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A Mapping of Job Opportunities for Indonesian Migrant Workers in the Malaysian Manufacturing Industry

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Abstract

This paper aims to place Indonesian migrant workers based on a mapping from the estimation of the demand function of foreign workers and the efficiency of production costs. The demand function of foreign workers and the function of production costs are obtained through a derivation in the function of Constant Elasticity of Substitution (CES) production. The mapping of Indonesian migrant workers placement applies five scenarios by the assumption that local wage constantly increased using panel data from the Malaysian manufacturing industries, period 2002-2015. The result found that the relationship of all foreign workers with local workers at various levels of skills in the manufacturing industry is substitution. The priority for high-skilled which is a priority for placing Indonesian migrant workers is manufacturing industries with CA code and CI code, middle-skilled is manufacturing industries with CB code, CI code, and CJ code, low-skilled is manufacturing industries with CA code, CL code, and Other manufacturing industries.

Keywords: Foreign workers; Placement of indonesian migrant workers; Wages; Price of capital goods; The cost of production.

1. Introduction

Disaster-prone areas, war zone, poor country are some of the reasons why people migrate or looking for a job abroad as stated by Martin (2009) in his research in the Asia Pacific region that the main reasons people migrate to other countries can are classified into two types i.e. economy and non-economic. Indonesia is one of the country's disaster-prone and has caused many people to lose their jobs, and then look for jobs abroad, particularly Malaysia. Economically, labor mobility occurs due to two factors, i.e: demand-pull and supply push, while non-economy is network. Demand-pull occurs because of the demand for labour from the company's destination country; supply push is caused by low wages and the number of unemployed people in the country of origin, and emergency factors such as disaster-prone areas in the country of origin, while the network is a network of relatives who invite to work abroad.

The development of Malaysia's manufacturing industry with technology orientation has been developing since the early 1990s in comparison to Indonesia which is still oriented to the primary product industry so that there are many foreign workers in Malaysia. The rapid growth of the Malaysian manufacturing industry is inseparable from the ownership of workers who are very adequate from both domestic and foreign so that the company can carry out the efficiency rate of the production cost of the production factor. Statistical data in 2015 showed that the manufacturing industry with fulltime workers is 2,075. 446 workers and part-time is 12,555 workers (Department of Statistic Malaysia, 2017). Besides, based on the Ministry of home affairs (2018), up to February 28, 2018, Indonesia placed the most workers in Malaysia, and the manufacturing industry became the third-largest placed by Indonesian migrant workers after the agricultural sector and construction sector. All foreign and local workers are divided into three skill levels, namely high-skilled workers, middle-skilled workers, and low-skilled workers.

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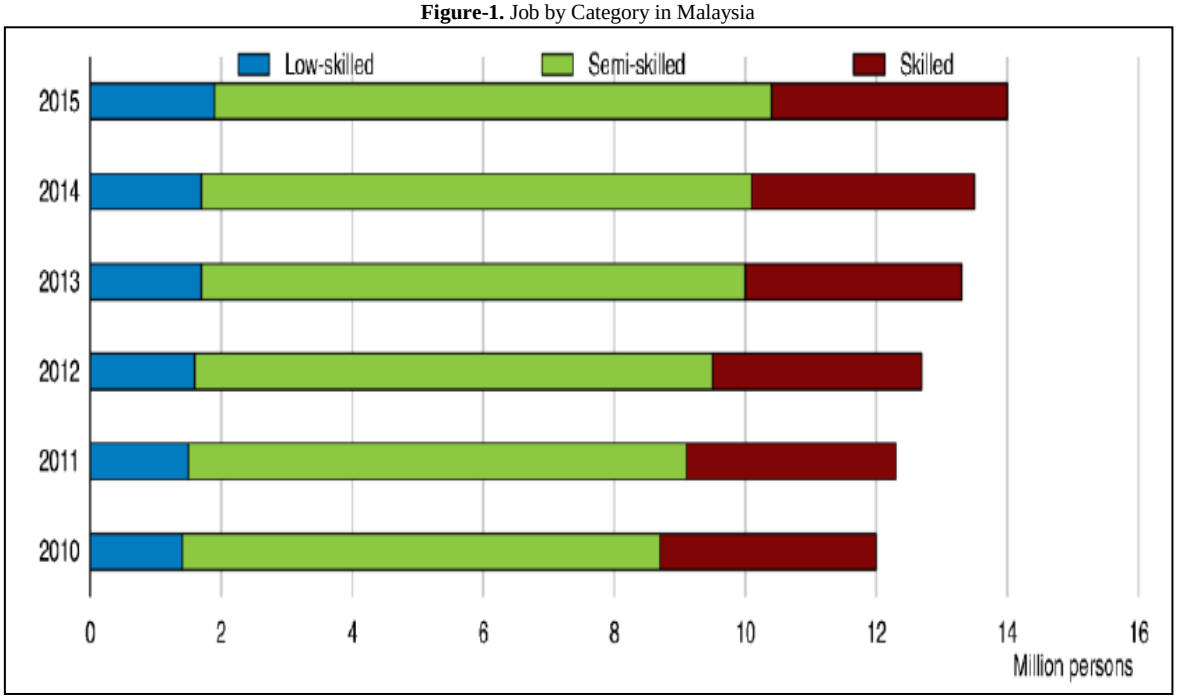
Figure-1. Job by Category in Malaysia



Source: Nixon *et al.* (2017)

Figure 1. Shows that in 2015, workers in Malaysia both foreign and local were mostly in the middle-skilled and then followed by low-skilled and high-skilled workers. The classification of workers based on the skill level disproved the Cobb Douglas theory stating that the factors of the production are homogeneous as described in Borjas' research and others. Borjas (2013) and Hamermesh (1986) research have proven that workers are heterogeneous because they can be classified by gender, age, ethnicity, education, experience, and training. Through the classification of workers, it can explain the substitution and complement between foreign and local workers. Substitution or complement relationship will also have an impact on the use of technology, the level of wages, employment opportunities and efficiency of production costs in the manufacturing industry. The existence of foreign workers is indispensable in Malaysia especially low-skilled. According to research Devadason (2013) A, Malaysians prefer to work in the office, with a cool room compared to the work in 3D (dirty, demeaning and dangerous).

The efficiency of production costs is closely related to production factors. According to Fahmy-abdullah *et al.* (2018) efficiency is the use of production factors effectively to produce output. A country that has a high level of labour mobility with heterogeneous workers that is between foreign and local with various levels of skills causes the industry to be able to choose production factor needs by considering the efficiency of production costs. Industries make decisions in a dynamic labour market environment, providing an opportunity for industries to choose between foreign and local workers; and foreign workers with capital taking into account production cost efficiency factors.

The Indonesian government in the effort to put Indonesian migrant workers in Malaysia especially in the manufacturing industry, we recommend taking into account the factor of substitution/complement relationship and factor of efficiency. The relationship of substitution/complement could be noticed through the relation between foreign and local workers; and also, through the relation between foreign workers and capital. The operational cost efficiency factor carried out by the Malaysian manufacturing industry.

Substitution and Complement. Foreign and local workers as one of the factors of production greatly determine the economic growth of a country. These factors of production in previous research studies can be complementary or substitute. The results of studies between foreign and local workers have a positive influence when it is a complementary and negative influence when substitute. Substitution or complement also impacts on the use of technology, wage rate, employment opportunities and production cost efficiency in the manufacturing industry. Substitution or complement relationships can be determined through elasticity. In accordance with Borjas (2013) which states that labour production factors are heterogeneous so that the production function is $Q = f(X_1, X_2, X_3, \dots, X_n), f_i > 0$ and $f_{ii} > 0$ whereby the company will use a number of production factors to produce output, as well as consider the function of production costs $C = g(w_1, w_2, w_3, \dots, w_n, Q),\ g_i > 0$. The heterogeneous production factors have complement or substitution relationships through the partial elasticity of demand and price of production factors ε_{ij}. The complement relationship will occur if $\varepsilon_{ij} > 0$ and a substitution relationship will occur if $\varepsilon_{ij} < 0$. If cross elasticity of factor demand is positive, if the cross elasticity of factor demand is positive, then the demand for input i increases when input wage w_j rise, these two inputs (i *and* j) are substitutions in production. Increasing the demand for input i will reduce the demand for input j. The firm will use relatively cheaper inputs.

According to Schoellman (2010) foreign workers who have cognitive-intensive abilities work more in the United States than are intensive-communicative who employ more local workers. Waldorf (2011), high-educated foreign workers are asked more in the gateway area and capital agglomeration in the manufacturing industrial area. Oğuz (2011), research suggests that the demand for skilled and knowledgeable Turkish immigrants in EU companies

tends to increase but this will change if the wages of Turkish immigrants are too high. Manacorda and Manning (2012) high-educated immigrants to local workers are imperfect substitutions in the United Kingdom production sector and this is following the results of research by Felbermayr *et al.* (2010) and Ottaviano and Peri (2012) in various countries. Bettin *et al.* (2014), explain that high-skilled foreign workers complement each other with local workers in the Italian manufacturing industry, but the company will replace the foreign workers with low-skilled local workers when the wage of foreign workers is high.

Borjas and Doran (2015), in their research entitled "Cognitive mobility: labour market responses to supply shocks in the space of ideas" reported that the demand for immigrants from Soviet Union mathematicians increased so that US mathematicians moved away from the research area. Educated and knowledgeable and experienced foreign workers have a negative impact on local workers. While Asali (2017) Palestinian foreign workers complement each other with local Israeli Arab workers, but not with Jewish Israel and this strengthens the results of his 2013 study. However, and negative relations with foreign workers and Israeli Arab workers who lack skills and work experience, as well as negative relations between foreign workers and Jewish Israeli workers.

Based on Kumar *et al.* (2012) study, Malaysia suffered a crisis of shortage of workers in the year 2000s, due to the development of human resources program by sending skilled workers abroad for 5 years, while the manufacturing industry was growing so rapidly since 1990. Therefore, the Malaysian government imported foreign workers from various countries including Indonesia through the Memorandum of Understanding (MoU). And this is in accordance with the research of Devadason and Subramaniam (2016) which states that the Malaysian labour market tends to require skilled foreign workers rather than unskilled workers due to the addition of manufacturing industry in Malaysia.

Bachtiar *et al.* (2015), in their study found that the demand for professional labour and technical supervisors had positive and complementary relationships with local workers and capital. In addition, Ismail *et al.* (2014); Ismail and Yuliyusman (2014) and Nur Fakhzan (2011) the demand for professional foreign workers increased because it has been able to encourage Malaysian economic growth both in the short and long term and immigrants have been able to create jobs in the public and private sectors. However, Osman *et al.* (2015) in their study found that the existence of foreign workers has led to increased unemployment because Malaysia workers were not ready to move to small cities in Malaysia.

Technical Efficiency and Foreign Workers. Technical efficiency is a consideration for firms to optimize operational costs in producing output so that the firms will choose efficient and effective production factors, namely between foreign with local workers and workers with capital. By measuring the technical efficiency of production cost, it will boost the country's economic growth. Technical efficiency can also be measured by the changes in wages so that firms will consider an effective and efficient workforce to increase productivity. As in the study Yusof (2008) who stated that high wages would increase higher productivity levels to increase the production of the firms.

As in Ali and Hamid (1996) study in Pakistan which stated that technical changes in the use of effective production factors and efficiency have influenced economic growth by 50% (from production factors i.e. capital), influencing the agricultural sector by 20% and the manufacturing sector by 10% (from production factors i.e. labour). According to Ismail (2009) study in Malaysia found that technological changes will cause a reduction in labour demand especially low-skilled but will increase the demand for high skilled workers. In addition, in the study Drine and Abid (2010) by reviewing the level of efficiency, it was stated that unemployment does not only occur because of excess labour but due to the unavailability of supply and demand for labour in Tunisia.

Malaysia is one of the countries targeted by the Indonesian government in placing its workforce. During the 2016-2017 period (up to August), the Indonesian migrant workers mostly worked in Malaysia among 25 other countries (BNP2TKI, 2017). The placement of Indonesian migrant workers abroad has been regulated in the Minister of Manpower Regulation of the Republic of Indonesia Number 22 the Year 2014 (Kementerian Ketenagakerjaan Republik Indonesia, 2014). In addition, Lindquist (2010) in his research stated that a Memorandum of understanding between Indonesia and the Malaysian government seeks to regulate the mobility of migrants between the two countries. Ananda *et al.* (2016), study state that the ASEAN Economic Community (AEC) is one of the new forms of problems faced by Indonesian migrant workers, due to the low level of competitiveness. Even so, the placement of Indonesian migrant workers abroad is one of the best solutions from the government to overcome the unemployment problem.

Based on the above issues, this paper aims to place Indonesian migrant workers based on a mapping from the estimation of the demand function of foreign workers and the efficiency of production costs.

2. Material and Method

The demand function of foreign workers and the function of production costs are obtained through a derivation in the function of Constant Elasticity of Substitution (CES) production costs. According to Jehley and Reny (2011) the general formula of CES is:

$$Q_{it} = A\left[\alpha_0 K_{it}^{\rho} + \sum_{j=1}^{6} \alpha_j L_{\text{jit}}{}^{\rho}\right]^{\frac{1}{\rho}} \quad (1)$$

and the production cost function is as follows:

$$C = rK + w_n L_n + w_m L_m \quad (2)$$

Where Q is an industrial output, K and L are factors of production: physical capital and labour, m and n are labours: foreign and local. A is a parameter that measures the productivity of technology in the manufacturing industry. α and ρ are parameters used to estimate the elasticity of substitution. r and w is the price of production factors. C is the number of costs to be paid in the production process. This study divides workers and wages into

three skill groups: Group 1 = high skill group, Group 2 = medium skill group, and Group 3 = middle Skill group. The "it" symbol is a variable produced in manufacturing industry "i" in the year "t", while "j" is specifically for wages and workers based on skill level.

After equations 1 and 2 are derivate, it will be obtained the reduce form formula for the labour demand as follows:

$$\mathrm{Ln}L_{jit} = \Pi_1 + \Pi_2 \mathrm{Ln}Q_{it} + \sum_{j=3}^{4} \Pi_j Lnw_{jit} + \Pi_5 \mathrm{Ln}r_{\mathrm{it}} + \varepsilon_{\mathrm{it}} \ldots\ldots\ldots\ldots\ldots \quad (3)$$

And technical efficiency formula obtained from the function of production costs which are derived indirectly is as follows:

$$\mathrm{Ln}TC_{it} = \xi_1 + \xi_2 \mathrm{Ln}Q_{it} + \sum_{j=3}^{5} \xi_j Lnw_{jit} + \xi_6 \mathrm{Ln}r_{\mathrm{it}} + \varepsilon_{\mathrm{it}} \ldots\ldots\ldots\ldots\ldots \quad (4)$$

Indonesian migrant workers placement mapping is done from the results of the estimation of both functions using five scenarios when local wage prices increase constantly. The 5 scenarios of the assumptions are:

1) Assumption of local wages on the estimated function of production costs. If local wages rise, the total production costs will rise, so the manufacturing industries will switch to use foreign workers.
2) Complement between foreign workers and capital goods in the estimation of the demand function of foreign workers. Where the addition of capital goods is followed by the addition of foreign workers.
3) Substitution between foreign and local workers in the estimation of the demand functions of foreign workers. If local wages increase, the manufacturing industries will replace local workers with foreign workers.
4) Complementation between foreign workers and local workers in the estimation results of the demand function of foreign workers. Where foreign workers do not increase unemployment in Malaysia.
5) Concurrent analysis between the function of production costs and the demand function of foreign workers. Where the value of 0 that indicates an insignificant relationship between local wages and total production costs is associated with a substitution that occurs between foreign workers and local workers in the demand function of foreign workers.

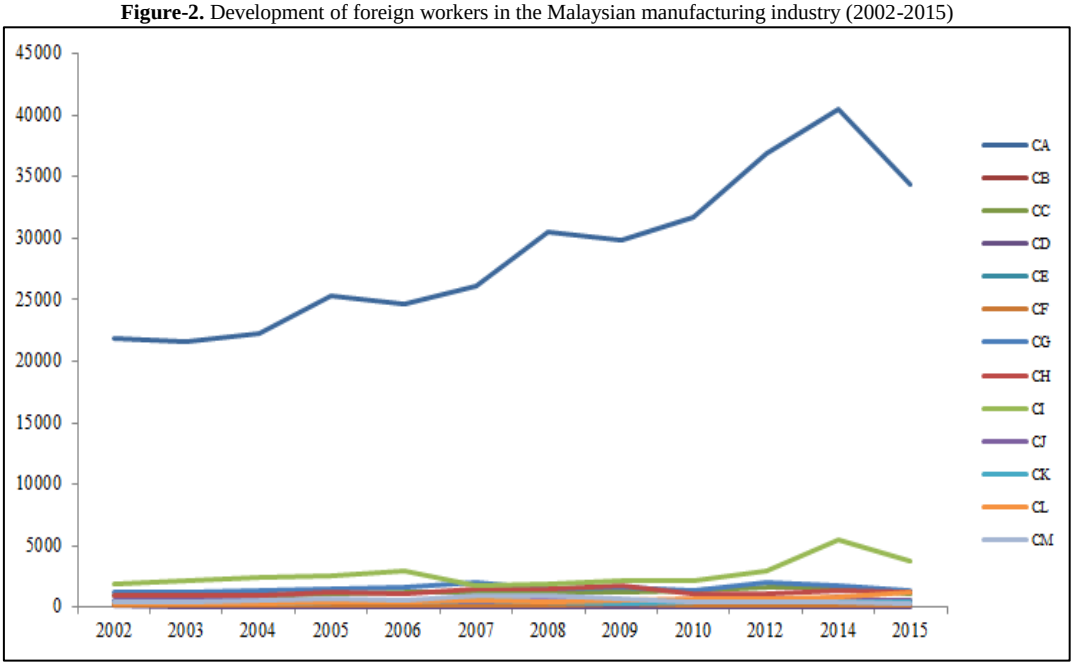
The scenario that determines the priority in the placement of Indonesian migrant workers in Malaysian manufacturing industries is a concurrent analysis between the function of production costs and the demand function of foreign workers. Where there is an insignificant relationship between local wages and total production costs is associated with substitution that occurs between foreign and local workers in the demand function of foreign workers. This paper used panel data from the Malaysian manufacturing industries (based on ISIC 3 digit) and taking 13 years to all variables for the period 2002-2015, so it is necessary to do an estimation test on random effects or fixed effect models. There is 13 manufacturing industry that is listed in the annual survey of Malaysia, but this study examines the manufacturing industries that have more than two sub-industries and the rest is combined into one namely "Other". The manufacturing industries examined are the manufacturing industry food products, beverages and tobacco with CA code, manufacturing textiles, textile products, leather and footwear with CB code, Manufacturing Radio, TV and communications equipment with CI code, manufacturing industries electrical machinery and apparatus n.e.c with CJ code, manufacturing railroad equipment and transport equipment, n.e.c with CL code and Other.

3. Results

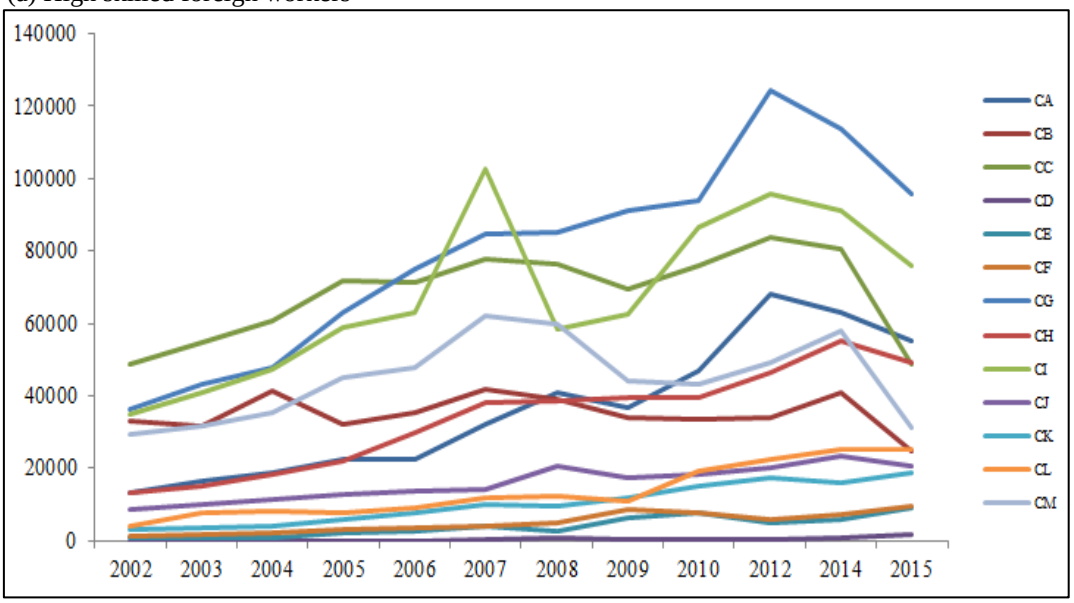
3.1. Description of Foreign Workers in the Manufacturing Industry (2002-2015)

The development of foreign workers from 2002 to 2015 was very volatile. In the early 2000s, the number of foreign workers increased relatively, but by 2008 foreign workers was relatively declining. Based on several studies on the impact of foreign workers on local workers, it is stated that high skilled foreign workers are most considered to contribute positively to local workers because they have complementary properties and strongly support the economy of the host countries (Bachtiar *et al.*, 2015; Bettin *et al.*, 2014; Devadason and Subramaniam, 2016; Islam *et al.*, 2017; Ismail *et al.*, 2014; Nur Fakhzan, 2011; Rahmah *et al.*, 2014) and then followed by middle skilled workers. Meanwhile, low skilled workers generally have a substitute relationship with local workers, thereby increasing the unemployment rate in the host countries (Bachtiar *et al.*, 2015; Brucker and Jahn, 2011; Magableh *et al.*, 2010; Peri, 2011;2017).

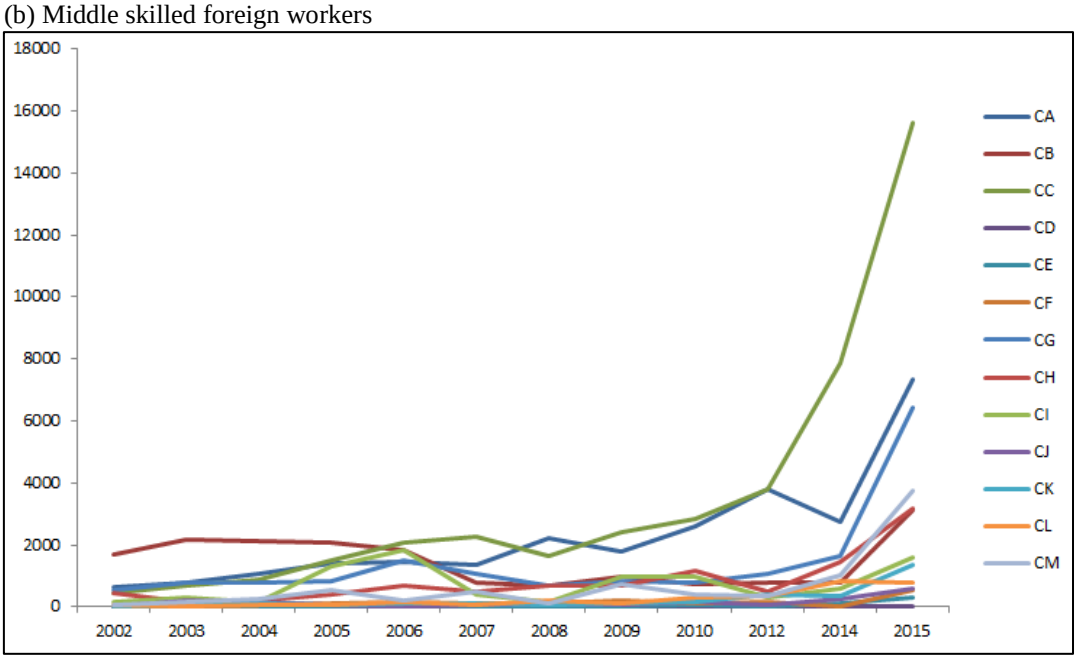
Figure-2. Development of foreign workers in the Malaysian manufacturing industry (2002-2015)



(a) High skilled foreign workers



(b) Middle skilled foreign workers



(c) Low skilled foreign workers

Source: Department of Statistics (2017a)

The demand for foreign workers in the Malaysian manufacturing industry was fluctuated in accordance with the efficient level of operational costs to obtain the optimal output. Figure 2. Describes that manufacturing industries with CA code, CI and CG code are the most receiving of high skilled foreign workers. Manufacturing industries with CG codes also receive the middle skilled foreign workers much more than the other industries although in 2012 the number of middle skilled foreign workers was declining. Meanwhile, the manufacturing industry with CC code mostly receives the low skilled foreign workers. By using technical efficiency to determine effective and efficient production factors, the manufacturing industry also considers the price of production factors. The amount of capital expenditure due to the technological process is also followed by the amount of wage expenditure. Rising expenditure on the production factor in particular wages should be able to improve labour productivity. Productivity itself has a very close relationship with real wages. Tang (2012) states that if firms employ workers with marginal productivity equal to a marginal cost (real wage) then the worker's productivity increases and wages will increase, whereas if the firms pay workers with more wages it will increase worker productivity.

The demand for labour both foreign and local is not detached from the level of worker productivity and real wages where these two variables are often debated in some labor researches. The causality relationship between these two variables is that the firm will employ workers who have marginal productivity equal to marginal costs whereby the firm will increase worker productivity so that wages will increase and the company will pay workers with more wages Tang (2012). In addition, wage efficiency theory also states that high wages will increase higher levels of productivity to increase firm production (Yusof, 2008).

Table-1. Shows that in the period 2002-2008, the growth of wages for high skilled workers both local and foreign workers tended to increase in several sub-industries, especially the sub-manufacturing industry with the CL code. While productivity increases with the high demand for low skilled workers. The period of 2008-2015 real wage growth has also increased but was more dominated by the increase in the growth of real wages of foreign workers and increased productivity growth but two sub-manufacturing industries experienced a decline in productivity, namely manufacturing industries with CE code and CD code. The period 2002-2015 growth in real wages was dominated by local workers and productivity growth increased especially in the manufacturing industry with CL code. In general, real wages constantly increase from 2002 to 2015 in Malaysian manufacturing industries. Increased real wages were also followed by increasing labour productivity in Malaysian manufacturing industries.

Table-1. Real Wage Growth and Productivity in Three Periods in Malaysian Manufacturing Industry (%)

ISIC CODE	Worker Classification	Real Wage Growth Level						Productivity Growth Rate		
		2002-2008		2008-2015		2002-2015		2002-2008	2008-2015	2002-2015
		Local	Foreign	Local	Foreign	Local	Foreign			
CA	High Skilled	1.83	-1.25	11.38	20.62	6.17	8.69	9.41	2.91	6.46
	Middle Skilled	2.56	1.66	9.24	7.97	5.60	4.53			
	Low Skilled	3.03	3.71	5.46	-0.12	4.13	1.97			
CB	High Skilled	2.06	3.83	8.43	13.59	4.95	8.26	5.13	15.16	9.69
	Middle Skilled	-0.11	1.77	5.58	3.49	2.48	2.55			
	Low Skilled	-2.40	-2.19	8.44	12.91	2.52	4.67			
CC	High Skilled	1.91	1.56	10.05	7.77	5.61	4.39	5.03	9.81	7.20
	Middle Skilled	1.91	0.64	11.79	7.08	6.40	3.57			
	Low Skilled	3.03	5.85	6.41	13.82	4.57	9.47			
CD	High Skilled	2.55	2.55	19.62	19.62	10.31	10.31	-2.93	-7.59	-5.05
	Middle Skilled	4.71	-19.10	15.33	15.33	9.54	-3.45			
	Low Skilled	0.79	-33.33	-4.42	0.70	-1.58	-17.86			
CE	High Skilled	3.11	3.11	4.64	4.64	3.80	3.80	-4.32	-1.21	-6.46
	Middle Skilled	5.55	5.55	-1.38	-1.38	2.40	2.40			
	Low Skilled	3.73	3.73	-3.57	-3.57	0.41	0.41			
CF	High Skilled	4.58	4.58	8.22	8.22	6.23	6.23	-8.71	3.82	-3.41
	Middle Skilled	4.88	4.88	6.22	6.22	5.49	5.49			
	Low Skilled	5.55	5.55	0.07	0.07	3.06	3.06			
CG	High Skilled	5.73	6.34	6.21	5.76	5.95	6.08	6.98	4.78	5.98
	Middle Skilled	4.03	4.55	6.96	6.11	5.36	5.26			
	Low Skilled	5.39	7.90	-0.38	-2.21	2.77	3.30			
CH	High Skilled	4.88	5.06	5.97	3.49	5.38	4.35	9.41	-0.10	5.08
	Middle Skilled	2.64	3.23	4.19	2.36	3.34	2.83			
	Low Skilled	4.76	10.31	2.38	-0.43	3.68	5.43			
CI	High Skilled	5.04	6.14	7.64	6.62	6.22	6.36	3.26	9.54	6.12
	Middle Skilled	2.84	3.96	9.76	10.32	5.98	6.85			
	Low Skilled	12.01	12.82	8.03	36.36	10.20	23.52			
CJ	High Skilled	13.90	9.48	-1.36	1.45	6.97	5.83	8.04	7.57	7.83

	Middle Skilled	4.37	5.11	9.32	9.78	6.62	7.23			
	Low Skilled	1.90	-0.10	-1.18	24.01	0.50	10.86			
CK	High Skilled	2.69	3.83	5.35	7.87	3.90	5.67	4.42	2.59	3.59
	Middle Skilled	0.99	1.75	3.83	-4.13	2.28	-0.92			
	Low Skilled	5.86	11.00	1.51	3.59	3.88	7.63			
CL	High Skilled	2.91	2.20	9.28	7.81	5.81	4.75	2.83	8.31	5.32
	Middle Skilled	-1.94	2.62	11.26	11.80	4.06	6.79			
	Low Skilled	1.55	17.67	4.94	9.42	3.09	13.92			
CM	High Skilled	4.24	5.75	-0.93	-2.08	171604.38	77.94	5.11	7.26	11.65
	Middle Skilled	3.24	3.84	2.31	1.88	-8.36	4298.63			
	Low Skilled	1.76	3.79	-2.49	-3.61	11683.83	140322.90			
TI	Total Industri									
	High Skilled	4.67	3.57	4.11	10.28	4.42	6.62	5.90	6.08	5.98
	Middle Skilled	1.21	2.41	7.80	7.23	4.20	4.60			
	Low Skilled	6.77	9.00	-0.29	3.68	3.56	6.58			

Source: own calculations and Department of Statistic Malaysia (2017)

3.2. The Results of Analysis

By testing the classical assumptions, multicollinearity occurs in the wages variable so that this study combines the variables of local and foreign wages by taking into account the largest percentage composition of both variables. Overall the composition of the wages of local workers averages 90% greater than the wages of foreign workers. This study also tested heteroscedasticity in the fixed effect model. Selected models in the estimation of the total cost of the production functions of the manufacturing industry are the fixed effects model unless the manufacturing industry with CJ code whereby the selected model is a random effect.

Appendix 1. The manufacturing industry with CA code demonstrates a significant positive relationship between the output, the wages of middle skilled workers, and the price of capital goods with total costs, where if the three independent variables increase, the total production costs will also increase, and vice versa. Manufacturing industry with CB code shows that only two independent variables that have a significant positive relationship with total production costs, namely output and prices of capital goods, where if both of these variables increase, the total production costs will also increase, and vice versa. The wage variables from all skill categories contribute less to production costs. Manufacturing industry with CB code is more inclined to industries using capital goods. The estimation of total costs in the manufacturing industry with CI code indicates that the independent variable that has a significant positive relationship with total production costs is output and the price of capital goods, where if both of these independent variables increase, it will increase total production costs and vice versa. However, the wages of low-skilled workers have a negative relationship, which means that the increase in low-skilled wages causes production costs to decrease.

The manufacturing industry with CJ code has a significant positive relationship with the total cost of production is high-skilled wages and the price of capital goods, where if both of these independent variables increase, it will increase the total cost and vice versa. However, the wages of low-skilled workers have a significant negative relationship. The manufacturing industry with CL code shows only two independent variables that have a significant positive relationship with the total production costs, namely output and the price of capital goods, where if both of these variables increase, the total production costs will also increase and vice versa. Wage variables from all skill categories contribute less to production costs. The manufacturing industry with CL code is more inclined to many industries using capital goods. The manufacturing industry incorporated into one (other) shows that output, the wages of high and low-skilled workers, and the prices of capital goods have a significant positive relationship with production costs, where if the independent variable increases, it will increase total production costs and vice versa.

Through the decline in CES production function, the study found that the output and price of production factors was an independent variable that determines the demand for foreign workers in the Malaysian manufacturing industry (Appendix 2). Estimates of the demand for foreign workers in the manufacturing industry with CA codes, substitution occurs between foreign and local workers with high and low skills. Manufacturing industry with CB code, substitution occur between high and low skilled foreign and local workers. Manufacturing industries with CI codes, foreign and local workers substitute each other in all skills. Manufacturing industry with CJ code, complement occurs between the price of capital goods and the demand for middle-skilled foreign workers, and substitution occurs between middle skilled foreign and local workers. Manufacturing industry with CL code, substitution occurs between low skilled foreign and local workers. Other manufacturing industries, the substitution of the price of capital goods occurs with high skilled foreign workers, while the complement occurs with medium and low-skilled foreign workers. Foreign and local workers substitute with each other at all skill levels.

3.3. A Mapping of Indonesian Migrant Workers Placement

Mapping the placement of Indonesian migrant workers can be done by looking at the estimated cost of function and labour demand in Malaysia manufacturing industry by using 5 predefined assumption scenarios.

Table-2. Mapping of Indonesian Migrant Workers in the Malaysian Manufacturing Industry

ISIC Code	Dependent Variable				Dependent Variable: Demand for High Skilled Foreign Workers		Dependent Variable: Demand for Middle Skilled Foreign Workers		Dependent Variable: Demand for Low Skilled Foreign Workers		A Mapping of Indonesian Migrant Workers Placement		
	The Wages of Local Workers			Price of Capital Goods	The Wages of High Skilled Local Workers	Price of Capital Goods	The Wages of middle Skilled Local Workers	Price of Capital Goods	The Wages of Low Skilled Local Workers	Price of Capital Goods	High Skilled	Middle Skilled	Low Skilled
	High Skilled	Middle Skilled	Low Skilled										
CA	0	+	0	+	+	0	0	0	+	0	√	√	√
CB	0	0	0	+	0	0	+	0	+	0		√	√
CI	0	0	-	+	+	0	+	0	+	0	√	√	√
CJ	+	0	-	+	0	0	+	-	0	0	√	√	
CL	0	0	0	-	0	0	0	0	+	0			√
Other	+	+	0	+	+	+	+	-	+	-	√	√	√

Note: + is positive relationship; - is negative relationship; 0 is contribute less; and gray area is priority area
Source: Own calculations

The result of the mapping shows the scenario assuming 1, the high-skilled Indonesian migrant workers can be placed in the manufacturing industry with the CJ code and Other. Middle skilled Indonesian migrant workers can be placed in the manufacturing industry with CA code and Other. Scenario assumption 2, Indonesia's middle skilled workers can be placed in the manufacturing industry with the CJ code and Other. And low-skilled Indonesian migrant workers can be placed in Other manufacturing industries.

Scenario assumption 3, the high-skilled Indonesian migrant workers can be placed in the manufacturing industry with CA code, CI code and Other. Middle skilled Indonesian migrant workers can be placed in the manufacturing industry with CB code, CI code, CJ code, and Other. Low-skilled Indonesian migrant workers can be placed in the manufacturing industry with CA code, CB code, CI code, CL code, and Other. And the other occasion, Meanwhile, the scenario assumption 4 does not occur in the manufacturing industry. Scenario assumption 5, industry-based ISIC code that is a priority for Indonesia in placing the workforce assuming the constant local wage increases and less contribute to the total cost of production while at the same time occurs of a demand for foreign workers. The manufacturing industry which has been a priority for high-skilled Indonesian migrant workers, it could be seen in the manufacturing industry with CA code and CI code. The Priority of the placement of middle skilled Indonesian migrant workers is in the manufacturing industry with CB code, CI code, and CJ code. Priorities for low-skilled Indonesian migrant workers are in the manufacturing industry with CA code, CL code, and Other.

4. Discussion

In general, the relationship between factor prices with total costs is positive, where if factor prices rise, total production costs will also rise. However, on the contrary negative relationship, rising prices of factors of production causes total costs to decline, this occurs if the level of productivity is able to produce a lot of output and this is in accordance with the research of Tamasauskiene and Stankaitye (2013). The output increases, then the firm will hire to workers both foreign and local. During the period 2008-2015 the Malaysian economy increased and eventually attracted foreign workers to come to Malaysia. Substitution between foreign and local workers occurs throughout the manufacturing industry even in high-skilled groups, this can happen with the return of high-skilled local workers to Malaysia.

Mapping resulting from the analysis of two functions, namely the cost function and the demand function of foreign workers is to determine the priority scale in mapping the placement of Indonesian workers in the Malaysian manufacturing industry. Substitution relationships show Indonesian workers not only compete with local workers but also with foreign workers from other countries. The Indonesian Government must provide qualified Indonesian workers in accordance with the demand of Malaysian manufacturing industry. Indonesian workers can become prioritized by considering the many cooperation between the two countries, the two countries have many common characteristic traits, common frames of reference in history, culture and religion.

5. Conclusion

This paper aims to place Indonesian migrant workers based on a mapping from the estimation of the demand function of foreign workers and the efficiency of production costs. This study found that there is a relationship complement and substitution between capital goods-foreign workers and foreign-local workers. These results prove that it is not forever high and middle-skill foreign workers relations with high and middle-skill local workers are mutually beneficial or complement it. Besides that, considering that Indonesia is a disaster-prone area, losing a job is one of the problems faced. Therefore, this mapping is an opportunity for the Indonesian government to place which

is a priority for the Indonesian government in placing Indonesian migrant workers based on the needs of the Malaysian manufacturing industry by preparing education and training.

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Appendix-1. Estimation of Efficiency Rate Through Total Production Cost Function

Dependent Variable: Total Cost	Manufacturing industry Classification by ISIC 3-digit code											
	CA		CB		CI		CJ		CL		Other	
	FEM	REM	FEM	REM	FEM	REM	FEM	REM	FEM	REM	FEM	REM
Q	0.4203***	0.4090***	0.8165***	0.9232***	0.5266***	0.4808***	0.0079	0.0039	0.6567***	0.6492***	0.2649***	0.4352***
	(0.1114)	(0.0381)	(-0.2731)	(0.1828)	(0.1262)	(0.1178)	(0.2185)	(0.1424)	(0.1125)	(0.0853)	(0.0708)	(0.0616)
W_{nm1}	0.1261	0.2731***	-0.0431	0.1925**	0.0324	0.1040	0.5444***	0.5175***	-0.1308	-0.0033	0.1473***	0.1209***
	(0.0878)	(0.0532)	(0.1467)	(0.0971)	(0.0971)	(0.0853)	(0.1640)	(0.1244)	(0.0886)	(0.0649)	(0.0366)	(0.0347)
W_{nm2}	0.1262**	-0.0066	0.0124	-0.2890***	0.0966	0.1063	0.1262	0.0292	0.0087	0.2661***	0.1579***	0.0902***
	(0.0536)	(0.0415)	(0.1103)	(0.0457)	(0.0989)	(0.0802)	(0.1627)	(0.1228)	(0.0654)	(0.0587)	(0.0331)	(0.0232)
W_{nm3}	-0.0604	0.0553***	-0.0186	-0.0574*	-0.0850**	-0.0618	-0.2255***	-0.1910***	0.0504	-0.0108	0.0220	0.0037
	(0.0493)	(0.0207)	(0.0561)	(0.0332)	(0.0357)	(0.0408)	(0.0596)	(0.0532)	(0.0434)	(0.0412)	(0.0200)	(0.0218)
r	0.9898***	0.8361***	1.3437***	1.4082***	1.0560***	1.1055***	1.3085***	1.3289***	1.0744***	0.9367***	1.1725***	1.1959***
	(0.0473)	(0.0319)	(0.0638)	(0.0508)	(0.0489)	(0.0434)	(0.1048)	(0.0641)	(0.0603)	(0.0528)	(0.0502)	(0.0413)
C	6.3925***	7.4963***	-4.4413	-6.2212***	5.4593***	4.0031**	5.1674*	6.4595***	4.1393***	1.1018	6.3740***	3.3053***
	(1.6026)	(0.5656)	(3.4907)	(2.3542)	(1.9736)	(1.8129)	(2.9841)	(1.5890)	(1.5074)	(1.2843)	(1.4260)	(1.0595)
R^2	0.9956	0.9868	0.9938	0.9923	0.9939	0.9380	0.9732	0.9709	0.9808	0.9728	0.9880	0.9055
N.(Obs)	66		72		84		72		72		252	
Hausman Test	0.0000		0.011		0.008		0.3904		0.0001		0.0005	

Note: the number in parentheses is standard error, *** is p<0.01; ** is p<0.05; * is p<0.1.x
Source: own calculations

Appendix-2. Estimation of Demand for Foreign Workers in Malaysian Manufacturing Industry

ISIC Code	Independent Variable	Dependent Variable					
		Demand for High Skilled Foreign Workers		Demand for Middle Skilled Foreign Workers		Demand for Low Skilled Foreign Workers	
		FEM	REM	FEM	REM	FEM	REM
CA	Q	0.0268	0.1056	1.7059***	0.4285***	0.5275	0.4509*
		(0.2656)	(0.2725)	(0.2195)	(0.1116)	(0.4423)	(0.2626)
	r	0.1327	0.1044	0.1240	0.4592***	0.1553	0.0905
		(0.1427)	(0.1226)	(0.0884)	(0.0657)	(0.2682)	(0.2038)
	W_{nm1}	0.5065**	0.4172**				
		(0.2455)	(0.1730)				
	W_{nm2}			-0.0137	0.3449***		
				(0.1026)	(0.0513)		
	W_{nm3}					0.9221***	0.4838***
						(0.2677)	(0.1080)
	C	-7.3465*	-7.1564*	-33.7263***	-16.2218***	-23.6356***	-14.5064***
		(4.1362)	(4.1007)	(3.4139)	(1.4677)	(8.3394)	(4.1068)
	R^2	0.7005	0.3121	0.9425	0.8987	0.7669	0.7193
	N.(Obs)	72		72		66	
	Hausman Test	0.5224		0.0000		0.0216	
CB	Q	-0.0359	0.0608	0.0908	0.0995	-0.1780	-0.6782
		(0.4594)	(0.5380)	(0.2764)	(0.1558)	(0.7025)	(0.4580)
	r	0.1490	0.1504	0.0355	0.0340	0.3146	0.2456
		(0.1484)	(0.1461)	(0.0665)	(0.0626)	(0.3236)	(0.2485)
	W_{nm1}	0.2193	0.2015				
		(0.2447)	(0.2942)				
	W_{nm2}			0.4416***	0.4510***		
				(0.1625)	(0.0907)		
	W_{nm3}					0.7095***	0.7924***
						(0.2719)	(0.1730)
	C	-1.5235	-3.3015	-1.401	-1.7021	-6.5680	3.9703
		(5.9885)	(6.6643)	(3.2844)	(2.0396)	(10.0081)	(5.5830)
	R^2	0.8401	0.2778	0.9621	0.8528	0.6377	0.5715
	N.(Obs)	70		72		68	
	Hausman Test	0.1857		0.7971		0.2199	
CI	Q	-0.2985	-0.1660	0.1821	0.2985	1.1666**	0.5007
		(0.2013)	(0.1575)	(0.2068)	(0.1726)	(0.4849)	(0.3117)
	r	-0.0109	0.0128	-0.0308	-0.0422	-0.2612	-0.1888
		(0.0800)	(0.0703)	(0.0745)	(0.0855)	(0.1863)	(0.1926)
	W_{nm1}	0.5292***	0.5385***				
		(0.1081)	(0.1043)				
	W_{nm2}			0.4358***	0.3947***		
				(0.1176)	(0.1194)		
	W_{nm3}					0.2906	0.4287**
						(0.1912)	(0.1966)
	C	3.3242	-0.3021	-2.6186	-4.4374	-23.5918**	-11.0749**
		(3.0077)	(2.2284)	(3.6998)	(2.5548)	(9.8974)	(5.1866)
	R^2	0.8714	0.6712	0.8698	0.4810	0.6355	0.6106
	N.(Obs)	84		84		65	
	Hausman Test	0.5563		0.5317		0.5071	
CJ	Q	0.1410	0.2688	0.6933***	0.6479***	1.5733**	0.9985*
		(0.1843)	(0.2058)	(0.1293)	(0.1669)	(0.7033)	(0.5801)
	r	-0.0471	-0.2230**	-0.4611***	-0.3836***	-0.4637	-0.3299
		(0.1366)	(0.1053)	(0.0907)	(0.0987)	(0.5408)	(0.3243)
	W_{nm1}	0.1462	0.3587***				
		(0.1304)	(0.1066)				
	W_{nm2}			0.1824*	0.1793**		
				(0.0997)	(0.0900)		
	W_{nm3}					0.2193	-0.1893
						(0.3176)	(0.2467)
	C	-0.5463	-3.9047	-2.7985	-3.0401	-27.1497***	-11.1507
		(2.1594)	(2.4454)	(2.0417)	(2.0717)	(9.1463)	(7.2905)
	R^2	0.8402	0.4297	0.8105	0.4196	0.2189	0.0796
	N.(Obs)	72		72		51	
	Hausman Test	0.0081		0.2833		0.2210	
CL	Q	1.2480***	1.0330***	1.6599***	1.5639***	1.8474***	0.8970***
		(0.2543)	(0.2474)	(0.3652)	(0.2111)	(0.4232)	(0.3103)
	r	-0.1925	-0.1374	-0.2369	-0.1886	0.3876	0.5748**
		(0.1454)	(0.1292)	(0.1867)	(0.1598)	(0.2638)	(0.2654)
	W_{nm1}	-0.1890	-0.0490				
		(0.2127)	(0.1885)				
	W_{nm2}			0.4649	0.3771**		
				(0.2787)	(0.1731)		

	W_{nm3}					0.4196*	0.1764
						(0.2204)	(0.2275)
	C	-17.2121***	-15.7115***	-33.7596***	-31.0145***	-50.3442***	-29.2882***
		(4.3746)	(3.5057)	(6.8565)	(4.2316)	(8.2966)	(6.3275)
	R^2	0.8084	0.3981	0.8913	0.5633	0.6245	0.3120
	N.(Obs)	72		71		53	
	Hausman Test	0.0629		0.0345		0.0005	
Other	Q	0.2340*	0.1725**	1.1784***	0.7597***	1.2845***	0.9504***
		(0.1291)	(0.0785)	(0.1118)	(0.0549)	(0.2271)	(0.1788)
	r	0.2043***	0.2048***	-0.4803***	-0.3967***	-1.0289***	-0.9187***
		(0.0746)	(0.0542)	(0.0676)	(0.0543)	(0.1557)	(0.1538)
	W_{nm1}	0.1614**	0.1928***				
		(0.0761)	(0.0365)				
	W_{nm2}			0.2044**	0.5163***		
				(0.0908)	(0.0241)		
	W_{nm3}					0.3566***	0.4253***
						(0.0892)	(0.0680)
	C	-6.5260***	-5.6261***	-11.7573***	-6.6592***	-10.1697**	-5.3433*
		(2.5056)	(1.3793)	(1.5077)	(0.9450)	(4.2872)	(3.2457)
	R^2	0.9041	0.4610	0.9386	0.6590	0.7431	0.3657
	N.(Obs)	252		251		241	
	Hausman Test	0.0725		0.0000		0.0002	

Note: the number in parentheses is standard error, *** is p<0.01; ** is p<0.05; * is p<0.1.
Source: own calculations