# Labor Employment in the Manufacturing Sector of Malaysia

**Mohammed B. Yusoff & Sharifah Nabilah Syed Salleh**
Department of Economics
International Islamic University Malaysia
P.O. Box 10, 50728 Kuala Lumpur,
Malaysia.
mohammed.yusoff@iium.edu.my, biela_jufri@yahoo.com

***Abstract***
*The manufacturing sector has been contributing significantly to the Malaysia's economy in terms of its contribution to GDP, employment, and exports. This paper examines the determinants of employment of labor in the Malaysian manufacturing sector. We estimate the model using the instrumental variable technique and the results suggest that the real wage rate, output represented by the value added, and capital represented by the value of fixed assets are all important determinants of labor employment in manufacturing sector in Malaysia. This implies that implementing policies to encourage capital accumulation and overall economic growth are indeed helpful to boost employment in the manufacturing sector. The elasticity of labor employment with respect to wage rate is 1.86 suggesting that labor employment is responsive to the changes in wage rate; a 1% decrease in wage rate increases employment by 1.86% which will then spur the manufacturing output which are mostly exported to foreign countries. This suggests that employment in the manufacturing sector could be created through wage reduction, increase in capital and output level.*

***Keywords:*** *labor employment, wage rate, manufacturing, Malaysia*

## 1. Introduction

In the early 1950s, Malaysia known then as Malaya, was a commodity-based economy relying heavily on the exports of tin and rubber to generate job opportunities and income. The export earnings were utilized to import consumption goods as well as capital goods to develop the domestic economy. But the performance of the exports of primary commodities had been volatile. As the export earnings of primary commodities had deteriorated, Malaysia switched to the import substitution development strategy during the 1957-1960 period designed to replace the imports with locally produced goods by erecting tariff and non-tariff barriers to trade. Toward this end, in 1960, Malaysia established the Malaysian Industrial Development Finance (MIDF) as a means to extend financial support to the manufacturing firms; this was followed by the establishment of the Malaysian Industrial Development Authority (MIDA) in 1965 to promote investment in the industrial sector, particularly the manufacturing sector. Then in 1968, the Investment Incentive Act was introduced to enhance the process of industrialization through tax exemptions and other fiscal incentives.

In 1970s, the Malaysian economy took another stride shifting toward the export-oriented industries as it was realized that rapid economic growth rate could only be achieved through exports because the small domestic market was unable to absorb the excess production. As a result, more lucrative incentives were offered to the export-oriented industries such as low interest credit, excise tax exemptions, sales tax exemptions, and import duty refunds. Free trade zones (FTZs) were then introduced to lure foreign direct investment, particularly in the export-oriented industries. The FTZs enjoy, among others, duty free imported materials and

other subsidies.

In the mid-1980s, Malaysia reinforced the outward orientation development strategy. This was because both the heavy industry which was introduced as a means to diversify the industrial sector and import-substitution industries did not perform to expectations. This was exacerbated by the fact that most of the infant industries also did not show satisfactory performance which tended to impede the expansion of the manufacturing sector.

As a result of the 1984-85 recessions, Malaysia implemented a three prong strategy to revitalize the Malaysian economy, namely through the: export promotion, import liberalization, and FDI liberalization. Thus, in 1985, Malaysia reduced the average tariff to about 13 percent. More reduction in tariff on imported items was introduced in 1989 to boost foreign direct investment and therefore from mid-1980 to late 1980s there was a significant inflows of foreign direct investment (FDI) in the manufacturing sector as Malaysia relaxed more policies in favor of FDI along with the financial liberalization through the opening up of the capital account. As a result, the industrial sector has continued to record rapid expansion in both the production as well as industrial base, except during the 1997-1999 period due to the Asian financial crisis.

## 2. The Malaysian manufacturing sector

Manufacturing involves the production of goods by using machines, equipment, labor, and raw materials. The manufacturing sector is closely related to engineering and industrial design and indeed it has a large influence in a country's economy. Malaysia is a middle income country with a multi- sector economy based on manufacturing and services. Manufacturing industries has contributed significantly to the Malaysian economic development. And as of 2011 the share of manufacturing in GDP was at 27.5 percent. The sector can be divided into two major categories: the resource based industries and non-resource based industries and these industries are fairly well developed. The major manufacturing industries are: electronics, electrical machinery and appliance; chemicals, chemical and plastic products; petroleum products; iron, steel and metal products; wood and wood products; and textile and apparel. As of 2011 the shares of manufacturing production by its major sub-sectors are: electrical and electrical machinery was at 26.4 percent, chemical and chemical products at 19.0 percent, and petroleum products at 15.9 percent while the contribution of other sub-sectors was small at less than 5 percent. As Malaysia's domestic economy is small, in terms of physical size and population, much of its manufactured products are exported to the foreign market. As of 2011, the major importing countries of Malaysian exports are Singapore at 13.6 percent, China at 13.2 percent, EU at 12.6 percent, the United States at 11.0 percent, and Japan at 7.0 percent. The major exports of manufactures are: electronics, electrical machinery and appliance at 46 percent; chemicals, chemical and plastic products at 10.2 percent; petroleum products at 7.8 percent; and iron, steel and metal products at 6.0 percent. It is very obvious now that the Malaysia's manufacturing sector has been too heavily dependent on electronics, electrical machinery and appliance; chemicals, chemical and plastic products; and petroleum products in terms of production and exports.

## 3. Structure of employment in Malaysia

The development of Malaysian labor market followed closely with the macro-policy changes to gear-up the Malaysian industrialization process. The manufacturing sector was regarded as the source of employment expansion, especially during the labor displacement period in

agriculture and mining sectors beginning in 1970 to early 1980s. As a result of these structural changes, Malaysia implemented a policy to encourage the migration of the rural workforce to the urban-based industries. Table 1 indicates the changes in the structure of employment in Malaysia from 1970 to 2013. The contribution of agriculture sector to total employment has been declining steadily where in 1970 it contributed 50.5 percent, 1980 at 40.6 percent, and by 2013 it fell to 12.7 percent. On the other hand, the employment in the manufacturing sector increased significantly when its contribution to total employment increased from 11.4 percent in 1970 to 27.6 percent in 2000, it fell to 17.72 percent in 2010 and it decreased further to 16.80 percent in 2013. The contribution of mining and quarrying sector has been declining from 2.6 percent in 1970 to only 0.70 percent in 2013 while the contribution of construction sector increased from 4.0 percent in 1970 to 9.4 percent in 2013.

**Table 1: Employment by sectors (% to total)**

| Sector | 1970 | 1980 | 1990 | 2000 | 2010 | 2013 |
|---|---|---|---|---|---|---|
| Agriculture, forestry & Fishing | 50.5 | 40.6 | 26.0 | 15.2 | 13.57 | 12.7 |
| Mining & Quarrying | 2.6 | 1.7 | 0.6 | 0.4 | 4.80 | 0.70 |
| Manufacturing | 11.4 | 15.8 | 19.9 | 27.6 | 17.72 | 16.80 |
| Construction | 4.0 | 5.2 | 6.3 | 8.1 | 9.1 | 9.4 |
| Others* | 31.5 | 36.7 | 47.2 | 48.7 | 68.50 | 60.4 |

**Sources:** Economic Report, Ministry of Finance Malaysia
**Note:** *Mostly services

Under the New Economic Policy (NEP), introduced in the 1970s, the strategy for the industrial development was through labor-intensive manufacturing as a way to create employment opportunities. But in the 1980s, the increase in the employment of labor in the manufacturing sector was rather low as there had been a shift in the industrial development strategy towards a more capital-intensive industry since Malaysia is no longer a cheap labor economy. As a result, many firms were more inclined to employ labor-saving technologies which were reinforced by the 1985 recession. The shift in the strategy to promote capital-intensive industry has been viewed as a way to diversify the industrial sector. As Malaysia is no longer a cheap labor economy, the transition from labor to capital intensification is indeed a step in the right direction.

There are several implications following the transition from labor to capital intensive industries. First, export-oriented industries were largely dependent on foreign direct investment. Hence, promotion of employment expansion has to be aligned with policies to lure foreign direct investment. The second factor is technology. The electronics sub-sector, for example, could not expand employment without first expanding their productive investment. This implies that technological change and new products play crucial roles in the expansion of these establishments which means that the skill requirements of labor would also have to move up towards higher technical skills.

The electrical and electronics (E&E) industry is a key driver of Malaysia's industrial development and contributes significantly to GDP growth, export earnings, investment and employment. Malaysia is a key player in the fast expanding E&E market where its major export destinations include China, the United States, Singapore, Hong Kong, and Japan. The E&E industry is targeted under the National Key Economic Areas (NKEA) to gear the nation towards high-income economy by focusing on high-value and high-growth manufacturing activities.

Malaysia's manufacturing sector continues to grow and transform as the country substitutes low value-added assembly operations for high value-added activities that promise long-term growth. A total of 787 manufacturing projects with investments of RM52.1 billion were approved in 2013 compared with 804 manufacturing projects with investments of RM41 billion in 2012. Within the sector, the Electrical & Electronics (E&E) industry recorded the highest investments approved in 2013 with 118 projects amounting to RM9.8 billion. Of this total, 44 projects were new projects with investments of RM6.8 billion while 74 were expansion/diversification projects with investments amounting to RM3 billion(MIDA,2014).

The E&E industry employed 33,020 workers in 2010 but declined to 317, 806 workers in 2014. The largest employer in the E&E subsector is the semi-conductor and electronic components, followed by audio & audio visual products, and manufacture of office and accounting machinery & and computer and computer peripherals. The number of workers employed in E&E industry has been in the downward trend.

Thus, the main objective of this study is to examine the factors affecting the employment of labor in the manufacturing sector in Malaysia. We hope that the findings from this study will help policymakers to find ways and means to create more employment opportunities in Malaysia, and in particular the manufacturing sector. The paper begins with an introductory remark about the Malaysian economy and employment structure, followed by the review of literature. The next sections are the model specification, estimation technique, and results and discussion. The final section is the conclusion.

## 4. Review of Literature

Heshmati, Almas & Mkhululi Ncubi (2004) study employment in the Zimbabwe's manufacturing industries by specifying the labor demand as a function of wages, output, quasi-fixed capital, and time variables as suggested by Layard (1986), Nickell (1986), and Symons (1985). The results of the estimated labor demand equation suggest that labor demand is more responsive to wage changes than capital and output. They argue that an excessive increase in real wages has a negative impact on labor retention in the Zimbabwe's manufacturing sector, and that investment and economic growth are essential for employment creation. Therefore, emphasis should be placed on policies that encourage capital accumulation, aggregate demand and overall economic growth as a means to spur employment in Zimbabwe's manufacturing industries.

Polat & Uslu (2011) examine the impact of international trade on employment in the manufacturing industry using a panel data of 95 manufacturing industries in Turkey. They use a labor demand equation which incorporates wages, output and international trade variables such as imports and exports. The results show that an increase in output had a positive impact on employment, while wages had negative impact on employment in all models analyzed in this study.

In another study, Aydiner-Avsar & Onaran (2010) estimate the effects of wages, real output and trade openness on employment in the private manufacturing industry in Turkey based on panel data. They also distinguish sectoral differences with respect to skill intensity. Generally, they find a significant impact of domestic factors, namely real wage and real output on employment. Output elasticity of labor demand is higher than wage elasticity in the total manufacturing sector for the whole estimation period and in the high and medium-

skilled sectors in the post-1980 period. This indicates that a stronger economic growth performance could have been a more effective policy than relying on low wages to stimulate employment. The wage elasticity of employment increases after trade liberalization, however despite this fact, the significant real wage declines in the post-1980s failed to create a strong employment boost in the Turkish manufacturing sector.

A study on labor use and adjustment in the Indian manufacturing industries using two-digit manufacturing industries data was done by Bhandari & Heshmati (2005). The labor demand was estimated as a function of real wage, value added or output, and capital. The results indicate that the mean of labor demand elasticity with respect to each of the independent variables is highest for output, followed by capital, and wages. These imply that more employment opportunities were generated by increasing the output. As for the capital stock that has a complementary relationship with labor employment, more employment opportunities would be created with the increase of capital stock.

Yusop et. al. (2005) conducts a study to determine the linkages between output, wages, productivity and employment in the electronic and electrical sub-sector of Malaysia. The findings suggest that in the short-run, changes in productivity are linked with changes in real wage, real output and employment. In addition, real output and productivity has an impact on the changes in employment. In the long-run, an increase in output leads to the increase in employment while increase in real wage constitutes towards a decrease of the real output.

Dunne & Roberts (1993) estimate the long-run demand functions for production workers, production worker hours, and nonproduction workers using micro data from U.S. establishment surveys. The study focuses on the estimation of the wage and output elasticities of labor demand using data on U.S. manufacturing plants in 1975 and in 1981. The empirical results reveal that the OLS estimates of both the wage elasticity and the output elasticity of labor demand are biased downward due to unobserved heterogeneity of the data. Estimates of the output elasticity of labor demand indicate that there are slight increasing returns to scale for production workers and production hours, with a pooled data estimate of 0.92, while the estimate for nonproduction workers is 0.98. Estimates of the average wage elasticity vary from -0.50 for production hours, -0.41 for production workers, and -0.44 for nonproduction workers.

Haouas, Yagoubi, and Heshmati (2003) investigate the process of adjustment in employment to a panel of six Tunisian manufacturing industries in the period 1971–96. Industries are assumed to adjust their labor inputs towards a desired level of labor-use. A translog labour requirement function is specified in terms of observable variables and is used to model the desired level of labor-use. The labor requirement is specified to be a function of wages, output, quasi-fixed capital stock and technology. The empirical results show that in the long run, employment demand responds greatest to value-added, followed by capital stock changes, and the least is by wages. The speed of adjustment in employment and the degree of labor-use efficiency show large variations among the sectors and over time.

A study to estimate the relationship between employment and the value added, wages, a proxy for productivity (TFP), FDI and exports in the Indonesian manufacturing was conducted by Aswicahyono & Purnagunawan (2013). They find that the employment elasticity is 0.14 with respect to value added. The labor cost coefficient is 0.14, negative and significant. The effect of total factor productivity (TFP) on employment is negative and

significant as TFP has affected employment through the adoption of new technology appeared to have been labor-saving during the period. Both FDI and exports are positively related to employment. The export relationship is in line with the expectations that firms engaged in exporting are likely to employ more workers, building on Indonesia's comparative advantage in a relatively abundant supply of unskilled labor. The significant coefficient for FDI is perhaps because foreign firms seek to take advantage of an abundant labor supply.

**Model Specification**

The employment equation in the manufacturing sector is specified as

$$L_t = \beta_0 + \beta_1 WR_t + \beta_2 Y_t + \beta_3 K_t + \varepsilon_t$$

Where L is employment, WR is real wage rate, Y is output and K is capital represented by the value of fixed assets. Real wage rate is expected to have negative relationship with employment as real wages is considered as a cost for the firm; an increase in real wage will decrease the labor demand. The output is expected to be positively related with employment but capital could be either positively or negatively related to the employment level depending on whether labor is treated as a substitution or complementary of the technology used for the firm. In this study output Y is represented by value added and K is represented by the value of fixed assets of the manufacturing industries.

**Data Sources and Definition of Variables**

We use annual data for the time period of 1972-2009. The data on employment, value added, value of fixed assets, wages, and consumer price index (CPI) are collected from the Department of Statistic Malaysia (DOSM). Wages are deflated by CPI to convert into the real value terms. Employment depicts the number of persons employed by the manufacturing sector at the last month of December during each of the reference year. The value added is the difference between the gross output and intermediate inputs that contribute towards an increment to the value of commodities and services produced by the manufacturing sector. Therefore, it shows the changes in economic activity. Capital is represented by the value of fixed assets of manufacturing firms. There are missing values for the years 1980 and 1998 because the industrial surveys were not conducted. We use the interpolation technique to estimate the missing observations.

**Estimation Technique**

The estimating equation has endogneity problem since it has at least two potential endogenous regressors, namely the wage rate and output which may be correlated with the error term. Endogeneity problem arises when the error terms are correlated with the explanatory variables which consequently violate the exogeneity assumptions. The three common causes of endogeneity are due to omitted variables, simultaneity, and measurement errors. When we estimate the model using OLS, it is important that all of the explanatory variables are exogenous which means that the explanatory variables and error terms are uncorrelated. The existence of endogeneity may lead to potential bias and inconsistency of the estimates giving misleading results and interpretations if we estimate the model by using OLS. In this study, before we estimate the model we test for exogeneity of the regressors using the Durbin-Wu-Hausman test.

We can compare the estimates of OLS and instrumental variable (IV) techniques. If their

estimates are very different this may be a sign that the model is having endogeneity problem. IV estimates will always be asymptotically unbiased while OLS estimates will only be unbiased if the regressors are uncorrelated with the error term.

We test for endogeneity using the Wu-Hausman Test. A regressor is said to be endogenous if it can be explained by the instruments in the model, whereas exogenous variables are those which are not explained by instruments. The endogeneity test determines whether a subset of the endogenous variables is actually exogenous. This is calculated by running a secondary regression where the variables to be tested are treated as exogenous rather than endogenous. The J-statistics between this secondary regression and the original estimation is compared. The test statistic is distributed as a Chi-squared random variable with degrees of freedom equal to the number of regressors tested for endogeneity.

**Results and Discussion**

The results of OLS given in Table 2 indicate that the real wage rate and output of the manufacturing sector are important determinants of employment in the sector where they are significant at 1 percent level whereas capital is insignificant. Employment is not responsive to the changes in real wage rate, output, and capital. A 1% change in real wage rate, output, and capital only lead to 0.95%, 0.57%, and 0.11% change in employment respectively. The goodness of fit is 0.9921 suggesting that 99% of the variation in employment can be explained by the regressors.

**Table 2**
**Results of OLS**

| Variable | Coefficient | Std. Error | t-Statistic | Probability |
|---|---|---|---|---|
| C | -0.298766 | 0.915388 | -0.326382 | 0.7461 |
| WR | -0.957543 | 0.152157 | -6.293122 | 0.0000 |
| Y | 0.578967 | 0.070346 | 8.230338 | 0.0000 |
| K | 0.118562 | 0.072407 | 1.637444 | 0.1108 |

Notes: Adjusted R-squared = 0.9914, F-statistic = 1428.577(prob.= 0.0000).

**Table 3**
**Results of Durbin-Wu-Hausman Test**

| | Value | df | Probability |
|---|---|---|---|
| Difference in J-stats | 10.23986 | 3 | 0.0166 |

J-statistic summary:

| | Value |
|---|---|
| Restricted J-statistic | 13.18688 |
| Unrestricted J-statistic | 2.947023 |

The results of Durbin-Wu-Hausman Test presented in Table 3 show that the difference in J-statistic is 10.23986 with p-value of 0.0166 and therefore the null hypothesis of exogeneity is rejected. We then choose to estimate equation (1) by instrumental variables (IV) technique. The instruments used are the lags of the variables in the model.

**Table 4**
**Results of Instrumental Variable Technique**

| Variable | Coefficient | Std. Error | t-Statistic | Probability |
|---|---|---|---|---|
| C | -6.122303 | 1.869298 | -3.275189 | 0.0025 |
| WR | -1.862775 | 0.301270 | -6.183069 | 0.0000 |
| Y | 0.701946 | 0.085333 | 8.225987 | 0.0000 |
| K | 0.226398 | 0.095238 | 2.377184 | 0.0234 |

Notes: R-squared = 0.9921, Adjusted R-squared = 0.9914,
F-statistic = 1370.398 with probability = 0.0000.

The results of instrumental variable technique in Table 4 indicate that the real wage rate and output are both significant at 1% level while capital is significant at 5% level. The employment is responsive to the change in the real wage rate; an increase in real wage rate by one percent will decrease the employment by 1.86 percent. But employment is not responsive to changes in output and capital; a one percent increase output and capital will increase the employment by only 0.70 percent and 0.22 percent respectively. Notice that the estimated coefficients of real wage rate, output and capital by instrumental variable technique have increased significantly compared to that of OLS. The R-squared is 99.21 percent indicating that the variation from employment can be explained by the three variables.

## Conclusion

The manufacturing sector has been contributing significantly to the Malaysia's economy in terms of its contribution to GDP, employment, and exports. This paper examines the determinants of employment of labor in the Malaysian manufacturing sector. We estimate the model using the instrumental variable technique and the results suggest that the real wage rate, output, and capital are all important determinants of labor employment, at least at 5 percent level, in the manufacturing industries in Malaysia. This implies that implementing policies to encourage capital accumulation and to spur overall economic growth are indeed helpful to boost employment. The elasticity of employment with respect to real wage rate is 1.86 suggesting that labor employment is responsive to changes in real wage rate; a 1% increase in real wage rate decreases employment by 1.86% and this will adversely affect the production of manufactured goods due to increase in production cost. On the other hand, labor employment is not responsive to both the output and capital. A 1% increase in output and capital would only increase employment by 0.70% and 0.22% respectively.

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