ECONOMIC PERFORMANCE OF CONTRACT BROILER FARMING IN MALAYSIA

BY

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ABSTRACT

Integrated broiler contract farming (IBCF) is one of the systems that increase poultry production in Malaysia. Generally, broiler farmers participate in this system to reap some attractive benefits. This study examined the economic performance of the contract broiler farmers (CBFs) and the potential relationship between participation and profit. The survey was conducted in Perak, Johor and Pahang to determine the factors that influence farmers' participation in the IBCF system. The study featured participation as the dependent variable together with independent variables, namely size of farm, the experience of the farmer, age, gross annual income, distance of farm to market center, and capital. The results from logit model indicated that all variables, except age, are statistically significant and have the potential to affect farmers' participation in IBCF. The pooled ordinary least square analysis was used to evaluate the economic performance of the CBFs. Size of farm, feed conversion rate, average body weight, average marketing age, mortality rate, and chicken rearing system are statistically significant and considerably influence the performance of CBF. Also, there is evidence of a positive relationship between participation and profit. Based on these findings, the study suggested that the close house system would be the best option for broiler farming. Thus, the government suggest to provide tax reduction to those who implemented close house system. Besides, it is recommended that the integrators with the cooperation of Department of Veterinary Service or the integrators themselves should provide the technical service to improve participation and the economic performance of the CBFs .This would eventually improve the broiler management and broiler production.

Keywords: Integrated broiler contract farming, contract broiler farmers, economic performance.

ABSTRAK

Kontrak ayam pedaging bersepadu (IBCF) merupakan satu sistem yang digunakan untuk meningkatkan pengeluaran ayam di Malaysia. Penternak ayam pedaging mendapat banyak manfaat apabila menyertai sistem kontrak ini. Kajian ini dijalankan untuk menyelidik prestasi ekonomi penternak ayam pedaging kontrak dan hubungannya dengan penyertaan dengan penyertaan di dalam system IBCF. Soal selidik telah dijalankan di Perak, Johor dan Pahang. Dalam kajian ini, penyertaan merupakan pemboleh ubah bersandar manakala saiz ladang, pengalaman penternak, umur, pendapatan kasar tahunan, jarak antara ladang ayam dengan tempat pemasaran dan modal pula sebagai pemboleh ubah bebas. Keputusan daripada model logit mendapati bahawa semua pemboleh ubah bebas mempengaruhi penyertaan penternak ke dalam sistem integrasi kontrak ayam kecuali umur, mempengaruhi penyertaan penternak ke dalam system IBCF. Analisis regresi berbilang data terkumpul digunakan untuk menilai tahap prestasi ekonomi penternak ayam pedaging kontrak. Saiz ladang, kadar pertukaran makanan, purata berat badan, purata umur ayam dijual, kadar kematian dan sistem perumahan ayam sebagai adalah signifikan secara statistik mempengaruhi prestasi ekonomi penternak ayam pedaging kontrak. Kajian ini juga membuktikan hubungan positif antara penyertaan penternak dan prestasi ekonomi. Dapatan kajian mencadangkan sistem rumah tertutup merupakan pilihan terbaik kepada penternak ayam pedaging kontrak. Oleh itu,pihak kerajaan dicadangkan untuk memberi penurunan cukai kepada penternak yang menggunakan sistem rumah tertutup ini. Di samping itu, pihak syarikat bersepadu dicadangkan bekerjasama dengan Jabatan Perkhidmatan Veterinar atau pihak syarikat bersepadu disarankan menyediakan perkhidmatan teknikal bagi memperbaiki penyertaan dan prestasi penternak ayam pedaging kontrak . Hal ini akan memperbaiki pengurusan dan pengeluaran ayam pedaging.

Kata kunci: Kontrak ayam pedaging bersepadu, penternak kontrak ayam, prestasi ekonomi.

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ABBREVIATIONS

ABW	Average Body Weight
AGE	Age of farmers
AMA	Average Market Age
CAP	Capital
CBF	Contract Broiler Farmer
CF	Contract Farming
CHS	Closed House System
DIS	Distance
DOC	Day Old Chick
DU	Dummy
DVS	Department of Veterinary Service
EDU	Education
EXP	Experience
EAS	Extension and Advisory Services
FCR	Feed Conversion Rate
FLFAM	Federation of Livestock Farmers' Associations of Malaysia
GAI	Gross Annual Income
IBCF	Integrated Broiler Contract Farming
IND	Individual Farmers
MOA	Ministry of Agriculture and Agro-Based Industry of Malaysia
MOR	Mortality Rate
MyCC	Malaysia Competition Commission
NAP	National Agro-food Policy
OHS	Open House System
PAR	Participation
PROFIT	Profit from the economic performance
SIZE	Size of Farm

CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

Integration Broiler Contract farming (IBCF) system is an integration program between a company which offers the contract which known as the integrators and a contract broiler farmer (CBF). In this program, the arrangement for the production or supply of broiler is established. The contract requires the CBF to raise the chicks in accordance with the terms and references given by the integrators.

For instance, the price of chicken is fixed by the integrator. If the CBFs agree with the terms and references, they are required to sign the letter of agreement or memorandum of understanding (MOU) with the integrators. In the CF, establish an agreement between integrators and CBF to make a commitment to supply broilers, at a particular price level for a certain period (Wainaina, Okello & Nzuma, 2012). For further discussion, this chapter discusses the background of the study, statement of the problem, the justification for the study and objectives.

1.1 BACKGROUND OF THE STUDY

Generally, the impressive progress in the poultry sector and particularly in this broiler business is because of the improvement of the technology inbreeding, disease control, feeds and increase investment in the private sector in the livestock industry, especially in the IBCF system. Poultry farming is singularly the most important livestock industry in Malaysia. The production of chicken probably increased because of poultry meat has

become the staple meat (Tapsir & Sarmin, 2008; D'Silva *et al.*, 2009; Shaffril *et al.,* 2010).

Generally, there are three types of the IBCF systems in Malaysia, namely, resource providing contract, contract related to production management and market specification contracts (D'silva *et al*., 2011). Resource providing contract mainly related to the production of a type of chicken, relevant production practices and the chicken standard packaging quality through the provision of credits and technical assistant. In this contract, the CBFs and integrators come across of memorandum between them to agree on terms and condition regarding of supply and trading the livestock products.

Furthermore, contract related to production management involved with the system and regulation of the chicken production. This is also known as resource provision contract where the integrators agree to supervise on technical aspect including land preparation and supply certain inputs for production.

Meanwhile, market specification contracts is a contract which is related to future purchase agreements which specific to quantities, timing and the market chicken price. Under this contract, the CBFs instructed to obey to all the methods of production which were recommended, cultivation, input regimes and specifications in the harvesting.

Technically, the IBCF system governs the connection between integrators and CBFs. Both parties have a specific legal agreement which is needed to be abided by them. Vertical integration in the broiler businesses along the supply chain set up as power over arrangements of the contract amongst integrators (upward) and CBF (downward).

CBFs normally gains significant returns and benefits from the IBCF system. The system alleviates cash flow problems, especially to small broiler farmers. They usually lack capitals, fewer opportunities to earn extra income, bear the high cost of production, capital risk and less technical expertise. Actually, the IBCF system transfers new technology for improving technical expertise and helps small farmers to enter the broiler market with minimal risk. According to Von and Kennedy (1994), the broiler rearing is a risky enterprise due to market volatility and taste shifts. Furthermore, the nature of the contract between CBF and integrators is able to remove CBF's risk through guarantee buyback the broiler and also production failure which related to a provision of coping. As a result, the farmers can raise the quality of chickens since the integrators support in the supplying of quality inputs in term of day old chick (DOC), feeds and medicines. Wainaina *et al.* (2012) used data collected from 180 smallholder poultry farmers stratified by participation in contract production. The study finds that, on average, contracted farmers earned more net revenue per bird compared to the independent farmers, by approximately 27 percent, and as such participating in contract farming could improve the welfare of these smallholder poultry farmers. This finding suggests that getting smallholder commercial poultry farmers to participate in contract farming can help improve their welfare through increasing the net revenues from these birds and thereof incomes.

However, some risks still faced by CBFs cannot be avoided. Such unavoidable risks are related to the variations in bird placements, the size of birds need to produce, the performance of the chicken and the disease and health condition problems which can cause inconsistency and instability of incomes and profit received by CBFs. In addition, according to the implementation of the IBCF system rule, the broilers

ownership belongs to the integrators. However, the mortality rates of the chicken and utility bills of production contribute to the production cost is still under the CBFs' responsibilities. Even though the IBCF system can help CBF to reduce these risks, but according to MacDonald and Korb, (2004) and Keey and Runsten (1999), to overdependence of CBF on integrators not only makes they less adaptation to broiler business but also limit power bargain power in contract negotiations.

Moreover, the IBCF system may place a greater business burden to the CBFs once there is a term (or combination of terms) in the contract. For example, the input contract price of DOC is too high and different to the open market prices or the contract chicken feed in the contract input price higher from the market price with the specified quality low and too high of quantity or the output contract live chicken price consider is extremely low from the market price. As a result, CBF may breach the contract and withdrawal from the system.

CBFs sometimes break contract either on account of production failure or because they have sold the produce to competing buyers or to the local spot market. When there is a good market at harvest, many CBFs are lured by higher spot prices where they can sell their produce for cash. In this way, they avoid the repayment of credit, which is usually subtracted at the time of delivery. The CBFs often claims production failure for the lack of compliance with the contract. The absence of effective legal systems and lack of collateral held by smallholders, as well as the weak insurance markets, create considerable risk for companies engaging in contract farming with smallholders (Coulter, Goodland & Tallontire, 1999). Because of the risk of default, many agribusinesses or traders have discontinued the process of supplying inputs to farmers

(Kherallah, 2000), again creating barriers preventing entry to agricultural markets by some smallholders. As stated by Glover (1984, 1987) and Singh (2002), breach of the contract also occurred when CBFs feed is used for their own business and not in contract farming or selling the input to an outsider for getting higher prices. Meanwhile, the integrators also may breach or do not follow the contract by supplying low-quality inputs, unfair quality standards, incomplete purchases, unsatisfied technical service and inefficient management or marketing problems. These treatments by integrators create negative perception by CBF. As a result, they will decide to discontinue their participation in the complete cycle of rearing.

The IBCF system, as a modern commercial poultry production, was introduced in Peninsular Malaysia in the middle of the 1980s (D'Silva *et al.* 2011). Later, it spread all over Malaysia including Sabah and Sarawak. In Malaysia, this system can be considered a new model of broiler market in the present-day. This system was constructed related to expanding of the agribusiness consolidation and integration on the last history.

In the IBCF system, CBFs do not require a huge capital to start off with the broiler farming operation. The CBF is only required to prepare the chicken houses and all other equipment for raising chicken including electricity and water supplies. CBFs do not have to worry about finding their own market to sell the raised broilers when the age and weight required for sale are achieved because the integrators will purchase the raised broilers from them. In addition, the CBFs will not be affected by chicken price fluctuation in the market because the CBFs will be paid with a farm-gate price which is fixed as per contract in the IBCF system. The chicks, feeds, and medicines will be

supplied to CBFs on the credit basis. The amount of these inputs will be deducted before the final payment is made by integrators once the chickens are sold to them (Wang, Wang & Delgado, 2014).

Moreover, the IBCF system is actually implemented to ensure sustainability of poultry production through an integrated value chain (Farooq, Mian & Asghar, 2001; Gulati, 2008; Ike & Ugwumba, 2011). It had contributed to the expansion of the production and higher broiler productivity (Indarsih, Tamsil & Nugroho, 2010). As a matter of fact, the establishment of the IBCF system can enhance national development agenda and improve current government's policies like National Agro-food Policy (NAP), which was structured for the period of 2011 – 2020 (Nungsari, 2011). Nungsari (2011) stated that the national policies are not just planning about agriculture as a business but they are more concern to produce food as security, as well as food safety Thus, the IBCF system was introduced in the early 1980s as a strategy to make sure broiler supply is enough in Malaysia (D'silva *et al*., 2010).The system can also assist the government to achieve one of the NAP aims, food safety and ensure sufficient food supply. In addition, Department of Veterinary Services (DVS, 2011) announced that on 2010, Malaysia export palm oil which the value is around RM45 billion and in return, they import food in the value of RM15 billion such as dairy and agro product. Malaysia is also not self-sufficient in the major food items such as rice, vegetables, fish, and beef.

Table 1.1 displays the chicken population by type in Malaysia. The chicken population in the chicken industry is dominated by broilers and then followed by layers during 2006 to 2010. According to this table, broilers population represents more than 60 percent of the entire chicken population in five years. This scenario shows that the

broiler industry is the main business activity in the chicken farming due to the advance of technology in the integrated broiler contract farming (IBCF) system such as the feed formulation and chick breed. The highest contribution of broilers production is in 2007, which represent 71.1 percent.

Table 1.1
Malaysia: Chicken Population by Types (2006 – 2010).

Types	**'000 (% total)**				
	2006	**2007**	**2008**	**2009**	**2010**
Broilers	102,639.9	106,890.6	106,233.6	121,455.5	117,844.3
	(70.5)	(71.1)	(67.3)	(69.7)	(63.8)
Layers	30,989.2	31,699.0	37,987.1	37,816.4	41,789.4
	(21.3)	(21.1)	(24.1)	(21.7)	(22.6)
Breeders	8,685.7	8,342	8,647.8	10,504.5	16,968.1
(parent stock)	(6.0)	(5.5)	(5.5)	(6.0)	(9.2)
Free-range	3,075.1	3,206.2	4,949.0	4,507.2	8,085.9
(*Ayam kampung*)	(2.1)	(2.1)	(3.1)	(2.6)	(4.4)
Free-range breeders	236.2	236.7	55.5	48.5	63.4
	(0.2)	(0.2)	(0.2)	(0.03)	(0.03)
Annual Total	**145,626.1**	**150,374.6**	**157,873.0**	**174,332.1**	**184,751.1**

Source: DVS, 2011

DVS (2010) estimated that the IBCF system dominated 75 percent of the national broiler production. In 2010, broiler production was 63.8 percent of total livestock production amounting RM10.85 billion. As reported by United State Department of Agriculture (USDA, 2014), through Global Agriculture Information Network (GAIN) in Table 1.2, consumption of broiler is forecast to grow from 1.4 million tons in 2013 to 1.43 million tons in 2014. Furthermore, USDA (2014) stated that the broiler meat is the staple protein source for all ethnic groups in the Malaysia, and is the dominant meat offered in all food service outlets. Franchising industries such as Mc Donald and Kentucky Fried Chicken (KFC) are by far the most popular restaurants. Moreover, 60 percent population of Malaysia are Muslim, therefore, poultry is the most important animal protein source.

Moreover, chicken is much cheaper than beef and pork, and chicken prices have been more consistent.

Table 1.2
Malaysia: Broiler Consumption, Export, and Import (2012 – 2014).

	2012	2013	2014
Production	1,374,500	1,408,862	1,437,039
Import	52,595	53,600	54,000
Total supply	1,427,095	1,462,462	1,491,039
Domestic consumption	1,394,598	1,431,062	1,459,039
Export	32,497	31,400	32,000
Total distribution	1,427,095	1,462,462	1,491,039

Source: USDA GAIN, 2014

The IBCF system involves the broiler supply chain where is depicted in Figure 1.1. In this figure, the broilers supply chain involves of parents stocks, hatcheries, feed mills and broiler growing farms. The function of parents stock is to produce eggs, and then those eggs are delivered to hatcheries for hatching. After that, the eggs hatched in the hatchery to produce DOC. Later the DOC will send to CBFs' farms to grow. The CBFs grow those chicks until they reach the market weight. Meanwhile, the function of feed mills is to produce feed to fulfill the need of the parent's stocks and the broilers.

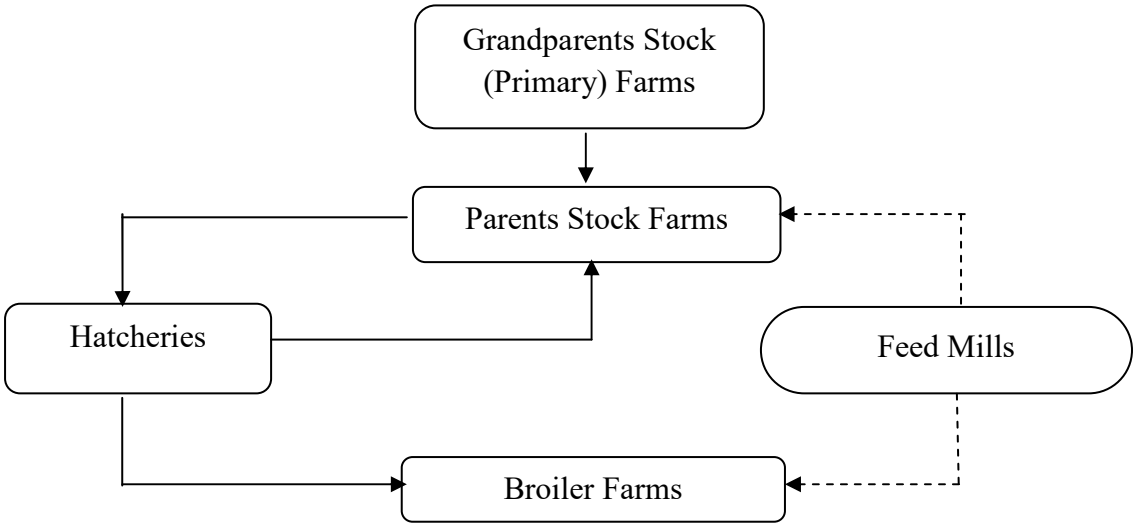

Figure 1.1
Broiler Supply Chain

In the IBCF system, the integrator provides a technical and managerial extension and advisory services (EAS), supplies the DOC, feed, medications and veterinary supplies. The integrators also bear the marketing risk responsibility and the expenses which involved in logistic within the farms. The integrators may also decide the frequency of flock rotations for each the IBCF system farm.

Furthermore, according to DVS (2013), there are four grandparent stocks in Malaysia act as primary farm operators which produce DOC for supplying to parent stock farmers including their own parent farm. These primary farms which also act as integrators are Ayamas, Huat Lai, Charoen Pokphand, and Leong Hup.

DVS (2013) stated that there are 92 integrators in Malaysia poultry industry and 22 of them are classified as parent stock companies. As shown in Table 1.3, eleven of these parent stock companies are fully integrators and the others are non-fully integrators. The full integrator means that they completely have parents' stock, hatcheries and feed mill. Those full integrators are Lay Hong, CAB Breeding Farm, Ayamas Breeder Farm, CP Farm, DBE Breeder Farm, Sinmah Breeder Farm, Dindings Breeder Farm, Huat Lai Breeder Farm, Pin Wee Breeder Farm, Leong Hup Poultry Farm, and KL Supreme. Meanwhile, non-fully integrators are not fully integrated because they might buy DOC, feeds or both from other companies.

Table 1.3
List of Parent Stock Companies

Fully Integrators	Non-Fully Integrators
Lay Hong	Banyen
CAB Breeding Farm	FFM Farms
Ayamas/KFC	TD Poultry
Charoen Pokphand	Hyperbird
DBE Breeder Farm	Kami Farming
Sinmah	Zue Heng Farming
Dindings	LKPP
Huat Lai	Medan Juara
Pin Wee	Pertanian Tani Jaya
	Shizul Farm
Leong Hup	Shunshing Sdn Bhd
KL Supreme	Sin Long Heng
	Zenxin Agric Farm
	Yithai Poultry Farm

Source: DVS, 2013

Hatcheries are the center for hatching the chicken eggs. These centers belong to integrators who have responsible for producing breeders and DOCs. Table 1.4 reviews, out of 53 hatcheries, 22 are based in Johor. Perak and Penang have eight and six hatcheries, respectively. In fact, it is about 58.5 percent of total hatcheries are owned and operated by integrators.

Table 1.4
Distribution of Hatcheries in Peninsular Malaysia

State	Hatcheries	Owned by integrator
Selangor	2	2
Penang	6	0
Kedah	3	1
Perak	8	7
Negeri Sembilan	4	0
Kelantan	1	1
Melaka	4	3
Johor	22	16
Terengganu	1	0
Pahang	2	0
Perlis	0	0
TOTAL	**53**	**31**

Source: DVS, 2013

Broiler farmers are considered as chicken growers in the broiler growing farms. A broiler farmer may or may not involve in the contract farming. In the IBCF system, the CBFs provide his labour, chicken houses and other necessary services and equipment. They usually operate their farms on their own lands and they hire their own labors in their contract farming. The other operating expenses bear by CBFs' are utility costs (electricity and water), mortality disposal and clean-up cost. At the end of the cycle period, the CBFs will receive a payment according to the weight of live birds produced. Also, as a common practice, integrators normally provide a bonus as incentives if the CBFs produce superior bird performance. Table 1.5 shows the declining pattern of the number of broiler farmers in Peninsular Malaysia for the period 2009 – 2013. The smallest number of broiler farmers was recorded in 2013. The highest declining in the growth of broiler farmers was recorded in 2012. Based on this table, it shows that the participation of farmers in the IBCF system decrease in this period.

Table 1.5
Number of Broiler Farmers

Year	Number of Broiler Farmers	Growth (%)
2009	2763	
2010	3014	9.08
2011	2704	-10.29
2012	2403	-11.13
2013	2179	-9.32

Source: DVS (2014)

Based on Table 1.6, Johor, Pulau Pinang, and Perak are considered as the top three broiler producing states, which are calculated about 60 percent of nation total broilers population. However, the DVS had lacks information whether these broiler farms are operated by own integrators, individual or CBF. In 2015, the government practice

licence system to all broiler farms which operate in the Peninsular Malaysia. Those licences should be obtained from the DVS office in every state. The purpose of this enforcement of the licence system is to control the spread of contagious disease including New Castle Disease, Avian Influenza, Infectious Bronchitis and Infectious Bursal Disease. Apart from that, the enforcement serves as a tool to curb the rise in air and flies pollutions.

Table 1.6
Number of Broiler Farms in Peninsular Malaysia

State	No. of farms	Broiler Population ('000).	Percentage (%)
Johor	603	37,248.5	32.10
Pulau Pinang	492	25,663.2	22.10
Perak	335	9,928.0	8.60
Selangor	199	8,112.3	7.00
Negeri Sembilan	148	7,222.8	6.20
Melaka	133	6,579.8	5.70
Kedah	100	6,267.8	5.40
Pahang	87	5,915.0	5.10
Terengganu	87	5,139.1	4.40
Kelantan	82	3,729.5	3.20
Perlis	13	180.0	0.20
Total.	**2,179**	**115,986.0**	**100.0**

Source: DVS (2014)

1.2 STATEMENT OF PROBLEM

The economic sustainability of the IBCF system is determined by many factors. Even though the IBCF system offers many advantages to CBFs, due to certain reasons, some broiler farmers have decided to quit from participating in the entire system. Some of them joined the system only for one or two life cycles of the chicken broiler. Some of the reasons they discontinue their participation because breach of contract, terminated from the system or leaving temporarily from the system. As shown in Table 1.5, the number of CBFs had declined about 27 percent from the year 2010 – 2013. This was supported by Tapsir (2008) reported CBFs supplied 75 percent of total national broiler

production. While according to MyCC report of 2014, the CBFs managed to supply only 62.5 percent from the national broiler production. This showed there is meant reduction of farmer vs broiler production from the CBFs. Since the CBFs cannot sufficiently supply the chicken, the integrators build their own broiler farms or/and converted their breeder farms to broiler farms. However, the implementation of these projects involves high capital, need more labors and land. Due to declining of participation CBFs in the IBCF system, cause reduce of establishment new entrepreneur especially the young generations in poultry industries.

According to the study conducted by Dinding Soya and Multifeeds Sdn. Bhd. in the area of Sungai Siput and Manjung, only 68.25 percent sustain in the IBCF system in 2013. The detail of percentage withdraw is disclosed in Table 1.7.

Table 1.7
CBF: Participants and Withdraw of CBFs (2012 and 2013)

Number of Cycle	2012	2013			
	Number of CBF	Number of CBF retain	Number of CBF Withdraw	Percentage of Withdraw	Loss of DOC intake per cycle
1	4	0	4	100.00	160,000
2	11	5	6	54.55	240,000
3	10	4	6	60.00	240,000
4	7	3	4	57.14	160,000
5	18	18	0	0.00	0
6	13	13	0	0.00	0
Total	63	43	20		800,000

Source: Dinding Soya and Multifeeds Sdn. Bhd, 2013

The study calculated the average intake of DOC per CBF is 40,000, so the loss of DOC intake per cycle 20 CBFs are 800,000 DOC or 46.50 percent. In term of monetary, the total loss of the company is about RM1.2 million per cycle since as reported by MyCC (2014), an integrator can earn net profit around RM1.50 per bird for every contract. The

same phenomena are facing by other integrators where participation low in the system will cause a declining chicken production through the system.

Based on the above scenario, some questions arises.

i. Why do CBFs decide to participate in the IBCF system?

ii. How do CBFs perform economically under the IBCF system?

iii. Whether participation and economic performance of CBF are related in determining the success of the IBCF system?

1.3 OBJECTIVES OF THE STUDY

The general objective of this study is to investigate the participation and economic performance of CBFs in the IBCF system in Malaysia. The specific objectives are:

i. to identify the determinants of CBFs' participation in the IBCF system,

ii. to evaluate the economic performance of the CBFs base on the scale of production and

ii. to analyze the relationship between participation and economic performance of the CBFs.

1.4 JUSTIFICATION FOR THE STUDY

One of the alternative ways to achieve stable and sufficient supply and price of broiler is through the participation and continuous involvement of the small farmers. Their participation and economic performance needs to be increased in the IBCF system. By conducting this study, some factors that encourage them to participate and their economic performance in this IBCF system can be determined. The determined factors

can be considered as the main element for maintaining sustainability and competitiveness of the broiler industry.

1.5 SCOPE OF THE RESEARCH

The study was carried out in Peninsular Malaysia. The specific location are Perak, Johor, and Pahang. The sample of CBFs selected was a representative of the CBFs in Malaysia because they are the major contribution of broiler in the chicken industry. The study is limited to only the IBCF system in broiler and more focus on CBFs participation characteristics and their performance which related to their profit and loss of each cycle.

1.6 ORGANIZATION BY THE CHAPTER

Chapter One is the introduction to discuss the background of the study, statement of the problem, objectives of the study, justification of the study and scope of the research. Chapter Two will emphasize on literature review which consists of the concept and mechanism of contract farm, theoretical framework, determinants of farmer's participation in the integration broiler contract farming and economic performance of broiler contract farmer. Chapter Three will elaborate the conceptual framework, the models, justification of the variables and method of analysis. Chapter Four will discuss the results and finally, a summary of findings, policy implication and conclusion will discuss in Chapter Five.

CHAPTER 2

LITERATURE REVIEW

2.0 INTRODUCTION

The theoretical and empirical reviews of the concept and mechanism of the IBCF system, the participation of CBFs in the IBCF system and economic performance of the CBFs are elaborated in this chapter.

2.1 THE CONCEPT AND MECHANISM OF CONTRACT FARMING

Contract farming (CF) has been defined in various perspectives. The earliest definition, CF is defined as the arrangement of contract, between firms and farmers regarding of production and marketing of an agricultural product with specific contract arrangement. The contract arrangement is made either in oral or written agreement (Roy, 1972). However, Glover (1984) argued that the definition introduced by Roy was too broad since it included forward contracts and the actual delivery is not essential. Therefore, Glover added contracting arrangements to modify Roy's definition. The contracting arrangement is concern about the firm and its suppliers where they know each other and the CBFs' practices are influenced by the firm's behaviour.

In fact, variations of contract farming are found in some countries, notably in Kenya, Thailand and Sri Lanka, where the firms provide block contracts to quota men, agents or middlemen, who in turn come into contractual arrangements with the small-scale farmer (Ayako, 1989). According to Gulati (2008), the success in the chain value of the

IBCF system is related to the balance contract within the parties especially the integrators and CBFs based on guarantee against risk and market competitive price.

Furthermore, Jeffrey and Ashok (2011) defined CF as a contractual agreement between an integrator and a farmer at the pre-determine price, supply of the agricultural inputs and produce the production. Under the CF system, instead of investing in own production, the integrator signs the contract with the farmer, specify exactly the total production and the way of producing, set the deadlines, and determine the price (Eaton and Shepherd, 2001).

As stated by Singh (2002), CF involves an agreement between a farmer and a company on aspects of quantity or acreage, quality, pre-agreed price and delivery time. According to Sridharan and Saravanan (2013), the development of CF is based on growth, sustainability, efficiency, and equity. Based on their finding, the current income paid to CBFs offered by the integrators is not sufficient and some of the CBFs incurred a loss.

CF exists in several categories or models namely the centralized, the nucleus estate, the multipartite, the informal and the intermediary models. The most popular model is the centralized model. It is often used in tree crops, annual crops, poultry and dairy farming. It involves centralized integrators which normally buying or contract with a large number of CF. The integrators often involved with high degree technologies like modern processing plant, hatcheries, feed mills and breeders farm. It is a model precise the quota allocation and tight qualities control which is vertically coordinated. The integrators take control of most the production and marketing aspects including

involvement in production varies from the minimal input provision to the opposite extreme.

Eaton and Shepherd (2001) stated products such as sugarcane, tea, coffee, cotton, milk, and poultry are related in this model where in this contracting model require compromised on substantial and specific processing prior to the retail requirement. The provision varies widely depending on the degree of input. In addition, Bijman (2008) found that the contracts under this model involve large farms due to the demand for large volumes of chicken requested by the buyers such as hypermarkets like Giants, TESCO and Mydin or big restaurants like Mc Donald and Kentucky Fried Chicken.

Meanwhile, the nucleus estate model is different from the centralized model. In this model, the integrator also manages a central broiler farm. According to Eaton and Shepherd (2001), the integrator own broiler farms sometime re-act as grower purposes and them also as a guaranteed throughput for the processing plant. It often re-acts as resettlement or transmigration plans if their contract farmers cannot supply enough chicken or live birds to their customer or their processing plants. Thus, this model has utilized out CF from the central estates.

Furthermore, the multipartite or tripartite model is a model which may involve of organization which frequently including the statutory bodies. Statutory bodies and private companies are usually participating with CF as a multipartite model. Their rules and responsibility re-act as credit provision, production, processing, management, and marketing. This model related to cooperative or with the involvement of financial institution investment which might be originated from centralized or nucleus estate

models. This multipartite model can involve the national or local governments. Due to the involvement of the government, this model is potentially being politicized and popular (Eaton & Shepherd, 2001).

Individual entrepreneurs or small companies are more related to this multipartite or tripartite model. The involvement in this model usually based on the seasonal operation. This model basically re-acts as research and extension and often need support from the government. Eaton and Shepherd (2001) stated that implementation of this model many involve a greater risk and suffer from extra-contractual marketing.

Finally, the intermediary model explains the involvement the integrators use as intermediaries of subcontracting to have linkages with the farmers. This model is very popular in Thailand and Indonesia. One of the disadvantages of the model is the integrators have no control of production, the output quality and also the prices which received by the CBF. Since the integrators have difficulty to control the CF because of location or miscommunication, the integrators always elect intermediaries as the agent to control the CBF (Setboonsarng, 2008).

2.2 THEORETICAL FRAMEWORK

This section discusses the theories that can explain the issues regarding participation and economic performance of CBFs in the IBCF system. The related theories are principal-agent theory and transaction cost approaches theory.

2.2.1 PRINCIPAL-AGENT THEORY

Principal-agent theory or agency theory explains the relationship between principal and agent. The theory of principal - agency created was first introduced by Stephen Ross and Barry Mitnick in 1970s, (Mitnick ,1975). Two specific problems were attempted in these theories which are agency problem and tolerance for risk. The main goals of the principal and agent are to avoid agency problem. An agency problem occurs because the objective of the agent may deviate and even conflict with the goal of the principals. For instance, beside the desire to gain maximum profit, the principal asks the agents to produce a good quality production. Therefore, according to this theory, both principal and agent normally reconcile different tolerances for solving risk. Integrators try to sort heterogeneous contract farmers by looking to the location, reliability, size, capital, farm condition and broiler farming experience that the farmers have. At this stage, it is not simply a matter of integrators picking farmers. This also depend to the agents (farmers) perceptions of the benefits and risks associated with contract farming. Then, its spill overs drive farmers' propensity or willingness to be considered for contracting. This could include a range of factors such as entry costs, family size, perceived mean and variance of the returns to the broiler production relative to alternative uses of land and labour, social learning and beliefs about impact on inputs supplied by the integrators, diseases and so on. In other words, different kinds of farmers might be equally exposed to participate or be selected into contract farming system purely by virtue of their shared geographic domain. Modelling this stage gets at the notion of regional specialization in particular commodities based on comparative advantage and of geographic poverty traps (Barrett & Swallow, 2006).

Furthermore, this theory also explains that the principals work more effectively where they can act directly or control the agents. They usually construct specific incentive schemes to control the behaviour of agents at least partly according to the principal's interests. Integrators as principals design various incentive scheme as additional encouragement to farmers as agent for attracting them to participate and retain in the IBCF system.

In regards to the IBCF system, the principal-agent theory can be used to portray the relationship between integrator (principal) and CBF (agent). Concentrate on the contractual relationship between the agent and principal. Ross (1973) and Jensen and Meckling (1976) explained that principal initiated the contract and agent make a decision either to accept or reject the contract. In this contract, integrators delegate agent to do farming and product the production. Therefore, based on this theory, the principal might be able to force an agent to do broiler farming and produce the broiler.

Moreover, the CBF and integrators are likely to pursue their self-interested objectives of seeking maximum profit and maximum personal economic wealth (Bruce *et al.,* 2005*)*. According to Minot (1986), the market specification, resource providing and production management are the classifications occur between integrators and farmers. In the market specification, both parties accept on terms of types and quality of production, future commitments on sales, price setting, timing, and location. Resource providing means that the integrators agree to supply inputs to CBF according to production specification, market situation, and types of credit of key inputs.

Production management related to production procedures and technological guidance that need to be followed by CBF. In line with the principal-agent theory, CBF consistently abided to integrators' interest and are supposed to act in the sole interest of their integrators.

2.2.2 TRANSACTION-COST APPROACHES

The idea of the transaction – cost approaches is the basis of an economic thinking introduced by John R. Commons in 1931, (Cheung and Steven, 1987). Transaction cost is the cost of participating in a market or a cost incurred during an economic exchange. Economic exchange means to transfer the right to use goods and services from the separable economic unit and this transacting activity requires supports which involve cost. Actually, while getting information and making negotiation, exchange conditions and transaction costs have already occurred. According to Fiani (2002), transaction costs can be defined as costs that agents face every time they turn to the market. The transfer costs associated with the legal or physical constraints on the movement and transfer of goods. They also include handling and storage costs, transport costs, and so forth. The transportation cost mostly related to distance of the farm to market place. While some transaction costs are the outcome of informational asymmetries and contract enforcement problems that force agents to incur expenditures associated with search, supervision, and management.

Minimize the transaction cost of exchange is the reason to establish a firm. If the firm finds that it is more expensive to produce the particular product by them, the firms will look for vertical integration to get the input of production. Therefore, the establishment of the IBCF system can also be explained by using the theory of transaction cost.

Hobbs (1996) stated that integrators and CBFs, from time to time, looking forward to minimizing the transaction costs. In this process, they normally characterized the cost into uncertainty cost, frequency cost, and asset specificity cost. Economically, when an asset was transferred to alternative uses, it was referred to the asset specificity cost. Asset specificity cost can be divided into time specificity, human capital specificity site specificity. Site specificity cost exists when both integrators and CBF allocate their place to do contract farming to minimize their transportation cost.

Time specificity is associated with the timing to produce the product and delivery and it affect product value. Knowledge and skills of the CBF in the production process is the human capital specificity cost. Therefore, the CBF will not burden with the asset specificity cost and this will influence the CBF's participation and economic performance to tighten up their involvement in the supply chain.

Uncertainty in this transaction cost is related to three main sources; behaviour, uncontrolled factors and inability to control decisions and plans by the third party like consumer or government policy. Moreover, Williamson (1979) included the element of uncertainty in the definition of transaction cost. Uncertainty is a situation where the current and future information is incomplete and probably the other party engage in opportunistic behaviour.

Opportunistic behaviour such as disagreed with the terms, expose of negative characteristics or mislead of rule and regulation are mainly behaviour that generates uncertainty in the transaction. Uncontrolled factors are factors which involve with technological changes which act of nature or consumer preferences. This include the

principal challenge confronting governments and the international development community is to ensure that smallholders and other rural poor benefit from commercialization, either through participation in the market or by successfully exiting agriculture and finding employment in different sectors. There is some compelling evidence to suggest that increased transaction costs deter entry of small farmers into the market. Thus, interventions aimed at reducing transaction costs could encourage increased farmer participation in competitive markets. . Eastwood, Lipton and Newell (2004) present an extensive review of the literature on small farm productivity. The major reason cited for higher levels of efficiency is the higher productivity of farm-family labour and lower supervision costs compared to large farms

Once the uncertainty increase, integrators, and CBFs may look settlement over the transaction, thus moving from the spot or individual markets will reflect their participation in the IBCF system, and economic performance. Therefore, any economic institution and firms need to create proper practices to reduce uncertainty.

In the IBCF system, for instance, integrators reduce uncertainty by providing the farmers guaranteed marketing channel and reducing market risk. The advantages for the integrators in the IBCF system are they receive greater certainty in quality and quantity of the products. While, due to the certainty regarding of the amount and type that the integrators guaranteed to receive, this will encourage the integrators to expand their business by buying specific assets for further investment such as processing facilities or cold storage. This will encourage repeating exchange amongst CBFs and integrators.

Furthermore, the IBCF system decreases uncertainty because of credence factors or niche characteristics. Retailers such as hypermarket or restaurant concern about the integrity of their products. For this reason, Young and Hobbs (2002) conclude that the information costs are increasing due to increasing in monitoring and enforcement costs and also cost while sourcing for the right supplier.

When the transaction between integrators and CBF or consumers is performed, the IBCF system tends to engage in the longer term. When the business linkages frequently occurred, thus will annoying or reducing the scope for opportunistic behaviour. Continuous transaction reinforcing will motivate CBF to sustain in the IBCF system.

Theoretically, this transaction cost is policing and enforcing costs, bargaining cost and searching information cost. Kristen and Sartorious (2002), Key and Rusten (1999) and Minot (1986) argue on failures basis which increases the transaction cost and effect to the participation and economic performance of CBF. They discussed the imperfection in markets for credit, inputs and agricultural support services as well as the asymmetries effect in production and marketing information. They also stated that increased coordination in the transaction costs will give impacts to CBF's performance and participation in the IBCF system.

2.2.3 Uncertainty Theory of Profit

The uncertainty theory of profit was developed by Frank H. Knight in 1921. According to Le Roy and Singell (1987), profit is defined as the net income of a business after the total income or total revenue deducted all the other costs which include the wages, rent,

the credits cost, interest and etc. Profits may actually be converted into the loss if the cost is higher or become zero when costs are equal to income.

In the IBCF system, uncertainty is the special function to the CBFs and leads to profit. In broiler farming, there are certain risks which are foreseen. Like other factors of business, CBFs also facing the uncertainty-bearing cause. The uncertainty cause depends on the temperament of the CBFs and the total resources at CBFs command which inclined to expose to uncertainty. The CBFs that participate in the IBCF system will reduce their uncertainty. Guo *et al.* (2005), in their study of 15 contract farming in a number of Eastern provinces in China, they found that farmers enter contract farming arrangements to reduce the uncertainty in price instability, market access, and technical assistance to improve product quality. This is also supported by Bijman (2008), stated that contract farming can reduce uncertainty factors for CBFs because the integrators provides a guaranteed outlet and credit in productions. Those uncertainty factors are significantly related to the *FCR, ABW, MOR, AMA,* and *SIZE* which later affect the CBFs profits.

CBFs realize the value of their profit depend to the broilers that have been produced and sold in the market. This all depends to the good deal of time which spent in the process of growing the broilers and selling the broilers. But between the times of contracts and sale of output, many changes may take place which may upset anticipations for good or for worse and thereby give rise to profits, positive and negative. It should be noted that positive profits accrue to those CBFs who make the correct estimate of good *FCR, ABW, MOR, AMA,* and *SIZE.* Whose anticipations prove to be incorrect will have to suffer losses.

Apart from the innovations and quality of production inputs which are supplies by the integrators to the CBFs, there are other factors which also cause uncertainty to the *FCR, ABW, MOR, AMA,* and *SIZE*. The factors are changes in tastes and fashions of the people, changes in government policies and laws especially taxation, wage and labour policies and laws and liberalization of imports. Besides that, movements of prices as a result of inflation and depression, changes in income of the people, changes in production technology, and competition from the new integrators that might enter the industry are also causes of uncertainty to *FCR, ABW, MOR, AMA,* and *SIZE* and bring profits, positive or negative, into existence.

2.3 DETERMINANTS OF FARMER'S PARTICIPATION IN THE INTEGRATION BROILER CONTRACT FARMING

The main objective of establishing the IBCF system is to deal with the access to commercial demand and lack of broiler supply. It is conducted based on production contract, risk sharing (e.g. price risk, idiosyncratic production risks and uncertainties in the common production include the effect of weather, genetic stock, and untried feed mixes), and financial credits between farmers and integrators. Knoeber and Thurman (1995) found that 84 percent of total risk is stemmed from price risk. Many studies of contract farming have supported their significant findings. For instance, Indarsih *et al.* (2010) discloses that the IBCF system was a preferred choice among some broiler farming system due to risk sharing (27.6 percent), financial credits (25.8 percent), and the guarantee of marketing (23.3 percent). Umar *et al.* (2013) found farmers intend to participate in IBCF since many firms especially farmers at the farm level with capacity of birds below 10,000 have been competed out because they do not have the capacity to

adopt the market strategies and therefore could not have the synergy to compete with the prices in the supply chain rivals.

Furthermore, Vukina (2010) agreed by stating that the IBCF system mostly contributes to risk sharing among participants who are involved in the contract. Venu *et al.* (2013) also stated some advantages of the IBCF system to the CBFs. They claim that the system will reduce the need for capital investment by farmers, reduce price risk because of fluctuation, guarantee returns and provide technical assistance provide to broiler farmers.

Broiler farmers participate in the IBCF system in order to reap numerous opportunities or potential advantageous provided by the system for them to contract farmers. Coordination of many primary production supplies by the integrators encourages CBF to be a demand-driven in the production system (Fraser, 2005). By participating in the IBCF system, they are provided with inputs and production services, introduced with an appropriate farming technology, provided guaranteed with the stable pricing structures, offered a good distribution system and marketing chain, and promised with the increment in their incomes. Kumar *et al*. (2005) suggested that to provide stable pricing structures, the farm production should be income-focused in the IBCF system rather than price-focussed.

However, some broiler farmers are seen reluctant to participate in the IBCF system due to several potential shortcomings to be faced by them. Among others, the shortcomings include are unavoidably increased risk, unsuitable low quality of inputs, manipulation of quotas and quality specification, market discrimination between broiler farmers and

others. According to Dhewa (2016), farmers reluctant to participate in CF since integrators keep prices very low in order to maximize profits. Dhewa (2016) also stated that the other reasons that farmers reluctant to participate in CF since they don't have an opportunity to speak to final customers to get feedback on how to improve and the integrators also request the CF to pay penalties for low-grade quality or rejected items, which the CF need to accept because there is nothing to compare.

In addition, individual characteristics can represent the key determinant that influences the broiler farmers' participation in the IBCF system. As such, some determinants are age, farm size, capital, experience, education level, gross annual income, and distance to the target market.

2.3.1 Age of Farmer

Age of farmer (*AGE)* is defined in the dictionary as the length of time that one has existed or duration of life. Simmons, Winters, and Patrick (2005) found *AGE* of the household had a significantly negative effect on CF of seed corn in Indonesia while Bellemare (2012) also found the same result in CF in several commodities in Madagascar. However, Kumar (2007) found youths who in agriculture industry accept CBF in agriculture because they practice modern farming methods.

Furthermore, Katchova and Miranda (2004) found in the soybean industry the effect of *AGE* was significantly positive but insignificant effect for wheat and corn in the U.S., respectively. Ito *et al.* (2012) also found *AGE* insignificant effect for watermelon industry in China. Todsadee *et al.* (2012) did a survey on broiler farmers in Chiang Mai, Thailand and they found at 10 percent level, *AGE* of farmers was negatively

significant which indicates that older farmers are more likely to participate in broiler farming compare to their younger counterparts.

A study done by Fritz *et al.* (2003) proved that *AGE* as important significant variable between acceptance and perception of agriculture. The awareness level of youth is difference from those of adults. Adult farmers were much more aware of how important agriculture is. In addition, an event in their study, there was a positive relationship between awareness and acceptance levels on agriculture. Zaleha (2007) found that only 15 percent of youth farmers work as agriculture workers in Malaysia. Another study done by Norsida (2008) stated that the acceptance among adults towards agriculture is positive but negative for the youth in Malaysia. This issue was further strengthened by Md. Salleh *et al.* (2009) and Ezhar *et al.* (2008) in their studies. They also found that farmers aged 42 years and above are the group that most interested to commit in the agricultural sectors including contract farming. This should be the main agenda in Malaysia since Malaysia is considered as one of the developing countries should alarm about this scenario. Senior farmers need to back up with the youth to the industries will ensure continuation and expansion.

2.3.2 Farm Size

Farm size is defined as acres of cropland, a population of birds or volume of production operated by the farmers. Farm size is a transparent and easily understood measurement. Farmers may own the operation land and also rear broiler on the land that they rent. Accordingly, this study defines farm size in accordance with the number or population of broiler reared by the farm.

Simmons *et al*. (2005) examined the development and benefits of CF in East Java, Bali, and Lombok, Indonesia. Their results indicate that participation in contracts is influenced by farm size and other factors as well as smallholder's age, education, and participation in the farm groups.

According to Mendes *et al.* (2014), besides 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) determined the efficiency of broiler farm in Chiang Mai province of Thailand and they found factors associated with economic efficiency of broiler were farm size and experience of the farmers.

Economically, as the *SIZE* increase, the average cost of production decreases. The existence of economies of scales suggests that farms can achieve lower average costs by increasing the farm size. This was argued by Behrooz (2013) which mentioned that farmers need optimum *SIZE* to ensure for achieving economic efficiency and maximum profit.

Shaikh and Zala (2011) stated that the benefit-cost ratio increases with the increases of the *SIZE*. They indicated that the net margin over the rupee invested on broiler also increases when the *SIZE* increases. They also suggested that for break-even analysis, the farmer has to maintain optimum *SIZE* of production to incur the cost production of the broiler. Sharzei (2002) found that by increase the broiler production, it is possible to reduce the production cost. By using production and cost performance, Rohani (2002) found that the optimal *SIZE* needed to achieve a minimum the production cost.

According to Duffy and Nanhou (2003), *SIZE* is one of the internal factors which cause farm profitability. Research done by Michael (2010) found that increasing *SIZE* enables the farmer to capture technical, technological and pecuniary economies of *SIZE*. It also enables the farmer to spread fixed costs over more units of production yielding lower per unit costs. In term of the technical perspective of economies, the larger the *SIZE* to purchase new technology, the cost of the new technology will be less per unit of production.

Moreover, the larger farms normally purchase large quantities of inputs at lower per unit cost and sell output in larger quantities for a higher price per unit. According to Kalamkar (2012), the average net returns per bird increased with the increase of the *SIZE* in both contract and non-contract farming.

2.3.3 Capital

Capital is measured by the farmers' wealth in the form of money or other assets owned by farmers available for a purpose likes starting a business or investing in the CF. Besides cash, CBFs normally need to have at least a piece of land for operation, chicken house, equipment, and labour before starting farming. However, according to Commonwealth Development Corporation or CDC (1989), the types of capital that have been used include equity investments, loans, grants, services provided in kind and self-generated funds. In general, when farmers own their land (instead of renting it), they can offer the land as a real guarantee, so banks or agribusiness firms will be more willing to lend them money, favouring the existence of contracts (Chiriboga *et al*., 2007).

Specifically, Indarsih *et al*. (2010) put emphasis on six reasons that hinder the development of farmers; 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 CFs, they concluded that lack of capitals was the top priorities among the respondents in joining contract farming. Their findings are seen in line with Meshehsa (2011) found increase of smallholder farmers to participate in contract farming of organic honey in Ethiopia because they experience difficulties to get credit for farm inputs. This related to the commercial banks and other local sources charge them high risk of repayment, and this affect less possibility to borrowing moneys. This was supported by Jan *et al.* (2012), found smallholder farmers in Cambodia to participate in contract farming because their access to credit is limited by the lack of collateral or high interest rates by the commercial banks. Prowse (2014) stated that small farms are frequently the most efficient agricultural producers, and have advantages over large farms in terms of labour related transaction costs, in particular supervision and motivation but because of capital constraints they facing problem to adopt technological innovations.

In addition, many empirical studies have also considered the impact of a farm's assets which measured either the value of household assets or the value of farm equipment having the positive effect on the participation in CF. However, Simmons *et al.* (2005), Leung *et al.* (2008), Wang *et al.* (2011), Bellemare (2012), Hu (2012) and Wainaina *et al.* (2012) found the capital is statistically insignificant related to contract participation.

Warning and Key (2002) identified a positive effect of capital e.g. equipment assets on the farmer's participation among Senegalese peanut farmers. They stressed that farmers with more equipment asset may have higher productivity and capable of making repayments. One possible explanation for the significance effect of farm assets in the participation of farm is that farm assets would serve as an alternative measure of farm size, in which any case of size effect may have already been captured by the size of the land.

2.3.4 Experience

Experience is interpreted as a number of years a farmer involves in the farming or rearing the broiler at any production scale. This also related to a number of years a farmer joins in the contract farming. Zhu and Wang (2007) discovered that the previous experience with CF contributes in a positive way, which suggests that farmers who have previous CF experience were likely to be successful. Correspondingly. Bijman (2008) point out that stability and technical knowledge base on experience, inter alia, cited as the most important reasons why farmers join contract-farming initiatives. This supported by Odunze, Van Niekerk and Ndlovu (2015) studied on viability of contract farming in the Zimbabwean maize and soya sector, found the farmer's scale and experience were identified as the significant factors affecting contract farming viability.

Obviously, as agreed by researchers, the future decision is strongly influenced by previous experience. It was agreed by Zhu and Wang (2007) and Todsadee *et al.* (2012) who discovered that the readily available of future contracts to be adopted at the time. Many studies have shown the evidence of CF to increase farmers' welfare on future

farming since they experienced with positive effect of CF, they tend to participate in the system

2.3.5 Educational Level

Education is the form of skills, beliefs, values, habits and knowledge of a group of people. They inherited education from one generation to the next via storytelling, discussion, teaching, training, and/or research. On one hand, the educational level can take place under the guidance of others, but may also be an auto dedication on the other.

Continuously, educational level in Malaysia is divided into multi-stages namely preschool, primary school, secondary school and college, university or apprenticeship. However, educational level is not, as a process that is limited to formal modes of learning. In fact, any form that is capable of transmitting knowledge, values, beliefs, skills, attitudes and habits from one human being to another can be considered as education (May & Aikman, 2003).

The educational level of farmers is considered as an important aspect because competent farmers are to negotiate with agribusiness firms relies on their educational (Chiriboga *et al*., 2007). Asenso - Okyere *et al.* (2008) also argued that the level technical knowledge is necessary for transferring successful farming practice through innovation in order to enhance productivity, competitiveness, and welfare of the farming community. Etling and Barbuto (2002) stressed that technical knowledge serves as a mechanism to develop sustainable farming entrepreneurs that well- equipped with sound knowledge. This will allow them to practice sustainable CF that will be beneficial for them over the long run.

Furthermore, it is interesting to note that, communication and perception of future income have respective roles in ensuring farmers to practice CF for promoting a sustainable agriculture. D'Silva *et al.* (2009) measured the relevance and relationships between a number of variables in order to gain a clear insight on particularly on the IBCF system and agriculture in general. Beside they proved that the youth's acceptance of CF as an important element to ensure the implementation of this farming method in agriculture to be successful. They discovered that the lower level of educational level achievement tends to dominate agricultural activities in Malaysia. This supported by Mendes *et al.* (2014) where on their studied, the education level presented a Pearson's coefficient of correlation of 0.37 with production performance, which may indicate that the farmers that attended school longer were able to apply what they learnt to the production activities, leading to better economic efficiency.

In a similar vein, Hassan and Shafrill (2009) confirmed that agriculture has been the popular choice among those in a low educational level group. However, lately, there were cases of substantial vibrant and young entrepreneurs with good educational level to be involved in modern methods as contract farmers after many successful farmers become increasingly wealthy in a respective field within the agriculture business.

Shafrill *et al.* (2010) empirically observed that similarity between city and town farmers extensively are more knowledgeable in agriculture since there are interactions with farmers and individuals who work in agricultural business. According to Guo *et al.* (2005), Wang *et al.* (2011), Bellemare (2012), Ito *et al.* (2012), and Wang *et al.* (2013), they found that educational level especially the head of the household with participation

in CF is not significantly related. Zhu and Wang (2007), Arumugam *et al.* (2011) and Hu (2012) found significantly positive in their studies between education levels with the participation of farmers in CF.

However, Ramaswami, Birthal and Joshi, (2006), Miyata *et al.* (2009) and Wainaina *et al.* (2012) found negative significant between educational level with participation in CF. Meanwhile, Simmons *et al.* (2005) and Katchova and Miranda (2004) found neither positive nor negative finding in their studies which depend on the commodity. By the way, to explain the possibility of the different finding, Miyata *et al.* (2009) in his survey said that appear to be nonlinear effect between educational level and participation in contract farming.

A survey was done by Cai *et al.* (2008) on rice contract farming in Cambodia and found farmers with more educated household heads significantly more likely to join the contract. Others factors which also contribute decision to join CF such as farmers with larger family sizes, younger less asset value, and those with farm locations closer to the highway. It is without a doubt that education plays a pivotal role that influences youth's involvement in a farming system. However, surprisingly previous studies demonstrated that those with higher educational level especially university graduates do not get actively involved in agriculture (Mc Larty, 2005).

A similar pattern was also observed in Malaysia whereby agriculture is dominated by those with lower educational level achievement. Studies were done by Bahaman *et al.* (2008), Md. Salleh *et al.* (2009) and Hayrol *et al.* (2009) proved that agriculture is the main choice for those with a lower educational level group.

2.3.6 Gross Annual Income

Gross annual income is one of the factors which will motivate CBF to participate in the IBCF system. Gross annual income is a total amount of income that farmers earned annually from participating in the IBCF system before taxes. According to Sokchea and Culas (2015) who examines the impact of farmers' gross income on 75 farmers, including 39 CBFs, in Kampong Thom province, Cambodia by using a treatment effects model. They indicate that CF with farmer organizations significantly raises farmers' income and this be the main factor farmers participate in CF. Bellemare (2012) studied about CF in Madagascar and found one percent increase in the likelihood of participating in CF is associated with a 0.5 percent increase in household income. This implies that the average effect has an upper limit of 50 percent of income. Bellamare (2012) also found that participation also increases income from non-contract crops and from livestock production.

A further study was done by Birthal *et al.* (2005) and they found *GAI* is a reason farmer to participate in CF since the gross annual income of contract dairy farmers in India were almost double than those of independent dairy farmers. Similar findings also observed by Simmons *et al.* (2005) where they examined contract growers of poultry in Indonesia. They concluded that the contracts increase income and reducing absolute poverty since poultry contracts improved in returns to capital than independent poultry growers. Later, Miyata *et al.* (2008) who also explored the constraints on participation and the impact of CF in apples and green onions in Shandong Province, China revealed that three-quarters of the farmers perceived an increase in income since they began contracting.

Furthermore, by using Heckman's two stage model, Sambuo (2014) also examined the factors influence 150 smallholder farmers participation in tobacco production in Urambo, Tanzania. He found farmers' income was significantly influenced their participation in CF.

2.3.7 Farm Distance from Market Centre

A strategic location and proper distribution facilities offered to the CF can also be considered as among the main factors that induce broiler farmers to participate in the CF. For most farmers, lack of reliable demographic situation was the main factor preventing participation in higher value markets.

Therefore, contract farming would only be attractive to farmers if companies agreed to deliver inputs at a correct time and collect the produce within the schedule. This all can be done smoothly if the distance of the place where the product being produced within the area which under control by the integrators (Begum, 2005).

CF is a form of contract which emphasizes the *DIS* of the farm to access 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 CF system. The factors including age, educational level and distance to credit source had a positive influence on farmer's participation in CF (Sharavari & Herald, 2009).

The closer the farm from the target market, farmers' participation in CF will increase. This result is supported by Leung *et al.* (2008) who studied about rice contract farming in Laos. On the one hand, integrators more interested to farmers who farmers who have access to the main road. Those farmers who are farther from the market, the integrators will look for additional security to secure the contract. Hence, CF effects may also be dependent on the infrastructural development.

2.4 ECONOMIC PERFORMANCE OF BROILER CONTRACT FARMER

Economic performance is one of achievement indicators in implementing business activities. It is considered as one of the objectives of business entity. This objective can also be long terms, such as economic sustainable and progress, or short term, such as the stabilization of the program in response to economic and social shocks. In regards to CF, economic performance can be an important indicator that measures the success or failure of the IBCF system.

Economists have used various measures for measuring economic performance. Such measurements are profit and loss, productivity and economic sustainability. Some economists such as Singh (2002), Sharma (2008), Schmidt (2008) and Venu *et al*. (2013) argued that the measurement of economic performance in term of returns rather than cost is more useful for measuring the profitability of the business.

Economic performance of the IBCF system can be measured using absolute performance and relative performance. This form of performance is normally used in the broiler industry. According to Martin (1997), absolute performance evaluates a

broiler against an absolute standard and earns a specified piece-rate payment. Relative performance evaluates a broiler against similar broilers.

Survival of broiler contract farmers actually depends on their economic performance and profitability. Duffy and Nanhou, (2003) emphasized profitability was normally used to determine the farmers' contribution in the private and public economic progress policies since profitability is observable and easily measured. According to D'Silva (2009), survival of broilers in the IBCF system in Malaysia depends on their level of economic performance and profitability which are related to effectiveness, ability to withstand obstacles in the competitive market and the competitiveness to run this business.

In another perspective, Shaikh and Zala (2011) mentioned that to examine and evaluate production performance based on farm size, the feed conversion ratio, liveability percentage, average body weight, and average marketing ages. Therefore, to evaluate the economic performance of the farm, that parameter will be accepted as independent variables and will be discussed further.

2.4.1 Feed Conversion Ratio

Technically, feed conversion ratio (*FCR)* was also known as feed conversion efficiency which measures the ability of livestock to turn feed mass into body mass. In livestock husbandry, *FCR* is a measure of livestock's efficiency in converting feed mass into weight or body mass. For dairy cows, for example, the output is milk, whereas broiler is raised for meat, the output is the mass gain. For instance, *FCR* is 2:1, which measure

that by consuming two kilograms of feed, the chicken's body weight increases one kilogram.

Furthermore, the *FCR* of a broiler is remarkable tools to compute the acceptability performance of the broiler. The proper information of *FCR* on locally available of the farm will provide the basis to develop acceptable livestock husbandry though the task of preparing acceptable and suitable management for the farmers. For example, Patricio *et al*. (2012) collected the same parameters such as *FCR*, liveability, live weight, daily weight gain and production efficiency index to measure and evaluate the performance of Brazilian broilers in the year 1990 – 2009. He found a significant improvement in *FCR,* which related to broiler strains genetically improved during that period to supply market demands.

In a similar vein, Asaniyan (2014) also studied about poultry farmers in Nigeria and using *FCR*, weight gain and feed intake as the variables to measure the broiler performance of a few different type of stocking densities. In his finding, he concluded that low *FCR* promotes broiler profit but in high stocking densities.

Furthermore, Greg (2012) found that feed is typically the most costly expense in broiler production. As a result, *FCR* is typically the primary tool by which a flock is evaluated. *FCR* is typically the primary tool by which a flock is evaluated. Sharma (2003) used Performance Indicator Factor (*PIF*) to evaluate the performance of CBF in Fiji and he needs to use *FCR* to calculate the *PIF* value. Overall, they found, if the *PIF* values in between index of 79 – 210, this indicates that the farmers in average performance**.** From the calculation shows that with low *FCR*, the farmer will have better PIF.

Beside, *FCR* is used to calculate farm performance; the value of *FCR* is also an important indicator beside weight and quantum of feed, as the base of payments or incentive which linked to the performance in terms of efficiency in managing the birds (Kalamkar, 2012). Furthermore**,** *FCR* is used to measure flock converts feed intake (feed usage) into live weight. Any changes in feed conversion ratio at any given feed price will have a huge impact on financial margins. *FCR* will indicate either the flock having both good planning and good management. The key to solving *FCR* problems is ensuring that throughout the brooding and grow-out period, good management practices are in place so that bird performance is optimized.

2.4.2 Mortality Rate

The mortality rate (*MOR*) is a measurement of the number of broiler deaths due to a specific cause in broiler farming, scaled to the size of that population, per unit of the cycle. It is counted at the end of the rearing cycle by the calculation where (population – number of birds been market / population × 100). Sharma (2003) mentioned that mortality in broiler flocks represents lost income to growers and integrators alike. According to Samarokoon and Samarasinghe (2012), even though *MOR* is an everyday part of broiler production, growers should tailor management programs to reduce its overall effect on flock performance.

There are various factors which can cause *MOR*. According to Onemolease and Eikheloa (2005), amongst the poultry farms in Esan West LGA of Edo State, Nigeria, the *MOR* was high with a percentage of 47 percent, largely caused by disease infection, poor feeding and accidental death.

Poapongsakorn *et al.* (2003), in their survey on technical implication in broiler farming in Thailand, found that high *MOR* normally at 10 percent or more usually due to a disease outbreak. The *MOR* partially related to farming mismanagement or issue with animal welfare like not enough labour. They also found the smallest farm has the worst performance while the very large farm (>20,000 birds) has the best performance in terms of the *MOR*. Three-fourths of the large farms had the *MOR* below five percent because of good management system where they take care the animal welfare and also due to rule and regulation by the countries which they export the chicken.

MOR can be used as the indicator for farm performance and efficiency. Ramaswami *et al.* (2006) studied about efficiency and distribution of the IBCF system in India. They found *MOR* may affect economic performance. In their studies, they also found that the CBF's incurred up to five percent of *MOR* and if beyond that, the farmer will bear the risk of loss.

Furthermore, Jabbar *et al.* (2007) did survey the CBFs' production in Bangladesh. They measured broiler performance using various parameters such as *MOR, FCR*, sale weight and fattening days to sale weight. They found *MOR* were about 12 percent and this could be considered high for commercial farms as it had implications for increase costs and lower down the profits.

As part of the measurement of farm performance, *MOR* is also used as a reference for the integrators to give incentive or bonus to CBF. Begum (2005) identified incentives for CBF who participate in the IBCF system in Bangladesh. Incentive is a motivation for the farmers to practice good management. Those CBFs who get low *MOR*, which

below than three percent, they were given a special incentive in term of extra income and this will motivate them for getting the high net return from the poultry farm.

2.4.3 Average Market Age

Average market age (*AMA*) is the broiler age that reaches to the market weight. At this age, the CBFs start to depopulate the birds and send to the market. Lee *at al.,* (1997) for instance defined *AMA* as the average age product been marketed according to demands for different product types.

Normally, integrators supply chicken in accordance with the demand of the customers or the market target. The market target is different according to the demographic segmentation. Demographic segmentation is market segmentation according to consumers' age, race, religion, gender, family size, ethnicity, income, and education. The demographic segmentation will affect the market age of the broilers. Lee *at al.* (1997) who studied about economic viewpoint and found if the optimal *AMA* can be predicted, it will increase the farmers' profit. According to Wang *et al*. (2012), broiler should be sold at an optimal weight in order to get more profit.

CBF plays function in the IBCF system as a broiler supplier according to what the integrators want as stated in the contract. *AMA* depends on body weight which demanded by the integrators. If the integrators need broiler between 1.5 – 1.6 kg, so when the chicken reaches the weight, the CBF will deliver the chicken to the integrators accordingly. When the broiler reaches *AMA* and weight in six or seven weeks, the farmer is paid on the basis of weight gained by the flock, which is influenced by the farmer's skill and good management (Farooq *et al*., 2001). Begum *et al.* (2012)

indicated in Dhaka, the integrators buy the matured broiler from the CBFs by paying a fixed price per kilogram of live broiler and then market these broilers through integrators sales centers. The average duration of the grow-out cycle is roughly five to seven weeks for an averaged sized (1.5 kilograms) broiler.

In certain circumstances, farmers need to sell immediately the chicken due to the high incident of disease which causes high mortality and to avoid more losses. Another situation, farmers want to avoid overcrowded and farmers have to depopulate some of the birds to give more space or to avoid stress. These cases will affect the *AMA*. Embrapa (2008) stated that the cycle length or *AMA* is also an important factor when the annual return from the broiler businesses considered. She found by extending the cycle length, it will increase the return of bird per cycle, whereas, shortening the grow-out time will increase the number of cycles of rearing per year. Other cases such as high demand for chicken, especially during the festival and sometimes there is a disaster like chicken house fall down which need the farmer to depopulate the birds fast if nowhere else to replace the chicken.

Many factors affect the cost of production and net profit per broiler. Schmidt (2008) studied the effect of broiler in Brazil and found economically, *AMA* significantly affected the other performance parameters such as *FCR*, liveability (L), production efficiency index (PEI), and farmer's gross margin but insignificantly affected production cost/kg broiler.

Similarly, Farooq *et al.* (2001) indicated that the *AMA* has a negative effect on the net profit per broiler but no effect on the cost of production. He relates the increase of *AMA*

may reduce the net profit per broiler. He observed an increase of *AMA* because of poor feed conversion ratio and extra management costs.

2.4.4 Average Body Weight

Average body weight (*ABW*) has been considered as one of the important parameters in assessing the potential of bird strain or feeding program as well with the economic performance of the farm. Poor *ABW* is also related to poor feed intake or poor feeding system. There are many factors which affect feed intake of chickens and hence determine nutrient intake level and efficiency of poultry production which related to management and environment, feed and water, and physical and health status of the broilers. According to Genda (2012), efficient feed conversion and excellent growth rate assist in the broiler grower's goal of achieving a targeted weight with the competitive advantage of lowest cost. *ABW* has been considered as one of the important parameters in assessing the potential of bird strain or feeding program as well with the economic performance of the farm. Poor *ABW* is also related to poor feed intake or poor feeding system. There are many factors which affect feed intake of chickens and hence determine nutrient intake level and efficiency of poultry production which related to management and environment, feed and water, and physical and health status of the broilers. Broilers are rear primarily to produce meat. The goal of raising broiler commercially is for them to gain as quickly as possible. Broilers are harvested at various ages according to consumer need such as round chicken, nuggets and chicken parts (Begum, 2012). Mendes *et al.* (2014) also found average bird weights at slaughter were positively correlated with financial performance of broiler farms in Brazil.

Feed efficiency is related to *ABW*. Feed efficiency found to be good if feed intake by the DOC as is more transformed to body weight in broiler farming. The fast growth rate is one of the two majors' factors for a successful and economic broiler production beside efficient feed conversion (Amakiri & Monsi, 1992). This objective can be achieved through efficient management practices that ensure effective disease prevention and control, besides with high-quality feed, fed ad libitum and the flock maintained under continuous illumination. They also found the average gram daily weight gain plays an important role in the optimum growth of the birds. Under normal practical conditions, a broiler must gain an average of certain grams or more per day. The average daily weight gain is not uniform for each week and varies considerably depending on age and sex.

The fast growth rate of broiler chickens was achieved through improved breeding programs, nutrition, and management. This agreed by Jabbar *et al.,* (2007) where he found any composition below the recommended value will lead to stunted growth; wastage of feed as a result of poor handling by the attendant could also result to poor *ABW.* The quality and quantity of feed given could have an effect on market weight including an imbalance in nutrient such as energy, protein; minerals could lead to reduced market weight.

2.5 LITERATURE GAP

Through the literature review found most of the study done by researchers either in Malaysia or in other countries, no study was done to evaluate decreasing of participation in IBCF system and their relation to the economic performance in term of loss and profit. Therefore, the author taking the initiative to do research to evaluate the

factors involved in the participation of farmers in IBCF system and the relationship to their economic performance.

2.6 CONCLUSION

CBFs are aware of the significance of the contract farming program and benefits obtained from participation in the program. There is enough evidence to support that farmers got involved in the contract farming program for utilisation of modern technology, guaranteed market, effectiveness in sales and purchase agreement, acceptable selling price, and the consulting and technical assistance from other departments or agencies. The principal – agent cost theory states that those farmers who are more skilful and *EXP* are more likely to participate in the IBCF system. The principle-agent also provide market power, incentive alignment and risk sharing to ensure CBF in the contract will earn high *GAI.* The principle- agent theory also stated the market coordination in credit arrangement and marketing in the IBCF system which supports the small *SIZE* farmers who normally have difficulty in credit arrangement, *CAP* and marketing. The transaction cost approaches theory mentions that farmers need sufficient amount of *CAP* to start and run their broiler farming. This will push them to participate in the IBCF system. In the transaction cost approaches theory also states that *DIS* as one of the cost which will initiate farmers whether to participate in the IBCF system. Finally, in the uncertainty theory, the setup the IBCF system will be based on *FCR, SIZE, AMA, ABW,* and *MOR*. Both integrators and CBF will negotiate their contract including incentive according to their result of *FCR, AMA, ABW,* and *MOR*. In conclusion, it is shown that the IBCF system is a business model by which farmers and buyers establish pre-agreed supply agreements. Tremendously, the IBCF system wills effects to the CBFs' incomes or economic performance.

CHAPTER 3

METHODOLOGY

3.0 INTRODUCTION

This chapter discusses the steps of analysis which conducted in this study. It covers theoretical framework, model justification of variable, data and sampling procedure and method of analysis. The performance of the IBCF system was evaluated based on CBFs' participation and the economic performance of the CBFs.

3.1 CONCEPTUAL FRAMEWORK

3.1.1 Theoretical Framework of Participation

The theoretical framework was developed based on theories which were discussed in Chapter 2. Based on these theories, the general view of the conceptual framework is displayed in Figure 3.1. Based on this figure, the theories explain that participation and economic performance of CBFs in the IBCF system are mainly influenced by production, cost, and market expansion.

The IBCF system can help CBFs to increase production by having sufficient inputs provided by the integrators after the establishment of the contract with both parties. As explained by transaction cost theory, the IBCF system can also minimize the cost of production, for instance, an initial cost due to the credit of inputs given by integrators to CBF.

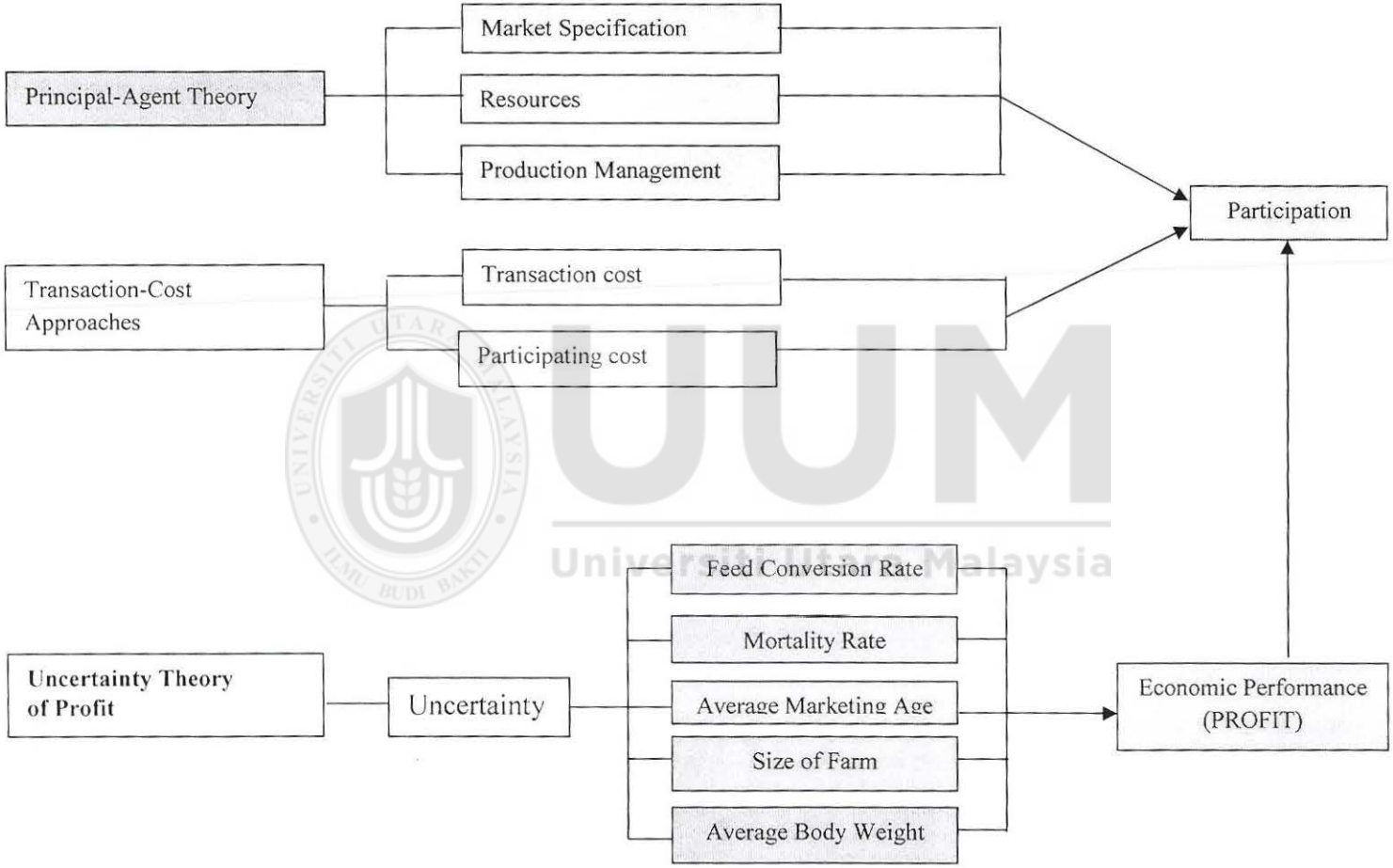

Figure 3.1 Conceptual Framework

3.1.2 Theoretical Framework of Profit

Let consider a competitive firm with the production function $y = f(k,l)$, where y is an output, k is capital and l is labour. Production cost of a firm is represented by $TC = wl - rk,$ where w is the price of labour and r is the cost of capital. If we assume profit maximization behaviour is $\pi = TR - TC$. Therefore, profit maximization equation is represented by Equation [3.1].

[3.1] $\pi = pf(y) - wl - rk,$

where, p is the price of y.

Profit (net returns) is obtained by deducting the total cost of production from the total revenue. It is represented by the formula:

[3.2] $Profit = TR - TC$

where TR is total revenue, and TC is total cost.

[3.3] $TR = P\,Q$

Equation [3.3] indicates that TR is the product of output price and quantity of output produced.

[3.4] $TC = TVC + TFC$

where TVC is total variable cost and TFC is the total fixed cost.

Therefore, the profit equation is shown in Equation [3.5].

[3.5] Profit (Net income) = $PQ - TVC + TFC$

3.2 THE MODEL

Based on the previous studies and theoretical framework, participation model, economic performance model, and casual analysis were estimated in this study.

3.2.1 Participation in Contract Farming

A farmer decision to participate in the contract farming system is influenced by many factors such as the age of farmer, size of capital, the size of farm, the experience of a farmer, education level of a farmer, gross annual income of farmer, and distance of farm to the target market.

Based on theories explained in Section 2.3, the detailed model is shown by Equation [3.2]. P_i, refers as probability of a farmer participate in the IBCF system, while $(1 - P_i)$ refers as the probability of a farmer will not participate in the IBCF system.

[3.2] $$PAR_i = \ln\left(\frac{P_i}{1-P_i}\right) = Z_i = \alpha_0 + \alpha_1 AGE_i + \alpha_2 CAP_i + \alpha_3 SIZE_i + \alpha_4 EXP_i$$

$$+ \alpha_5 EDU_i + \alpha_6 GAI_i + \alpha_7 DIS_i + \varepsilon_i \; ; \text{i} = 1, 2, 3...211.$$

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 (level of education)
GAI = Gross annual income of farmers (RM)
DIS = Distance of farm (km)
ε = Error terms
α_i = Coefficients (i = 1,2,...,7)

3.2.2 Economic Performance of Contract Farmer's Model

For this study, CBF's economic performance is expected to be influenced by the size of farms, average body weight, mortality rate, feed conversion ratio and average marketing age. Based on the profit theory explained in section 2.3, the detailed model is shown in Equation [3.3].

[3.3] $$PROFIT_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 ABW_{it} + \beta_3 MOR_{it} + \beta_4 FCR_{it} + \beta_5 AMA_{it} + \beta_6 DU_{it} + \varepsilon_{it} \; ; \; i = 1, 2...211, t = 1, 2$$

where:

$PROFIT$ = Net profit (RM)
$SIZE$ = Size of farms (number of birds)
ABW = Average body weight (kg)
MOR = Mortality rate (%)
FCR = Feed conversion ratio
AMA = Average marketing age (days)
DU = House system(0 = closed house, 1 = open house)
β_i = Coefficients (i= 1,2,...,6)

3.2.3 Relationship between Participation and Economic Performance of Contract Farmer's Model

The third analysis related to the quantitative evaluation of the relationship between participation and economic performance of CBFs in the IBCF system has been done using logit model. A CBF decision to participate in the contract farming system is

influenced by the economic performance. The detailed of the logit model is shown by Equation [3.4].

$$[3.4] \quad PAR_i = \ln\left(\frac{P_i}{1-P_i}\right) = Z_i = \phi_0 + \phi_1 PROFIT_i + \phi_2 AGE_i + \phi_3 CAP_i + \phi_4 SIZE_i +$$

$$+ \phi_5 EXP + \phi_6 EDU_i + \phi_7 GAI_i + \phi_8 DIS_i + \varepsilon_i \; ; \text{i} = 1, 2, 3...211$$

where:

PAR	=	Participation
PROFIT	=	Net profit (RM)
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 (level of education)
GAI	=	Gross annual income of farmers (RM)
DIS	=	Distance of farm (km)
ϕ_i	=	Coefficients; *i*= 1,2,…, 7

3.3 JUSTIFICATION OF THE VARIABLES

This section justifies those independent variables that are included in models. *PAR* is dependent variables in the equation.

3.3.1 Age of Farmer

Age of farmer (*AGE*) represents the age of the CBF who participate in the IBCF system. This variable is measured by how old of the farmers. This variable has been used by many previous researchers such as Simmons *et al*. (2005), Kumar (2007), Todsadee *et al*. (2012) and Bellemare (2012). For instance, most studies stated that younger farmers be more likely inefficiency involve in broiler farming than their older counterparts. Therefore, the older farmer is more willingness to participate in the IBCF system.

3.3.2 Size of Farm

Farm size (*SIZE*) is referred to the population of broiler in the farm. One of the factors influence CBF to join the IBCF system is size. The *SIZE* is calculated according to the number of broilers reared by the farmer in one cycle.

SIZE can be used as an indicator of the success of farmer in the business or farmer status or wealth. This variable has been employed by Simmons *et al.* (2005), Todsadee *et al*. (2012) and Mendes *et al*. (2014) and in their studies. Simmons *et al.* (2005) indicated in their research that *SIZE* influenced participation of farmers in IBCF system in East Java, Bali and Lombok, Indonesia.

Therefore, this variable is positively associated with the farmer's decision to participate in the IBCF system. Most of the empirical study found the *SIZE* positively significantly influenced farmer to participate in the IBCF system.

SIZE also plays an important role in given scale production economies. Most of the researchers such as Sharzei (2002), Rohani (2002), Hossain *et al.* (2008), Michael (2010), Shaikh and Zala (2011) and Behrooz (2013), used *SIZE* as one of their variable in calculating farm performance. They suggested that larger farm size has tendency to reduce the cost of production.

Shaikh and Zala (2011) in their break-even analysis, found farmers had to maintain the optimum size of production to incur the cost production of the broiler. Therefore in calculating the economic performance, *SIZE* used in the calculation and as expected, the *SIZE* causes the positive effect on the economic performance of the CBF in the IBCF

system. This was proved by the researchers including Sharzei (2002), Rohani (2002), Hossain *et al.* (2008), Michael (2010), Shaikh and Zala (2011) and Behrooz (2013),

3.3.3 Size of Capital

The size of capital (*CAP*) is considered as an important variable to include as a factor influence farmer to participate in the IBCF system. Lack of capital amongst the CBFs is one of the reasons they joined in the IBCF system. The *CAP* is measured by the amount of cash and physical assets owned by farmers. For smallholder farmers, lack of capital is one of the reason make them participate in the contract farming.

According to Begum (2005) and Indarsih, Tamsil and Nugrobo (2010), lack of capital of the CBFs and facilities provided by the integrators such as a credit of input were the factors which encourage farmers to participate in the IBCF system. This supported by Ekwere and Edem (2014) who carried out studied in Etinan Local Government Area of Akwa Ibom State, Nigeria and revealed a significantly high degree of relationship between the credit facilities with the independent variables such as gender, age, education, family size, farm size and farming experience. They also identified lack of capital has been identified as one of the constraints faced by small-scale farmers

However, Simmons *et al.* (2005), Leung *et al*. (2008), Wang *et al.* (2011), Bellemare (2012), Hu (2012) and Wainaina *et al.* (2012) have also employed this variable in their studies and found this variable statistically insignificantly related to contract participation. In that case, the *CAP* will examine whether the *CAP* positively affects farmer participation in the IBCF system.

3.3.4 Experience of Farmers

The length of a farmer's experienced (*EXP*) can either generate or erode confidence. Experience means how long farmers been in the broiler industries. The longer farmers in the industries, the more experience they are. With more experience, a farmer can become more or less averse to the risk of the IBCF system arrangement.

In the study is to explore *EXP* as one of the factors to farmers to participate in the IBCF system. Masakure and Henson (2005) employed *EXP* as one of the independent variable of farmer decision to participate in the contract farming. Through a personal interview with a sample of 300 contracting farmers, Masakure and Henson (2005) found *EXP* as factors which develop skills acquisition in the context of scarce extension to participate in the contract farming in Zimbabwe. Zhu and Wang (2007) found that the previous experience with CF contributes positively to the participation of farmers in the IBCF system. It means that farmer with more *EXP*, more likely to participate in the IBCF system.

This variable is used to verify whether it got any significant effect on the participation in the IBCF system. It is expected that *EXP* cited as one of the reasons farmers to participate in the IBCF system.

3.3.5 Education Level of Farmers

The probabilities of farmers to participate in the IBCF system are related to the level of education (*EDU*) of the farmers. *EDU* was identified base on primary, secondary or higher education level such as diploma or degree.

CBF capital variable such as education is expected to have a positive relationship with individual's productive capacity. In addition, a farmer with higher qualification is more likely to participate in the IBCF system. De' Silva (2009), Hassan and Shafrill (2009), Asenso-Okyere *et al*. (2008) and Etling and Barbuto (2002) have used these variables in their research to define the education and their contribution to farmer participation in the IBCF system.

Hassan and Shafrill (2009) proved that agriculture is not a popular choice amongst those in high education level. This was supported by the findings of Ito *et al.* (2012), Bellamare (2012), Wang *et al.* (2011) and Guo *et al.* (2005) where they also found this variable is not statistically significantly affect farmers participation in the IBCF system. In that case, the hypothesis of this variable will examine that education level is significant with participation in the IBCF system.

3.3.6 Gross Annual Income of Farmers

Gross Annual Income (*GAI*) is one of the independent variable and plays important roles in influencing CBFs to join the IBCF system. *GAI* is gross income of the CBFs earn yearly through their participation in the IBCF system. *GAI* has been used by many researchers such as Sambuo (2014), Miyata *et al.* (2008), Birthal *et al.* (2005) and Simmons *et al.* (2005) in their studies regarding of decision of farmers to participate in the CF system. Sokchea and Culas (2015) proved that *GAI* was significantly affected by the acceptance of the CF system. The hypothesis is *GAI* is significant with participation in the CF system. *GAI* will be one of the reasons a farmer to participate in the IBCF system.

3.3.7 Distance from Market Target

Distance from the market target (*DIS*) is examined by how far the farm from the target market. If the *DIS* of the broiler farm is close to the local target market, it is likely that CBF will be compelled to enter into a contract with integrators to reduce the level of associated spoilage or low quality of the product.

A few researchers have employed this variable in their studies such as Wainaina *et al*. (2012), Leung *et al*. (2008), Begum (2005), Patrick (2004) and Zhu *et al.* (2001). Zhu *et al*. (2001) and Patrick (2004), indicated that farmers are more likely to participate in CF where farms are nearer distant from market centres. The hypothesis is that distance of farm location from target market has a positive effect on the participation of farmers in the IBCF system. It is expected that farmers' farms located nearer to the integrators' target market, it most probably that the farmer will participate in the IBCF system.

3.3.8 Feed Conversion Ratio

In broiler farming, the feed conversion ratio (*FCR)* is used as an indicator of farm performance. If the *FCR* is lower or the value is between 1.5 – 1.7, it means that the farm efficiency is higher. The *FCR* is the mathematical relationship between the input of the feed that has been fed and the weight gain of a population. *FCR* is calculated by using Equation [3.5].

$$[3.5] \quad \text{Feed Conversion Ratio (FCR)} = \frac{\text{Feed intake (kg)}}{\text{Live weight (kg)}}$$

Asaniyan (2014), Kalamkar (2012), Patricio *et al.* (2012), Greg (2012) and Sharma *et al.* (2003) used of *FCR* as a primary tool for evaluating the economic performance of

the farm. Kalamkar (2012) and Sharma *et al*. (2003) found small changes in *FCR* will have a substantial impact on financial margin. In this study, *FCR* is expected as a variable which has a positive significant effect on the economic performance of CBF.

3.3.9 Mortality Rate

Mortality rate (*MOR*) refers to a number of the dead broiler, scaled to the size of that population, per unit of the cycle. The *MOR* is counted at the end of the rearing cycle computed based on Equation [3.6].

$$[3.6] \quad \text{MOR} = \frac{\text{Size of farm - Number of Livebility}}{\text{Size of farm}} \times 100$$

This variable has been used by researchers; Samarokoon and Samarasinghe (2012), Jabbar *et al.* (2007), Ramaswami *et al.* (2006), Poapongsakorn *et al.* (2003) and Sharma (2003) for calculating broiler performance in their studies e.g., Begum (2005) and Sharma (2003) found that those farmers who get low *MOR*, they will get a high net return from the poultry. Therefore, it is expected that this variable will have a significant effect on the economic performance of CBF.

3.3.10 Average Market Age

In general, market age is the age of a bird start to depopulate and send to the market when they reaching the market weight. Specifically, average market age (*AMA*) is referred to the average age when broiler sends to the target market for slaughter. Some of the broilers were sent to market early or a few of them will be delay according to the demand of the customers.

Some researchers such as Wang *et al.* (2012), Begum *et al.* (2012), Embrapa (2008), Schmidt (2008), Lee *at al.* (2007) and Farooq *et al.* (2001) employed this variable to monitor economic performance of the farmers. Lee *et al.* (2007) and Begum *et al.* (2012) found profit related to the optimum market age. Thus, it is expected that *AMA* has a significant impact on economic performance of CBF.

3.3.11 Average Body Weight

The broiler is sold in the market according to the body weight. Average body weight (*ABW*) is calculated at the end of the cycle using Equation [3.7].

$$[3.7] \quad \text{Average Body Weight (ABW)} = \frac{\text{Total of Weight (kg)}}{\text{Number of Broiler in Market}}$$

Begum *et al.* (2012), Genda (2012) and Amakiri and Monsi (1992) used this variable in their researches measuring the economic performance of the broilers. According to Amakiri and Monsi (1992), the fast growth rate of the broiler is one of the major factors for a successful broiler production and Genda (2012) found excellent growth rate assist farmer to achieve the excellent economic performance of broiler farmers. Hence, it is assumed that *ABW* is significantly influence the economic performance of the CBFs.

3.4 DATA AND SAMPLING METHOD

Primary data was used in the empirical analysis. The primary data was collected using survey. The main instrument of the survey is a questionnaire. The detail question in the questionnaire can be referred in Appendix 1.

In this study, the sample comprises of CBFs and independent farmers in Peninsular of Malaysia. To gain the respondents required, multi-stage random sampling was employed. Based on Babin *et al.* (2013), this study used three stages sampling.

In the first stage, three zones were randomly selected in Peninsular Malaysia, namely Eastern, Northern, and Southern zones. Northern zone composes of Perak, Penang, Kedah, and Perlis. Eastern zone consists of Kelantan, Terengganu, and Pahang. Southern 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. Therefore, Perak, Pahang, and Johor were selected to represent each zone. These states are selected mainly because of their contribution to poultry revolution, huge presence of contract broiler farms and big contract firms in the region.

In the third stage, the respondents of the study were selected using the simple random sampling method. For the purpose of sampling, respondents were randomly selected in every state which was selected in the second stage. Figure 3.2 shows the detail of sampling method.

Determination of sample size is based on the table given by Babin *et al.* (2013). Since the total of broiler farms in Peninsular Malaysia is 2,719 as reported by MyCC (2014), the chosen sample size is 211 respondents.

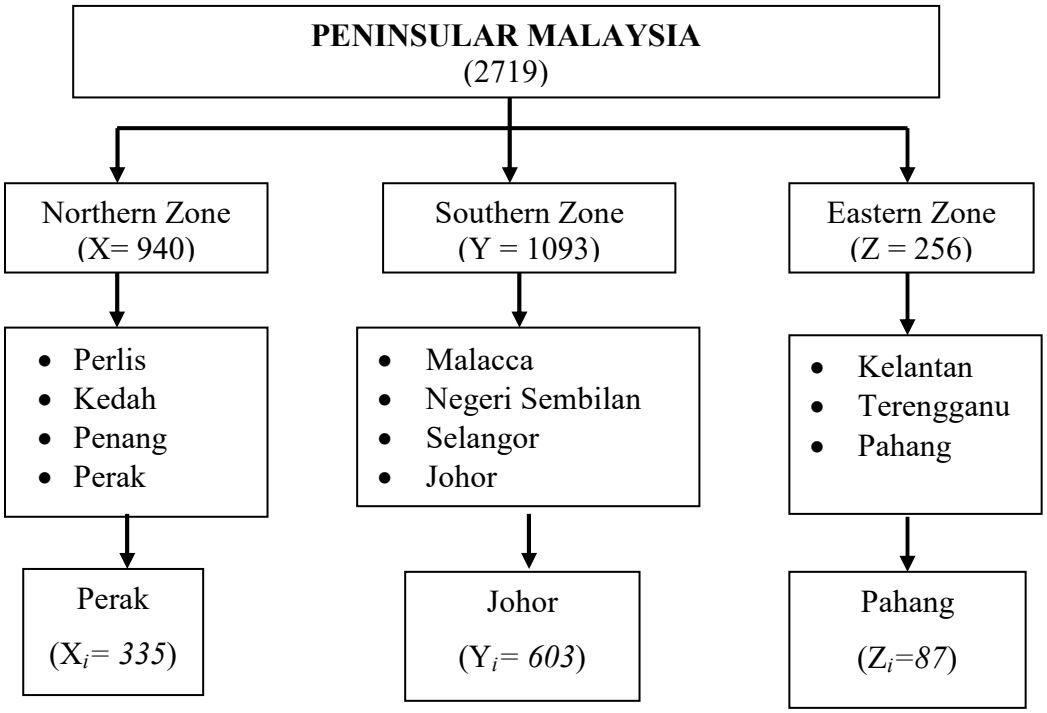

Figure 3.2
Multi-Stages Sampling of Respondent

3.4.1 RELIABILITY AND VALIDITY TEST OF VARIABLES

For further analysis of all the variables, Cronbach's Alpha Reliability Test was performed to confirm the reliability and validity of the collected data. The reliability statistic score shows the Cronbach's Alpha is 0.84 and therefore, the data gathered is constructive and valid to be used in the analysis.

3.4.2 SIZE OF SAMPLE

The survey involves a total of 211 respondents who located in Johor, Pahang, and Perak. According to Babin *et al.* (2013), the size of the sample is sufficient. Of this total, 31.28 percent of them are from Perak. As stated in Table 3.1, there are 85.78 percent respondents participated in the IBCF or known as contract broiler farmer (CBF) and only 14.22 percent of them run businesses as individual farmers (IND).

Table 3.1
Size of Sample

State	Respondent				Total	
	CBF		IND			
	Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**
Johor	54	25.59	10	4.74	64	30.33
Pahang	61	28.91	10	4.74	71	33.65
Perak	66	31.28	10	4.74	76	36.02
Total	**181**	**85.78**	**10**	**14.22**	211	100.00

3.5 METHOD OF ANALYSIS

The quantitative methods were employed to analyse the factors that influence participation, to evaluate the economic performance of CBFs and relationship analysis of participation and economic performance of CBFs in the IBCF system. Briefly notify using two methods; logit model and pooled ordinary least square.

3.5.1 Logit Model

Empirical evaluation of the determinants of farmer participation in the IBCF system and the relationship between participation and economic performance of the broiler farmers have been evaluated using logit model. A 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 [3.8] and Equation [3.9].

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

[3.9] $$1 - P_i = \frac{1}{1 + e^{Z_{ii}}}$$

Therefore,

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

$P_i/(1-P_i)$ represents as odds ratio which is the probability ratio that a broiler farmer participates in the IBCF system and the probability a broiler farmer will not participate in the IBCF system. By taking the natural log of Equation [3.10], Equation [3.11] is established.

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

where X is independent variables which are listed in Equation [3.4] and [3.6].

3.5.2 Pooled Ordinary Least Square

The second analysis involves evaluation of the economic performance of the CBF. The economic performance is represented by profit and loss of the CBF who involve in the IBCF system.

The profit and loss are considered as major indicators success of the CBF. Since the data in this study involve the combination of time series and cross-sectional, pooled ordinary least square will be employed to perform the economic evaluation of the IBCF system.

As mentioned by Bass and Wittink (1975), pooled ordinary least square (POLS) model offers advantages over individual regressions. One of them is pooling data offers a high degree of freedom. In this study, the number of cross section, $N = 4$ ($i = 1, 2, 3, 4$) of

time-series observation, $t = 2$. The period $t = 2$ is chosen based on the number of broiler rearing cycle.

POLS have been employed to estimate Equation [3.11]. In estimation process of using POLS, the main assumptions are there is no unique attributes of individuals within the measurement set and no universal effects across time. For allowing POLS is used in the analysis, error term in Equation [3.12] fulfils the following assumptions.

[3.12] $\varepsilon \sim iid\left(0, \sigma^2\right)$

[3.13] $E\left(\varepsilon_{it}^2\right) = \sigma^2$ and $E\left(\varepsilon_{ij}^2\right) = \sigma^2$

[3.14] $E\left(\varepsilon_{it}\varepsilon_{ij}\right) = 0; i \neq j$

Equation [3.12] and Equation [3.13] show that error term is normally distributed independent random variables with zero means and constant variances. Meanwhile, Equation [3.14] shows that there is no serial correlation problem. Since the sample is collected independently, thus, serial correlation of residuals is not an issue. Estimation using pooled regression model has been beginning with the homogeneity test. If the homogeneity hypothesis is rejected, then the estimates can be based on the pooled model.

3.6 CONCLUSION

This chapter discusses comprehensively all elements which are needed in the methodology including the theoretical framework, justification of the variables, models, study area, population, sampling and method of analysis. In addition to that, literature reviews and the theoretical concept have been used to justify the inclusion of the

variables in the different models. Perhaps, the method of analysis which used in the study would contribute significant results and can be used in recommending the appropriate policy development and program related to broiler industry.

CHAPTER 4

RESEARCH FINDINGS

4.0 INTRODUCTION

Under this chapter, the results of respondents' profiles are discusses in section 4-1. Section 4.2 demonstrates the descriptive statistics while in Section 4.3 explores the correlation analyses of variables. Furthermore, in section 4.4 enlightens the results of determinants of farmers' participation in the IBCF. While in section 4.5 signifies the results of economic performance analysis. The relationship between participation and economic performance is elaborated in Section 4.6. Finally, conclusion concludes the chapter.

4.1 ANALYSIS OF RESPONDENTS' PROFILE

Prior to doing an empirical analysis, respondents' profile analysis has been done for providing general information of the respondents. In this analysis, some selected characteristics of the respondents have been chosen, namely; gender, age, marital status, education, experience, reasons to participate in the IBCF system, occupation, location, annual income of farmers, size of farm, farm ownership, source of capital, broiler housing system and distance of farm to marketplace.

4.1.1 Gender of Farmer

As shown in Table 4.1, male CBF and IND farmers dominant by male since 96.2 percent of them involve in this business.

Table 4.1
Gender of Farmers

Respondent	Gender			
	CBF		IND	
	Frequency	%	Frequency	%
Male	176	83.41	27	12.80
Female	5	2.37	3	1.42
Total	**181**	**85.78**	**30**	**14.22**

This scenario similar to the finding observed by Eaton and Shepherd (2001) where they found that contract farming in many developing countries is mainly conducted by male family heads. Furthermore, Zaitun and Nooraini (2014) found female in Malaysia more concentrate on household tasks and childcare activities compare to involving in agriculture sectors.

4.1.2 Age of Farmers

The results of the survey in Table 4.2 shows that respondents whose ages above 30 years old dominated the IBCF's system participants (96.69 percent). Among them, the age bracket, 31 – 40 years and 41 – 50 years of old are the majority group.

Table 4.2
Age of Respondents

Age	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
< 30 Years	6	2.84	0	0	6	2.84
31 – 40 Years	68	32.23	6	2.84	74	35.07
41 – 50 Years	75	35.55	7	3.31	82	38.86
> 50 Years	32	15.17	17	8.06	49	23.33
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

Most of the broiler farmers who participates in the IBCF system started since the teenager. Therefore, they inherited the business and sustain in the IBCF system since this is their main source of their income. However, Sambuo (2014) found that coefficient of age has a significant positive impact on participation in contract farming.

He found that the probability of farmers to participate in the IBCF system is the older man.

Overall, this survey found only 37.9 percent of the youths who below than 40 years old participate in broiler farming. This finding is similar to De Silva *et al.* (2010) and Abdul and Norhlilmatun (2013), where they found youth more interested in manufacturing, commercial or even the government sectors as self-employed compare to doing own business in the agriculture sector.

Furthermore, Table 4.3 illustrates the tabulation of respondents' age versus location of the sample. All respondents in Pahang and Perak are over 30 years old and only 90.6 percent of respondents in Johor is above than 30 years old.

Table 4.3
Tabulation between Ages of Respondents by State

Age	State						Total	
	Johor		Pahang		Perak			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Below 30 years	6	2.84	0	0	0	0	6	2.84
31-40 years	35	16.59	32	15.17	7	3.32	74	35.08
41 – 50 years old	17	8.06	36	17.06	29	13.74	82	38.86
Above 50 years	6	2.84	3	1.42	40	18.96	49	23.22
Total	**64**	**30.33**	**71**	**33.65**	**76**	**19.43**	**211**	**100.00**

However, most of the respondents or 64 percent in the youth category located in Johor. Compare to Pahang and Perak, most of the respondents or 54.9 and 90.8 percent in elder category which is more than 40 years old.

4.1.3 Marital Status of Respondents

Table 4.4 displays that 95.73 percent of the respondents who involved in the broiler industry were married. This may relate to lower the price of labour where the family

may use household labour and less likely to hire in labour which typically will lower the monitoring cost. Warning and Key (2002), empirically analysed the impact of the oil peanut contract-farming program in Senegal and found most of the contract farmers are married and they use household labour to minimize the operational cost.

Table 4.4
Marital Status of Respondents

Marital Status	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
Single	5	2.37	0	0	5	2.37
Married	172	81.52	30	14.21	202	95.73
Widow	4	1.90	0	0	4	1.90
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

4.1.4 Education Level of Respondents

Table 4.5 indicates the education level of respondents. Most of the respondents either as CBF or IND attended a primary and a secondary school. Most secondary level of farmers involve in the broiler farming compare to the graduates.

Table 4.5
Education Level of Respondents

Level of Schooling	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
Primary School	2	0.95	0	0	2	0.95
Secondary School	144	68.25	24	13.37	168	79.62
Diploma or degree	35	16.59	6	2.84	41	19.43
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

Sharma (2008), who studied on 150 farmers in agricultural commodities like rice and wheat in India, found that the education level significantly increases participation in the contract farming since it decreases the risk aversion behaviour of the farmers.

Furthermore, Table 4.6 displays that, 65.9 percent of respondents who graduated with diploma and degree certificates were below 40 years old. This is a positive sign where a number of youths from tertiary school or high education level are interested to involve in the broiler farming is increasing compare to finding by De Silva *et al.* (2010) who did survey on youths in Malaysia.

Table 4.6
Tabulation between Age and Education Level

Age	Education						Total	
	Primary school		Secondary school		Tertiary school			
	Frequency	%	Frequency	%	Frequency	%	Freq.	%
Below 30 years	0	0	1	0.47	5	2.37	6	2.84
31-40 years	1	0.475	51	24.17	22	10.43	74	35.08
41 – 50 years old	0	0	71	33.65	11	5.21	82	38.86
Above 50 years	1	0.475	45	21.33	3	1.42	49	23.22
Total	**2**	**0.95**	**168**	**79.62**	**41**	**19.43**	**211**	**100.00**

4.1.5 Farming Experience

According to Table 4.7, majority of the respondents or 93.36 percent of them have more than five years of farming experience. The percentage of CBFs who have experience in the bracket of 5-10 years and more than 10 years are almost equal. Meanwhile, majority IND farmers have more than 10 years' experience.

Table 4.7
Farming Experience

Experience	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
< 5 years	14	6.64	0	0	14	6.64
5 – 10 years	83	39.34	6	2.84	89	42.18
> 10 years	84	39.81	24	13.37	108	51.18
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

The finding is similar with study done by Asian Development Bank (ADB, 2015) on farmers who participate in the IBCF system in Republic of China found that to improve farmers' livelihoods; there is a critical need for good knowledge and experience of the

business aspects of running their farm and of how to market their products. This evidence notified that many experienced farmers participate in the IBCF system because they know the system provides many benefits. Therefore, for success in the broiler farming, the farmers may require experiences farm management, marketing and agribusiness.

Furthermore, Table 4.8 illustrates that 77.63 percent of respondents in Perak have experience in broiler farming more than 10 years. However, respondents in Johor and Pahang, who have experience in broiler farming between 5 to 10 years are the highest percentage. This was related to historical and prove that Perak is one of the states which the earliest in developing broiler farming in Malaysia.

Table 4.8
Tabulation between Experience and Respondent's Location

Experience	State						Total	
	Johor		Pahang		Perak			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
< 5 years	13	6.16	1	0.48	0	0	14	6.64
5 – 10 years	30	14.22	42	19.90	17	8.06	89	35.08
>10 years	21	9.95	28	13.27	59	27.96	108	51.18
Total	**64**	**30.33**	**71**	**33.65**	**76**	**36.02**	**211**	**100.00**

4.1.6 Occupation of Respondents

Table 4.9 shows that 77.73 percent of CBFs are full-time farmers. From the survey, those who a part – time farmers, they have other jobs either as government servants, professionals or contractors. From the survey, the IND farmers involve in the broiler farming as a full-time farmers. According to them, they did full time farming because their investment is big and they are totally bear the risk of business. Therefore, they need to give full concentration of the farm.

Table 4.9
Respondents' Main Occupation

Occupation	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
Broiler Farming	164	77.73	30	14.21	194	91.94
Non-Farming	17	8.06	0	0	17	8.06
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

4.1.7 Size of Farm

Table 4.10 illustrates size of farm owned by the respondents. Table 4.10 shows that 5.69% of farmers under small group, 45.49% in medium group and 48.82% under category of larger scale of farmers, respectively. It is found that most of the CBF and IND farmers rear broilers in a big quantity which is more than 50,000 birds per cycle. These farmers agreed that they can reduce costs of production such as labour and infrastructure costs by increasing the production. This is in line with economic theory which states that average cost of production decrease when the total production is increased. This is supported by Duffy (2009) and Randall (2013) where they found that the average cost per unit of production decreases as the size of the farm increases since the farmer is able to spread more production over the same level of fixed expenses.

Table 4.10
Farm Size of Respondent

Size	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
< 20000 birds	9	4.27	3	1.42	12	5.69
20001 – 35000 birds	37	17.53	0	0	37	17.53
35001 – 50000 birds	53	25.12	6	2.84	59	27.96
> 50000 birds	82	38.86	21	3.66	103	48.82
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

Meanwhile, Table 4.11 reveals the tabulation between age and size of farm. It is found that majorities of respondents who below than 30 years old and above than 50 years rear

broilers more than 50,000 birds. The table also notify that 55.8 percent of respondents who between 30 to 50 years old rear broiler below than 50,000 birds. It concludes that the middle age of farmers are operating smaller farms compare to the youngest and the eldest farmers.

Table 4.11
Tabulation between Age and Size of Farm

Age	Size of farm									
	<20000 birds		20001-35000 birds		35001 – 50000		>50000birds		Total	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Below 30 years	1	0.47	0	0	1	0.47	4	1.90	6	3.79
31 -40 years old	5	2.37	15	7.11	23	10.9	31	14.69	74	26.54
41 – 50 years old	2	0.95	18	8.53	24	11.37	38	18.00	82	38.39
Above 50 years old	4	1.90	4	1.90	11	5.21	30	14.22	49	31.28
Total	**12**	**5.69**	**37**	**17.54**	**59**	**27.95**	**103**	**48.81**	**211**	**100.00**

4.1.8 Housing System of Broiler Farming

There are two systems of the broiler farming houses; closed house system (CHS) and open house system (OHS). As shown in Table 4.12, 76.30 percent of the respondents are using OHS. They have decided to use OHS because of the amount of investment needed and operational costs incur are lower than CHS.

Table 4.12
Farm House System

Farm-Type	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
CHS	47	22.28	3	1.42	50	23.70
OHS	134	63.51	27	12.79	161	76.30
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

MyCC (2014) also stated similar finding on the survey they did on 2010 – 2012 where about 70 percent of farmers in Malaysia rear their broilers using OHS while only about 30 percent has changed to CHS. The OHS is still permitted in 2013 in all states. But, starting from 2014, due to the control of pollutions and outbreak of diseases, some states have enforced and ensured that only the CHS is permitted to be built although the

existing OHS is permitted. For such reasons which related to disease and pollution, only Perak, Negeri Sembilan and Johor have started to obligate new applicants among farmers to build CHS. Other states plan to do the same enforcement by 2020. Furthermore, the evidence of choosing the OHS among respondents are shown in Table 4.13.

Table 4.13
Reason for Choosing Open House System

Reason	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
Economic	5	2.37	5	2.37	10	4.74
Disease prevention	12	5.69	0	0	12	5.69
Better performance	25	11.85	12	5.69	37	17.53
Capital availability	139	65.88	13	6.16	152	72.04
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

From Table 4.14, majority or 92 percent of the owner of CHS is above 30 years old. However, in all groups, the majority are using OHS. Look like the young generation concern about bio security and control of pollution when they involve with the broiler farming.

Table 4.14
Tabulation between Age and Farm House System

Age	Farm House System				Total	
	CHS		OHS			
	Frequency	%	Frequency	%	Frequency	%
Below 30 years	2	0.95	4	1.89	6	2.84
31 -40 years old	10	4.74	58	27.49	68	32.23
41 - 50 years old	17	8.06	60	28.44	77	36.50
Above 50 years old	19	9.00	41	19.43	60	28.43
Total	**48**	**22.75**	**163**	**77.25**	**211**	**100.00**

4.1.9 Distance of Farm to Market Places

Table 4.15 shows the distance of the respondents' farm from the market places. Market places mean either wet market or processing plants. In every state, they use the same practise of market places. They either send the broiler to open market or wet market or to the processing plants which belongs to the integrators or individual farmers.

Table 4.15
Distance of Respondents' Farm from Marketing Place

Distance	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
< 30km	34	16.11	30	14.21	64	30.32
31 – 50 km	93	44.08	0	0	93	44.08
51 – 80 km	45	21.34	0	0	45	21.34
>80 km	9	4.26	0	0	9	4.26
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

The results in Table 4.15 show that 70.2 percent of CBFs located within the radius of 50 kilometres from the market places. According to the respondents, they prefer to build their farms near to the processing plant or the target market for transportation cost, minimizing mortality of chicken and reducing broiler body weight lost during transit period. According to Drain *et al.* (2007), economic performance reduces due to high mortality and lost weight during transit birds to marketing centre. The table also reveals that all of the INDs' farms are localized near to their marketplaces which below 30 km because it is easy for them to manage and take care of their business.

4.1.10 Farm Ownership

Table 4.16 shows that 93.37 percent of a farm owned by respondents. A few of the farmers are renting the farm from other farmers, who stopped farming due to loss and

no profit, owner passes away, entire family reluctant to continue the business, the farmer bad health condition and retired from the broiler business.

Table 4.16
Farm Ownership

Ownership	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
Own	173	82.00	24	11.37	197	93.37
Rented	8	3.79	6	2.84	14	6.63
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

Furthermore, Table 4.17 shows the relationship between age and the farm ownership. All respondents whose age below 30 years old ownership their broiler farms. Majority or 71.43 percent respondents, who rent the farm, are between 41 to 50 years old. The table also shows that 73 percent of CBFs who are between 31 – 50 years old have their own farms for broiler farming. Meanwhile, the percentage of farmers who rent the farms within the same age is 6 percent. This range of age between 31 to 50 years old is considered reasonable age range to involve in the broiler farming.

Table 4.17
Relationship between Age and Farm Ownership

Age	Ownership				Total	
	Own		Rented			
	Frequency	%	Frequency	%	Frequency	%
Below 30 years	6	2.85	0	0	6	2.85
31 -40 years old	72	34.12	2	0.95	74	35.07
41 - 50 years old	72	34.12	10	4.74	82	38.86
Above 50 years old	47	22.27	2	0.95	49	23.22
Total	**197**	**93.36**	**14**	**6.64**	**211**	**100.00**

4.1.11 Size of Capital and Capital Source of the Respondents

Table 4.18 shows the relationship between sizes of the capital of the respondents involves in the broiler farming. There is 59 percent of the respondents who involve in

the broiler farming have capital which above more than RM800, 000. Based on the size of capital, the CBFs have insufficient capital and they need support from the integrators as contract farmers for running their broiler farming.

Table 4.18
Relationship between sizes of capital with respondents

Size of capital	Ownership				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
Below RM400,000	46	21.8	0	0	46	21.80
RM400,000 – RM800,000	39	18.5	0	0	39	18.50
RM800,000 – RM1,200,000	73	34.6	4	1.89	77	36.19
More than RM1,200,000	23	10.9	26	12.32	59	23.22
Total	**181**	**85.8**	**30**	**14.21**	**211**	**100.00**

Farmers finance their farm activities using various sources of capitals. Table 4.19 disclose the main capital sources that financing farmers to do broiler farming are personal saving and the commercial bank loan. More than 73 percent respondents who involve in the IBCF system get financial assistance from both sources. It means that commercial bank is an important source of financing for supporting farmers to participate in the IBCF system.

Table 4.19
Capital Sources of Respondents

Capital Source	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
Sell property	11	5.21	0	0	11	5.21
Personal saving or from other business	58	27.49	21	9.95	79	37.44
Loan from friend, family, or relatives	14	6.64	9	4.26	23	10.90
Loan from commercial bank	98	46.45	0	0	98	46.45
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

These findings can be supported by Setboonsarng (2008) on contract farming operation in South East Asia countries. He found in most cases, the integrators need to provide contract agreement as a guarantee to support farmers to get the loan from commercial banks. This support by Ogbanje, Yahaya, and Kolawole, (2012), where he found the commercial banks finance the most important sector of developing economies i.e. agriculture in developing countries. Short, medium and long-term loans are provided for the purchase of agriculture inputs including the construction of warehouses, the purchasing of vehicles, threshers and other equipment.

From the Table 4.20, shows loan from the commercial bank is the main capital source for all groups of age's farmers except the age group of 41 to 50 years. The findings in Table 4.20 also shows that 42.68 percent of respondents in the range of 41 to 50 years old more depend to their personal saving as a capital source to start a business in the broiler farming. Beside loan from the commercial bank, 16.67 percent of the respondents below 30 years old use loan from relatives to start their business in the broiler farming.

Table 4.20
Relationship between Age and Capital Source of Respondents

Age	Capital Source									
	Sell Property		Personal Saving or from other business		Loan from Friend, Family and Relatives		Loan from Commercial Bank		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Below 30 years	0	0	0	0	1	0.47	5	2.37	6	2.84
31 -40 years old	2	0.94	23	10.9	4	1.90	45	21.33	74	35.07
41 – 50 years old	2	0.94	35	16.59	15	7.11	30	14.22	82	38.86
Above 50 years old	7	3.32	21	9.95	3	1.42	18	8.54	49	23.23
Total	**11**	**5.20**	**79**	**37.44**	**23**	**10.90**	**98**	**46.45**	**211**	**100.00**

4.1.12 Gross Annual Income of Respondent

The gain in terms of high *GAI* may encourage respondents to participate in the IBCF system. As shown in Table 4.21, it is found that 61.61 percent of the respondents received *GAI* more than RM350, 000 annually. This result is in line with the finding with Delgado *et al.* (2001). He reported that CBF did better than IND farmers at comparable levels in the Philippines and Thailand, because their price guarantees to served them well if the facing of falling world prices. This is also supported by MacDonald (2014) where he argued that most of the CBFs sustain in the IBCF system because 60 percent of them earned household incomes that exceeded the U.S. standard income.

Table 4.21
Gross Annual Income of Respondents

Bracket of annual Income	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
< RM100,000	4	1.90	0	0	4	1.90
RM150,001 – RM200,000	23	10.90	0	0	23	10.90
RM200,000 – RM350,000	51	24.17	3	1.42	54	25.59
>RM350,000	103	48.82	27	12.79	130	61.61
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

Furthermore, the findings in Table 4.22 display that 95.9 percent of respondents above than 50 years old earned more than RM350, 000 per year. The table also shows that 24.17 and 38.87 percent of respondents in between 31 to 50 years old, also earn more than RM350, 000. From the surveys, 50 percent of respondents below 30 years old earn RM250, 000 to RM350, 000 per year.

Table 4.22
Relationship of Age with Gross Annual Income

Age	Bracket Of Gross Annual Income									
	< RM100,000		RM100,001 – RM200,000		RM200,000 – RM350,000		>RM350,000		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Below 30 years	0	0	2	0.94	3	1.42	1	0.47	6	2.84
31 -40 years old	2	0.94	12	5.69	33	15.64	27	12.80	74	35.07
41 – 50 years old	2	0.94	7	3.32	18	8.53	55	26.07	82	38.86
Above 50 years old	0	0	2	0.94	0	0	47	22.27	49	23.23
Total	**4**	**1.88**	**23**	**10.89**	**54**	**25.59**	**130**	**61.61**	**211**	**100.00**

4.1.13 Reasons for Participating in the IBCF System

In the survey, the farmers are also asked the reason why they join the IBCF system. As shown in Table 4.23, marketing problem is the main reason that motivated them to join the IBCF system. A study was done by Ariffin *et al.* (2013) in Peninsular Malaysia also found that marketing problem motivated farmers to participate in the IBCF system since the contract farming provides guaranteed market, minimize the transaction cost and reduces the risk for CBF by controlling the price fluctuations associated with the quantity adjustments within commodity markets.

Table 4.23
Respondents' Reasons for Participating in the IBCF system

Reason	CBF	
	Frequency	%
Insufficient fund	76	41.99
Marketing problem	90	49.72
Less risk	15	8.29
Total	**181**	**100.00**

However, Sasidha and Suvedi (2015) in their study in India found the major factors that influence farmers to participate in the IBCF system are lack capital and technical expertise such as technical provision by the integrators. In addition, market volatility

risk is considered being part of the reasons why the farmer participates in the IBCF system.

4.2.14 Perception of Respondent toward the IBCF System

In the survey, respondents were also requested to express their general assumption regarding the IBCF system. Table 4.24 states that almost 58 percent agreed that the IBCF system generates good income while 21.81 percent assumed that this system is the less risky business mechanism. Thus, it is worth to participate with the IBCF system.

Table 4.24
Perception of Respondents toward the IBCF system

Perception	CBF	
	Frequency	%
Generate Good Income	105	58.01
Less Risky	46	25.41
Lack of capital	20	11.05
Technical expertise	10	5.53
Total	**181**	**100.00**

Saraswati, Devaraj, and Mohan (2010), who surveyed on broiler contract farming of VHL Company in Mysore, India, found that CBFs have performed very well for small and marginal farmers. It can also be a tool for improving the system helps CBFs in term of access to credit, inputs, information and technology and product market. Furthermore, according to Sasidhar and Suvedi (2015), no market risk, quick returns, and low working capital required motivated farmers to participate in the IBCF system.

4.1.15 Reason for Not Participate in the IBCF system

The findings in Table 4.25 disclose that 50 percent of the respondents rejected the IBCF system because they have enough capital to run their own businesses and 33.33 percent of them said they have their own marketing strategy or own marketing plan.

Other reasons why respondent reluctant to participate in the IBCF system because they unsatisfied with the contract agreement or their farm location are far away from the integrators market target. Sasidhar and Suvedi (2015) also found in their study that about 91.67 percent of the IND farmers have a marketing strategy to get a fast return and the main reason they are not interested in participating in the IBCF system.

Table 4.25
Respondent's Reason to Reject the IBCF system

Reason	Total	
	Frequency	**%**
Have owned marketing plan/strategy	10	33.33
Enough capital to run own business	15	50.00
Not satisfied with contract agreement	3	10.00
Geography factor	2	6.67
Total	**30**	**100.00**

4.1.16 Economic Performance of Respondents

Table 4.26 display the economic performance of the respondents where 71.27 percent of the CBF and 46.67 percent of the IND farmers earns more than RM1.00 per bird per cycle. According to farming cost structure as presented by Federation of Livestock Farmers' Associations of Malaysia (FLFAM) in MYCC report on 2013, the cost of production per bird is RM1.00.

Therefore, based on FLFAM's calculation, farmers make the profit if they earned more than RM1.00 per birds. Therefore, from the survey, 61.14 percent of the CBF make the profit from the IBCF system.

Table 4.26
Economic Performance of Respondents

PROFIT per birds	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
RM0 – 0.5	11	5.21	6	2.84	17	8.05
RM0.6 – 1.00	41	19.44	10	4.74	51	24.18
RM1.1 – 1.49	73	34.60	8	3.79	81	38.39
RM2.0 and above	56	26.54	6	2.84	62	29.38
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

4.1.17 Feed Conversion Ratio

From Table 4.27, all of the IND farmers recorded FCR more than 1.70, while 43.6 percent of CBFs in the IBCF system, the FCR below 1.7. Therefore, the farm performances of the CBFs are much better compared to the IND farmers.

Table 4.27
Feed conversion ratio

FCR	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
1.5 – 1.6	24	11.37	0	0	24	11.37
1.61 – 1.70	55	26.07	0	0	55	26.07
1.71 – 1.80	63	29.86	6	2.84	69	32.70
Above than 1.80	39	18.49	24	11.37	63	29.86
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

This result is in line with the observation of Jabbar *et al*. (2007), Kalamkar (2012) and Mac Donald (2014). In their studies, they argued that CBF performs better than IND farmers since the CBFs in the IBCF system are more exposed to latest technologies in broiler farming provided by the integrators. The integrators support them with a good quality feed and the newest technologies such as advanced vaccination programs which prevent the broilers expose to the contagious disease such as New Castle disease. Therefore, broilers can survive and grow in good environment and management. As a result, broilers grow healthy. As a result, CBFs achieved good FCR.

4.1.18 Mortality Rate

Table 4.28 shows the evidence of mortality rate found from the survey. From the table, only 32.8 percent of the CBF and 8.06 percent of the individual farmers get good mortality rate which is below five percent. According to FLFAM in MyCC (2013), the benchmark for the farmers to make a profit in broiler farming is that they need to minimize their mortality rate at least below five percent. MyCC (2013) mentioned that farmers who practice good husbandry management program will get low mortality rate. Begum (2005) and Sharma (2003) also stated that farmer will get a high net return from the poultry farming if they can lower down their mortality rate.

Table 4.28
Mortality Rate

Mortality Rate	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
1 – 5%	69	32.80	17	8.06	86	40.86
5.01 - 9.99%	22	10.43	13	6.15	35	16.58
10 - 15%	25	11.85	0	0	25	11.85
More than 15%	65	30.71	0	0	65	30.71
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

4.1.19 Average Market Age

Table 4.29 displays that most of the respondents either CBFs or individual farmers market their birds less than 40 days. The evidence from the survey visualize that the respondents are in good condition since 66..3 and 10.43 percent of CBF and IND farmers respectively, market their birds less than 40 days. From the low value of *AMA*, the broilers can sell the chicken fast. Farooq *et al.* (2001) and Schmidt (2008) agreed that by reduce the *AMA,* it will increase the net profit since it will reduce the production cost by minimize mortality and less feed intake.

Table 4.29
Average Market Age of Broilers

Average Market Age	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
Less than 40 days	140	66.36	22	10.43	162	76.79
41 – 45 days	32	15.17	8	3.78	40	18.95
46 – 50 days	6	2.84	0	0	6	2.84
More than 50 days	3	1.42	0	0	3	1.42
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

4.1.20 Average Body Weight

ABW of the broiler is shown in Table 4.30. From the table, 70.63 percent of the CBF have marketed their broilers more than two kilograms while within the IND farmers, they are more interested in marketing their broiler less than two kilograms. According to the IND respondents, they prefer to sell the broilers early so that they can save cost on feeds and medications. They can avoid facing high mortality once the birds reach an older age. However, for the CBFs, since they got credit on feeds, therefore, they prefer to raise the broiler longer and sell broiler above than two kilograms since the conversion feed to meat in that period is more efficient. Studied done by Faturoti (1989), Jabeen, Salim and Akhtar (2004) and Amakiri, Owen and Etokeren, (2011), there is a significant relationship between efficient *FCR* and *ABW* and thus, it suggests that farmers should sell the broiler at the correct time to achieve more profit margins.

Table 4.30
Average Body Weight of Broilers

Average Body Weight	Respondent				Total	
	CBF		IND			
	Frequency	%	Frequency	%	Frequency	%
1.5 – 1.8 kg	2	0.94	19	9.00	21	9.94
1.81 – 2.0 kg	26	12.32	11	5.21	37	17.53
More than 2 kg	153	70.63	0	0	153	72.53
Total	**181**	**85.79**	**30**	**14.21**	**211**	**100.00**

4.2 DESCRIPTIVE STATISTICS

Table 4.31 discloses the descriptive statistics for participation model in the IBCF system participation. The table summarizes the values of mean, median, maximum, minimum and standard deviation of all the variables included in the participation model. The Table 4.31 shows that the median almost the equal value with the mean for all variables except *SIZE* and *CAP*. Those variables are *AGE, EXP, GAI* and *DIS*. This conclude that they normally be distributed and have a symmetrical distribution as show in Figure 4.1. The low scores are referring to the minimum value of the variable; while the high score is refer to the maximum value of the variable.

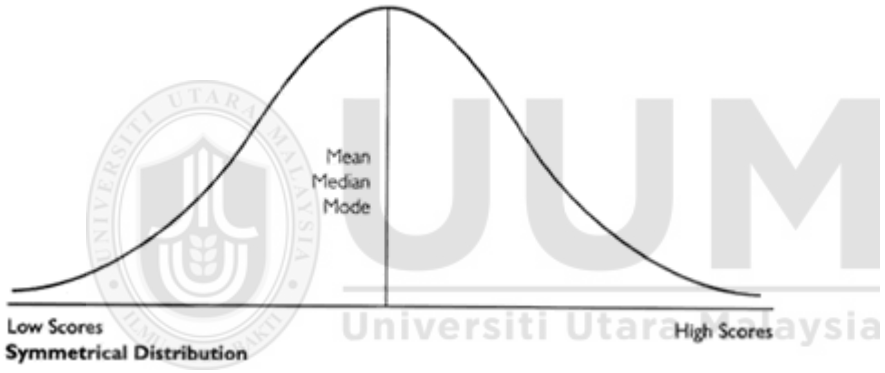

Figure 4.1
Descriptive Statistics for Symmetrical Distribution

Both in *SIZE* and *CAP,* the median are below the mean. This shows that the distribution of value would have a shape similar to the one depicted below that is positively skewed as refer to the Figure 4.2.

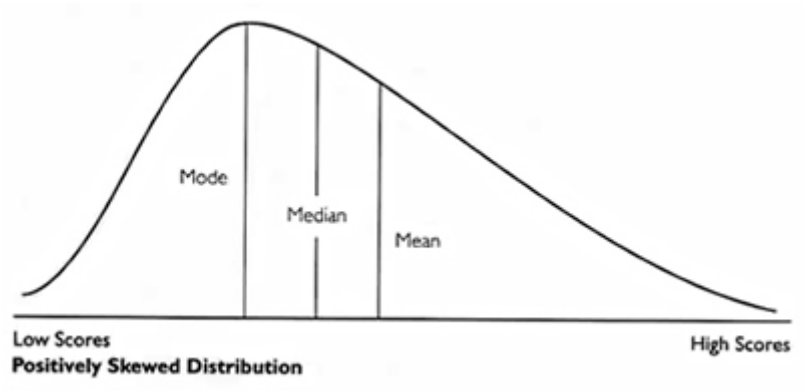

Figure 4.2
Descriptive Statistics for Positive Skewed Distribution

The standard deviation values of all the variables, except *GAI, SIZE,* and *CAP*, are small which indicate that all observations are distributed surrounding their mean values. Furthermore, based on skewness, kurtosis and Jarque-Bera values, the collected data are normally distributed. Therefore, the *t*-statistics test is valid to be used in the statistical analysis.

Table 4.31
Descriptive Statistics for the IBCF System Participation

Statistics	Variables						
	PAR	**AGE**	**EXP**	**GAI**	**SIZE**	**CAP**	**DIS**
Mean	0.05	44.12	16.02	512334.80	44279.90	395767.20	32.25
Median	0.00	44.00	15.00	470000.00	35850.00	300000.00	32.00
Maximum	1.00	67.00	38.00	1980000.00	178300.00	1500000.00	78.00
Minimum	0.00	26.00	3.00	45000.00	6000.00	50000.00	6.00
Std. Dev.	0.22	8.98	7.22	365464.20	31572.83	282219.70	15.85

Meanwhile, descriptive statistics for the economic performance of the CBFs in the IBCF system are shown in Table 4.32. Median and mean value of *ABW*, *AMA* and *FCR* were almost equal. Therefore, the distribution for *ABW*, *AMA* and *FCR* are same like Figure 4.1 which is symmetrical distribution. Since the median value of SIZE and MOR

are below than mean value, this indicates that their distribution of values are positively skewed as refer to the Figure 4.2.

However, the median value of *PROFIT* is RM4000.96 which is more than the mean value, RM -558.40. In this distribution, there are high values and relatively few low values. Therefore, the distribution is negatively skewed as showed in Figure 4.3.

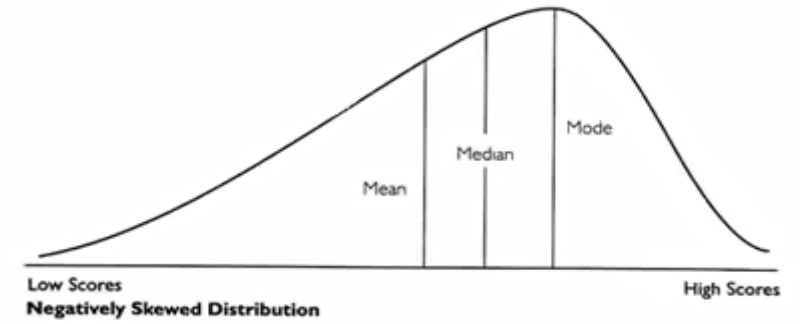

Figure 4.3
Descriptive Statistics for Negative Skewed Distribution

The standard deviation values of all the variables, except *SIZE*, are small which indicate that all observations are distributed surrounding their mean values. Moreover, based on the skewness, kurtosis and Jarque-Bera values, all the data are normally distributed. The descriptive statistical analysis is valid by using t-statistic test.

Table 4.32
Descriptive Statistics for Economic Performance

Statistics	Variables					
	PROFIT	**SIZE**	**ABW**	**AMA**	**FCR**	**MOR**
Mean	-558.40	44279.90	2.16	38.90	1.78	7.32
Median	4000.96	35850.00	2.17	39.00	1.76	6.18
Maximum	194618.10	178300.00	2.91	59.00	6.29	88.27
Minimum	-590512.10	6000.00	1.00	23.00	1.11	0.18
Std. Dev.	48953.94	31572.83	0.24	3.11	0.28	6.02

4.3 CORRELATION ANALYSIS

Regression analysis involves identifying the relationship between a dependent variable and one or more independent variables. A model of the relationship is hypothesized, and estimates of the parameter values are used to develop an estimated regression equation. Various tests are then employed to determine if the model is satisfactory. If the model is deemed satisfactory, the estimated regression equation can be used to predict the value of the dependent variable given values for the independent variables.

Table 4.33 displays the results of Pearson Correlation analysis in the participation model. Only *AGE, CAP* and *DIS* have statistically significant correlation with *PAR* either at five percent and 10 percent level of significance. *DIS* and *CAP* shows negative correlation with *PAR* .It mean the nearer the farm location to the market place, more farmers will be interested to participate with the IBCF system. And also, farmer with less capital are more subject to participate in the IBCF system. However, AGE has a positive correlation with *PAR.* This mean the older farmers are more interested to participate in the IBCF system.

Table 4.33
Pearson Correlation Analysis of Variable in the Farmer's Participation in the ICBF Model

Variables	PAR	AGE	EXP	GAI	SIZE	CAP	DIS
PAR	1.000						

AGE	0.287	1.000					
	(0.000)*	-----					
EXP	0.091	0.757	1.000				
	(0.211)	(0.000)*	-----				
GAI	0.095	0.338	0.295	1.000			
	(0.195)	(0.000)*	(0.000)*	-----			
SIZE	0.055	0.100	0.041	0.257	1.000		
	(0.448)	(0.170)	(0.577)	(0.000)*	-----		
CAP	-0.369	0.289	0.149	0.326	0.488	1.000	
	(0.000)*	(0.000)*	(0.040)*	(0.000)*	(0.000)*	-----	
DIS	-0.297	0.076	0.119	-0.029	0.156	0.064	1.000
	(0.000)*	(0.297)	(0.101)	(0.686)	(0.032)*	0.383	-----

Note: * and ** indicate significant at the 0.05 and 0.10 level of significant, respectively.

Furthermore, Table 4.34 displays the results of Pearson Correlation analysis in the economic performance of the ICBF Model. All variables, except *AMA* and *DU,* have statistically significant correlation with *PROFIT* either at five percent and 10 percent level of significance. Both *FCR* and *MOR* show to have very strong negative correlation with *PROFIT.* This means the *PROFIT* of the CBFs will increase tremendously if the CBFs achieve less *FCR* and low mortality rate. The *SIZE* also shows strong positive correlation with *PROFIT*. It shows CBFs who rearing big scale of farms are making more *PROFIT* compare to the small scale farms. *ABW* has positive correlation with *PROFIT* but the relationship not so strong. If the CBFs *ABW* increases, the *PROFIT* also increases moderately.

Table 4.34
Pearson Correlation Analysis of Variable in the Economic Performance of the ICBF Model

Variable	PROFIT	SIZE	ABW	AMA	FCR	MOR	DU
PROFIT	1.000						

SIZE	0.782	1.000					
	(0.011)*	-----					
ABW	0.305	-0.166	1.000				
	(0.000)*	(0.001)*	-----				
AMA	0.033	-0.083	0.549	1.000			
	(0.526)	(0.106)	(0.000)*	-----			
FCR	-0.829	-0.049	-0.182	-0.002	1.000		
	(0.000)*	(0.344)	(0.000)*	(0.968)	-----		
MOR	-0.825	0.028	-0.298	-0.097	0.853	1.000	
	(0.000)*	(0.589)	(0.000)*	(0.058)**	(0.000)	-----	
DU	-0.004	-0.043	-0.086	0.059	0.077	0.019	1.000
	(0.943)	(0.397)	(0.094)**	(0.245)	(0.132)	(0.718)	-----

Note: * and ** indicate significant at the 0.05 and 0.10 level of significant, respectively

4.4 THE DETERMINANTS OF CBFs' PARTICIPATION

The marginal effect of the logit model is use to elaborate the participation of CBFs in the IBCF system. The estimation result of the findings including the diagnostic checking of the data collections are discussed in this section.

4.4.1 Estimation Results of Participation Model

Table 4.35 illustrates the estimation results of the participation model. The table shows that all coefficients except *AGE* are statistically significant at five percent level of significance. The findings show that there are positive significant relationships between *PAR* and both *EXP* and *GAI*. It means that more experienced CBF have a high willingness to join the IBCF system. The finding is supported by the principal – agent cost theory which states that those farmers who are more skilful and experienced are more likely to participate in the IBCF system. As argued by D'Silva *et al.* (2009), with

the skill and experience in the broiler farming, farmers have more confidence and competence to get involve in broiler farming.

Table 4.35
Estimation Results of Participation

Dependent Variable: PAR
Method: ML - Binary Logit

Variable	Coefficient	Standard Error	*z*-statistic	Prob.
CONSTANT	-3.811	4.209	-0.905	0.365
AGE	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*
SIZE	-7.955	3.765	-2.114	0.035*
CAP	-3.485	4.416	-0.789	0.000*
DIS	-2.051	0.201	-10.204	0.000*
Obs with Dep=0	181	Total obs		211
Obs with Dep=1	30			

Note: * indicates significant at 5 percent level of significance.

Experienced CBF normally has sufficient understanding of the system and situation of the IBCF system. So that, they tend to stay in the system because they know that the IBCF system will provide them many benefits such as credit inputs, technical support, and guarantee market. These findings are consistent with the study of Begum (2005), Jabbar *et al*. (2007), Saenz *et al.* (2007) and Wainaina *et al.* (2012). In particular, Begum (2005) studied on contract farmers in Bajitpur, Kuliarchar and Kishorganj districts in Bangladesh. Meanwhile, Jabbar *et al.* (2007) studied on 183 CBF, 120 independent farms and 60 non-poultry farmers which are located in Bajitpurthana and surrounding areas in Bangladesh. Both studies found that direction of CBFs who had more experience are more towards to participate in the IBCF system. Saenz *et al.* (2007) studied about pepper contract farming in Costa Rica and found younger farmers are less experience and the elders who are more experience were more likely to grow under contract. By using data collected from 180 smallholder poultry farmers,

Wainaina *et al.* (2012) found that more than 80 percent of those farmers participate in the IBCF system in Kenya have *EXP* in broiler farming more than five years since they found the contract system could improve the welfare of these CBF.

Sasidha and Suved (2012) also provide the same conclusion. By conducting the survey on 240 farmers in Karnataka and Andhra Pradesh states in India, they also found that those who attached to the IBCF system have more experiences in broiler farming. Therefore, they are willing to stay in the system.

However, Ramaswami *et al.* (2005), who did a survey on CBFs whose were associated with leading poultry integrators in Rangareddy, Mehboobnagar and Nalgonda districts in the state of Andhra Pradesh, India, noticed that farmers who are less experienced, less educated and older tend to participate in the IBCF system. Their results are supported by Thamizhselvi and Rao (2010) who argued that less experienced farmers have more intention to join the IBCF system. Kumar and Anand (2007) argued that integrators prefer to offer a contract to the farmers who are inexperienced in poultry production since likely to have lower bargaining power.

Furthermore, the variable *GAI* has a positive significant influence on *PAR*. The result indicates that *GAI* is the strongest variable to influence CBFs to participate in the IBCF system with the value of coefficient of 9.496. It shows that once the CBFs can generate good annual income and this will motivate them to join and sustain in the IBCF system. The result of this research is consistent with Minten *et al.* (2009), contract farmers in Madagascar, have higher welfare and more stable income than with non-participating in the schemes. Narayanan (2014) studied about poultry contract farming in India and

found increasing of participation of farmers in the contract farming since profits of poultry farmers increase by 150 percent. Moreover, with the adoption of better production technologies introduced by the integrators can increase the *GAI* of the contract farmers. Similarly, Singh (2002) also found that those smallholder farmers, who participate in contract farming in the Indian State of Punjab, have higher incomes compare to independent farmers.

Ramaswami *et al.* (2006) and Wang *et al.* (2014) also found in their studies that CBFs participates in the IBCF system because they gain benefits in terms of lower risk and higher expected returns. According to the principle – agent theory, the IBCF system is a system that provides market power, incentive alignment and risk sharing to ensure those CBFs in the contract are fully covered and benefited with the system and finally will earn high *GAI*.

The study was done by Goldsmith (1985) and Wainina *et al.* (2012) are also in line with the principle agent and transaction cost theories. Goldsmith (1985) reviewed a number of case studies of the IBCF system in Africa, Asia, and Latin America, and found that the income of CBF is greater than an independent farmer in the majority of the cases. Wainina *et al.* (2012) found IBCF system in Kenya improves the welfare of participating farmers because the contract system reduces the rural poverty and this will encourage the smallholder farmers to participate in the IBCF system.

Furthermore, Table 4.35 shows that variable *SIZE* has a negative significant relationship with *PAR*. Therefore, CBF with the small size of farms has more intention to participate in the IBCF system. According to the principle-agent theory, market coordination in

credit arrangement and marketing in the IBCF system will support the broiler farmers especially the small size farmers to join the IBCF system. Small farmers normally have difficulty especially in credit arrangement and marketing. They prefer to participate in the IBCF system in order to sustain their broiler farming production. In term of competition, they may not compete for the larger broiler farming. Therefore, they may reduce their risk by participating in the IBCF system.

This result is in line with a study done by Nyaga (2007) at Kims Poultry Care Center, a big integration firm located in Nakuru, Kenya. Nyaga found that the CBFs willing to participate in the scheme because of the connection with the credit arrangement are from the small *SIZE* of farmers. Key and Runsten (1999) and Narrod *et al.* (2009) encountered that majority of the small farmers fail to market both broiler outputs. As a result, they are willing to integrate with the IBCF system for surviving in the broiler farming.

Regarding to the participation issue in CF, Kirsten and Sartorius (2002), Baumann (2000), Singh (2002), Da Silva (2005) and Birthal *et al*. (2005) and Delgado *et al*. (2008), also recognised that in certain circumstances small size broiler farms do engage with IBCF system. They recognized that rapid growth in consumer demand for livestock offers an opportunity to reduce poverty among smallholder livestock farmers in the developing world. These farmers' opportunities may be threatened, by competition from larger-scale farms. They showed that the competitiveness of smallholder farms depends on the opportunity cost of family labour and farmers' ability to overcome barriers to the acquisition of production- and market-related information and assets. Therefore, pro-poor livestock development participate in IBCF system to

strengthen and help them to overcome the disproportionately high transaction costs in securing quality inputs and obtaining market recognition for quality outputs.

The results also show that *CAP* has a negative significant influence on *PAR*. It means that CBF who have less capital are more interested to participating in the IBCF system. In the IBCF system, integrators normally provide many assistances and support such as credit for inputs of broiler production. This can reduce the burden of CBF who do not have enough capital. This finding is similar to transaction cost theory where for market development, farmers need support from the third party such as integrators to give credits especially quality DOC and feed to assist the CBFs to practice good broiler farming. The integrators also provide marketing facilities, so that the CBF can market their broiler and pay back their loans to the integrators. This finding is similar with Kakade *et al.* (2015) who studied on 45 CBFs in Atpadi and Kawartha Mahankal of Sangli district of India. They found that, normally, independent broiler farmers need sufficient amount of *CAP* to start and run their own business. But due to insufficient *CAP*, CBF engages with IBCF system to sustain their business in poultry farming.

A significant relationship was also observed between *PAR* and *DIS*. If the farms located nearer to the target market, the farmer has more intention to participate in the IBCF system. From the survey found location of the market place mostly nearer to farms. This finding is in line with the transaction cost theory where the integrators provide a good network which includes logistic facilities to the CBF. Minot and Ngigi, (2010) also stated that farmers organize themselves to obtaining a contract with an exporter and they are more likely to get a contract if living on main roads within a short distance to Nairobi. The integrators will look for target market which nearer to the

CBFs' farms (Fulton & Clark, 1996). Another advantage of locating the farmers nearer to the target market, it can also reduce the stress of the birds during transportation from farm to market. Therefore, it can avoid mortality and loss weight during while transporting the birds to the market.

Therefore, the IBCF system can perform effectively if the farm is located nearer to the marketplace since it can save production cost and reduce delivery time. These findings are consistent with the study that was done by Ramaswami *et al.* (2005), Begum (2005), Sharavari and Herald (2009) and Kalamkar (2012). They observed that *DIS* significantly affect participant of farmers into the IBCF system since the distance of the farm from the target market is important to reduce transportation cost and this will give a higher economic return.

4.4.2 Marginal Effect and Odd Ratio on Logit Model

Table 4.36 presents the marginal effects from the logit estimation. Among the independent variables considered, *SIZE, CAP*, *GAI, EXP* and *DIS* significantly influence the probability of participation in the IBCF system at least at the 10 percent level.

From Table 4.36, the *EXP* has a positive effect on the CBF's likelihood to participate in the IBCF system and was significant. Marginal effect results show that, one year increment in experience will increase the probability of joining or participating in the IBCF system are seven percent. This is probably due to the fact that more experienced farmers are likely know the benefits and advantages of the IBCF system such as access to credit, guaranteed and fixed pricing structure and access to reliable markets

Table 4.36 also show that the *GAI* variable was found to be positively and significantly influence the decision to participate in the IBCF system since its coefficient is statistically at five percent level of significant. Every increase of RM in the *GAI* will increase the probability of the farmer to participate in contract farming. These findings suggest that farmer's *GAI* endowment increases the probability of participating in contract farming. The finding shows that those farmers with higher levels of *GAI* are more likely to participate in contract farming.

Table 4.36
Marginal Effect and Odd Ratio

Variables	Marginal Effects	Odds Ratio
SIZE	-0.043**	-0.222**
	(0.021)	(0.243)
AGE	0.399	1.185e+06
	(0.092)	(5.934e+06)
CAP	-0.134**	-108.8*
	(0.033)	(235.4)
GAI	0.006**	0.811**
	(0.018)	(0.483)
EXP	0.075**	0.071**
	(0.051)	(0.167)
DIS	-0.095**	-28.220**
	(0.027)	(35.680)
Constant		0**
		(0.000)
Observations	211	211

Note: * and ** denote significant at 5 percent and 10 percent level of significant

As expected, the coefficient of *CAP* variable is negative and highly significant at five percent level of significant. Specifically, it means that CBF with lower *CAP* is more likely to participate in the IBCF system than their counterparts. The computed marginal effects indicate that CBFs who have low *CAP* also have a higher likelihood of participating in the IBCF system.

Similarly, *SIZE* of the CBF' farm has a negative effect on the CBFs' participation in the IBCF system since its coefficient is statically significant at 10 percent level of significance. The results show that an increase in *SIZE* of the CBF' farms will reduce the likelihood of participating in the IBCF. The finding suggests that those CBFs with bigger *SIZE* prefer to use alternative marketing arrangements, probably because they are able to seek information on other marketing channels. The computed marginal effects indicate that CBF who have a smaller size of the farm also have a higher likelihood of participating in the IBCF system.

The results also indicate that *DIS* to the target market negatively influenced farmers' participation. Every kilometre increase in the *DIS* from the market target will reduce the probability of participating in contract farming by nine per cent. The finding implies that the further the farm away from the target market, the less likely the farmer will participate in the contract farming. Barretts *et al*. (2011) found the integrators considers a location's associated suite of transaction costs, including the transportation costs incurred when picking up the commodities, the prevalence of insecurity and crime, the quality of phone service, and the institutional conditions that may influence the likelihood of participation in the IBCF system by the CBFs. The findings also corroborate past studies by Fafchamps and Hill (2005) and Fafchamps and Gabre Madhin (2006) who indicates that long distances of the farms to the main markets increase the transaction costs of transporting the products from CBFs. This implies that the further away the farm from the target market, the less likely the farmer will participate in the IBCF system. An increase of kilometre in the distance from the main road will reduce the probability of participating in contract farming. This finding is

perhaps due to the fact that the integrators prefer to work with farmers who are near the target market due to ease of reaching such farms.

Table 4.38 also presents the estimate of odds ratio. The odds ratios are calculated by the binary logit coefficients (Probability = [odd / (1-odd)]) and it means that farmers with more *EXP* are more interested in contract farming compared to less *EXP* farmers.

The estimated odd ratio of farmers who earned high *GAI* is 0. 5 times higher than the farmers with low *GAI*, indicating that these farmers who earned *GAI* are more intention to be involved in the IBCF system. *SIZE* of the farm, which is significant at the 0.01 significant willingness level, has a negative and significant effect on the probability to be involved in contract farming.

Furthermore, the odd ratio for *CAP* is significant at the 0.05 significant level and significant effect on the probability that farmers with small *CAP* more likely to be involved in the IBCF system.

Farmers whose farm *DIS* is nearer to the target market indicated an interest in IBCF system is more likely to be involved in the IBCF system compared to those whose farm far from the target market.

4.4.3 Diagnostic Checking

The diagnostics results of the model are shown in Table 4.37. The result indicates that it fits the data well since the Likelihood-ratio test (χ^2) statistically significant at *p*-value = 0.000. Even though Pseudo–R^2 is low, the result of the estimation is accepted

since this study use survey data. Furthermore, the percentage of corrected prediction (PCP) is a large percentage since 96.9 percent indicating the model is well fits with the data. McFadden's value indicates that the model is excellent fit since the value within 20 – 40 percent. Meanwhile, the mean VIF is 1.73 which is less than five, indicate that collinearity is not a problem among the independent variables in the model. The small value of the value 24.7 in BIC provides very strong support for the chosen model.

Table 4.37
R-squares and Diagnostic Test

R^2	**Value (percent)**
Pseudo R^2	37.4
McKelvey and Zavoina R^2	81.6
Cragg – Uhler-Nagelkerke R^2	57.4
Mcfadden	32.3
Efron R^2	49.0
Tjour's D R^2	45.7
Count R^2	96.9
Diagnostic Tests:	**Value**
Likelihood-ratio test (χ^2)	0.00
VIF	1.73
Percentage of corrected prediction (PCP)	96.9%.
BIC	24.7%

4.4.4 Robustness Checking

Figure 4.1 statistically indicates robustness check for logit participation model. The regression equation is 95.08 percent which indicates that the model is good fitness with the analysis. Therefore, it can conclude from these robustness checks that the results are robust to alternative estimators and specifications.

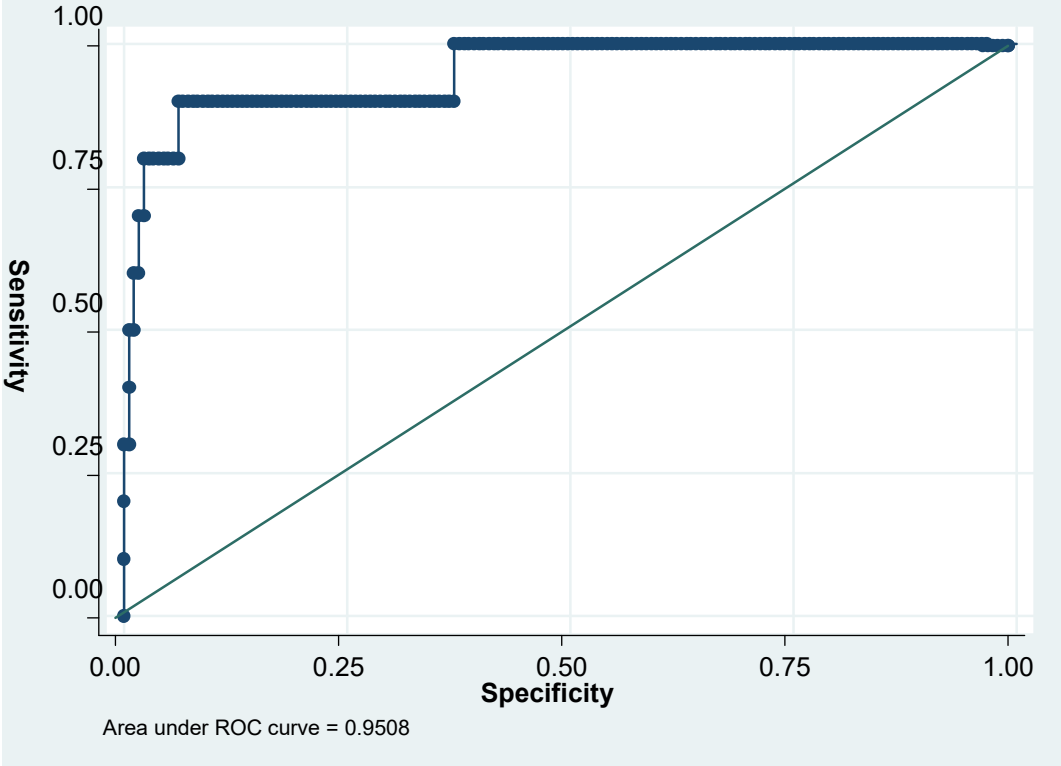

Figure 4.4
Robustness Checking of the Participation Model

4.5 EVALUATION OF ECONOMIC PERFORMANCE OF THE CBF

Estimation results of economic performance (*PROFIT*) and diagnostic checking of data collection are enclosing in this section.

4.5.1 Discussion of the Estimation Results

The economic performance is evaluated based on the variables of *ABW, SIZE, FCR, AMA*, *MOR,* and *DU*. The estimation results are shown in Table 4.38. All coefficients are statistically significant at five percent level of significance. It means that *SIZE, ABW, FCR, AMA*, *MOR* and *DU* variables highly significantly affect the *PROFIT* of the CBF in the study area. These results are in line with the result of Sasidha and Suved (2012), Jabbar *et al.* (2007), Gbenga *et al.* (2009) and Ramaswami *et al*. (2005). They

also agreed that these variables were significantly affected economic performance in their studied areas.

Table 4.38
Estimation Results of Economic Performance of Contract Farmers Model

Dependent Variable: PROFIT

Variable	Coefficient	Std. Error	*t*-Statistic	Prob.
C	141481.700	19725.000	7.173	0.000*
SIZE	0.146	0.040	3.689	0.000*
ABW	36897.560	6461.900	1.710	0.000*
AMA	-1614.690	478.088	-0.377	0.001*
FCR	-82917.480	8770.557	-1.454	0.000*
MOR	-3140.117	409.817	-0.662	0.000*
DU	7380.965	2878.506	0.564	0.011*
R-squared	0.765	Mean dependent var		-558.404
Adjusted R-squared	0.762	S.D. dependent var		48953.940
S.E. of regression	23904.190	Akaike info criterion		23.019
Sum squared resid	2.14E+11	Schwarz criterion		23.092
Log likelihood	-4389.753	Hannan-Quinn criter.		23.048
F-statistic	203.818	Durbin-Watson stat		1.809
Prob(F-statistic)	0.000			

Note: * indicates significant at the 0.05 level of significant

As stated in the table, it is found that *ABW* significantly effects on the *PR0FIT.* For instance, increase one kilogram of *ABW* causes increase *PROFIT* by RM36, 897. This finding is in line with the results of the study by Kleyn (2012). He argued that the most important aspects of broiler production are in terms of feed efficiency and the increase of *ABW*. Klein (2012) also stated that CBFs must make sure the birds must consume adequate amounts of feed besides maximizing husbandry efficiency. This will improve the *ABW* and automatically will increase the profit per birds. This was agreed by Datta *et al.* (2012) who did an experiment with a different type of breeds and they found that *ABW* values were the best preferred if the farmer wants to achieve good *PROFIT*. The results are also consistent with Sharma (2003) who studied on 34 broiler farmer in Fiji

Island. He found beside location, market weight significantly affects the economic performance of the farmers.

Furthermore, the table also shows that *FCR* significantly affects on the *PROFIT*. It means that as *FCR* increases by one point, *PROFIT* declines by RM82, 917. *FCR* is used to measure the efficiency of the conversion rate of the feed intake to convert to body weight. The *FCR* will increase if the broilers consume a lot of feed but poor to convert it to meat. As a result, the cost of the production increase and the economic performance of the farmers decrease. Meanwhile, Sasidhar and Suvedi (2015) who conducted a study of broiler farmers in India's Karnataka, Telangana and Andhra Pradesh states found that increased of *FCR* significantly decreased the farmers' performance. Studied done by Waller (2007) prove that *FCR* was related to feeding intake. He found that 70 percent of the primary component of the variable cost is the feed cost and feed are the most expensive input in broiler farming. He stated that if the feed conversion low, the *FCR* will increase and they will face loss or poor broiler performance. According to Samarokoon and Samarasinghe (2012) and Saran *et al*. (2005), *FCR* is the important factor contributing to the profitability of broiler production.

Farmers with poor *FCR* was the top reason for changing input providers or integrators by CBFs. CBFs will join those integrators who normally can achieve low *FCR*. They believed that those integrators with low *FCR* provide good birds strain, quality feeding program, and age of the birds. This result is also in line with research done by Mendes *et al.* (2014) on financial performance in broiler production in Brazil. They found poor FCR was the second major problem faced by broiler farmers and significant concern of

farmers, since feed costs may account for 70% of the total production costs. For this reason, poultry companies make a considerable effort to achieve maximum efficiency in balancing diets in order to improve feed conversion ratio.

Moreover, Olawumi and Faqbuaro (2011) reported farmer who rears Marshall breed achieve good *FCR* result at age of nine weeks and this can increase the broiler meat production and maximum the profit. While Park and Joeng (1990) found the Ross breed; achieve good *FCR* at the age of seven to nine weeks.

Table 4.38 also shows *AMA* plays an important role and significantly affects the *PROFIT*. Every one day increase in the *AMA*, *PROFIT* decreases by RM1, 615. According to farmers, *AMA* is one of the parameters which can improve production efficiency and cause higher productions. These findings are consistent with Schmidt (2008) who studied on 35 CBFs in Brazil and he found that *AMA* more than 45 days old does not effect on average flock weight but will increase the *FCR* and mortality rate. As a result, the production cost will increase and profit decrease.

Furthermore, Faria Filho *et al.* (2008), who studied on surface models using broiler performance data, found farmers optimized *ABW* and *FCR* if *AMA* between 36.6 to 45.5 days, Sakomura *et al*. (2005) found that growing parameters of Ross broilers from 1 to 70 days of age and observed that the good *AMA* for males is maximum at 42 days. . In addition, Cobb (2001) found that *FCR* gradually worsens with the increase of *AMA* and then the *AMA* can minimize *FCR* if slaughter in younger age. Moreover, Farooq *et al*. (2001) obtained a similar result and they claimed higher *AMA* will narrow the margin of total gross income and net profit per broiler.

In terms of *MOR*, shows that *MOR* has coefficient statistical significantly effect on the *PROFIT* at five percent significant. Since one percent increases in *MOR* causes a reduction in *PROFIT* by RM3, 140.12. High mortality rate of broiler causes loss production and then cause poor performance to the broiler farmers.

A similar finding was obtained by Kitsopanidis and Manos (1991). They found that if *MOR* increases by one percent, *PROFIT* reduces by 2.5 to 10 percent. Mendes *et al.* (2014) also observed high mortality rates of the broiler significantly reduce total market body weight and this will affect the income of the farmer. Tabler *et al.* (2004) claimed mortality in broiler flocks represents lost income to CBF and integrators alike and CBF should tailor management programs to reduce its overall effect on flock performance.

The house system chosen by the CBF for rearing broiler significantly affect *PROFIT*. Since the coefficient of *DU* is statistically significant, the study proves that CHS contribute to increasing the performance of the CBFs. Table 4.39 shows that *PROFIT* increase by RM7, 380.97 by using CHS in broiler farming. The *PROFIT* of the farmer improve because the system provides a lot of advantages. In contrast to OHS, CHS is a type of housing system where the chicken house totally close and CHS has a system to control environmental by the elimination of sidewall curtains and the addition of centrally controlled heating, ventilation, and cooling systems, including static pressure-controlled sidewall inlets and the capability for tunnel ventilation.

In OHS, it is practically impossible to control the climate because temperature and ventilation depend on the weather. Due to poor economic performance and problems in disease and ventilation management, farmers start to convert their broiler housing

system to CHS. CHS is defined as a house system in which there is a difference between the inside and outside climate. Climate control is possible in the CHS and there is usually a ventilation system in use. These findings in line with Zhao *et al*. (2014) where they concluded in their results that the OHS provides an enriched environment for broilers and facilitates the expression of natural behaviours of the broilers but resulted in poorer performance and higher death rate. This finding is relevant to Cunningham (2004) statement. According to him, CHS provides greater control over the birds' environment. Economic benefits of closed housing include fewer condemnations and downgrades will improve feed conversion and better livability. Furthermore, Cunningham (2004) argued that even though the closed housing costs more to build and operate than conventional curtain-sided housing, but economic benefits achieved through improvement of performances that generally offset the additional costs.

The impact of a CF scheme on the distribution of economic performance will depend on the contract in the IBCF system. The firm chooses CBF to contract and sets the contract terms. The CBF, in turn, choose whether to participate or not. Based on the uncertainty theory of profit, the integrators work as employer. The integrators work out a plan what they want and the CBS as the worker will produce broiler according to demand of the integrators. When the CBF fulfil the demands of the integrators and this will absorb the principle cost but in certain situations, the CBF could not accept the integrator’s rule, they will make their own decision; therefore, the input cost will obey by the CBF itself. To make the decision to follow or not the order of the principle is based on *FCR, SIZE, AMA, ABW,* and *MOR.*

The results obtained from the research shows that *FCR, AMA, ABW,* and *MOR* affected the economic performance of the CBFs. Therefore, the CBFs will use these variables as their indicators to do broiler farming so that they can sustain in the broiler industry.

Based on uncertainty theory, *FCR, SIZE, AMA, ABW* and *MOR* got effect on both the transaction and the participating cost. The obtained results showed that high *FCR, AMA,* and *MOR* will increase the cost of productions and reduced the economic performance while high *ABW* will increase the economic performance of the CBF.

In the uncertainty theory, the setup the IBCF system will be based on *FCR, SIZE, AMA, ABW,* and *MOR*. Both integrators and CBF will negotiate their contract including incentive according to their result of *FCR, AMA, ABW,* and *MOR*. The trust and legal contract in IBCF system will be initiated by *FCR, SIZE, AMA, ABW,* and *MOR* since this variable proven stimulated economic performance for both integrators and CBFs.

The analysis of the economic performance of the CBFs was divided according to the size of the farm; large, medium and small. The Table 4.39 shows the results of the economic performance for the large scale of CBF. The result shows that all variables except *AMA* are significant affect the *PROFIT* since their coefficient is significant at 5 percent level of significant. In the Table 4.39, shows that increase of increase of kilogram of *ABW* and number of *SIZE* will increase *PROFIT* of the CBFs at RM44, 304.71 and RM248, respectively. However, increase of one unit of *FCR* and one percent of *MOR* will decrease the *PROFIT* by RM226, 386 and RM6, 353.42, respectively.

Table 4.39
Estimation Result of Economic Performance of Contract Farmers Model (Large)

Dependent Variable: PROFIT

Variable	Coefficient	Std. Error	*t*-Statistic	Prob.
C	326560.300	32150.970	10.157	0.000*
ABW	44304.710	8875.285	4.992	0.000*
AMA	43.167	660.702	0.065	0.948
SIZE	248.00	0.056	4.423	0.000*
FCR	-226386.000	18094.420	-12.511	0.000*
MOR	-6353.420	571.453	-11.118	0.000*
DU	9369.631	3608.236	2.597	0.011*
R-squared	0.885	Mean dependent var		2174.614
Adjusted R-squared	0.880	S.D. dependent var		53704.200
S.E. of regression	18641.740	Akaike info criterion		22.555
Sum squared resid	4.38E+10	Schwarz criterion		22.708
Log likelihood	-1492.933	Hannan-Quinn criter.		22.617
F-statistic	161.586	Durbin-Watson stat		1.798
Prob(F-statistic)	0.000			

Note: * indicates significant at the 0.05 level of significant

Meanwhile, Table 4.40 shows the economic performance for the medium scale of CBFs. It was found that in this group, only *ABW, AMA, FCR* and *MOR* significantly affect the *PROFIT* of the CBFs. Compare to the large scale of CBFs, *DU* and *SIZE* not effectively significant affect the *PROFIT* of the CBFs. Table 4.41 shows in medium group, the *PROFIT* will increase by RM49,397.01 if the *ABW* also by one kilogram. But then, if the *FCR* increase of one point, the *PROFIT* will decrease RM105, 375.90. The table also shows that if the *AMA* increase one day and the *MOR* increase one percent, the *PROFIT* will decrease RM2, 723.65 and RM1, 310. 84, respectively.

Table 4.40
Estimation Result of Economic Performance of Contract Farmers Model (Medium)

Dependent Variable: PROFIT

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	191541.200	18225.490	10.510	0.000*
SIZE	0.065	0.106	0.611	0.542
ABW	49397.010	6636.224	7.444	0.000*
AMA	-2723.654	484.459	-5.622	0.000*
FCR	-105375.900	7561.648	-13.936	0.000*
MOR	-1310.841	379.674	-3.453	0.001*
DU	4268.242	3076.552	1.387	0.167
R-squared	0.924	Mean dependent var		-4338.150
Adjusted R-squared	0.921	S.D. dependent var		54757.910
S.E. of regression	15388.590	Akaike info criterion		22.160
Sum squared resid	3.95E+10	Schwarz criterion		22.2871
Log likelihood	-1920.923	Hannan-Quinn criter.		22.212
F-statistic	337.249	Durbin-Watson stat		1.955
Prob(F-statistic)	0.000			

Note: * indicates significant at the 0.05 level of significant

From the Table 4.41, only *ABW, FCR,* and *MOR* are statistically significant affect the *PROFIT* of the CBFs who involving in the small scale in the IBCF system. This table also shows that *DU* does not significantly to affect the *PROFIT* which is similar to the medium scale of CBFs. Other variables such as *SIZE* and *AMA* do not significantly affect the *PROFIT* of small scale CBFs. The Table 4.41 also shows that in the small scale of farmers, by the increase of one kilogram of *ABW* will effect to the *PROFIT* by an increase of RM 13,237.26. Furthermore, the table also shows that but the increase of one point of *FCR* and one percent of *MOR*, the *PROFIT* will decrease RM 45,341.40 and RM1, 064.16, respectively.

Table 4.41
Estimation Result of Economic Performance of Contract Farmers Model (Small)

Dependent Variable: PROFIT

Variable	Coefficient	Std. Error	*t*-Statistic	Prob.
C	64994.980	9030.062	7.198	0.000*
SIZE	0.151	0.108	1.399	0.167
ABW	13237.260	2072.291	6.388	0.000*
AMA	-176.858	154.192	-1.147	0.255
FCR	-45341.400	3841.823	-11.802	0.000*
MOR	-1064.164	141.805	-7.504	0.000*
DU	-87.085	832.599	-0.105	0.917
R-squared	0.924	Mean dependent var		3364.056
Adjusted R-squared	0.918	S.D. dependent var		11024.460
S.E. of regression	3160.487	Akaike info criterion		19.044
Sum squared resid	6.79E+08	Schwarz criterion		19.259
Log likelihood	-707.132	Hannan-Quinn criter.		19.129
F-statistic	138.734	Durbin-Watson stat		1.958
Prob(F-statistic)	0.000			

Note: * indicates significant at the 0.05 level of significant

4.5.2 Diagnostic Checking

In this section, the diagnostic checking involves of testing the overall significance of the sample regression, the coefficient of determination (R^2), heteroscedasticity test and normality test.

The results of the analysis in Table 4.42 can be employed for implementing diagnostic checking. In term of testing the overall significance, the *F*-calculated value of 138.73 is greater than the *F*-critical value. Thus, H_0 is rejected. This means that all independent variables jointly influence *PROFIT*.

From the same table, the value of R^2 shows that 92.4 percent variation in *PROFIT* is explained by all independent variables. This percentage is considered marginally high for analysis using survey data.

Furthermore, heteroscedasticity test is done using information in Table 4.42. The value of chi-square statistic is 169.467 and its corresponding *p*-value is 0.000, leading to rejection of H_0 at a five percent significance level. Therefore, it shows that there is no evidence of heteroscedasticity in the analysis.

Table 4.42
Heteroscedasticity Test: Breusch-Pagan-Godfrey

Statistical term	Value	Statistical term	Value
F-statistic	49.836	Prob. F(6,375)	0.000*
Obs Chi-squared	169.467	Prob. Chi-Square(6)	0.000*
Scaled explained SS	893.699	Prob. Chi-Square(6)	0.000*

Meanwhile, the normality test has been done using histogram normality test. Figure 4.2 shows that collected observations are normally distributed. It can also be proved by the values of Jarque-Bera and its probability. Since its probability value is less than five percent level of significance, the hypothesis of observation is normally distributed cannot be rejected.

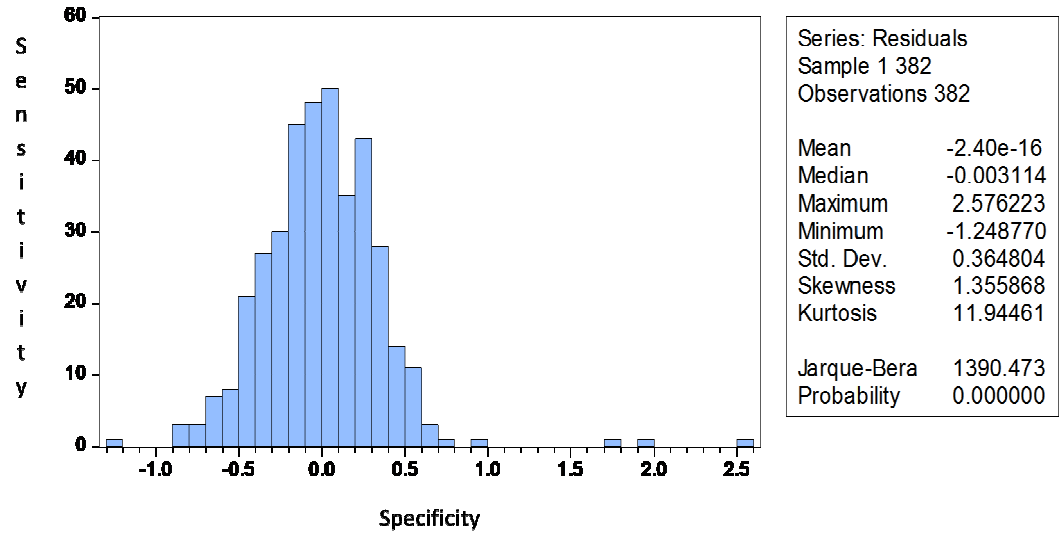

Figure 4.5
Normality Test

4.6 RELATIONSHIP BETWEEN PARTICIPATION AND ECONOMIC PERFORMANCE OF THE CBF

Estimation results of the relationship between participation and economic performance of the CBFs are reported in this section. Then, it is followed by the diagnostic checking of data collection.

4.6.1 Discussion of Estimation Results

Table 4.43 shows the empirical results of the relationship between participation and economic performance of the CBF. The results display that all coefficients of independent variables are statistically significant at five percent level of significance, except coefficient for *SIZE* and *AGE*.

Table 4.43
Estimation Results of Participation and Economic Performance of Contract Farmers Model

Dependent Variable: PAR
Method: ML - Binary Logit

Variable	Coefficient	Std. Error	*z*-statistic	Prob.
CONSTANT	-4.013	5.294	-0.758	0.449
PROFIT	5.230	1.736	3.013	0.006*
AGE	0.115	0.099	1.162	0.247
EXP	0.971	0.151	6.430	0.000*
GAI	-8.216	1.546	-5.314	0.000*
SIZE	-4.585	4.335	-1.056	0.291
CAP	3.315	0.482	6.878	0.000*
DIS	-2.114	0.222	-9.522	0.000*
Obs with Dep=0	181	Total obs		211
Obs with Dep=1	30			

Note: * significance at 5 percent level of significance.

By focusing on the effect of *PROFIT* to *PAR*, the result in Table 4.43 indicates that there is a positive relationship between the two variables. It means that if the price per

chicken increased by one ringgit, the probability of farmer to participate in the IBCF increased by 5.23.

This result is consistent with the findings of Wainaina *et al.* (2012) who collected data from 180 smallholder poultry farmers in Kenya. By stratifying participation in the contract production and found on average, contracted farmers earned more net revenue per bird approximately 27 percent more compared to the independent farmers and this motivates the smallholder commercial poultry farmers to participate in the IBCF system to improve their welfare through increasing the net revenues broiler farming and there of incomes. The finding can be supported by the transaction cost theory. In this theory, it shows that the CBFs found to participate in the IBCF system is relies on the transaction cost theory. In this theory, it mentions that if the transaction cost, which relates to the income of the CBFs are more than the participation cost which relates to the production cost, it mean that the CBFs make a profit and this will motivate them to sustain in the IBCF system.

The findings can also be supported by Miyata *et al.* (2009), who used a Heckman selection–correction model. They found that CF raises the income of the small farm income and this will motivate a number of farmers to bring into such schemes.

Goldsmith (1985) and Singh (2002) also review a number of case studies of contract farming in Africa, Asia, and Latin America and in the Indian State of Punjab. They found economic performance and participant have a positive relationship where if the contract farmers earn more profit, participation in the IBCF system will increase. Jones

and Gibbon (2011) found to increase the participation cocoa CF in Uganda since real net cocoa revenue increased by 58 percent to 168 percent.

Furthermore, Warning and Key (2002) were the first to attempt to deal with the self-selection of farmers into contract farming in a study of peanut contract farming in Senegal. They found that participants in contract farming have a significant relationship with an economic performance where the higher incomes of contract farmer will increase participation in contract farming. Cahyadi and Waibel (2013) estimated contract participation increased net household income by 60 percent (significant at the 10 percent level). The overall, results show that while contract farming has a significant positive effect on smallholder income and participation in palm oil CF in Indonesia.

4.6.2 Marginal Effect and Odd Ratio on Logit Model

The marginal effect on the relationship between participation in the IBCF system with CBF economic performance is shown in Table 4.44. The results indicate that participating in contract farming has a positive and significant impact on the incomes of the farmers at the one percent level. The impact for these farmers is an increment in net revenue per bird of RM0.12 respectively which are significant at five percent. It can, therefore, be concluded that the impact of participating in contract farming is an increment of net revenue per bird of approximately five percent on average. Table 4.45 shows that participation in the contract system by 0.117 if the farmers make *PROFIT* in the IBCF system. This finding is in line with the research done by Ramaswami *et al.* (2006) on poultry farmers with and without contracts in India. They found that average gross margins were similar between contract growers and others, but the regression analysis indicated significant gains from contracting. Moreover, Reardon *et al.* (2009)

also stated that farmers who participate in the modern CF. They found CBFs have greater net earnings per ha or per kg marketed. This finding suggests that getting CBFs to participate in contract farming can help them to improve their welfare through increasing the revenues from these birds and thereof incomes.

Table 4.44
Marginal Effect and Odd Ratio of Participation and Economic Performance of Contract Farm Model

Variables	Marginal Effects	Odds Ratio
PROFIT	0.117*	0.016*
	(0.049)	(0.039)
SIZE	-0.043	0.222
	(0.021)	(0.240)
AGE	0.399**	1.185e+06**
	(0.090)	(5.934e+06)
CAP	0.134**	108.800*
	(0.03)	(235.400)
GAI	-0.006	0.811
	(0.018)	(0.483)
EXP	-0.0754	0.071
	(0.050)	(0.167)
DIS	0.095**	28.220**
	(0.030)	(35.680)
Constant	0**	0**
Observations	211	211

Note: * and ** denote significant at 5 and 10 percent, respectively.

Table 4.44 also shows the odds ratio estimate relationship between *PROFIT* and *PAR* in the IBCF system. The relationship between both variables is positive significant at 0.1

significant level. The estimated odd ratio of farmers shows that participation of farmers in the IBCF system is 0.04 times higher if they make *PROFIT*.

4.6.3 Diagnostic Checking

Table 4.45 shows the result of diagnostic checking. The result indicates that the result fits the data well *(p*-value= 0.000). Further, since the percentage of corrected prediction (PCP) is a large *ρ*-value (96.1 percent), it indicates that the model well fits with the data. Furthermore, McFadden's value of 31.1 percent indicates that the model is an excellent fit. McKelvey and Zavoina value of 87.6 percent assume that values were distributed normally amongst the independent variables. Meanwhile, the mean VIF is 1.65 which is less than five; indicate that collinearity is probably not a problem between the dependent variable and all the independent variables. The BIC value of 26.2 percent emphasizes that very strong support of using the logit model.

Table 4.45
R-squares and Diagnostic Test

R^2	**Value (percent)**
Pseudo R^2	38.2
McKelvey and Zavoina R^2	87.6
Cragg – Uhler-Nagelkerke R^2	61.8
Mcfadden	31.1
Efron R^2	48.5
Tjur's D R^2	47.8
Count R^2	81.9
Diagnostic Tests:	**Value**
Likelihood-ratio test (χ^2)	0.00
VIF	1.65
Percentage of corrected prediction (PCP)	96.1%.
BIC	26.2%

4.7.4 Robustness Checking

Figure 4.3 statistically indicates that the regression equation achieved 96.1 percent which indicates the model is good fitness with the analysis. This logit model yields results that were verified in Table 4.43 and Table 4.44. Therefore, it concludes from these robustness checks that the results are robust to alternative estimators and specifications.

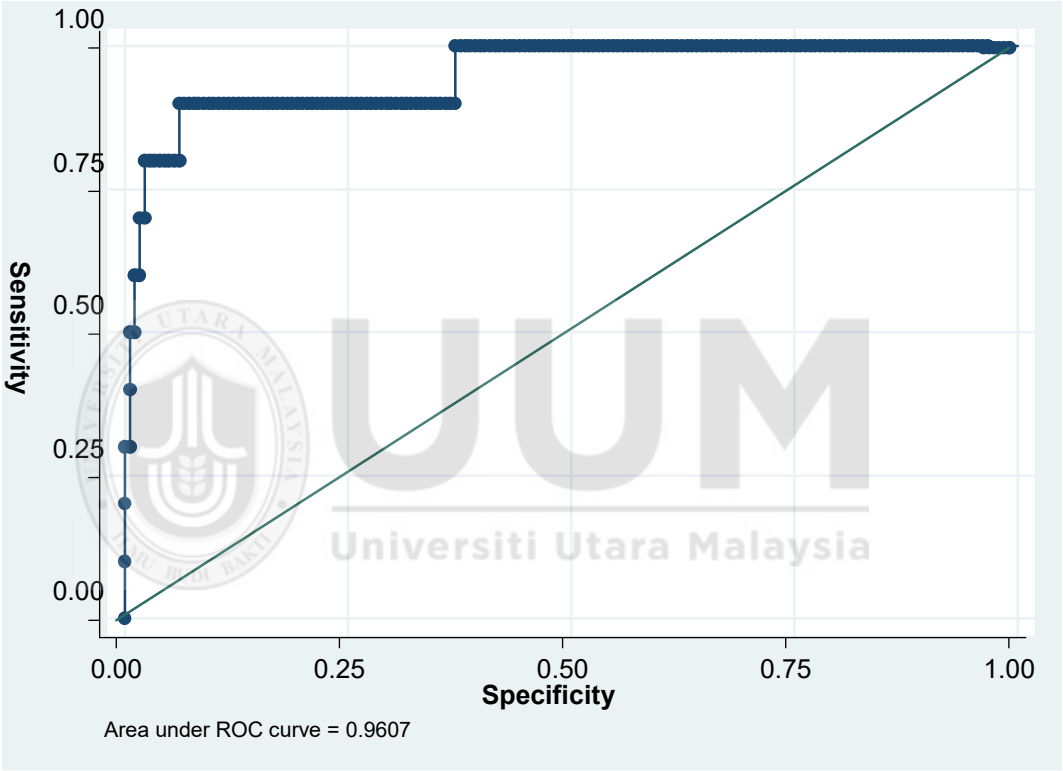

Figure 4.6

Robustness Checking of PROFIT with Participation in the IBCF System

4.8 Conclusion

The overall findings indicated that the factors related to CBF participation in the IBCF system and evaluated the impact of the IBCF system on the economic performance of broiler production in Malaysia are significantly related. The empirical study shows the

farmer's annual gross income, years of experience, availability of capital, the distance of farms to market target and access to finances were all identified as the significant factors affecting participation in the IBCF system. Besides that, the prospective integrators and cooperatives between CBFs and integrators and the highly variable average returns to CBFs as value chain to *PROFIT* and participation in the IBCF system. This leads to the conclusion farmers are participating in the IBCF system largely because of the economic performance and their inability to bear the high investments on inputs, assured income and absence of marketing risk.

CHAPTER 5

SUMMARY AND POLICY IMPLICATION

This chapter conclude the summary of findings, the contribution of research**,** policy implication and limitation of the study. Also, it wraps up with the recommendation of the future research and conclusion.

Based on the result of participation estimation, experience and gross annual income variables have significant positive relationships with the participation in the IBCF system. However, size of farm*,* capital and distance variables is found to have the negative relationship with the participation in the IBCF system, respectively.

In the pooled multiple regression analysis, the results of the CBFs' economic performance in the IBCF system proved that all the independent's variables; average body weight*,* feed conversion rate*,* average marketing age, mortality rate and housing system variables are the statistically significant affect that the CBFs' economic performance in the study. Specifically, the result reveals that average body weight significantly affects profit in a positive manner. The results indicate that a rise in average body weight would lead to an increase the CBFs' economic performance.

The pooled multiple regression analysis also suggests that housing system positively affects the economic performance of the CBFs. This proves that those CBFs who using closed house *system* in the rearing the broilers achieve better economic performance compared to those CBFs who used open house system.

The empirical result of the relationship between the participation and economic performance of the CBFs are using the logit model. Empirically, it is observed that there is a positive relationship between variables *PAR,* and economic performance. It means an increase in one ringgit of the profit would improve by 3.23 units of farmer participation in the IBCF system.

5.1 Policy Implication

From the results of the study, it is shown that experience, gross annual income, farm size, capital, and distance variables are found significantly affect CBFs in order to participate in the IBCF system. From the study found farmers are more experience, less capability in term of capital, small scale farmers, having high annual income from the IBCF system and their broiler farms nearer to the market is significant to participate in the IBCF system. Therefore, the integrators and local banks should support the small farmers by providing loans with low interests to encourage small farmers to participate in the IBCF system. The integrators should not only depend to experience farmers but also consider providing technical service and knowledge to the young players by provide training and motivation courses such as in job training, so that to encourage the new generations especially the young graduates to have interest involve in the broiler farming and participate in the IBCF scheme. The integrators should also consider to improve transportation and logistics facilities to the farmers' broiler farms, to enable those farmers whose farms location are far away may consider to participate in the IBCF system.

Since IBCF system contributes 70 percent of national broiler production, the integrators should consider playing a key part to improve the performance of contract farmers. The study showed a strong relationship between participation with economic performance. CBFs sustain in the IBCF system because of economic performance. From the study, the CBFs should aware about the importance of size of farm, feed conversion rate, average body weight, average market age and mortality rate which significantly affects the economic performance. Therefore to get good feed conversion rate, average body weight, average market age and mortality rate all depend on the quality of inputs, technical service and marketing by the integrators and good husbandry practice by the CBFs.

Since the poultry farming with closed house system brings higher productivity, therefore, the government should encourage more private companies to invest in the poultry business and promote them to use closed house system. This is necessary to achieve bigger productivity of chicken to fulfil the demand of the people especially in Malaysia, as well as for export. The government also should implement tax deduction for those farmers who comply closed house system in their poultry production. The government may also consider to give subsidies on broiler feeds price to the farmers. By implementing this actions, it may lower down the cost of production and also can motivate farmers to change their housing system from open house system to closed house system.

5.2 Limitation of the Study

As expected, several respondents were interviewed in the selected areas were reluctant to divulge information on their contract farming or out-grower schemes for reasons of

confidentiality or company policy. Meanwhile, some expressed concern that any disclosure could be detrimental to the company's operations and plans, and beneficial to their competitors. As a result, only basic information was obtained from these respondents.

However, other respondents were willing to discuss their operations in general terms, but not to divulge details of their contractual arrangement with integrators. Although several respondents indicated that their contracts were available for perusal, some respondents were unwilling to provide information about their agreement with integrators.

Confidentiality and an unwillingness to share their contracts have caused complication to examine the contracts so as to more fully and accurately assess the obligations in the IBCF system. The criteria used for selecting the case studies were based on the effectiveness of the contractual arrangement in the sense that the scheme is still functional, the longevity of the schemes and, to some extent, the number of CBFs involved. Since not all of the CBFs can provide two cycles data because of stop farming or change integrators, therefore, to perform consistency of the data, only two cycles data were collected from each respondent.

5.4 Recommendation for Future Research

From the study, the researcher found that closed house system system effect farm performance of the broiler farmers in term of disease control and air pollution. Therefore, more studies should be performed to get the best design of closed house system to be practiced in Malaysia. At moment they use cooling pad system. From that

research, the broiler farmers can decide which closed house system to use as a way to increase the broiler production and improve the economic performance.

More studies also should be carried out by the government to decide what the best way or incentives should be given to recruiting more broiler farmers in long terms basis among farmers and also to the newcomers especially the young generation. This serves as a strategy to ascertain ample supply of chicken to Malaysia. The Malaysian government should send more researchers on-board to other countries like Thailand, India or China where their poultry technologies in contract farming sector more advance to understudy on how respective governments play their parts to improve and expand the CF system in their domestically.

Lastly, due to economic problems such as expensive inputs like corn, soya beans and others imported raw materials; the government should encourage more research to be carried out by the scientists to do research on potential of local raw materials such as food or vegetable wastage, so that the broiler farmers can lower down their production cost. The Malaysia's government also should give more grants to encourage more researchers to study about current diseases, quality of foodstuffs and study the best practices of neighbouring countries in poultry management and the IBCF system. These findings can be utilised to improve the local broiler management and production.

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APPENDIX

QUESTIONNAIRE

1 Gender

	Male
	Female

2. Age of respondent

	Below 30 years
	31 – 40 years
	41 – 50 years
	Above 50 years

3. Marital status

	Single
	Married
	Divorced
	Widowed

4. Education level of respondent

	No education
	Primary school
	Secondary school
	Diploma/Degree/Postgraduate

5. Years of farming experience

	<5 years
	5 – 10 years
	> 10 years

6. Why do you participate in CF

	In sufficient capital
	Marketing problem
	Less risk

7. Why do you think about CF?

	Generate good income
	Less risky

8. State where doing the farming

☐	Johor
☐	Pahang
☐	Perak

9. What is your main occupation?

☐	Broiler farming
☐	Non-farming

10. What is your another occupation?
Please specify:_____

11. What is your average annual off-income?

☐	< RM50,000
☐	RM50,000 – 100,000
☐	RM100,000 – 150,000
☐	> RM150,000

12. Number of broiler rear per cycle?

☐	< 10,000 birds
☐	10,001 – 20,000 birds
☐	20,001 – 30,000 birds
☐	30,001 – 40,000 birds
☐	40,001 – 50,000 birds
☐	> 50,000 birds

13. Ownership status of farm

☐	Own
☐	Rented

14. What is your source of your capital?

☐	Sales of property
☐	Personal saving or from other business
☐	Loan from friends/family/relatives
☐	Loan from integrators
☐	Loan from commercial bank/insurance
☐	Loan from government initiative financing programme

15. Size of capital when start the business?_____

16. Type of chicken house?

	Close house system
	Open house system

17. Why do you choose this house system?

	Economic
	Disease prevention
	Performance more better
	Base on capital on hand

18. What do you think about contract farming?

	Remain as CF system.
	Will extend farming and rear more chicken.
	Not confidence in CF and change to other business or to other job.

19. Distance from market centre or processing plant

	< 20 Km
	21 – 40 Km
	41 – 60 Km
	61 – 80 Km
	> 80 Km

B.EVALUATION OF ECONOMIC PERFORMANCE

20.

	PROFIT	Size of farm (number of birds)	FCR	Mortality rate (%)	Average Market Age (days)	Average market weight (kg)
Cycle 1						
Cycle 2						

21. Cost of production

Items	Cycle 1(RM)	Cycle 2(RM)
Feed cost		
DOC		
Medication, Vaccination & Disinfectant		
Utility		
Maintenance		
Transportation		
Manpower		
Housing Depreciation		
Bank Interest based on 7%		

22. Revenue

Revenue	Cycle 1(RM)	Cycle 2(RM)
Sales of broiler		
Sale of Chicken Manure		