



RESEARCH ARTICLE

PARTICIPATION OF FARMERS IN THE INTEGRATED BROILER CONTRACT
FARMING IN MALAYSIA

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ABSTRACT

Integrated broiler contract farming (IBCF) is one of the system used to increase poultry production in Malaysia. Broiler farmers participate in this system for having some benefits. This paper has examined characteristic of farmers who participate in the IBCFs in Malaysia. A survey was conducted in Malaysia to determine the factors which contribute participation of farmers in IBCF using logit model. This model involves participation (PAR) as dependent variable and size of farm (SIZE), experience of farmer (EXP), age, gross annual income (GAI), distance farm to market place (DIS), capital (CAP) and education (EDU). The results show that all variables, except SIZE and EDU are significantly influence the participation of farmers in IBCF at the conventional level of significance.

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INTRODUCTION

In Malaysia, poultry has become the main provider of staple meat and singularly the most important in livestock industry. According to Tapsir *et al.* (2011), the production of broiler increased tremendously due to its ability to fulfil the self-sufficiency with the technology progress in husbandry, advance in nutrition, chicken breed and widely practised of the contract system. The main contract system is integrated broiler contract farming (IBCF).

IBCF dominates as much as 75 percent of the national broiler production in the country without which shortage of chicken in the market would be eminent. Therefore, government focuses on IBCF in order to maintain adequate supply of eggs and poultry as one of the agenda in the Malaysian national Agricultural Policy (1998 – 2000). This is supported by Sugumar (2006), that an effort to vertically integrate the industry among the small broiler farmer is one of the strategies at achieving the agenda. The Department of Veterinary Service (DVS), in 2013 reported strategies by using IBCF have increased the broiler production of up to 53.2 percent which involve more than RM 15 billion in the year of 2013. Sulaiman *et al.* (2011) estimated that IBCF will increased to 55 percent and it is expected that it will increase further in the future. At the same time, broiler consumption per capita had increased from 28 kg in year 2000 to 40 kg in year 2014, and it will increase about 2.30 percent per year (DVS, 2014). Due to high demand of broiler meats, as shown in Figure 1, birds

population also increase from 471.56 million in year 2007 to 720.11 million in 2013 (DVS,2013).

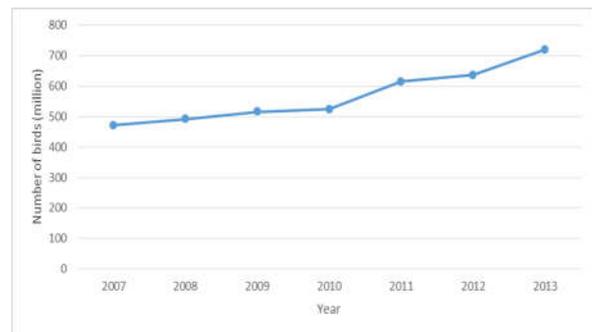


Figure 1 Commercial Broiler Production, 2007 – 2013

Source: DVS, 2014

In Malaysia, all the input production to the contract broiler farms are supplied by the integrators. The integrator company mostly act as vertical integrators and own the feed mill, parent breeder farms, hatchery, processing plants and marketing division. On average, contract farmers manages 10,000-150,000 broiler chicken. Farmers are paid according to the contract agreement between them and integrator based on their broiler performance, particularly final live weight and dressed carcass weight. This study is therefore targeted towards evaluations of the factors influencing farmers' participation in IBCF.

There are total of 2,384 IBCF outfits in 2011 in Peninsula Malaysia as stated in Table 1, which increase to 2,608 farms

in 2014 (DVS, 2014). Kedah, Pulau Pinang and Perak are the top broiler producing states which account for 60 percent of total farmer involve in IBCF located in Peninsular Malaysia.

Table 1 Integrated Broiler Contract Farms by State (2011 - 2014)

State	Year			
	2011	2012	2013	2014
Kedah	527	543	559	598
Pulau Pinang	444	457	471	485
Perak	251	259	266	270
Selangor	224	231	238	242
Negeri Sembilan	186	191	197	201
Melaka	175	180	186	189
Johor	150	155	159	162
Pahang	140	144	149	151
Terengganu	140	144	149	151
Kelantan	137	141	145	148
Perlis	10	10	11	11
Total	2384	2455	2529	2608

Source: DVS

Impacts of IBCF in the economy, there are determinant that influences farmers to participate in the IBCF. Among those determinants are age, farm size, capital, experience, education level, gross annual income and distance from target market. Therefore, this study objective is to establish the determining factors which may influence farmers to participate in the IBCF in Malaysia.

This paper is organized as follows; Section 2 reviews the determinants of farmers participating in the IBCF system. The methodology of study is discussed in Section 3. Section 4 present result and discussion and lastly in Section 5, policy implication to improve the IBCF system were discovered.

LITERATURE REVIEW

In principle, IBCF provides significant benefits to those who involve in the system. Glover and Ghee (1992) and Glover and Kusterer (1990) found in their studies that IBCF as a contract arrangement which provide farmers to easily market their broilers. IBCF is a form of contract business where the contract farmer's provide tools, land and labour while the integrators supplies technical assistance, some inputs such as seeds or pesticides and undertakes to buy the grower's output at a pre-determined price. From the point of view of the integrators, this arrangement ensures raw material supplies of the desired quality including subject and production uncertainty. Meanwhile, from the point of view of the contract farmers, such an arrangement provides an assured market and hence reliable income which to the extent permitted by production risks. Without a contract, risks would be too much and few small contract farmers would want to produce these crops. For this reason, Begum (2005) described IBCF as an institutional arrangement that combined the advantages of plantations including quality control, coordination of production and marketing and of smallholder production which includes superior incentives and equity considerations.

For instance, Indarsih, Tamsil and Nugroho (2010) found that IBCF was a choice by almost broiler farmers due to risk sharing (27.6 percent), financial credits (25.8 percent), and the guarantee of marketing (23.3 percent). Meanwhile, Vukina (2001) has also agreed that IBCF contributes to risk sharing among participants who involve in the contract system. The IBCF offers advantages of reducing capital investment, reducing risk of price fluctuation, guarantee returns and provision of technical assistance to the farmers (Venu *et al.*, 2013). Furthermore, Kumar *et al.* (2005) have suggested that in the IBCF, the farm production should be income-focused rather than price-focussed. Fraser (2005) stated that IBCF system was established to encourage demand-driven production system, which coordinates many aspects of primary production supply.

Broiler farmers participate in the IBCF because of numerous opportunities or potential advantages provided by the system for them as contract farmers. Due to some benefits provided by the IBCF, the system has attracted high participation among broiler farmers. By involving in the IBCF, they are provided with inputs and production services, introduced with an appropriate technology, provided guaranteed and stable pricing structures, offered a good distribution system and marketing, and promised with the increment in their income. However, some broiler farmers are reluctant to participate in the IBCF due to some potential disadvantageous or expected problems. Among expected problems normally associated with the IBCF are unavoidable increased risk, unsuitable and low quality of inputs, manipulation of quotas and quality specification, discrimination amongst broiler farmers and others.

There are a few determinants that influences farmers to participate in the IBCF such as age, farm size, capital, experience, education level, gross annual income and distance from target market. For the demographic variable such as age was normally supported by empirical studies but it fails to achieve a consensus as to both the sign and significance on the probability of participation in IBCF. Todsadee *et al.* (2012) did survey on broiler farmers in Chiang Mai, Thailand and they found age of farmers appears to be negatively and significantly at 10 percent significant level which indicates that younger farmers are more likely to be inefficient in broiler farming than their older counterparts. Age also is believed to be a major element for acceptance of contract farming. A study by Fritz *et al.* (2003) shows that there are significant differences on acceptance and perception on agriculture including contract farming between youths and adults. The self-reported awareness levels of adults were opposite those of youths. Norsida (2008) also observed in her study that youths are less likely to participate in agriculture. Furthermore, Md. Salleh *et al.*, (2009) and Ezhar *et al.*, (2008) found that majority of their respondents who involved in the agriculture are 42 years old and above.

Farm size is defined according to acres of cropland or population of birds or volume of production operated by the farmers, which is a transparent, easily understood measure for which statistics have been kept for many years. Simmons, Winters and Patrick (2005), examines the emergence and

benefits of IBCF in East Java, Bali, and Lombok, Indonesia, and found that farm size and other factors such as smallholder's age, education, and participation in farm groups influenced participation in IBCF. Besides, according to Mendes *et al.* (2014), factors such as education level, labour, gross income per flock and average bird weight at slaughter, flock size also play an important role which had a positive impact on financial performance and farmer participation in the broiler farming. Todsadee *et al.* (2012) found farm size and experience of the farmers significantly affect to economic efficiency of broiler farming in Chiang Mai, province of Thailand.

Capital in this study is define as wealth in the form of money or other assets owned by farmer available for a purpose such as starting a business or investing in IBCF. Specifically, Indarsih, Tamsil and Nugrobo (2010) have emphasized on six reasons; lack of capital, additional income, risk reduction/risk sharing, marketing guarantee, facilities provided by the integrators and using the available housing (ex-independent). By using 50 contract farmers, they established that the reason of risk reduction or risk sharing was the top priorities among respondents in joining contract farming. Their findings are actually in line with other researchers such as Begum (2005). In contrast, Simmons *et al.* (2005), Leung *et al.* (2008), Wang *et al.* (2011), Bellemare (2012), Hu (2012) and Wainaina *et al.* (2012) found farm's assets which measured either the value of household assets or the value of farm equipment is statistically insignificant in relation to contract participation.

Experience is related to the number of years farmer involve in farming or rearing broilers in commercial quantity. This also relates to the number of year farmer joined contract farming. Zhu and Wang (2007) found previous experience with IBCF contributes positively, which suggests that farmers' previous IBCF experience was likely successful. It obviously showed that the future decision is strongly influenced by previous positive or negative experiences. This were agreed by Zhu and Wang's (2007) and Todsadee *et al.* (2012) who indicates that future contracts may be adopted more readily given that many studies find evidence that IBCF increases farmer welfare on future farming.

The knowledge, skills, values, beliefs and habits of a group of people are part of education which were transferred from one generation to the next through storytelling, discussion, teaching, training, and or research. Education frequently takes place under the guidance of others, but may also be autodidactic. Education is commonly divided into stages as pre-school, primary school, secondary school and then college, university or apprenticeship, however education is not, as a process, restricted to formal modes of learning. Indeed any form that the transmission of knowledge, values, beliefs, skills, attitudes and habits from one human being to another can be considered to be education, (May and Aikman, 2003). It is without doubt that education plays a pivotal role that influence youths involvement in a farming system. However, Mc Larty (2005) demonstrated that those with higher education especially university graduates do not get actively involved in agriculture. Similar patterns were also observed by other

researchers; Bahaman *et al.* (2008), Md. Salleh *et al.* (2009) and Hayrol *et al.* (2009). They argue the agriculture is among the main choice for those with lower education group in Malaysia. Gross annual income (*GAI*) is one of the factor which will motivate farmers to participate in IBCF. *GAI* is a total amount of income that farmers earned annually from participate in IBCF before taxes. According to Sokchea and Culas (2015) who using a treatment effect model in their studies on 75 farmers, including 39 contract farmers, in Kampong Thom province, Cambodia, they indicates that IBCF significantly raises farmers' income and this be the main factor farmers participate in IBCF. Furthermore, by using Heckman's two stage model, Sambuo (2014) also examine the factors influence 150 smallholder farmers participation in tobacco production in Urambo, Tanzania and he found farmers' income was significantly influenced their participation in contract farming.

A strategic location and proper distribution facilities offered to the IBCF can also be considered as among the main factors that induce broiler farmers to participate in the IBCF. IBCF is a form of contract which emphasize the distance of the farm to access with the credit facilities and to the marketing network and supply chain such as hypermarket to market broiler products. According to Begum (2005), the demography of the farm with the market target is important to reduce transportation cost and this will give higher economic return to participants in the IBCF system. Moreover, Sharavari and Herald (2009) also stated that age, education, distance to credit source had a positive influence on farmer's participation in IBCF.

METHODOLOGY

Primary data was used in the empirical analysis. The primary data was collected using survey. The main instrument of survey is questionnaire form. Pre-tested or pilot test and actual survey was conducted to have more reliability analysis.

Data were collected from 211 smallholder poultry farmers who participated in the IBCF. The respondents were selected using multi-stage random sampling. Based on Babin *et al.* (2013), three-stages sampling was conducted in this study. In the first stage, the Peninsular Malaysia was divided into three zone, namely northern, east and central zones. Northern zone composes of Perak, Penang, Kedah and Perlis. East zone consists of Kelantan, Terengganu and Pahang. Central zone composes of Selangor, Negeri Sembilan, Malacca and Johor.

In the second stage, one state was randomly selected to represent each zone by using simple random sampling. As a result, Perak, Pahang and Johor were selected to represent each zone. In the third stage, respondent were randomly chosen from the list provided by the DVS for each state in the second stage two.

Age of farmer, size of capital, size of farm, experience of farmer, education level of farmer, gross annual income of farmer, and distance of farm to target market are the variables that influence farmers to participate in IBCF. The detail model

is shown by Equation [1]. P_i , refer as probability farmer participate in the IBCF system, while $(1 - P_i)$, and refer as the probability of a broiler farmer will not participate in the IBCF system.

$$PAR_i = \ln\left(\frac{P_i}{1-P_i}\right) = Z_i = \beta_0 + \beta_1 AGE_i + \beta_2 CAP_i + \beta_3 SIZE_i + \beta_4 EXP_i + \beta_5 EDU_i + \beta_6 GAI_i + \beta_7 DIS_i + \varepsilon_i; i = 1, 2, 3... 191. \quad [1]$$

where:

- PAR = Participation
- AGE = Age of farmer (year)
- CAP = Size of capital (RM)
- SIZE = Size of farm (Number of birds)
- EXP = Experience of farmer (year)
- EDU = Education level of farmer
- GAI = Gross Annual Income of farmer (RM)
- DIS = Distance of farm from market place (Km)
- ε = Error terms
- β_i = Coefficients ($i = 1, 2, \dots, 7$)

In this study, *AGE* represents the demographic variable fails to achieve a consensus as to both the sign and significance on the probability of participation and was calculated in year since the farmers were born. *CAP* in this study is defined as wealth in the form of money or other assets owned by farmer available for a purpose such as starting a business or investing in IBCF. Beside cash, farmers need to have land for operation, chicken house, equipment and labour before start farming. *SIZE* is a number of bird rear by the respondents per cycle and *EXP* is related to the number of years broiler farmer involve with the farming or rearing the broiler in commercial scale. This also related to number of year farmer joined contract farming. *EDU* measures education level of the farmers either graduated from university, secondary or only primary level. *GAI* was measure. Using gross annual income earned by the respondents yearly in the broiler farming and *DIS* is the distance of the farms from the market place.

Empirically, the model was used to evaluate the factors that influence farmers to participate in the IBCF system is logit model. Logit model is a model which demonstrates a relationship between a dependent variable and one or more independent variables (P). If P_i , refer as a broiler farmer's probability participation in the IBCF system, then $(1 - P_i)$, refer as the probability of a broiler farmer will not participate in the IBCF system. These probabilities are represented by Equation [2] and Equation [3].

$$P_i = \frac{1}{1 + e^{-Z_i}} = \frac{e^Z}{1 + e^Z} \quad [2]$$

$$1 - P_i = \frac{1}{1 + e^{Z_i}} \quad [3]$$

Therefore,

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{Z_i}}{1 + e^{-Z_i}} = e^{Z_i} \quad [4]$$

$P_i / (1 - P_i)$, represents as odds ratio which is the probability ratio that a CBF participate in the IBCF system and the probability a broiler farmer will not participate in the IBCF system. By taking the natural log of Equation [4], Equation [5] is established.

$$PAR_i = \ln\left(\frac{P_i}{1 - P_i}\right) = Z_i = \beta_0 + \beta_1 X_i \quad \text{where } i = 1, 2, 3... N \quad [5]$$

RESULTS AND DISCUSSION

The estimation results of empirical analysis using logit model are displayed in Table 2. The table illustrates that all independents variables are significantly related to *PAR* except *SIZE* variable. The result in the table shows that *EXP* is significantly related to farmer to participate in the IBCF. The more experience of the farmers, the more they participate in the IBCF. This emphasizes that experience farmers know about the benefits of the IBCF system and their willingness to sustain in the system. This result is also consistent with Masakure and Henson (2005), Guo *et al.* (2006), Bijman (2008) and with Wang *et al.* (2011), who indicate that stability and technical knowledge including *EXP* were, inter alia, cited as the most important reasons why farmers join contract-farming initiatives.

Table 2 Estimation Results of Participation

Dependent Variable: PAR				
Variable	Coefficient	Std. Error	z-statistic	Prob.
C	-3.811	4.209	-0.905	0.365
SIZE	0.066	0.092	0.717	0.477
EXP	0.965	0.144	6.701	0.000*
GAI	9.496	1.406	-6.754	0.000*
AGE	7.955	3.765	-2.114	0.035*
CAP	3.485	4.416	7.894	0.000*
DIS	-2.051	0.201	-10.204	0.000*
McFadden R-squared	0.935	Mean dependent var		0.053
S.D. dependent var	0.224	S.E. of regression		0.069
Akaike info criterion	0.101	Sum squared resid		0.879
Schwarz criterion	0.221	Log likelihood		-2.537
Hannan-Quinn criter.	0.149	Deviance		5.073
Restr. deviance	78.245	Restr. log likelihood		-39.122
LR statistic	73.171	Avg. log likelihood		-0.013
Prob(LR statistic)	0.000			
Obs with Dep=0	181	Total obs		211
Obs with Dep=1	30			

Note: * significance at 5% level.

Furthermore, *GAI* variable has positive significant influence on *PAR*. It shows that IBCF system can generate good annual income and this motivates farmers to attach with IBCF. Ramaswami *et al.* (2006) and Wang *et al.* (2014) found that lower risk and higher expected returns are the reasons for the farmers to participate in IBCF. This finding is similar to

Bellemare (2012) who found that farmers interested to participate in contract farming since it appeared to lead almost 10 percent increase in income. Wainina *et al.* (2012) stated that smallholder farmers willing to participate in the IBCF after they realize that IBCF system improves their welfare and reduce rural poverty and policies. Goldsmith (1985) reviews a number of case studies of contract farming in Africa, Asia, and Latin America, and finds the income of farmer is greater than independent farmers in the majority of the cases. Moreover, with the adoption of better production technologies introduced by the integrators give positive impact to the *GAI* of the contract farmers. Singh (2002) also finds that those smallholder farmers participate in the contract farming in the Indian state of Punjab since their incomes higher compare to independent farmers.

Table 2 also shows that there is a positive significant relationship between variable *PAR* and *AGE*. It means that age influence farmer to participate in the IBCF where the older generation are more likely to accept IBCF more than the young generation. On the other hand, Katchova and Miranda (2004) found age has significant positive effect on soybean contract farming in the United States (US). However, studies done by Simmons *et al.* (2005) and Katchova and Miranda (2004), proved that there is an insignificant effect of age in seed rice and broilers in Indonesia and also for corn and wheat in the US, respectively. Ito *et al.* (2012) in his study found a nonlinear age effect for watermelon industry in China. Todsadee *et al.* (2012) did survey on broiler farmers in Chiang Mai, Thailand and found that age of farmers appears to be negative and significant at 10 percent which indicates that younger farmers are more likely to be inefficient in broiler farming than their older counterparts.

This study also found a positive significant relationship between variable *PAR* and *CAP*. This indicates that those farmers who have better *CAP* are more willing to participate in IBCF. Indarsih, Tamsil and Nugrobo (2010) and Warning and Key (2002) also identify a significantly positive effect of the *CAP* in term of farm equipment assets in participate farmer in Lombok, Indonesia and contract of Senegalese peanut farmers, respectively. However, Simmons *et al.* (2005), Leung *et al.* (2008), Wang *et al.* (2011), Bellemare (2012), Hu (2012) and Wainaina *et al.* (2012) found *CAP* is statistically insignificantly related to contract participation.

A negative significant relationship was also observed between *PAR* and *DIS*. The study show that most of the farms located near to the target market. From the study, it is found that the IBCF can be performed smoothly if the distance from broiler farms is nearer to the market place. This agreed by Begum (2005) and Sharavari & Herald (2009), where they also found that the IBCF is a form of contract which emphasize the distance of the farm to access with the credit facilities and to the marketing network and supply chain such as hypermarket to market broiler products. According to Begum (2005), the demography of the farm with the market target is important to reduce transportation cost and this will give higher economic return to participants in the IBCF system.

POLICY IMPLICATION AND CONCLUSION

Broiler farming is the most competitive industry in livestock industry in Malaysia. The development of broiler industry in Malaysia is actually guided by increasing number of participants in IBCF. Therefore, the participation of broiler farmers in this industry should be increased. It is suggested that Malaysian government should implement more aggressive approach to achieve this objective. Among these approaches is to encourage more young generation to involve in broiler farming. Based on the empirical results, it is suggested that the government should encourage the integrators to recruit more farmers with training and motivation course. This has positive effect on the youth who participate in the IBCF. By providing training and technical assistance to them especially proper guidance from veterinarian and technicians of integrators, they will be guided to implement contract farming. Since the result shows that the annual income can encourage broiler farmers to participate in the contract farming, the mechanism of the broiling system need to be further improved such as the government or integrators do more research on diseases, birds genetic and raw material quality to improve the production of broilers. As a result, the broiler farmers' income will be increased. The government should also provide loan or financing assistance either through commercial banks or government institutions to fulfil the needs of broiler farmers, especially additional working capital. In addition, the government can also assist broiler farmers using friendly taxation and subsidies system to reduce the cost of broiler production.

In sum, this study has been successfully determined some determinants of broiler farmers' participation in the IBCF system. By increasing participation of broiler farmers in the IBCF system, the government actually expedite the target of achieving the National Agro-Food Policy (2011 – 2020).

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