

## **EMPLOYMENT STRUCTURE IN A RICE FARMING VILLAGE IN MALAYSIA : A CASE STUDY IN SEBRANG PRAI**

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(Received: April 3, 2009; Accepted: November 12, 2009)

### **ABSTRACT**

Malaysia achieved dramatic economic growth through foreign investment in the industrial sector from the 80s. This led to the creation and expansion of employment opportunities in multi-national companies and factories built mostly on the west coast of Peninsular Malaysia. People started to be employed full-time or part-time in the industrial sector located in rural or urban areas. In the rural area this has created great impact on the employment structure of the traditional rice farming villages. It is possible to assume a deagrarianization process in villages which lie closely connected to the impact of industrialization. The impact of industrialization might have caused deagrarianization of the traditional employment structure, especially among paddy farmers in the west coast of Peninsular Malaysia.

This paper aims to examine the actual changes and influential factors in employment structure, based on a case study in Kampung Permatang Tinggi Bakar Bata, Sebrang Prai. A survey was conducted in 2006 among 42 Malay paddy farmers and 58 workers using a structured questionnaire. Kampung Permatang Tinggi Bakar Bata, Sebrang Prai is located in one of the main rice granaries and is adjacent to the industrial zone in the north of Penang. In order to discriminate types of job, quantification method type II was used in the analysis to discriminate outside variables by qualitative data. The results of the study indicated that there was a clear change in employment structure among the paddy farmers. The number of full-time farmers decreased and the number of part-time farmers increased in this area from the 1980s to 2000s. The study also revealed that age was the most important factor in choosing between on-farm and off-farm work, and between full-time and part-time work in the study village.

**Key words:** industrialization, deagrarianization, part-time farming, off-farm employment, quantification method Type II

### **INTRODUCTION**

In recent decades, the industrial sector in Malaysia has been growing rapidly through foreign direct investment. During the 1970s-1980s, the Malaysian economy developed dramatically due to export-oriented growth and import-substituting industrialization. Since 1986, outward industrialization started with investment promotion measures (Ishizutu 1998). Penang has been in the vanguard of development and industrialization due to electronics and electrical appliance companies in Malaysia's leading industrial zone. These companies have been supported by such incentives as Pioneer Status and Free Trade Zone policies which had a strong capacity for labour absorption (Arai 1996). A large number of East Asian, European and American electrical and electronic companies built their factories in Prai, Bayan Lepas Free Trade Zone and Mak Mandin industrial parks in Penang. These multi-national companies provided job opportunities for rice growing villages. The development of infrastructure such as highway, bridges and byways facilitated commuting between urban and suburban areas. Thus it provided ample opportunities for villagers in Sebrang Prai to seek jobs in the suburban area.

While Penang has been well recognized as an urban area, it has played an important role in the agricultural sector. The granary, called Sebrang Prai, has contributed with relatively high productivity to domestic production of the staple food of the country. In fact, it is one of the eight major rice granaries in Malaysia; Muda(MADA), Kemubu(KADA), Kerian-Sg.Manik, Barat Laut Selangor, Sebrang Perak, Ketara(Benut), Sebrang Prai and Kumasin Semerak. Total cultivated area was 4,666.9 hectares including 4,652.9 hectares of wetland and 13.8 hectares of dry land in Penang state (Agriculture Census 2006). Paddy fields in Penang state were mostly irrigated, at the level of 98.5%. Since 1987, mini-estates became a popular system in northern and middle Sebrang Prai with an average size of 499.9 hectares (Fujimoto 1994). According to PPK, currently 2,543.4 hectares of fields are organized as mini-estates in 2005. Even though paddy area and the total production seemed to be low, the yield is one of the highest among the eight granaries in Malaysia.

Penang state is characterized by two contrasting dimensions: the important rice farming area in Sebrang Prai and a developed industrial zone. Some studies in the past focused on technological innovation in rice farming from the 1960s to 1980s (Purcal 1971;Fujimoto 1994), while one study was directed to changes in employment structure caused by industrialization in Sebrang Prai (Fujimoto 1995). Employment structure was further affected by the opening of expressways and increase in factories during the 1990s. It is therefore possible to assume the process of deagrarianization in this village (Rigg 2001). This paper aims to clarify the details of the employment structure in a rice farming village in Sebrang Prai by specifying the determinative factors on occupational choice, examine particular groups which have been strongly affected by industrialization, and identify what types of farmer tended to work in the off-farm sector. Specific aims of this paper are as follows: (1) to identify the employment structure of paddy farmers and their family members; (2) to analyze the determinant factors which influenced occupational choice between on-farm and off-farm work among employed villagers; and (3) to clarify determinant factors which also affected occupational choice between full-time and part-time farming among paddy farmers.

In order to clarify the difference between on-farm and off-farm work and between full-time and part-time farming, the quantification method Type II was applied by setting these groups as outside variables for the purpose of analyzing the contribution of each item to the choice of job (Nagahama 1987). This method is based on the multidimensional data analysis developed by Chikio Hayashi in Japan. The quantification aims to make numerical representation of intercorrelated response pattern (qualitative data) with validity (Hayashi 1967). It quantifies outside variables and items with canonical correlation analysis, and utilizes Lagrange's theorem resulting in eigenvalue problem in the following manner.

When each item  $m$  has category of  $C_1, C_2, \dots, C_m$ , variable function on item  $y$  will become the following linear equation.

$$y = a_{11}x_{11} + \dots + a_{1c_1}x_{1c_1} + a_{21}x_{21} + \dots + a_{2c_2}x_{2c_2} + \dots + a_{m1}x_{m1} + \dots + a_{mc_m}x_{mc_m}$$

$x_{ij}=1$  :  $i$  item and  $j$  category,       $x_{ij}=0$  : others      ( $i=1, \dots, m$  ;  $j=1, \dots, c_i$ )

Category score  $a_{ij}$  normalizes to average out at 0 within each item. When outside variable is discriminated into  $k$  groups, variable function on outside variable  $z$  will be the following linear equation.

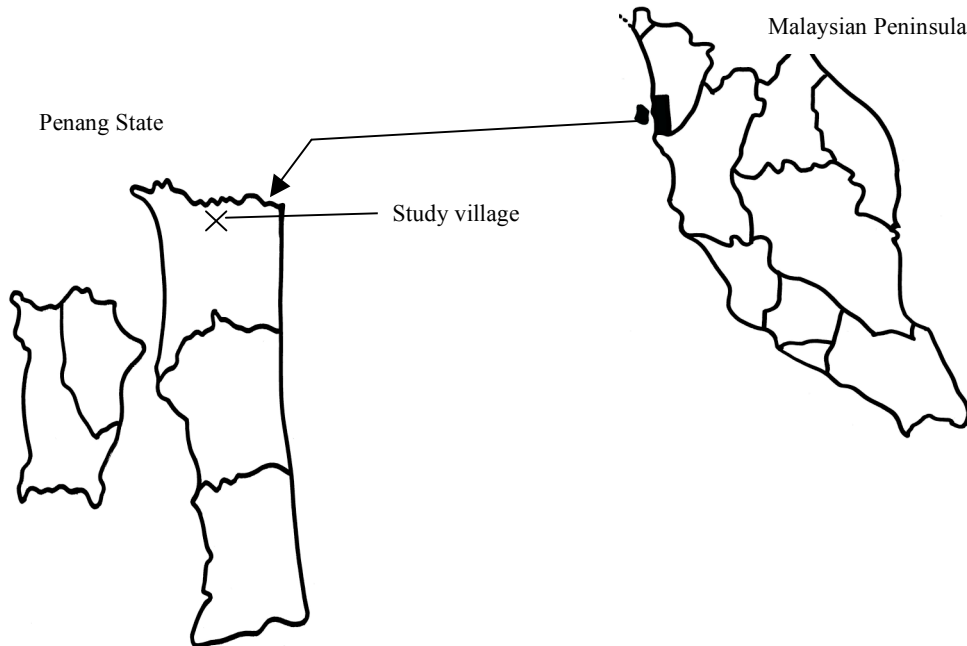
$$z = b_1z_1 + b_2z_2 + \dots + b_kz_k$$

$z_i=1$ :outside variable among groups ,  $z_i=0$  : others      ( $i=1, \dots, k$ )

Category score of outside variable  $b_i$  to each group equals the average of the item score on each group. Correlation will indicate how much outside variable  $k$  groups were precisely discriminated. Correlation  $r$  represents the range of values from 0 to 1 (Yanai 2005).

#### **CHARACTERISTICS OF THE AREA AND RESPONDENTS STUDIED**

Penang state consists of Penang island and a nearby region, Sebrang Prai of Peninsular Malaysia. We focus on a rice farming village in Sebrang Prai. As shown in Figure 1, the study village is located north of Kepala Batas, 2km from Muda River on the border of Kedah state, and approximately 20km from Butterworth. Kampung Permatang Tinggi area involves a total of four villages, which are named Permatang Tinggi A, B, C and Bakar Bata. The survey was conducted in Kampung Permatang Tinggi Bakar Bata (hereafter, abbreviated as Kg.PTBB) from May to July, 2006



**Fig. 1.** Map of the study village

Table 1 presents the outline of the study village. The data were collected through interviews with heads of households who all worked as paddy farmers in the village. Total number of respondents was 42, consisting of 17 full-time, and 25 part-time farmers. It is clear that half of the farmers, 21 respondents, only operated less than a hectare of paddy land. There were five farmers cultivating more than two hectares, and the average operated area was 1.1 hectares per household, but rented in land occupied 0.36 hectare on average. The interview with 42 heads of households collected data on 100 family members who were engaged in some employment.

Table 2 shows the number of workers by main occupation and gender in Kg.PTBB. On-farm employment is a category for paddy farmers, consisting of full-time farmers and part-time farmers. There are only three women who helped their husbands in rice farming with limited working hours among 42 households. Off-farm employment meant seasonal wage work in rice farming and other jobs in the off-farm sectors such as the government, industrial, agricultural and informal sectors (Table 2). More than half the workers in the off-farm sectors belonged to the industrial sector. Employed workers in the off-farm sector included part-time farmers among household heads, their wives, sons and daughters.

**Table 1.** The outline of the study village, 2006.

*Employment structure in a rice farming village .....*

<b>Items</b>	
Total households	137
Number of households studied	42
Average family size (persons)	6
Total number of workers	100
Number of HHH	42
Full-time	17
Part-time	25
Number of farmers by tenurial status	
Owner farmers	21
Owner-tenant farmers	16
Tenant farmers	5
Average farm size (relong)	2.1
Number of households by farm size (relong)	
Less than 1.0	9
1.0-1.9	12
2.0-2.9	6
3.0-3.9	9
More than 4.0	6

Source: Survey, 2006

Note: 1relong in Sebrang Prai = 1.3acres = 0.4ha

**Table 2.** Number of workers by main occupation in the study village.

<b>Type of job</b>	<b>Men</b>	<b>Women</b>	<b>Total</b>
On-farm			
Full-time farmer	16	1	17
Part-time farmer	25	-	25
Off-farm			
Government sector	14	6	20
Industrial sector	30	21	51
Service sector	9	6	15
Side worker on farm	-	3	3

Source: Survey, 2006

Note: Multiple counting

**EMPLOYMENT STRUCTURE IN PENANG STATE, MALAYSIA 1970s-2005**

Agricultural share of GDP declined from 37.8% in 1970 to 14.9% in 2005, while the industrial sector became the fastest growing sector in the Malaysian economy. Changes in agricultural structure in the various economic phases resulted in labour movement with rising demand in the manufacturing sector. There was almost no change in the domestic labour force in the agricultural sector, while the labor force in the industrial sector has continued to increase over two decades. In comparison with 2004, the labour force in the industrial sector more than doubled in the 1980s.

This section focuses on the employment situation in Penang state in order to identify some aspects of the chronological situation of labour utilization and actual employment. Since early times, work in the rural area has consisted mostly of seasonal work in on-farm and off-farm jobs. In the 1960s, there was a period of transition from paddy single cropping to double-cropping with the diffusion of irrigation facilities in the northern part of Penang State. Employment activities were classified into on-farm and off-farm for both genders. Working patterns in on-farm and off-farm employment related to paddy activities clearly depended on the season (Purcal 1971). The seasonal variation of the cycle of activities centered around the harvesting months of July and January, and the transplanting months of September and April. This made a difference in monthly work pattern and working hours. In the case of farms smaller than the 0.5-1.1 hectares group, farmers were underemployed up to 35% of their available time over the years (Purcal 1971). In the case of female respondents, only a few of them helped in paddy farming and the rest did not take part in any farm activities. Transplanting and harvesting were very heavy and important activities for women, however this work was only temporary and seasonal, and women were underemployed for 57% of the time in the whole year, as shown in Table 3. Main on-farm jobs were paddy work, rubber work, and mat-making. Mat-making and other activities were generally low in productivity, although they were important activities during the slack season of paddy farming. Off-farm activity for women was paddy work in double-cropping area, but no activity in single cropping area. In the 1960s, women were generally not allowed to seek jobs outside the village, which was a centrally important environment for them. The exceptions were women from landless households or widows, who were less inhibited by social constrictions on wage-work. This study shows that working pattern and characteristics are connected to gender, season, landholding size and social custom.

**Table 3** Under employment of men and women in a year.

	<b>Male</b>	<b>Female</b>
Time available for productive work(hrs) (A)	2,200	1,650
Working time (hrs) (B)	1,463	713
Available time (%) (C=B/A*100)	67	43
Underemployed workers (% of villagers)	33	57

Source: J.T.Purcal 1971, pp.26 and 57

After an investment promotion measure was established, the characteristics of employment structure on the west coast have recently been transformed, with factories being built in manufacturing quarters. The increase of companies and factories in free trade zones accelerated the influx of labour force from the agricultural to the manufacturing sectors, from 1986. Furthermore, in the 1970s and 1980s, there was a new trend in labour saving technology in paddy work. The introduction of direct-seeding instead of transplanting by hand, and mechanization with combine harvesters transformed the work of crop establishment, harvesting, threshing and transportation. These were very important technological changes in the rice farming sector. Traditional contract activities and exchange labour custom could not persist in the face of labour-saving technology, which deprived women of employment opportunities in rice farming (Fujimoto 1994). From 1978 to 1987,

the number of full-time rice farming households decreased, and family members increasingly tended to work in the off-farm sector. One of the key changes was that women became supplementary workers after the introduction of labour-saving technology, while men played a vital role in mechanized rice farming. From 1986 and specifically in the 1990s, expanded employment opportunities promoted the employment of the younger generation in the industrial sector.

### **Employment structure in the study area**

Table 4 shows the time-series data of two different villages in Seberang Prai: Kg.PTBB and Kampung Guak Tok Said (Kg.GTS). Since both villages are rice growing villages, located only 3 km from each other, these data were accepted to examine changes in rice farm occupation in Seberang Prai. It then becomes clear that the ratio of full-time farmers decreased from 83% in 1978 to 67% in 1987, and drastically to 31% in 2006. On the other hand, the ratio of part-time farmers has gradually increased from 12% in 1978 to 55% in 2006. It is possible to assume the number of part-time farmers increased rapidly due to the introduction of the commuting bus from company and factory to the neighboring villages on the highway and its junction. The percentage of part-time farmers has gradually escalated in both villages by this transformation in the surrounding environment. At the same time, as Table 4 indicates, there is a clear trend of aging of farmers, from 40 years old to 49 years old in 1978, and to 56 years old in 2006. In the case of full-time farmers, the trend is more obvious: 30 years in 1978 to 62 years in 2006. This implies the lack of successors in rice farming in the area.

## **DETERMINATION OF OCCUPATIONAL CHOICE**

### **Occupational Choices and Determinants**

This section is devoted to a quantitative analysis of determinants of occupational choice in Kg.PTBB, based on Analysis of Accidents at Railroad Crossing by The Quantification Method. It should be noted that although this method is unrelated to agriculture, it is actually highly relevant in revealing the determinant factors affecting the choice of job. The quantification method Type II is able to analyze the contribution of each item to job choice by setting the following two groups to the outside variable. Let us consider two kinds of grouping, firstly on-farm and off-farm work. The group of on-farm work includes full-time and part-time farmers, and the other group involves off-farm workers in the non-agricultural sector. The second grouping of 42 farms is determined by whether he/she is a full-time or part-time farmer.

Through these two sets of outside variable, influential factors having an impact on occupational choice will be analyzed for 100 workers for on-farm and off-farm work, and for 42 farmers to be full-time or part-time farmers. Off-farm workers consist of hired workers and self employed workers, including part-time farmers. Possible determinant factors taken into consideration are gender, age, educational background and landholding.

### **Between On-Farm and Off-Farm Work as Outside Variable**

Independent variable of on-farm work is 1, and off-farm work is 2. The items are as follows: variable  $k_1$  is a dummy variable for sex (man=1, woman=2). Variable  $k_2$  is a categorical data for educational background level (no schooling =1, elementary school=2, junior high school=3, high school=4, University=5). Variable  $k_3$  is also categorical data for age (18-39 =1, 40-69=2, more than 70=3), and  $k_4$  is a dummy variable for land tenurial status with or without land ownership (no land holding=1, land holding=2).

**Table 4.** Changes in farm occupation status, 1978-2006.

Employment pattern	1978 <sup>1)</sup>				1987 <sup>2)</sup>				2006 <sup>3)</sup>			
	No.	%	Paddy land (relong)	Average age of HHH	No.	%	Paddy land (relong)	Average age of HHH	No.	%	Paddy land (relong)	Average age of HHH
Rice farming	43	83	2.9	39	35	67	3.7	52	13	31	3.0	62
Rice + other crop farming	1	2	2.3	55	0	0	-	-	3	7	2.2	60
Rice farming + wage labour	6	12	2.1	31	14	27	2.7	41	23	55	2.4	52
Rice farming + self employed	2	4	1.9	53	3	6	1.2	49	3	7	5.1	52
Total	52	100	2.8	40	52	100	3.3	49	42	100	2.73	56

Source: 1) and 2) Fujimoto, 1994

3) Survey, 2006

Note: Figures for 1978 and 1987 refer to Kg. G.T.Said

The results of the estimation are presented in Table 5. As correlation coefficient  $r = 0.7661$  indicates, the discrimination of 100 workers in the analysis is reasonably good. The positive value of the category score represents the extent of contribution of the category to on-farm work, and the negative value to off-farm work. In Table 5, the extent of the contribution of each item is shown by a score range, while the order for the score ranges is indicated in parentheses. This method was used to obtain category scores and score ranges for two groups (on-farm work and off-farm work), so as to elucidate the dependence of those groups on particular items.

**Table 5.** Values of category scores for employment choice factors obtained for two groups (on-farm and off-farm workers).

Items	Number of workers		Category score	Score range
	On-farm	Off-farm		
Gender				
Man	41	26	0.2657	0.8053
Woman	1	32	-0.5395	(2)
Education				
No schooling	3	2	-0.3093	
Elementary school	20	8	0.1921	0.5013
Junior high school	7	2	0.0885	(4)
High school	11	31	-0.0747	
University	1	15	-0.0933	
Age				
18-39	1	43	-0.5758	1.14837
40-59	25	13	0.3955	(1)
More than 60	16	2	0.5725	
Tenurial status				
Tenant	17	58	-0.1989	0.7956
Owner	25	0	0.5967	(3)

Source: Survey, 2006

Note: Owner includes tenant-owner

$r = 0.7661$

The largest score range was obtained for the factor of “age”, followed by “gender”, “tenurial status” and “educational background”. The category giving the largest positive score was “tenurial status” because land owner has the character of being occupied in rice farming as on-farm worker. The second highest score was for the category “generation: younger than 40”, but with a negative sign, indicating that the younger generation preferred to be employed in off-farm work. The largest score range is seen for the generation, and interestingly the category score increases with the increase in age. The generation from 18 to 39 had a maximum category score, indicating that membership in this age group clearly affected choice of job between on-farm and off-farm works.

The score range for gender is the second largest. It is clear that the effect of gender is an important factor in job choice with men tending to work on-farm and women off-farm. The score range for tenurial status was the third largest among the four score ranges. It is interesting to note that the score range for educational background is the smallest, and so are the category scores. However,



there is a clear tendency for the workers who studied at high school and university to prefer working in the off- farm sector. In this case, off-farm work involved governmental or private companies. On the other hand, the workers with no-schooling tended to work in self-employed sector or in temporary wage work in the off-farm sector.

### **The Outside Variables between Full-Time and Part-Time Farmers**

In order to clarify the choice between full-time and part-time work from factors including “education”, “age”, “pension”, “farming experience” and “size of planted area”, an analysis was also conducted by the quantification method Type II with these two groups being the outside variables. As is indicated by correlation coefficient  $r = 0.5440$ , the discrimination in the analysis may be adequate. The positive value of the category score represents the extent of contribution of the category to being full-time farmer, and the negative value part-time farmers.

Independent variable of full-time farmer is 1, and part-time farmer is 2. The items are as follows: variable  $k_1$  is a dummy variable for education (no schooling and elementary=1, secondary=2, high school and university=3). Variable  $k_2$  is a categorical data for age (18-49 years old=1, 50-69 years old=2, elder than 70 years old=3). Variable  $k_3$  is also categorical data for pension (no pension =1, pension=2). Variable  $k_4$  is categorical data for farming experience (0-19 years=1, 20-39 years=2, more than 40 years=3), and  $k_5$  is categorical data for planted area (0.0-0.9 relong=1, 1.0-1.9 relong=2, 2.0-2.9 relong=3, 3.0-3.9 relong=4, more than 4.0 relong=5). For all of these items, positive contributions are expected on the choice of being full-time farmers.

Table 6 presents the results of the analysis, from which the following points deserve mentioning. First, the largest score range was obtained for the factor of “age”, followed by “size of planted area”, “pension”, “farming experience” and “education”. The category giving the largest positive score was “older than 70 years old”, indicating that older farmers were likely to be full-time farmers.

The second highest score for the category was “pension”, suggesting that farmers older than 56 years old who had previously worked in the governmental sector were most likely to be full-time farmers. It should be noted that only workers in the governmental sector can receive pension after retirement at 56 years old. Second, the score range of age was the largest and the category score increases with the increase in age. Age of more than 70 years old gave a maximum category score, indicating that the choice of becoming full-time farmers was most strongly affected in this age group.

Third, the score range of the planted area was the second largest, and farmers in the size of 0.0-0.9 relong, 2.0-2.9 relong and 3.0-3.9 relong tended to be full-time farmers. On the other hand, farmers in the size of 1.0-1.9 relong and more than 4.0 relong tended to be part-time farmers with negative category scores. Most of the farmers in both groups worked in the informal sector as self-employed workers, by which they could manage the time schedule for daily work of on-farm and off-farm labour hours. Fourth, the score range of pension was the third largest, and indicated that farmers with pension tended to be full-time farmers, which is consistent with the earlier discussion.

Lastly, the score range of the period of farming experience revealed that farmers with more than 40 years of experience in rice farming tended to be full-time farmers, while farmers with less experience tended to be part-time farmers. This again is consistent with the earlier finding that the older farmers tended to remain as full-time farmers.

**Table 6.** Values of category scores for employment choice factors obtained for two groups. (full and part time farmers).

Item	Number of farmers		Category score	Score range
	Full-time	Part-time		
Education				
No schooling and elementary	11	12	-0.0888	0.2287 (5)
Junior high school	3	4	0.1398	
High school and university	3	9	0.0887	
Age (years)				
18-49	0	11	-1.0911	2.2374 (1)
50-70	14	13	0.2747	
More than 70	3	1	1.1463	
Pension				
None	10	24	-0.2676	1.4051 (3)
Have	7	1	1.1375	
Farming experience (years)				
Less than 20	6	10	-0.1087	0.3749 (4)
20-40 years	6	13	-0.0065	
More than 40	5	2	0.2662	
Planted land (relog)				
Less than 1.0	4	5	0.2815	1.6547 (2)
1.0-1.9	4	8	-0.8679	
2.0-2.9	3	3	0.7868	
3.0-3.9	5	4	0.4470	
More than 4.0	1	5	-0.1438	

Source: Survey, 2006

Note:  $r = 0.544$

## CONCLUSION

Concerning the employment structure of paddy farmers and their family members, there was an interesting pattern in the study village. First, we can point out a large increase in the number of part-time farmers during the past decades. At the same time, there was a clear trend of the increase in aged farmers. Second, four factors of age, sex, land holding and educational background were discovered to be the determinants of the occupational choice of the head of the farm households to be engaged in on-farm or off-farm employment. Third, five factors involving age, size of planted area, with or without pension, period of rice farming experience, and educational background were seen to affect the occupational choice of being full-time or part-time farmers.

The quantification method Type II revealed that age was a crucial factor for determining the job

choice between on-farm and off-farm employment, as well as being full-time or part-time farmers. Gender also appeared to be a very important factor in determining whether to be engaged in on-farm or off-farm employment, while farm size played a key role in determining to be full-time or part-time farmers. It was clearly shown that the younger generation preferred working off-farm, and younger farmers chose to be part-time farmers. This tendency is attributed to the characteristics of the area, which is located within commuting distance of an industrial zone.

It is clear that employment structure in the study village has been affected by its geographical advantage of location within commuting distance of the industrial zone. In addition, improved infrastructure such as roads and highways brought about a huge impact to the study village by commuting bus of companies and factories. This traditional rice village on the west coast of Malaysia demonstrated a typical case of the deagrarianization in employment structure caused by industrialization.

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