURE

An increase in the level of productivity reflects an increase in the efficiency of inputs. Hence, the same level of inputs can produce a higher output level, which means that the cost of production reduces. In other words, it reflects an improvement in the quality of inputs. There are several factors affecting productivity such as level of technology and socio-demographic (Bhatia, 1990). Other factors like human resource development (HRD), human resource management (HRM), institutional restructuring may also influence productivity. Bhatia (1990) argued that lower level of technology and unstable socio demographic changes causing low productivity in India as compared to the United States and the United Kingdom. In his study of manufacturing sector using 1965-1985 data, it was shown that factor efficiency was influenced by factor of production, workplace and working condition, socio-economic and socio-politics.

Human capital attainment especially in terms of education and training plays an important role in determining firm's performance such as output, productivity and profit (Sandra and Lynch 1996, Honig 2001, Blundell et al. 1999, Barron et al. 1989, Blackemore and Hoffman 1988). A study by Sandra and Lynch (1996) found that there was a positive relationship between workers' year of schooling and productivity. Further, this study found that an impact of training was very much dependent on the training programs whether it was in accordance with the firms' needs. Among the important training programs were related to technical and computer skills.

Labor productivity is very much related to skills among workers that can be acquired through proper training. Workers who have attended training will be more efficient, productive and contribute to productivity growth. Rahmah (2000), for example found that SMIs' expenditure on training had a significant positive impact on labor productivity.

A positive relationship between human capital and productivity is also much influenced by workers' wage rate. A higher wage rate received by the workers will encourage them to work harder and contribute to higher productivity. Workers with higher level of education and attended formal training tend to receive higher wages and they are also more likely to contribute to career development, research and development and further human capital accumulation (see Blundell et al. 1999, Montague 1986). Consequently, this contributes to higher productivity growth. Therefore, it is very important for firms to have more educated workers to gain this added stimulus effect.

A study by Mason and Finegold (1997) in the United States and Britain support the positive relationship between human capital and the firm's performance. They found that education and training were more important determinant factors of productivity as compared to physical capital. Moreover, human capital achievement will create services and geographic diversifications, especially, in the professional services where human interaction is important (see Hitt et al. 2001)

Firms with more educated workers are better able to sustain and control their present technology or adopt modern and new technology. They are more able to invest in human capital like training because knowledgeable workers learn and adapt faster and more innovative (see for example Bosworth and Wilson 1993, Bishop 1994 and Chapman and Tan 1990). Katz (1969) calculated residual factors to show the contribution of technological progress to output and labor productivity growth in Argentina in the period 1946-1961. He concluded that capital was the major determinant of labor productivity besides TFP. Pickles (1990) looked at the economic growth of Iraq and found that apart from technological improvement experienced by this country, capital was still the main contribution to output growth. Hwang (1989) studied manufacturing sector in Taiwan to compare productivity level among sub- industries particularly between export-oriented industries with non-export oriented industries. His study revealed that the export-oriented industries managed to achieve higher level of productivity as compared to the non-export one due to the fact that the government policy was more in favor of the export oriented industries.

Technological advancement is closely related to capital intensity. Accordingly, in the capital- intensive firms, productivity may be higher. For example, Hishashi (1991) found that in Japan the contribution of capital to productivity growth was larger in the capital-intensive industry as compared with the labor-intensive industry. Another important determinant of productivity is capital-labor ratio. In fact, this ratio is frequently used as an indicator of level of technology where the higher capital-labor ratio is associated with higher level of technology. In the United Kingdom, for example, between the periods of 1980-1986, a study conducted in 81 firms showed that productivity increased by 4.7 per cent. Of this 2.2 per cent was due to the growth of capital-labor ratio (Haskel and Martin 1993). Further, this study revealed that a decrease in skilled labor by 2.63 per cent led to productivity reduction by 0.7 per cent each year. In other words, if there was no reduction in the number of skilled labor, productivity would have increased higher than 4.7 per cent to achieve 5.4 per cent.

Nik Hashim (1998) focused his study on the contribution of TFP to output or productivity growth in the manufacturing sector in Malaysia as a whole in the period 1985-1994. No attempt was made to segregate the data by industrial size or even by types of sub-industries. His study revealed that capital was a major determinant of productivity growth, and TFP still played a very minimal role. Using the same data source Rahmah (2001) found that the growth of the capital labor ratio significantly determined labor productivity in the textile, wood-based, plastic based, rubber-based, metal products and electrical-electronics industries. The contribution of capital-labor ratio was larger in the rubber-based and metal products industries at more that 50 percent of those industries labor productivity growth.

MODEL SPECIFICATION AND SOURCE OF DATA

Output Function

Lucas (1998) developed the output function as below,

$$Y = AK \quad (uhL) \quad \text{..................................} \quad (1)$$

where,

A = efficiency parameter
K = capital stock
u = time allocated for producing output
(1-u) = time allocated for human capital investment
h = human capital stock
L = workers
uhL = L* = effective labor

Taking into consideration the time factor and adding the external factor, equation (1) becomes,

$$Y = AK(t) \quad L^*(t)^{1-} \quad ha(t)\ {}^1U\ {}^2 \quad \text{.........} \quad (2)$$

where,

ha = average years of schooling among workers.
U = human capital obtained from learning by doing
$L^* = u(t)h(t)L(t)$

Taking natural logarithm of equation (2) we derive,

$$\ln Y = \ln A + \quad \ln K + (1- \quad) \ln L^* + {}_1 \ln ha + {}_2 \ln U + \mu_1 \quad \text{.........} \quad (3)$$

Since human capital attainment among workers can be measured from job category, this variable is substituted for effective labor in equation (3) and we derive,

$$\ln Y = \ln A + \quad \ln K + (1- \quad) \ln L^* + {}_1 \ln P + {}_2 \ln AM + {}_3 \ln T + {}_4 \ln OT + {}_2 \quad \text{........} \quad (4)$$

Labor Productivity Function

Human capital model developed by Corvers (1996, 1997) used a Cobb-Douglas production function,

$$Y = AK^{\alpha}L^{*\beta} \quad \text{..} \quad (5)$$

Where,

Y = output
K = capital
L^* = effective labor
A = efficiency parameter

Effective labor is labor with three levels of education, primary, secondary and tertiary,

$$L^* = L \bullet L_1^{\theta 1} L^{\theta 2} L^{\theta 3}$$

Where,

L = quantity of labor
L_1 = number of workers with primary education
L_2 = number of workers with secondary education
L_3 = number of workers with tertiary education

Equation (1) can be written as,

$$Y = AK^{\alpha}(L\, L_1^{\theta 1} L_2^{\theta 2} L_3^{\theta 3})^{\beta} \quad \text{..........................} \quad (6)$$

Divide equation (2) by number of workers (L)

$$\frac{Y}{L} = \frac{AK^{\alpha} L^{\beta} L_1^{\beta\theta_1} L_2^{\beta\theta_2} L_3^{\beta\theta_3}}{L} \quad \text{..........} \quad (7)$$

Rewriting the equation (7), we get,

$$\frac{Y}{L} = A\left(\frac{K}{L}\right) L^{\alpha+\beta-1} L_1^{\beta\theta 1} L_2^{\beta\theta 2} L_3^{\beta\theta 3} \quad \text{.........} \quad (8)$$

and substituting $1-L_2-L_3$ for L_1, we get,

$$Y/L = A\left(\frac{K}{L}\right) L^{\alpha+\beta-1}(L-L_2-L_3)^{\beta(1-\theta 2-\theta 3)} \quad L_2^{\beta \quad \theta 2} \quad L_3^{\beta\theta 3} \quad \text{...} \quad (9)$$

Labor productivity depends on the relative share contribution of the three types of labor. In terms of growth equation (9) can be written as,

$$\left(\frac{\dot{Y}}{L}\right) = \dot{A} + \left(\frac{\dot{K}}{L}\right) + (\ \ +\ \ -1)\,\dot{L}$$
$$+\ (1 -\ _2 -\ _3)\,\frac{d\,ln(1 - L_2 - L_3)}{dt}$$
$$+\ \ _2 L_2 +\ \ _3 L_3 \text{ ....} \quad (10)$$

and in terms of logarithm

$$ln\left(\frac{Y}{L}\right) = ln\,A +\ \ ln\left(\frac{K}{L}\right) + (\ \ +\ \ -1)\,ln\,L$$
$$+\ (1 -\ _2 -\ _3)\,ln(1 - L_2 - L_3) \quad (11)$$
$$+\ \ _2 LnL_2 +\ \ _3 LnL_3 +\ \ _3$$

The external factor that can be added to labor productivity function of equation (11) as follows,

$$ln\left(\frac{Y}{L}\right) = ln\,A +\ \ ln\left(\frac{K}{L}\right) + (\ \ +\ \ -1)\,ln\,L$$
$$+\ (1 -\ _2 -\ _3)\,ln(1 - L_2 - L_3)$$
$$+\ \ _2 LnL_2 +\ \ _3 +\ _1 ln\,ha$$
$$+\ _2 lnU +\ \ _4 \text{ ....} (12)$$

Equations (3), (4) and (12) are estimated for this analysis using ordinary least squares estimation. Several adjustments were made to these equations to suit with the data. Since the data also contain workers without formal education, this variable was added in estimating the effective labor. Number of workers who attended training is used to measure human capital obtained from learning by doing. Since information on time allocation is not available, effective labor is measured by multiplying quantity of labor by workers at various education levels by giving them weight, with higher weight for higher education. Equations (3) and equation (4) were estimated on output as well as on value added, whereas equation (12) was estimated on output per worker as well on value added per worker as dependent variables.

Data for this analysis was gathered from the field study conducted in early 1997 before the economic crisis. The study covered 138 SMIs in the Klang Valley. The sample consists of types of manufacturing industries, namely, food and beverage, textiles, electrical-electronic, wood-based, rubber-based and basic metal industry. Since the data is available by types of industry, equation (3) is also estimated by industrial types. However, the textile and rubber-based industries cannot be estimated likewise due to their very small sample size.

ANALYSIS OF THE RESULTS

The results of the estimation are presented in Table 2, Table 3, Table 4 and Table 5. The results of the estimation of the production and value added functions using effective labor are reported in Table 2. The value of R^2 is higher for the output function as compared to the value- added function. All variables are significant except years of schooling variable for the value- added function. The main determinant of output is workers' average years of schooling, followed by training, capital and effective labor. While training plays the most important role for the value added growth followed by capital and effective labor. This implies that all human capital variables even though measured differently are important determinants of SMIs' output and value added.

Table 3 presents the results of estimation of equation (12), i.e. the productivity function. The capital labor ratio plays a significant role in determining labor productivity in the SMIs under study. Both regressions that represented output per labor and value added per labor in measuring productivity show a significant relationship between capital-labor ratio and lab our productivity. An increase of 1 percent of capital labor ratio will increase labor productivity by 0.161 to 0.182 percent. Another significant productivity determinant is number of workers with tertiary education. The positive impact of this variable is much larger than the capital labor ratio, i.e. an increase of 1 percent of this variable will increase productivity by 0.522 to 0.704 percent. Further, the study finds that the number of workers who have attended training will significantly reduce the value added per labor. This may be due to shortages in skills because more skilled workers are more likely to attend training.

Table 2: Regression Estimates of Production Function using Effective Labor

Variable	Output	Value Added
Constant	8.559(6.275)***	8.200(3.806)***
LnK	0.154(3.102)**	0.156(2.009)**
LnL*	0.118(2.542)**	0.127(1.745)*
Lnha	1.288(2.483)**	1.252(1.531)
LnU	0.518(5.957)***	0.440(3.208)***
R^2	0.513	0.285
N	138	128

Notes:
*Significant at 10 % significance level;
**Significant at 5 % significance level
***Significant at 1 % significance level

Table 3: Regression Estimates of Labor Productivity Function

Variable	Output/Labor	Value Added/Labor
Constant	9.489(4.704)***	10.208(3.224)***
LnK/L	0.182(3.344)***	0.161(1.883)*
LnL	0.121(0.260)	-0.052(-0.073)
LnL_1	-0.172(-0.913)	-0.144(-0.475)
LnL_2	-0.130(-0.632)	0.105(0.325)
LnL_3	0.522(2.116)**	0.704(1.742)*
Lnha	-0.351(-0.531)	-0.880(-0.840)
LnU	-0.094(-1.082)	-0.292(--2.068)
R^2	0.234	0.129
N	138	128

Notes: same as in Table2

The results of regression estimates of the production and value added functions using various job categories are shown in Table 4. These estimations produce better results not only in terms of the value of R^2 but the significant relationship of the variables. It is shown that all types of jobs significantly determine the output and value added growth except the technical workers, which is insignificant determinant of value added at least at 10 percent significance level. The most important job category for the production function is the administrative and managerial workers followed by the technical, professionals and others. The administrative and managerial workers are also the most important determinants of value added followed by professionals and others. These results imply that in the SMIs under study, besides the management aspect that plays the most important role for output and value added increased, other types of workers are also important. In this estimation the capital variable is not significant, that implies capital is not an important determinant for SMIs to perform better.

Table 5 shows the regression estimates of the production function by types of industry. It is clearly shown that capital input significantly determines the output for food and beverage industry, wood-based and basic metal-based industries. The value of output-input elasticity in the last two industries are greater than one, indicating that an increase of 1 percent in the capital input will increase output by more than 1 percent. However, in the food and beverage industry, the value of this elasticity is 0.538. The effective labor has a positive relationship with output for food and beverage industry, but it is negatively significant determinant of output for the electrical-electronic and basic metal industries. This may be due to workers composition with large number of workers without formal education that inflate the effective labor for that industry. For the electrical and electronic industry, human capital in terms of workers' years of schooling and who have attended training play a dominant role in determining its output. While in the basic metal- industry, training is important but an increase in workers' years of schooling will reduce its output level.

Table 4: Regression Estimates of Production Function Using Job Category

Variable	Output	Value Added
Constant	12.151(22.060)***	11.518(12.029)***
LnK	0.025(0.534)	0.015(0.140)
LnP	0.336(2.938)***	0.429(2.169)**
LnAM	0.478(3.070)***	0.456(1.658)*
LnT	0.374(2.739)***	0.154(0.639)
LnOT	0.265(2.211)**	0.419(1.961)*
R^2	0.701	0.455
N	138	128

Notes: same as in Table 2

Table 5. Regression Estimates of Production Function by Types of Industry

Variable	Food& Beverage	Electrical Electronic	Plastic	Wood	Basic Metal
Constant	2.741 (1.006)	5.016 (1.623)	10.149 (3.002)***	-7.115 (-1.562)	5.076 (2.720)***
Ln K	0.538 (3.327)***	-0.020 (-0.229)	0.064 (0.483)	1.232 (4.393)**	1.011 (9.510)***
Ln L*	0.257 (2.916)**	-0.311 (-2.378)**	0.228 (1.638)	0.387 (0.925)	-0.148 (-2.73)***
Ln ha	1.443 (1.078)	3.012 (2.354)**	1.522 (1.115)	2.022 (1.521)	-2.390 (-3.468)***
Ln U	0.098 (0.529)	1.182 (7.495)***	0.228 (1.638)	-0.707 (-1.731)	0.428 (3.959)***
R^2 N	0.960 10	0.868 16	0.413 21	0.939 9	0.871 43

Notes: same as in Table 2

SUMMARY AND POLICY IMPLICATION

Analyses in this paper highlight some important empirical findings on the role of human capital on the SMIs' performance in particular, output growth and labor productivity. In general, human capital measured by effective labor, workers' years of schooling and workers' training play a significant role in determining SMIs' output and value added growth for the firms under study. However, labor productivity growth is greatly dependent on the capital labor ratio. Most human capital variables do not have a significant relationship with labor productivity except workers with tertiary education. This implies that SMIs need more educated workers to enhance their productivity growth. This is supported by a strong significant positive relationship between high-level job categories like professional, administrative and managerial workers with output or value added growth.

Analyses by types of industry reveals that only certain industries, namely' food and beverage, electrical-electronic and basic-metal gain a positive contribution from their workers' human capital possession. The capital input is the only significant determining factor for the output growth for the wood-based. While for the plastic-based industry, none of the variables shows a significant relationship.

Malaysia has experienced rapid changes in its industrial process from a relatively low technology to high technology. In this process the most affected sector is SMIs because they form the majority of the manufacturing establishments. Some SMIs manage to cope very well with these changes and easily adapt to current market requirements. Nevertheless, some of them have to struggle and suffer from many problems especially to cope with the liberalization and globalization process.

One aspect that must be possessed by SMIs so as to compete in the global market is efficiency in using inputs. When efficiency in using inputs can be increased there will be a comparable reduction in cost of production and output price can be kept relatively lower. Through this mechanism, SMIs can penetrate the export market if the quality of their output is competitive enough.

In general, the results from the analyses in this paper reveal that SMIs have benefited from human capital investment. Except in some subgroups like plastic and wood-based, there is no significant contribution of human capital variables. Several steps are suggested to enhance human capital contribution on SMIs' performance.

a. Upgrading human resource development. Many SMIs in Malaysia do not have a proper program or plan to train and upgrade their labor force. Facilities from Human Resource Development Fund (HRDF) are underutilized by the SMIs despite the fact that they register with the Human Resource Development Council (HRDC). Therefore, capital from HRDF must be utilized or harnessed fully through greater enforcement and participation with the government providing such facilities. Many SMIs apparently commented and also lamented that the procedure to train workers using HRDF services are too strict with inherent red tapes and difficult to follow guidelines (Rahmah, 1999).
b. In-house training. This study found that very few firms have training facilities within the organizations. Most workers' trainings were obtained outside the firms, which were less efficient and inadequate. In-house training may be seen as superior than outside training because it can easily be tailored to the firms' need. Moreover, this type of training may reduce training cost because it can be conducted through on-the-job training procedure.
c. Conducting continuous research and development are important for SMIs to develop their own indigenous technology. For this to be realized and harnessed successfully, R&D comes into play because without this new technology cannot be developed. Technology does not mean only the use of machines but also in terms of other aspects like marketing the products and other related aspects like advertising, packaging and so forth.
d. Improve management within SMIs, which include all aspects of management like personnel, product, input, human resource and so forth. Good management may result in efficiency through better understanding among workers, smoother production process, linkages, and information from one division with another division and also establishing the external contact. All these aspects as enumerated above will help increase SMIs' efficiency, productivity and marketability of the products.

CONCLUSION

The above analysis shows that human capital variable measured by effective labor, years of schooling, training and job categories play a crucial role in determining the firms' performance, except for certain industries. As SMIs form a major part of the industrial establishments in Malaysia, the development of these industries undoubtedly help to speed up the economy in achieving the status of developed nation. In the era of knowledge-based economy, human capital plays an important role in enhancing the firms' performance. Therefore, the firms must emphasize and enhance their human capital investments especially in terms of education and training.

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