

Title: The Impact of Foreign Workers on The Manufacturing Output, Employment and Wage in Malaysia

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JEL Classifications : J08, J23, J31, J44,

Key Words: Economics Policies, Labor Demand, Wage Differentials, Professional Labor Markets

I. Introduction

In industrialized societies such as presented by Berger & Piore (1980), Osili (2007) and Kanapathy (2008) have raised an interesting hypothesis regarding international labor migration, that the influx of foreign workers have increased the economic transformation (ET). The ET was defined in terms of Toffler's three wave paradigm that involved several major changes in production, distribution and communication technologies as well as changed in institutions and networks of organizations and technologies management. These technology advances drived most local workers who tend to have better and suitable skills and education to participate in the primary labor market because it provided more promising improvement in rewards and working conditions. While a large numbers of vacancies in the secondary labor market were expected to be filled by low skilled foreign workers. Thus, ET has often been claimed as the major driving force in attracting the influx of foreign workers in a country labor market.

For instance, the experience of the United States has shown that the *ET* or continual technological advances has reinforced a massive entry of foreign workers into the domestic labor market. Hence, most vacancies in the primary labor market, such as in agricultural sector as well as the low paid jobs in manufacturing, trade and services sectors, tend to be filled by foreign workers from various countries, such as Canada, Mexico, Cuba, China, Japan, India and Philippine (see Borjas, 2000). Therefore, we can conclude that foreign workers provide a significant contribution to the growth of The United States' economies.

The positive relationship between economic transformation and influx of foreign workers has been supported by Simon, Stephen & Sullivan (1993) in theirs study in The United States. They stated that Cuban-American in South Florida had offered positive contribution to state's economic growth. The level of education, skilled and higher entrepreneurship that were possessed by those Cuban immigrants before 1970s, were

generally believed as a key factor in determining the skyrocketing of economic growth in related regions. However, the later Cuban immigrants in year 1980s were tend to be pessimistic. This is primarily due to a large of Cuban refugees (escapees) has become illegal workers in Florida. As the result, the existences workers in Florida has been claimed to be as a responsible factor for the lower Florida's economic growth.

Similarly, the *ET* has also assumed to provide a significant contribution to the influx of foreign workers in European Economies. However, several authors argue that they do not effect to the economic growth, employment and relative high wage for local workers (Zimmermann, 1995 and Venturini 1999). Zimmerman (1995), for instances found that the foreign workers influx do not bring the negative impact. It is because the fact that the existence of foreign workers has become a complementary to local workers in process of production. For that reason, the foreign workers influx can foster the capital deepening, higher economic growth and create the new employment for local workers.

In East Asia, the consequences of *ET* to the influx of foreign workers also display similar tendency to the United States' and European counties (see Athukorala, 2006). The *ET* of East Asia has driven the demand for foreign workers excessively, especially for those countries categorized as Newly Industrialized Countries (NIC's) notably as Japan and South Korea. These two countries has shown a successful export-oriented industrialization. Importing lower skilled foreign workers in these countries has long been started since the mid-year 1980s, specifically after the increasing of Yen rate (*Endaka*) in year 1980s, where usually the workers are imported from ASEAN countries, such as Indonesia, Philippine and Thailand. Thus, the foreign workers influx in a country labor market does not cause the negative side to wage rate and employment for local workers, since job categories possessed by those foreign worker were different.

In similar vein, the influx of foreign workers in Malaysia has been a great concern for many years. However, the importing of foreign workers formally from Indonesian has just started in the mid-year 1980s, immediately after the second agreement achieved in Medan (Indonesia) in 1984 (Kasim, 1998; Osman, 1996; Adnan, 1997). Originally, the importing of foreign workers from Indonesia was as an effect of worker shortage in plantation. Then it was extended to industrial and services sectors. The worker shortage was sound after Malaysia had been successful in exporting of its industrial goods to various countries in the mid of 1980s.

II. Review Of Literatures

a. The Impact of Foreign Workers on Economic Growth

Whether or not an involvement of foreign labors in the production process of a country will assist in the economic growth is still debated (See Osili, 2007). Some findings showed a positive correlation between economic growth and foreign labor because they can create job opportunities and capital accumulation (Simon, 1988). On the contrary, other studies found that foreign workers retarded economic growth because the majority of them are unskilled (World Bank, 1995). On the positive side, some studies argued that the influx of foreign labors could increase demand for food and services in destination countries; and subsequently increased the rate of return from investment and capital accumulation (Greenwood & McDowell, 1986).

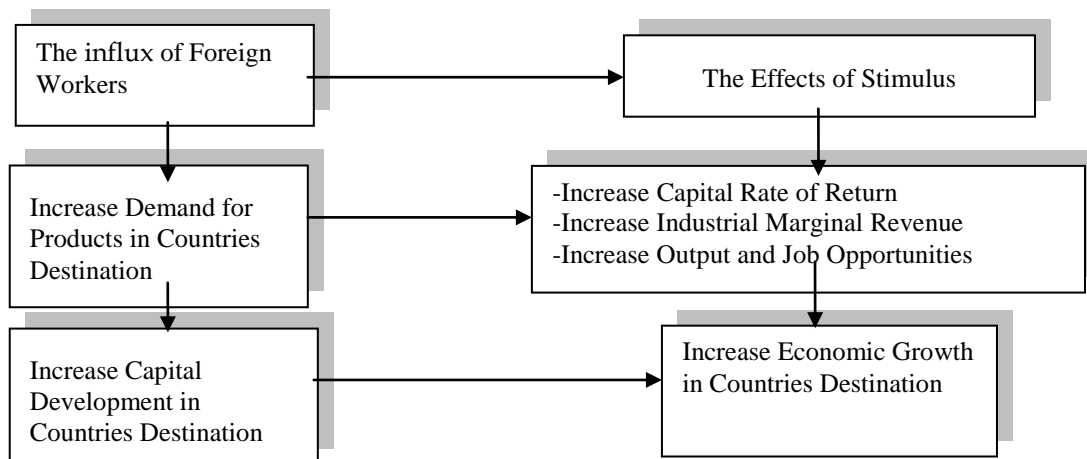
The first opinion is generally argued that countries will get benefits from the influx of foreign workers because they can stimulate economic growth through the increasing of public demand for goods and services, and capital formation (Simon, Stephen & Sullivan, 1993). This opinion is based on the *Say's Law* which suggests that supply will always create a

demand (*supply create its own demand*). While others opinions expressed that if the influx of foreign workers is massive, they could hamper economic growth because they are of low-skilled and low-educated. In fact, some argued that the influx of foreign workers will only lead to problems in the social, economic and political areas of the importing country because many of those entered illegally (see also Orjithan1985).

A study conducted by Simon (1988) in the state of California and the city of Los Angeles in the United States found that the influx of foreign workers has provided substantial benefits to a wide range of industrial output growth in both regions. While the negative effect of the influx of foreign workers to local workers was very small and mostly concentrated to the local workers who come from Latin American countries. Furthermore, the highest impact of the influx of foreign workers on economic growth was mainly due to strong growth of employment in both regions. During the 1970-1980 periods, employment had grown by 46.1% in California and 52.7% in Los Angeles. The increasing in the growth of the labor force caused a 5.2% contraction in wage due to the influx of foreign workers in those two regions.

In Europe, the findings of a study conducted by Zimmermann (1995) concurred the study conducted by Simon (1988). The influx of foreign workers were significantly impact on economic growth, employment opportunities and wage of local workers. This is because the influx of foreign workers increased the capital formation and creates new job opportunities for local workers. In addition, the influx of foreign workers did not adversely affect the wages of local workers because they were complementary in the production process (see Figure 1).

Figure 1:Effect of Foreign Workers against Economic Growth(Opinion Optimistic)



In Australia, a study conducted by Dickson (1975), found that the influx of foreign workers acts as a stimulus to the economic growth of the country. The influence of this stimulus occurred through the complementary relationship between foreign workers with local workers, whereby the influx of foreign workers encouraged the local workers to be more productive; thus, stimulating the increase in output and consumer demand for goods and services produced. Shortly, we could note that the complementary relationship between foreign workers with local workers is believed to be one of the forces that could encourage an increase in the rate of economic growth in the country.

A study conducted by Norman and Meikle (1985) in the same state also supported Dickson's findings (1975). By using econometric analysis, Norman and Meikle found that the influx of foreign workers could improve job opportunities for local workers far exceeding's the negative effect caused by the influx of foreign workers. Creation of employment opportunities is not only done by foreign workers together with local workers to form a joint venture, but it could also be done by foreign workers themselves independently. Therefore, Norman and Meikle (1985) believed that the form of a complementary relationship between foreign workers with local workers provided considerable benefits to boost the country's economic growth.

In contrast to the studies by Dickson (1975), and Norman and Meikle (1985), other studies conducted by Greenwood and McDowell (1986) in the United States found that the opposite situation; whereby the influx of foreign workers resulted in a negative and significant impact on wages and employment opportunities for local workers. According to them, the influx of more foreign workers surrogate (substitute) against the interests of local workers for foreign workers to get involved and become a member of the labor union. They generally worked in non-permanent jobs and many of the foreign workers worked illegally. This situation led to various demands by local workers to improve their well-being that was affected because of the foreign workers. Therefore, Greenwood and McDowell (1986) believed that the influx of foreign workers, especially foreign workers without permits had reduced employment opportunities and wages of local workers.

The study conducted by Baker (1987) in Australia, as well as a study conducted by Baker and Benjamin (1994) in Canada supported the results of studies conducted by Greenwood and McDowell (1986). According to those researchers the influx of foreign workers could hamper the economic growth, employment opportunities and wages of local workers because foreign workers enjoy the benefits from the use of capital without paying any cost for it. Foreign workers utilized public facilities of a country but they do not have to pay taxes, while taxes are used to construct public facilities. This situation would lead to an elimination of the amount of capital available for local workers. Therefore, those experts believed that the influx of foreign workers could hamper economic growth and the opportunity for raising wages earned by local workers.

A study conducted by Baker (1987) in Australia for example found that for every 1% increase in the number of workers caused by the influx of foreign workers would raise 1% of investment. Mean while, the increase of 1% in local workers could raise 8% capital formation compared to capital formation caused by the influx of foreign workers. This suggested that

the effect of the influx of foreign workers against capital formation is very small and could inhibit the incoming of overall capital formation. Therefore, Baker (1987) believed that the influx of foreign workers could hamper economic growth, employment opportunities and rising wages of local workers.

b. The Impact of Foreign Workers on Employment

Several studies have been carried out by the economists that are related to the influence of foreign workers to the employment opportunities for local workers, for example, studies that have been conducted by Lalonde and Topel (1991), Altonji & Card (1991); Freeman & Katz (1991); Winegarden & Khor (1991); Simon et al, (1993) in the United States, as well as studies conducted by Venturini (1999) in Italy, Winter-Ebmer & Zweimuller (1999) in Austria and Bauer et al. (1999) in Germany. Nonetheless, there is still a disagreement among economists about the influence of foreign workers admission to employment opportunities for local workers. On the one hand there are some experts who agree that the admission of foreign workers into the labor market of a country have a negative impact to the employment opportunities for local workers. Those who agree argue that the foreign workers admissions would not reduce employment opportunities for local workers.

The study, conducted by Lalonde and Topel (1991) and Altonji & Card (1991) using data from the population census in the United States found that the influence of the foreign worker admissions to employment opportunities for local workers was negative, ie between -0038 to -0062. Similarly, the results of a study conducted by Simon et al, (1993), and the results of a study conducted by Muller & Espenshade (1985). While the study by Freeman and Katz (1991) on 428 types of industries in the same country found a positive relationship. Nonetheless, the resulting relationship was not significant. These findings showed that the

influx of foreign workers into the US labor market had led to reduced employment opportunities for local workers in the country.

Mean while, a study conducted by Winegarden and Khor (1991) in the same country found that there was a simultaneous relationship between foreign employee inclusion and employment opportunities for local workers. Using US census data, it was found that the influence of foreign workers' employment on employment opportunities for local white workers differed in influence on black native workers (negro). It was found that there was a complementary relationship (complement) between foreign workers and white local workers, while the relationship was opposite for black native workers (negro). The degree of substitution or complement between foreign workers and local white and black native workers was 0.003 and 0.01, respectively.

In Austria, the study conducted by Winter and Zweimuller (1999) was not much different from studies conducted by previous experts. Using the data of young workers under the age of 35 in the period of 1988-1991 found a relatively large and negative relationship between the influx of foreign workers and employment opportunities for local workers in the same age group. It was found that every 1% increase in the influx of foreign workers would increase unemployment of local workers young age by 5%. The high influences of foreign workers' incomes to employment opportunities for local workers were mainly due to the fact that the skills of local workers were lower than those of foreign workers, especially in young local workers younger than 35 years. In addition, the high influences of foreign workers' employment on unemployment were also due to the special skills possessed by local workers not match with the demand or industrial needs of the country concerned.

In Italy, studies conducted by Venturini (1999) showed results that were not significantly different from those conducted by Winter-Ebmer and Zweimuller (1999). He found that the existence of a substitution or complementary relationship between foreign

workers and local workers was also depend on the geographical mobility of local workers and the laws governing the importation or withdrawal of foreign workers in the country. According to them, the higher geographic mobility of local workers and the increasingly stringent legislation applicable to imports of foreign workers had caused a negative influence of foreign workers' exposure to smaller employment opportunities of local workers. The opposite situation would apply if local geographic mobility conditions were relatively lower, and no specific regulations were clearly established concerning the issue of the admission of foreign workers in the country concerned.

In Malaysia, for example, local geographic mobility rates were high due to the high displacement of villagers to cities. Even some of them had moved abroad, such as to Singapore (see Adnan, 1997). This situation had caused a negative impact of foreign workers' to employment opportunities for local workers. In addition, laws that specifically regulate the import of foreign workers were rarely encountered. In fact, certain regulations governing the entry of foreign workers vary from time to time following the changing economic and political conditions of the country (see Kasim, 1998; Osman, 1996).

c. The Impact of Foreign Workers on Wage

The influx of foreign workers also has an impact on the level of wages received by local workers. In understanding the effect of foreign workers' inclusion on this level of wages, economists often use the wage function that local workers receive as a dependent variable and an increase in the influx of foreign workers as their independent variables. The general form of wage functions commonly used by experts in understanding the effect of foreign workers' inclusion on the prevailing wage rates for local workers is as follows: (see Altonji and Card 1991, Borjas, 1994):

$$\Delta \log w_s = \left(\frac{\lambda}{\varepsilon_s - \delta_s} \right) \left(\frac{\beta - b}{b(1-b)} \right) \left(\frac{\Delta N}{N} \right) = \alpha_s \left(\frac{\Delta N}{N} \right) \quad (1)$$

$$\Delta \log w_u = \left(\frac{\lambda}{\varepsilon_u - \delta_u} \right) \left(\frac{\beta - b}{b(1-b)} \right) \left(\frac{\Delta N}{N} \right) = \alpha_u \left(\frac{\Delta N}{N} \right) \quad (2)$$

Δw is a wage change, $\lambda = \text{Nu.Du}(w_u, p) / Q_i$, $\varepsilon_i \geq 0$ represents the elasticity of the worker's supply category - i , $\delta_i < 0$ represents the elasticity of demand for labor, and ΔN labor changes caused by the influx of foreign workers. The magnitude of this influx of foreign workers to the level of wages received by local workers depends largely on the relative skilled proficiency of foreign workers compared to the local workers. Generally, studies conducted have found that the increasing of skilled proficiency and professional of foreign workers influx will increase the wages received by local workers.

Grossman (1982) in his study of the influx of foreign workers' incomes to the level of wages of local workers in major US cities found that the expropriation of foreign workers had a negative effect on the level of wages earned by local workers. Similarly, the influence of the foreign workers influx on the level of wages received by the second generation of local workers. Meanwhile, capital relations with the wages of these three types of workers were positive. This meant there was a complementary relationship between capital with foreign workers, capital with local workers and capital with second generation workers. By using the regression equation, it was concluded that the complementary relationship between capital and foreign workforce was stronger in foreign workers with relatively high education compared to the relatively low-paid foreign workers. Although Grossman (1982) found a negative influence between foreign workers and employment opportunities, their impact on the decline in wage rates received by local workers was relatively small. It was found that every 1% increase in foreign labor supply would only lower the wage rate received by local

workers by 0.02%. Similarly, every 1% increased in foreign labor supply only lowers the wage rate received by second generation workers by 0.03%.

In contrast to a study conducted by Grossman (1982), a study by Borjas (1983) on the relationship between hispanic workers with black afro and white workers in the same country found that hispanic workers who were generally immigrants had a positive relationship with wage rates received by black native workers (Negro). Similarly, the relationship between these Hispanic workers and the wage rates received by local white workers, but there was no strong indicator to suggest that black native workers had a positive relationship with the rate of wages received by white workers. The positive relationship between the Hispanic foreign workers and the wage earned by these local workers indicated that the influx of foreign workers created the productivity of local workers increased, thus increasing the demand and the limited expenditure of the goods produced.

Although the results of the study conducted by Borjas (1983) was different from the results of studies conducted by Grossman (1982), but the value of elasticity coefficient produced almost the same. That was, the two findings of those studies found that the effect of foreign workers entering the level of wages received by local workers was relatively small. Borjas (1983) found that the influence of the influx of hispanic foreign workers on the increase in wage rates received by white local workers in the United States amounted to 0.160. While the influence of the influx of foreign workers to the increase in wage rates received by black native workers (Negro) was 0.023 only (Borjas, 1983: 101).

A study conducted by Laryea (1997) in Kananda on the level of substitution between foreign workers and local workers by industry and sex classification found results not much different from those studied by Borjas (1983). By using the CES (constant Elasticity of substituton) production function and the LMAS (Labor Market Activity Survey) data during 1988-1990, it was found that every 1% increased in foreign workers would increase by 1.1%

overall local worker wage rate, 1.3% wage rate of male local workers and 1.4% wage rate of female local workers. The high influences of foreign workers 'influences on the increase in local workers' wages were mainly due to the industry being the sample of studies being the main industries, ie industries that were struggling amongst foreign workers proficient with local workers in finding employment. For example it was argued that female foreign workers generally work more in large trading sectors and shop managers. While more men work in the transportation industry. Both categories of those industries contributed considerably in driving the Canadian economy.

In Malaysia, there are several studies that investigate the issues of foreign workers, such as the studies by Zulkifly (1995), Idris & Rahmah (2006), and Bachtiar et al. (2015). For example, the study conducted by Zulkifly (1995) in the case of foreign workers in plantation sector, he found that the ratio of foreign worker to total labours had increased. Meanwhile, the wage rate of local workers had shown downward trend due to the presence foreign workers influx. Although, this study was not tested empirically, but it provides the indication that the influx of foreign workers to Malaysia had brought unfavorable condition to job opportunities and wage rate of local workers. The influx of foreign workers had caused the job opportunities and wage rate for local workers decreased.

Idris and Rahmah (2006) has studied the elasticity of substitution between foreign and local workers in the Malaysian manufacturing sector. The results from the study showed that the foreign and local workers are more of substitute than complement. It indicates that if the foreign wage decreased, firms would be willing to take foreign workers to cut cost of production. A high substitutability are found in heavy industry of basic metal products. Idris and Rahmah (2006) also suggested that the influx of foreign labour may jeopardized the local in terms of job opportunity, especially in heavy industry. Similar to Idris and Rahmah, Bachtiar et al. (2015) studied the demand for foreign workers in Malaysian Manufacturing

sector found that professional foreign workers contributed significantly to manufacturing output growth. The study also found that professional foreign workers and local workers are complementary, while the unskilled foreign workers and local workers are substitutes.

III. Model Specification and Variables

This study utilizes pooling data with cross section analysis and time series. The data consisted of 12 observations time series (1994-2005) and 72 observations through cross section analysis in various industry categories. This specification may appear biased caused by firms differences that occur in certain industry categories, for instance sizes, the amount of workers, industry locations, and technology that are used in the production process (see Bregman, Fuss & Regev, 1995). Moreover, the new firms that merge with certain industry categories cannot be observed during the study conducted as well as for the firms that have been bankrupt.

From the model it can be seen that the output variable (Q), the demand for foreign workers (Lm) and local workers wage (wn) interfere with each other. Thus, to get the correct estimation, the simultaneous equation is used as follows:

$$\ln Q_{it} = \alpha_{i10} + \alpha_{i11} \ln K_{it} + \alpha_{i12} \ln L_{it} + \alpha_{i13} \ln Lm_{it} + u_{i1t} \dots\dots\dots(3)$$

$$\ln Lm_{it} = \alpha_{i20} + \alpha_{i21} \ln Q_{it} + \alpha_{i22} \ln r_{it} + \alpha_{i23} \ln wm_{it} + \alpha_{i24} \ln wn_{it} + u_{i2t} \dots\dots\dots(4)$$

$$\ln wn_{it} = \alpha_{i30} + \alpha_{i31} \ln L_{it} + \alpha_{i32} \ln Lm_{it} + \alpha_{i33} \ln wm_{it} + u_{i3t} \dots\dots\dots(5)$$

Where Q is output, and K, Ln and Lm are capital, local workers and Foreign workers respectively. In addition r, wn and wm are prices of capital goods, wage for local and Foreign workers respectively. Variables that have signs “it”, for instance “Qit” indicates that the Q variable is output that resulted in industry i in year t.

Capital (K) influences output through inputsconsumption in the production process. In this case, capital is consistedof fixed assets and current assets according to time and types of industry and technology that are used in production. Nonetheless, in producing output the owners or employers of the firms are still in need of machines and equipment. The fixed asset cannot change in a short time frame, as capital cost is too high. Moreover, in many cases when machines and equipment are bought, the owners of firms usually obtain loans from the banks with a low interest rate. Therefore, it is fair to surmise that capital is an exogenous variables in this model (Bedrossian&Petoussis,1987).

Capital goods price (r) influences output through Foreign workersdemand. Thereby, the increase of capital goods will cause decrease in the number of physical capital inputs and skilled workers in the production process. Eventually, the firms or industries would switch to semi-skilled Foreign workers(Griliches,1969; Borjas,1983; and Hamermesh,1984).

Foreign workerswage (w_m) influences output growth through industrial demand for foreign workers. The increasing of wage could stimulate firms or industries to their inputs' consumption in their production process. Then, the firms that areof an industry will usually dispense their demand for foreign workers. In contrast, there are many cases where increasing of wage causes industrial demand for foreign workers. In the labor market theory, there is a positive relationship between wage and industrial demand for foreign workers whereby it is discussed in higher wage economic theory (see Ress, 1973 and Katz, 1986).

In high wage economic theory, it is stated that improvement in wage can create better moral and prosperity among workers. It can also improve workers' motivation. In this situation, high productivity and competitiveness among the workers will cause them to achieve better heights. Even in the new version of the high wage economic theory, which is known as *efficiency wage theory*, it clarifies that the firms' profits can improve if wages are

paid is above the equilibrium of the market wage. It means, that high wage is a stimulus for workers' motivation, which in turn will minimize workers' turnover cost, reduce labor union bargaining power, and attract more qualified workers (Katz, 1986).

Local workers wage (w_n) can also influence output growth due to industrial demand for foreign workers. The increasing of local workers' wages can influence firms to replace their labor input with a cheaper alternative. In the short term, the employers' alternative is replacing the utilization of local workers with foreign workers in the production process. The adjustment of this labor input in labor market theory is known as cross elasticity substitution between local workers and foreign workers (Borjas, 2000).

IV. The Procedural Analysis and Sources Of Data

As explained earlier, the output variable (Q), the demand for foreign workers (Lm) and local workers wage (w_n) influences one another. That is why, the usual regression equation (OLS) often used by econometric experts is less precise. To overcome this problems, the simultaneous equations are use in order to obtain the estimation results that are more precise and accurate than OLS. To that end, there is an alternative that we can use; which is to swap the equation system's structure as shown by equation (3) up to equation (5) to the derivative equation form (*reduced form*). Structure edequationis an equation in which the function of endogenous factors functions to the exogenous and endogenous factors. When the equation of this structure is transformed in the reduced form, the endogenous factors in the model will serve to exogenous factors alone (Greene, 2000).

In general, the derivate equation (*reduced form*) presented in this study are as follows:

$$\ln Q_{it} = \Pi_{i10} + \Pi_{i11} \ln K_{it} + \Pi_{i12} \ln ln_{it} + \Pi_{i13} \ln r_{it} + \Pi_{i14} \ln wm_{it} + v_{i1t} \dots\dots\dots(6)$$

$$\ln Lm_{it} = \Pi_{i20} + \Pi_{i21} \ln K_{it} + \Pi_{i22} \ln Ln_{it} + \Pi_{i23} \ln r_{it} + \Pi_{i24} \ln wm_{it} + v_{i2t} \dots\dots\dots(7)$$

$$\ln wn_{it} = \Pi_{i30} + \Pi_{i31} \ln K_{it} + \Pi_{i32} \ln r_{it} + \Pi_{i33} \ln wi_{it} + \Pi_{i34} \ln wj_{it} + v_{i3t} \dots\dots\dots(8)$$

Where Π_{ijk} is a function of the parameter α_{ijk} in equation (3) so that equation (5), or $\Pi_{ijk} = f(\alpha_{ijk})$, and $v_{ijt} = f(\alpha_{ijk} \text{ and } u_{ijt})$.

Instrument variables are used to avoid the mistakes in simultaneous equations models. In this study, the estimation for production function (Q_{it}), the demand function for foreign workers (Lm_{it}), and the local workers wage function (wn_{it}) used instrument variables, such as input of capital, price of capital, and wage for foreign workers based on job categories. Although, the utilization of instrument variables will not solve all problems that are related to simultaneous equations, the usage of instrument variables is expected to minimize cross section variation (Bregmant et.al.,1995). Moreover, to estimate the parameters in simultaneous equations, the equation of 2-SLS(two stage least squares)is used. This equation is commonly applied in econometrics. To obtain the desired parameters, estimations are performed using the SPSS computer program package.

Data used in this study are based upon the Industrial Survey conducted by The Department of Statistics Malaysia for the period of 1994-2005. This is after the memorandum of understanding (MoU) between Malaysian and Indonesian officials, and some other countries in 1984. Specifically the data used in this study areas follows: *First*, production or output (Q) macro data of each industry have a four-digit classifications. The data covers gross value of outputs produced by each industrialclassification based on a constant price in 2000.

Second, capital data (K) consists of fixed asset and current assets, types of industry and technology that are used in the production process. In practice, the physical capital input data are very difficult to obtain,. This is because the capital represents certain types of assets, such as machines, equipments, vehicles, and building for plants and offices. Therefore, to calculate these assets for capital stock can create some problems.To estimate the stock value of capital, the data of machines and equipments depreciation from various industries are used as proxy.

Third, the number of labor data (L), the number of local workers (L_n) and the number of foreign workers (L_m) for each industry, have five job categories. They are professional workers (L_{mp}), technical-supervisor (L_{mtp}), skilled workers (L_{mm}), middle-skilled (L_{msm}) and unskilled workers (L_{mtm}). Professional workers are those who have professional training to conduct certain tasks such as research, and knowledge to solve problems related to technology, economy and social welfare. Professionals are usually connected to engineers, architects, doctors, lawyers, and accountants. Technical-supervisors are those involved in research and directed by professionals. Skilled workers are workers who have formal training. Middle-skilled workers are those with limited training and not included in the skilled workers category. Further, the unskilled workers are those who have never had related training to do their jobs.

Fourth, the wage data in this study are the data of wage paid by industry for all workers according to the industrial classifications and their job categories. The wage data is real wage data that is accepted by workers per year. In view that there is no detailed data available regarding wages for every worker, the wage data used in this study will be proxied by wage share that is paid by each industry category for all workers according to their job types. The data use consumer price index on the basis of constant price in year 2000.

Others data are also used in this study; namely those that are related to interest spent by each industry. In the case of capital (K), it is difficult to select the appropriate variable to be applied to measure the price of capital goods. This is because it involves various values such as assets values, depreciation, interest rates and tax (Hebbink, 1993). The data used as proxy to measure the price of capital goods (r) is interest rate; this means the firm's cost's expenditure is a consequence as well as getting bank loan.

V. Empirical Findings

Table 1 shows the estimation results of the Cobb-Douglas production function and resources of outputs growth from various categories of industry. In general, it can be stated that the process of industrial development in Malaysia has shown some results whereby physical capital and local workers have a positive role and they are significant at improving Malaysia's output, except for local workers participation in the food, beverage and tobacco industry (ISIC 31), wood, wood products and furniture industry (ISIC 33).

Table1. Cobb-Douglas Estimation Function Baseon Industry Categories and Job Types

Variable	ISIC (International Standard Industry Classifications)					
	31	32	33	35	36	38
K	1.177 (10.34)***	.457 (2.71)**	.817 (4.12)***	.416 (3.29)***	.770 (7.55)***	.462 (5.66)***
Ln	-.037 (-0.27)	.487 (4.47)***	.160 (-1.35)	.216 (2.58)**	.263 (1.59)*	.518 (5.91)***
Lmp	-.044 (-.53)	.170 (.826)	-.167 (-1.352)	.292 (2.19)**	.431 (3.06)***	.129 (2.13)**
Lmtp	.114 (2.28)**	.060 (0.597)	-.006 (-.062)	-.018 (-.214)	-.109 (-1.66)*	-.037 (-.951)
Lmm	.091 (1.80)*	-.029 (-.434)	-.090 (-.853)	-.022 (-.351)	-.057 (-1.17)	.014 (.371)
Lmsm	-.122 (-3.14)***	-.090 (-.610)	.098 (.570)	-.001 (-.011)	.082 (.599)	.014 (0.279)
Lmtm	.074 (0.79)	.052 (.404)	.092 (.719)	-.021 (-.324)	-.063 (-.851)	-.016 (-.382)
Constant	2.225 (2.44)**	3.964 (2.54)**	3.864 (2.54)***	6.859 (5.20)***	1.793 (1.21)	3.888 (6.43)***
R ²	.928	.983	.990	.925	.860	.956
N (Obs.)	56	18	24	39	34	93

Note: 31= Food, Beverage and Tobacco Industry; 32= Textile, Garmen, and Leather industry;

33= Wood, Wood Products and Furniture Industry; 35= Chemical and Chemical products

36= Non-Metal Products; 38= Fabricated metals, Machinery, electronic and equipment

***= Denote Statistical Significance at the 1%; **=Denote Statistical Significance at the 5%;

*= Denote Statistical Significance at the 10%

The testing of Cobb-Douglas production function shows that professional foreign workers have important contribution to outputs growth of various industries in Malaysia, particularly in heavy industries that are capital intensive. For instances, chemical, chemical products, petroleum, rubber and plastic industry (ISIC 35), non-metal products industry (ISIC 36), also as well as fabricated metals, machineries, electronics and equipments industry (ISIC

38). Meanwhile, skilled and technical-supervisors of foreign workers have significant roles in the outputs of light industries, especially for food, beverage and tobacco industry (ISIC 31). This means the expatriate workers have consequential participation in outputs' growth of various industries in Malaysia.

Table 2 shows the estimation of demand function for foreign workers according to industrial categories and job types. In general it can be stated that outputs, the prices of capital goods and wage have influenced the industries at various levels. However, positive and significant elasticity of demand– outputs are founded in the textile, garment and leather industries (ISIC 32); fabricated metals, machineries, electronic and equipments industries (ISIC 38); chemical, chemical products, petroleum, coal, rubber and plastic industries (ISIC 35); and non-metal products industries (ISIC 36).

This study findings complement previous studies, of Stein (1981) and Myint (1984). In their studies, they found that the demand for foreign workers by export-oriented industries tends to increase. However, industrial demand for import substitution has a tendency to decline. This is because export-oriented industries are more likely to achieve the economic of scale than import substitution industries. In addition, the prices of goods of export-oriented industries are more stable than the price of goods for import substitution industries. The negative relationship between industrial demand for foreign workers who have high skills with capital goods in ISIC 32 and ISIC 36, indicate that capital and foreign workers are complementary, especially for professional and technical-supervisor foreign workers. It matches the prior studies by Griliches (1969), Hamersmesh (1984), Borjas (1993), and Bachtiar et.al. (2015). They found that there was a substitution relationship between capital and unskilled foreign workers. Meanwhile, the relationship between capital and high skilled foreign workers are complementary in the process of production. This means, if there is an

Table2. The Estimation of Industry Demand function for Foreign WorkersBase onIndustry and Job Categories

Code ISIC	Variable	Job Categories				
		Professional	Technical Supervisor	Skilled	Semi-Skilled	Un-skilled
31	Q	.349 (5.26)***	.507 (5.29)***	.019 (.178)	-.044 (-.244)	.017 (.144)
	r	-.041 (-.626)	-.031 (-.388)	.054 (.484)	-.075 (-.416)	-.061 (-.469)
	wm	.954 (27.60)***	1.012 (35.06)***	.972 (25.63)***	.844 (13.96)***	.831 (13.87)***
	wn	-.423 (-9.51)***	-.740 (-10.12)***	-.236 (-3.21)***	.071 (.455)	.010 (.071)
	Constant	-4.442 (-12.59)***	-2.789 (-7.18)***	-.433 (-.735)	.033 (.039)	-.008 (-.010)
	R ²	.971	.976	.949	.897	.925
	N(Obs.)	56	56	56	56	56
32	Q	.644 (4.99)***	.845 (7.16)***	.291 (2.56)**	-.263 (-.403)	.063 (.458)
	r	-.242 (-1.253)	-.416 (-4.03)***	-.277 (-2.90)**	.307 (.560)	-.143 (-1.287)
	wm	.647 (4.36)***	.839 (14.69)***	.916 (40.94)***	.691 (4.410)***	.859 (35.92)***
	wn	-.126 (-1.275)	-.321 (-2.05)*	.023 (.391)	.391 (.916)	.204 (1.820)*
	Constant	-6.807 (-8.10)***	-6.123 (-12.37)***	-2.968 (-6.53)***	-2.899 (-1.368)	-2.031 (-4.08)***
	R ²	.981	.989	.996	.916	.925
	N(Obs.)	18	18	18	18	18
33	Q	.014 (.065)	.386 (2.72)**	.279 (1.039)	.149 (.670)	.535 (2.44)***
	r	.185 (.672)	.184 (1.166)	.073 (.228)	.342 (1.206)	.109 (.501)
	wm	.586 (5.70)***	.722 (15.82)***	.908 (15.24)***	.921 (14.08)***	.810 (24.40)***
	wn	-.002 (-.013)	-.347 (-3.69)***	-.388 (-1.272)	-.645 (-2.03)*	.445 (-3.54)***
	Constant	-2.789 (-2.71)**	-4.936 (-6.14)***	-2.116 (-1.207)	-.067 (-.050)	-3.897 (-3.39)***
	R ²	.984	.996	.990	.991	.994
	N(Obs.)	24	24	23	24	23
35	Q	.882 (3.95)***	.634 (2.36)**	.162 (.324)	1.252 (1.97)*	-.283 (-.938)
	r	-.054 (-.329)	-.226 (-1.225)	.073 (.213)	-.479 (-1.163)	.110 (.561)
	wm	.563 (3.90)***	.802 (9.69)***	.756 (10.02)***	.940 (7.63)***	.870 (27.99)***
	wn	-.322 (-1.76)*	-.049 (-.273)	.134 (.512)	-.655 (-3.045)***	.230 (2.84)***
	Constant	-9.753 (-5.29)***	-8.318 (-5.21)***	-5.512 (-1.61)*	-8.670 (-1.97)*	-.249 (-.124)
	R ²	.898	.932	.869	.780	.971
	N(Obs.)	39	39	39	39	39

36	Q	1.709 (4.44)***	.062 (.296)	-.251 (-1.441)	.103 (.305)	-1.100 (-4.14)***
	r	-1.003 (-2.99)***	-.278 (-1.60)*	-.298 (-1.92)*	.087 (.232)	.783 (2.77)***
	wm	.670 (7.04)***	.895 (18.47)***	.810 (19.76)***	1.076 (6.857)***	.848 (18.82)***
	wn	-.844 (-4.85)***	-.183 (-1.15)	.442 (2.22)**	-.892 (-4.58)***	.450 (3.56)***
	Constant	-7.130 (-3.93)***	1.288 (1.450)	.844 (.919)	3.504 (1.93)*	1.562 (1.131)
	R ²	.687	.960	.985	.712	.938
	N(Obs.)	34	34	34	34	34
	38	Q	.445 (3.34)***	.020 (.294)	.551 (3.78)***	-.098 (-.618)
r		-.082 (-.986)	.151 (3.06)***	-.114 (-716)	.284 (1.89)*	.167 (1.075)
wm		.695 (16.52)***	.841 (31.88)***	.770 (17.93)***	.776 (17.36)***	.812 (24.58)***
wn		-.097 (-1.132)	-.044 (-.662)	-.373 (-3.74)***	-.117 (-1.030)	.208 (1.61)*
Constant		-6.250 (-11.55)***	-3.405 (-13.96)***	-3.876 (-5.66)***	-.853 (-1.254)	-.291 (-.340)
R ²		.970	.979	.900	.892	.911
N(Obs.)		93	93	93	93	92

Note: 31= Food, Beverage and Tobacco Industry; 32= Textile, Garmen, and Leather Industry; 33= Wood, Wood Products and Furniture Industry; 35= Chemical and Chemical Products; 36= Non-Metal Products; 38= Fabricated metals, Machinery, electronic and equipment.

***= Denote Statistical Significance at the 1%; **= Denote Statistical Significance at the 5%;

*= Denote Statistical Significance at the 10%

increase in capital goods, the employers will shift from their capital and invest more in unskilled foreign workers.

The shift in response of industrial demand for foreign workers as an affecto the increase in foreign workers wage is positive and significant to all industry categories. This positive relationship does not suit the theory. Instead, it relates to the introduction of lower wage labor applied by Malaysia since the 1970s. This policy has brought some multinational corporations into Malaysia (especially those who are labor intensive) to replace their workers with contracted workers and cheaper foreign workers from various countries such as Indonesia.

The positive relationship between wage and demand for foreign workers is also related to foreign employers or owners preferences of employing workers from their own countries. In Malaysia, most foreign multinational corporations prefer to hire workers from

their own countries, particularly for professional and technical-supervisor workers. The demand for these high level foreign workers is determined by owners' decision, although their wages are high. Hence, this situation is also related to the owners' perceptions (including local owners); whereby they are more interested in hiring foreign workers rather than local workers. They think that foreign workers of this category are more efficient, productive, and have a higher commitment to their jobs.

The response of industrial demand for foreign workers to the change of local workers' wage shows varying relationships from one industry to another. However, the response of unskilled foreign workers to the increasing of local workers' wage is positive for all industrial categories. Meaning, the increase in unskilled local labor's wage causes an increase in the industrial demand for foreign workers. The finding of this study indicates that unskilled foreign workers are substitutes for local workers of the same category. Although there is a substitution relationship between local workers and unskilled foreign workers, for high skilled foreign workers such as professionals and technical-supervisors, there is opposite correlation, whereby the coefficient results are negative. As such, the high skilled foreign workers are complements to local workers in the production process. This matches prior studies such as by Norman and Meikle (1985) in Australia, Winegarden and Khor (1991) in the US, Zimmermann (1995) in some European countries, Venturini (1999) in Italy, as well as Idris and Rahmah (2006) in Malaysia. In their studies, they found that foreign workers are complements to local workers. Therefore, those foreign workers could not be seen as competitors for local workers in the production process.

Table 3 demonstrates the results of the wage function of local workers that are based on industry categories and job types. In general, it can be stated that the influx of foreign workers brings negative consequences and is significant in influencing the local workers' wage. Even though, the contributions are dissimilar between these industry categories and others,

mostly, the negative impact of foreign workers influx to the level of wage is higher in food, beverage, and tobacco industry (ISIC 31), textile, garment, and leather industry (ISIC 32) and non-metals industry (ISIC 36). The contribution level of foreign workers influx to the wage rate of local workers is related to the number of foreign workers. In heavy industries, for example in ISIC 38, for the use of technology in the production process the expertise and high skill of the foreign workers and professionals is imperative. Therefore, they have higher wage than local workers' wage. However, the influx of foreign workers in the industry labor markets has a small impact to the decreasing of local workers wage. On the contrary, for light industries for instance in ISIC 32 the process of industry development uses more unskilled workers. Those low skilled workers are abundantly available and easy to hire. Thereby, the influx of low skilled foreign workers can reduce the wage level of local workers.

The effect of foreign workers influx to the decreasing of level wage for local workers varies at each skilled level. In light industries, for examples in ISIC 31 and ISIC 33 the decreasing of wage are caused by the increasing of demand for low skilled foreign workers, particularly for middle-skilled and unskilled workers who contribute more than high skilled workers. On the other hand for the middle and heavy industries, such as in the groups of ISIC 35, ISIC 36, and ISIC 38 are affected in the opposite way where the professional and technical-supervisor foreign workers cause the decreasing of wage.

For all industry categories, the contributions of foreign workers wages improvement for local workers wages are positive and significant. Meaning, the increasing of foreign workers' wage will be followed by the increasing of local workers' wage as well. Nevertheless, the results of these contributions have variations between industries. For examples, in ISIC 31 and ISIC 36, the local workers wages for skilled and middle skilled are paid higher than foreign workers in the same categories. The same thing also happens in ISIC 32 and ISIC 35 where wages for professionals and technical-supervisors for local

**Table3. The Estimation of Local Workers WegeFuction
Base on Industry and Job Categories**

Code ISIC	Variabel	Job Categories				
		Professional	Technical- Supervisor	Skilled	Semi- Skilled	Unskilled
31	Ln	1.012 (52.107)***	1.004 (94.947)***	0.957 (33.585)***	1.015 (44.901)***	.995 (21.531)***
	Lm	-.907 (-19.949)***	-.879 (-36.891)***	-1.129 (-17.441)***	-1.125 (-26.773)***	-.985 (-16.492)***
	Wm	.898 (9.993)***	.872 (37.188)***	1.144 (18.695)***	1.102 (31.939)***	.995 (21.531)***
	Constant	0.302 (2.026)**	0.336 (4.409)***	0.004 (0.020)	-0.154 (-0.925)	0.251 (1.039)
	R ²	.994	.996	0.978	0.985	.978
	N(Obs.)	56	56	56	56	56
32	Ln	1.144 (30.696)***	1.024 (28.619)***	.987 (76.2002)***	.991 (59.407)***	1.007 (47.031)***
	Lm	-1.188 (-11.702)***	-1.010 (-12.153)***	-.952 (-10.274)***	-.959 (-25.142)***	-1.010 (-8.441)***
	Wm	1.076 (11.758)***	1.003 (16.391)***	.954 (11.489)***	.960 (31.284)***	.986 (9.495)***
	Constant	-0.670 (-1.609)*	-0.124 (-0.395)	0.209 (1.008)	0.138 (0.976)	0.114 (0.483)
	R ²	.990	.997	.999	.998	.997
	N(Obs.)	18	18	18	18	18
33	Ln	.987 (30.616)***	1.016 (214.72)***	1.002 (57.570)***	.997 (58.179)***	1.002 (114.32)***
	Lm	-1.051 (-10.700)***	-1.037 (-77.256)***	-1.063 (-19.546)***	-1.058 (-18.348)***	-1.049 (-36.126)***
	Wm	1.034 (17.658)***	1.013 (100.84)***	1.056 (22.442)***	1.045 (22.153)***	1.041 (43.495)***
	Constant	-0.034 (-0.168)	-0.072 (-2.025)*	-0.109 (-0.717)	0.017 (0.165)	-0.028 (-0.438)
	R ²	.999	.999	.999	.999	.999
	N(Obs.)	24	24	23	24	23
35	Ln	.991 (81.101)***	.999 (39.460)***	.767 (11.28)***	.977 (86.087)***	.999 (85.156)***
	Lm	-1.012 (-76.794)***	-1.028 (-17.193)***	-0.110 (-0.941)	-.984 (-63.715)***	-1.006 (-19.450)***
	Wm	1.019 (146.13)***	1.017 (21.941)***	.193 (2.098)**	.999 (98.050)***	1.001 (21.662)***
	Constant	-0.054 (-0.879)	-0.004 (-0.015)	3.476 (6.047)***	0.102 (1.372)	0.037 (0.264)
	R ²	.999	.994	.892	.998	.997
	N(Obs.)	39	39	39	39	39
36	Ln	1.089 (11.774)***	.974 (35.402)***	.910 (12.297)***	1.057 (9.167)***	.999 (17.435)***
	Lm	-.877 (-5.858)***	-.953 (-21.106)***	-1.168 (-9.409)***	-1.239 (-12.609)***	-.968 (-8.386)***
	Wm	.912 (11.346)***	.964 (24.181)***	1.149 (10.559)***	1.038 (29.909)***	.879 (8.719)***
	Constant	-0.167 (-0.285)	0.248 (1.289)	0.424 (0.670)	0.508 (0.918)	0.697 (1.383)
	R ²	.898	.988	.923	.975	.917
	N(Obs.)					

	N(Obs.)	33	33	33	33	33
38	Ln	1.021 (98.625)***	.999 (101.24)***	1.007 (75.888)***	1.007 90.365)***	1.005 (29.917)***
	Lm	-1.127 (-39.207)***	-.904 (-16.066)***	-1.033 (-35.030)***	-1.038 (-29.154)***	-.525 (-3.492)***
	Wm	1.100 (37.417)***	.908 (19.744)***	1.011 (50.236)***	1.003 (38.254)***	.530 (4.221)***
	Constant	-0.430 (-3.241)***	0.278 (1.710)*	-0.001 (-0.009)	0.114 (1.342)	0.733 (2.326)**
	R ²	.999	.998	.993	.994	.931
	N(Obs.)	93	93	93	93	92

Note: 31= Food, Beverage and Tobacco Industry; 32= Textile, Garmen, and Leather Industry;
33= Wood, Wood Products and Furniture Industry; 35= Chemical and Chemical Products;
36= Non-Metal Products; 38= Fabricated metals, Machinery, electronic and equipment.

***= Denote Statistical Significance at the 1%; **= Denote Statistical Significance at the 5%;

*= Denote Statistical Significance at the 10%

workers (include for unskilled workers in ISIC 35) are paid higher than foreign workers. Hence, in ISIC 32 and ISIC 38, all categories for local workers are paid higher than foreign workers, except for technical-supervisors in ISIC 38.

VI. Conclusions and Implications

In conclusion, it can be stated that highly skilled foreign workers are still necessary for industrial development in Malaysia. At the same time, the presence of those foreign workers negatively impact local wage level. Therefore the dependence could be eliminated through several efforts. *First*, by redesigning the human resource development to produce the high skilled workers; that is through the cooperation between universities and industries. *Second*, by utilizing advanced technology and investing in more machineries and modern equipments. *Lastly*, by giving incentive to research and development (R&D) staff, i.e. technology that corresponds to local workers' abilities.

a. The Using of Professional workers

For middle and heavy industries that are capital intensive in their process of production, such as in the chemicals industry, chemical products, petroleum, coals, rubber and plastic industries (ISIC 35), and non-metals industry (ISIC 36) the professional foreign

workers are still needed,—since they are as a catalyst for output growth. Meanwhile, the technical-supervisors, especially of the ISIC 36 should be reduced and replaced with local workers since these foreign workers can stagnant outputs. The use of professional foreign workers in these three industry categories is essential to push technological transfer.

The demand for professional foreign workers is still beneficial for heavy industries, for example in the fabricated metals, electronics, and equipments industries (ISIC 38). However, their contribution to outputs' growth is relatively small compared to middle and heavy industries that intensively utilize physical capital. For the food, beverage and tobacco industries (ISIC 31), the demand for skilled and technical-supervisor foreign workers are still needed due to technological development in the production process. In contrast, the use of middle skilled foreign workers should bereduced, since they can impede the output growth.

b. The Utilization of Advanced Technology

Another way to reduce the dependence on foreign workers, especially for low skilled workers is by using modern technology. It is essential for those industries which are labors intensive replaceworkerswith semi-automatic or automatic machineries. In the future,the manufacturing industry cannot relyonlyon the laborers of low cost, butto utilize technology and be of capital intensive.

c. The Regulations of Price Inputs

The substitution ability between capital and labor shows that each changes in price ratio, such as the increasing in interest rate, will stimulate the demand for workers, including foreign workers demand, especially for lower skilled and unskilled. For capital intensive industries or industries with high demand-capital elasticity, the policy to increase the interest rate will cause the diminishing of industrial activities. Therefore, regulationsthat maintain

interest rate is critical to improve the investment and utilization of technology for various industries in Malaysia.

d. The Welfare of Workers

Since the 1980s the cheap labor cost strategy used is aimed to maintain the minimum wage rate. It has provided a lot of benefits for the growth of manufacturing industries in Malaysia. However, in the future the cheap labor strategy can not be justified to maintain products' competitiveness. The benefits from lower labor cost have since diminished as several industrial countries namely the US and the European community had highlighted on the social issues of labor during the World Trade Organization (WTO) forum; whereby this problem is related to the ILO agreement. If the agreement is not followed, this issue will be a barrier of non-tariff trade for developing countries.

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Appendix

Table 1. Migrant Worker in Malaysia by Contry of Origin

Country of Origin	Year					
	2002		2008		2013	
	Number	%	Number	%	Number	%
Indonesia	788,221	73.8	1,085,658	52.6	1,051,227	53.0
Bangladesh	82,642	7.7	316,401	15.3	352,005	17.8
Thailand	20,599	1.9	21,065	1.0	Na	
Philippines	21,234	2.0	26,713	1.3	Na	
Pakistan	2,000	0.2	21,780	1.0	Na	
Others	152,833	14.3	591,481	28.7	579,433	29.2
Total	1,067,529	100	2,622,596	100	1,982,665	100

Note :na is not available

Source:Ministry of Home Affairs, Malaysia, 2015

Table 2.Migrant Workers in Malaysia by Sector

Sector	Year							
	2002		2005		2008		2011	
	Number	%	Number	%	Number	%	Number	%
Maid	232,282	22.0	320,171	17.6	293,359	14.2	184,092	11.7
Manufacturing	323,299	30.6	581,379	32.0	728,867	35.3	580,820	36.9
Plantation	298,325	28.2	472,246	26.0	333,900	16.2	299,217	19.0
Construction	149,342	14.1	281,780	15.5	306,873	14.9	223,688	14.2
Services	64,281	6.1	159,662	8.8	211,630	10.3	132,919	8.4
Agriculture	Na		Na		186,967	9.1	152,325	9.6
Total	1,067,529	100	1,815,238	100	2,061,596	100	1,573,061	100

Note :na is not available

Source:Ministry of Home Affairs, Malaysia, 2011.