Revista Argentina de Clínica Psicológica
2020, Vol. XXIX, N°5, 731-742
DOI: 10.24205/03276716.2020.1068

A Way Forward to Promote the Farming Contracts Between Firms and Farmers in Cultivation Productions: A CASE STUDY Of VIETNAM

Nguyen Van Song[a], Vu Ngoc Huyen[b*], Nguyen Thị Thuy[c], Dinh Van Tien[d], Thai Van Ha[e], Nguyen Xuan Diep[f], Vuong Thi Khanh Huyen[g]

Abstract

The purpose of this study is to assess the factors affecting the level of linkages between firms and farmers in crop development in Thai Binh province, Vietnam. The two main research methods used were exploratory factor analysis (EFA) and regression analysis with survey data which was conducted from 300 farmers, 10 firms, and 15 managers related to contract-farming. The results indicated that there are 5 factors that significantly affect the level of participation of farmers in the linking process, the order of impacts from strong to weak is as follows: (1) Commitment and sharing of benefits and risks between farmers and firms in the linking process, (2) Issues related to management skills and enterprises capacity of link firms, (3) Price issues that farmers are interested in in the process of implementing links with firms, (4) Policy environment - Institutions related to farmer contracts between firms and farmers, (5) Household awareness about the benefits brought about by farmer contracts with firms. Based on results, a number of specific solutions have been proposed to enhance the efficiency of farming contracts between firms and farmers in cultivation production.

Keywords: farm contracts, firms, farmers, cultivation production, Thai Binh.

1. Introduction

Vietnam's agricultural sector is still small, fragmented and traditional agriculture. Therefore, cooperation and alignment in the industry are more necessary than ever (Tran Quoc Nhan, 2012). However, the results of linkage in Vietnam were not as expected. Farmers are not interested in joining the agricultural association (Quang Sang, 2019). In the total 50,000 firms involved in the agricultural sector, only about 1,000 are directly linked to farmers (Bao Loan & Duong Thanh, 2019). The farmer contract between firms and farmers was not strong and sustainable because there was no mechanism for sharing profits and risks (Nguyen Van Chi, 2020). The proportion of commodity agricultural products that are consumed through contracts between farmers and firms are still low (Quynh Anh, 2020).

Thai Binh is a Vietnamese administrative unit and a coastal province in the Red River Delta. By the end of 2018, Thai Binh ranked 13/63 provinces and cities in terms of population, ranked 29th in Gross Regional Domestic Product (GRDP) and ranked 8th in speed GRDP growth (Thai Binh Statistical Office, 2018). The area of food crops in 2017 was about 171,9 thousand hectares, of which the rice area was 158,7 thousand ha (General Statistics Office, 2017). However, the current implementation of farming contracts between firms and farmers in Thai Binh province has been still very limited.

The government perceives contract farming as an excellent opportunity to boost rural economic development (Hélène et al., 2019). Decision No. 80/2002/QD-TTg of June 24, 2002 of the Prime Minister (the policy of linking 4 houses) and the Directive No. 25/2008/CT-TTg of October 10, 2008 of the Prime Minister The Government has strengthened the direction of consuming agricultural products through contracts.

The model of "linking four houses" has been

[a,b,g]Vietnam National University of Agriculture (VNUA), Trau Quy, Gia Lam, Hanoi, Vietnam
[c]Hanoi University of Industry (HAUI), Minh Khai, Bac Tu Liem, Hanoi, Vietnam
[d,e]Ha Noi University of Business and Technology (HUBT), Vinh Tuy, Hai Ba Trung, Ha Noi, Vietnam.
[f]Thai Nguyen University of Economics & Business Administration (TUEBA), Thai Nguyen, Vietnam.
Emails: nguyensonghua@gmail.com, vungochuyen.vnua@gmail.com, thuynguyen17072007@gmail.com, dvtien.napa@yahoo.com, vanha280182@gmail.com, nguyenxuandiep@gmail.com, vuongthikhanhhuyen@gmail.com.
*Corresponding Author: Dr. Vu Ngoc Huyen**
Email of Corresponding Author: vungochuyen.vnua@gmail.com

researched, built, and applied in rural agriculture production practices in Tra Vinh province in the works of Vo Huu Phuoc (2010), and in the Red River Delta of Nguyen Tat Thang (2014), Enterprises and Farmers are the two main actors of linkages in agricultural production. Le Thi Kim Oanh et al. (2016) found that contract farmers received lower price than non-contract farmers did in exchange for higher stability of price and better market access. Nguyen Dinh Phuc et al. (2017) pointed out 4 factors that have a great influence on the ability of sugarcane farmers to participate in the associated model including the capital (95.38%), agricultural extension (94.98%), experience (65.27%), and area (61.09%).

The above studies analyzed different topics of linkage in Vietnam. However, there are many research gaps that can develop: The process of links between business and farmers in each locality are different. On the other hand, to our understanding, there has not been any scientific and comprehensive and systematic research on how to link businesses and farmers in the development of crop production in Thai Binh province.

Against this background, this study contributes to the literature in three ways. First, we generalized the situation of agricultural production linkages between farmer households and businesses in Thai Binh province. Secondly, we modeled the factors that influence people's participation and analyzed the impact of each of them. Thirdly, we formulate policy recommendations to improve linkage efficiency in production in Thai Binh and can be applied to other localities.

2. Literature reviews

Hirschman (1958) divided the concept of farmer contracts based on industry and interdisciplinary relationships: Links include backward linkages and forward linkages. The backward linkages arise from the demand for input supply of a newly established industry, while forward linkages arise from using that sector's output as the input of the pull-along activities.

Contract farming, as an institution in agriculture, has a long history. Various forms of this institutional arrangement were employed by United States multinationals in Central America at the beginning of the 20th century, and by the Japanese to secure sugar production in Taiwan from 1885 (Runsten & Key, 1996).

During the period 1930-1950, contracting was used increasingly in many food and fibre sectors. The fruit and vegetable canning sectors expanded in the United States and Europe (Little & Watts, 1994; Clapp, 1994). From the late 1950s, Mexican growers increasingly supplied the American markets with fruit and vegetables under contract (Watts, 1994), and in the period 1960-80 there was a significant increase in contracting for vegetables, fruit, nuts and seed crops (Kilmer, 1986). Contract farming has also spread rapidly in Asia, Latin America and Africa owing to the higher returns earned by high-value export crops and the impact of new technologies (Clapp, 1994; Staatz & Eicher, 1998). Some places, forms of contracting are dependent on specific institutions such as marketing orders and bargaining cooperatives (Sporleder, 1992). The contract could specify the price, quantity, quality, the provision of agribusiness inputs (Sporleder, 1992; Runsten & Key, 1996). Reardon and Barrett (2000) have observed that the agricultural industrialization process in many developed countries has brought a number of effects in regulating the supply chains that make them more closely connected.

Boehlje (2000) argues that in many developed countries, agricultural production is changing from an industry dominated by family-based, small-scale farms or firms to one of larger firms that are more tightly aligned across the production and distribution value chain. The signing of contracts allows farmers to overcome barriers to integration into the world economy (Carney, 1988; Clapp, 1994; Jackson & Cheacher, 1994; Little & Watts, 1994; Royer, 1995; Pasour, 1998; Delgado, 1999; Vellema, 2000). Contracting could also improve access to capital and credit (Hudson, 2000).

Contracting farmers can reduce production costs and increase production and income as a result of their use of new technology and their access to company inputs (Watts, 1994; Clapp, 1994). Contracting farmers can stabilise output of the product and stabilise income. At the same time, contracts may simplify production and marketing decisions, thus improving the farmer's effectiveness (Hudson, 2000). Contracting farmers can increase profit opportunities through a greater product range and differentiated products (Pasour, 1998), or by diversifying out of traditional crops in developing countries in order to grow high-value crops and thereby increase their income (Williams, 1985; Levin, 1988; Delgado, 1999).

Saggi (2002), Giroud & Scott-Kennel (2006), Unctad (2001) have concluded that horizontal linkages shows the interaction between foreign and local enterprises in the production of goods and services in the same production phase. The most important effect is called the spillover effect (Coe & Helpman, 1995; Coe et al., 1997; Giroud & Scott-Kennel, 2006; Dieppe & Mutl, 2013). Fujita & Mori

(2005), Hussain & Planning (2000) have concluded that there are two main types of linkages. The first type is called economic link (E-farm contracts), including activities related to the production and trading of goods and services. The second type is called knowledge link (K-farm contracts), including human activities in creation and transfer of knowledge, thus creating the knowledge spreading effect. Mesquita & Lazzarini (2008) concluded that linkages have a combination of vertical and horizontal links, which appear in the development and integration process when the relationship between households, facilities and enterprise is a combination of cooperation and competition.

Otsuka et al. (2016) found that although contract farming contributes to the improvement of farmers' income by introducing new crops and production methods, there is room for strengthening its effects on poverty reduction through policy. Olounlade et al. (2020) found evidence of significant negative effects on rice production income at a 1% level. Hung Anh & Bokelmann (2019) found out formal institution brings better market access for coffee farmers, but main issues are regarding opportunistic behavior, imperfect market knowledge, traditional farming habits, and contract noncompliance, which have resulted in a lower preference for the market of processors/exporters.

Through the theory of contract farming, it can be seen that contract farming gives contract farmers many benefits such as easy market access and more stable market, the contract could specify the price, quantity, quality, the provision of agribusiness inputs. Through an economic contract, the parties must be responsible and obliged to implement the terms of the contract. These are also the scientific bases for us to build a hypothetical research model for this research.

3. Research methodology

3.1. Conceptual Research Framework

The process of developing the survey table and conducting data collection survey has been carried out in the following main stages.

To start this analysis, at first define the factors related to the level of participation of farmers in linkage with firms in Thai Binh province. There were six factors that were expected to affect the level of participation of farmers as follows: (1) Awareness of farmers about benefits of farmer contract with firms; (2) Commitments in the process of linking with firms; (3) Sharing benefits and risks between farmers and linked firms; (4) Management skills and business competence of linked firms; (5) Policy environment - Institutions related to the farmer contract between firms and farmers; (6) Price issues that farmers are interested in in the process of implementing farmer contracts with firms.

The second stage is that design of preliminary survey. After that discussion groups and expert interview to adjust the scale, complete questionnaires and determine the location and selecting interviewees. After official investigation, the collected data were entered into SPSS software and start processing data. Cronbach's Alpha test is constructed to examine the reliability for each component. Exploratory factor analysis is used for reducing the number of variables to a smaller set of underlying summary variable or component. The regression analysis helps to provide an estimation of the relationship among the variables and the impact of independent.

3.2. Data Collections

There are 31 independent variables and two dependent dichotomous variables that form a database. These data were obtained from 300 samples according to the following formula:

$n = \sum_{j=1}^{m} kPj$

If the model has m scales, Pj is the observed variable number of j-th scale. The ratio of the sample to an analytical variable (k) is 5/1 or 10/1. In this study, the author used 6 scales with a total of 31 variables, with the number of samples selected from 5-10 times the number of variables, so the total number of samples is from 155-310 samples.

This study used data from a panel survey of random 300 farmers in three selected districts of Thai Binh province (Dong Hung district, Vu Thu district and Kien Xuong district). The set of questionnaires was divided into two parts, the first part involved the respondent background such as gender, age, education level, occupations, monthly income, agricultural production area, major crops… while the second part included 5 Likert scale ranging from strongly disagree (1) to strongly agree (5) direct questionnaire about factors affecting the level of participation of farmers, such as: awareness of farmers, commitments in the linking process, sharing benefits and risks, policy environment and price. Besides, the author also interviewed in-depth 10 enterprise and 15 managers to find out information about markets and policies in the province.

3.3. Data analysis

The sample data were entered into computer software (SPSS). It is statistical software which eases to compile and analyze data. We can compile

or entry collected primary data or secondary as same as Microsoft Excel. Two main analyses in this study are Exploratory Factor Analysis (EFA) and Multivariate Regression Analysis.

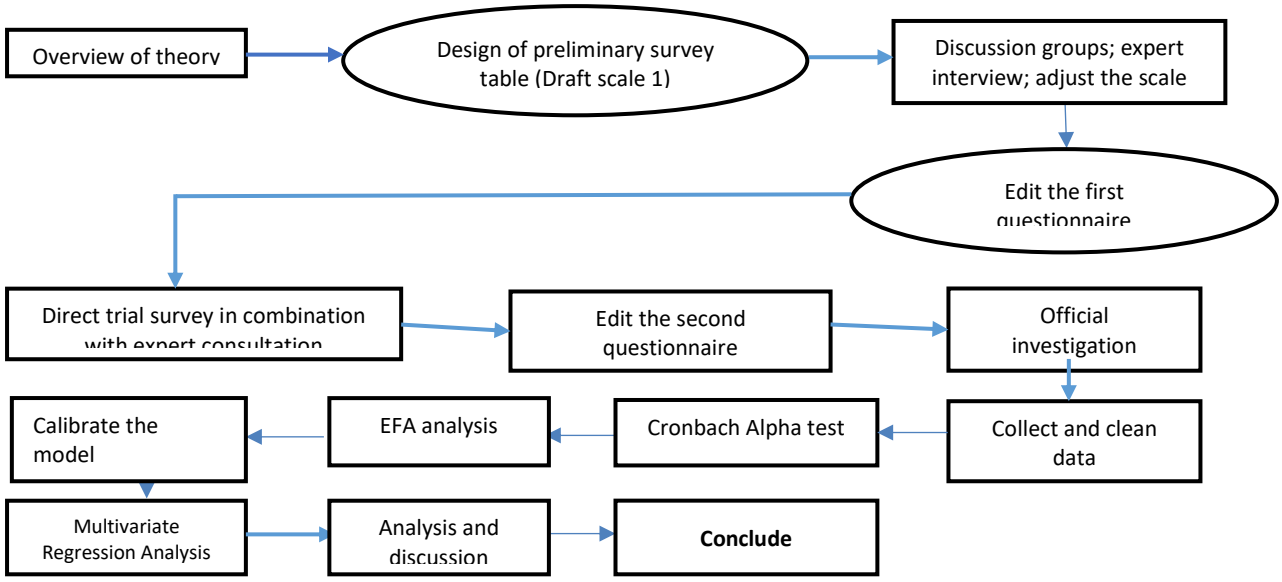

Figure 1. **Model of building survey table and conducting data collection survey**

Source: Summary of the author (2019)

Table 1. **Summary of survey samples on farmer contracts between firms and farmers**

Number of sample survey	Subject matter investigated	Location of investigation
125	Farmer	Dong Hung district
82	Farmer	Vu Thu district
93	Farmer	Kien Xuong district
10	Enterprise	Thai Binh province
15	Managers	Managers of provinces, districts and cooperatives

Source: Summary of the author (2019)

Exploratory factor analysis is used for reducing the number of variables to a smaller set of underlying summary variable or component. This method is one of a statistical method to uncover the underlying structure of a relatively large set of variables (Norris & Lecavalier, 2010). In Exploratory Factor Analysis (EFA), firstly it is looking at the Kaiser-Meyer-Oikin (KMO) value that measure of sampling adequacy for the variables is close to 1.0 (Latif et al., 2012; Latif et al., 2018; Kaiser, 1974). The values more than 0.6 consider reliable as recommended by Nunnally (1978). According to Cristobal et al. (2007), the item with corrected item - total correlation lower than 0.30 are not acceptable. Similarly, the Bartlett's Test of Sphericity to see the sufficiency correlation items to proceed in the analysis when it is significant at $p < 0.001$, which means that there are some relationships between the items. Since both of the tests were significance, it is suggesting that the data is appropriate to proceed with data reduction procedure to group the items into acceptable components (Habidin, 2013). The number of factors is determined based on the Eigenvalue index (The value of the variance divided by each factor) - representing the variance explained by each factor. According to Cerny & Kaiser (1977) factors with Eigenvalue less than 1 will be excluded from the model. Variance explained criteria: the total variance explained must be greater than 50%. Using Principal components extraction method with varimax rotation and stopping points when extracting elements with Eigenvalues greater than 1 with observed variables. Then, all items are loaded into respective factor with a minimum factor loading of 0.4 (Habidin, 2013; Hatcher, 1994). A reliability test is conducted to ensure all factors are accepted as being reliable for the research in order to enhance the accuracy of the assessment and evaluations (Habidin, 2013).

After completing the Exploratory Factor Analysis, the variables do not guarantee values

convergence is removed from the model. The relationship between independent variables and dependent variable groups is determined by Multivariate Regression Analysis. The value of the new variable in the research model is the average of the variables observing its component, the value of the components automatically calculated by SPSS software from the weighted average value of the observed variables were normalized. However, before conducting regression analysis, an important analysis should be performed first, a correlation analysis to test the linear correlation between variables in the model. Specifically, the study tested the correlation between the dependent variable and each independent variable and between the independent variables. Pearson correlation coefficients were used to quantify the degree of rigor of the linear relationship between two quantitative variables. The closer the absolute value of Pearson's coefficient is to 1, the closer these two variables are linearly correlated (Chu Nguyen Mong Ngoc, 2008). In this study, expect a strong linear correlation between dependent variables and independent variables.

4. Results

4.1. Situation of farmer contract between firms and farmers in Thai Binh province

4.1.1. Links between farmers and farmers

According to Department of Agriculture and Rural Development of Thai Binh Province (2017), the province had 112 groups and affiliated groups in livestock production and aquaculture, 109 livestock groups, 3 aquaculture groups and 13 models of husbandry cooperation groups. Collaborative groups have linked on breeds, feed, veterinary drugs, animal husbandry processes, lower production costs, improved product quality, and more concentrated product creation. Some cooperative groups have signed contracts with input suppliers and outlets. A number of large-scale self-invested farm owners are forming a chain of production with agreements to supply animal feed, veterinary drugs and consumption of livestock products.

Links between farmers and farmers in Thai Binh Province have been a horizontal linkages type. Farmers have joined together to create areas of specialized production of crop products with a larger scale and larger area. These links have helped them to sign contracts directly with the companies supplying raw materials in large quantities, higher discount, and guaranteed of raw materials quality. Therefore, the product quality has been more uniform, input production cost has been more economical.

4.1.2. Links between firms and farmers, between cooperatives and farmers

Thai Binh province has 20 enterprises participating in linking with cooperatives and farmers; 4 livestock enterprises are linking with owners of livestock farms; 2 enterprises are linking with seafood production households. The form of these links are vertical linkages. Some typical link models in Thai Binh province: (1) Farmer contract model of Japanese rice production and high-quality rice. The area given for this farmer contract model accounted for 50.1% (4,892ha), being by far the largest one among farmer contract models. (2) Farmer contract model of rice seed production. The area given for this farmer contract model comprised of 30.9% (3,015 ha). (3) Farmer contract model of crop production. The area given for this farmer contract model accounted for 19.1% (1,859 ha). The linked crops include: potatoes, sweet corn, squash, chili, baby cucumbers, and vegetables for export. (4) Farmer contract model with whiteleg shrimp farmers in Thai Thuy districts and Tien Hai districts. Every year, companies provide over 200 million of good quality shrimp seed to farmers. Besides, they also provide technical assistance and search for markets consuming over 200 tons of commercial shrimp.

4.2.3. Link between farmers and associations

Currently in Thai Binh province, the way of link between farmers and associations are often through contracts. In 2019, Thai Binh province had 80 communes in association with production with 20 companies and enterprises. Products contracted include: Rice seed, commercial rice, corn, millet, cucumber, squash, peanuts, spinach, potatoes...

Regarding the development of high-tech agriculture, there are some large corporations in renting land from farmers to develop clean agriculture, typically TH TRuemilk Group. TH TRuemilk invests in the production of clean and organic foods, such as rice, vegetables, tubers and fruits. According to plan, TH TRuemilk Group will invest in developing hi-tech agriculture project with scales up to 3000ha and total investment of 3,000 billion VND.

4.3. Assess factors affecting the farmer contracts between firms and farmers

4.3.1. Cronbach's Alpha Analysis

Cronbach's Alpha analysis results for the observed variables are described in the following table:

Table 2. **Summary of scale test for independent and dependent variables**

No.	Code	Observed variables	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
Awareness of farmers about benefits of farmer contract with firms (NT), Cronbach's Alpha = 0.908				
1	NT01	Output products are guaranteed to be consumed entirely by linked firms	.610	.904
2	NT02	The input services provided by linked firms with good quality	.812	.887
3	NT03	Product selling price can be guaranteed	.765	.890
4	*NT04*	*Farmers inputs may be owed*	*.517*	*.917*
5	NT05	Farmers have access to seedling services and plant protection services	.809	.887
6	NT06	Farmers have access to crop technical services	.822	.886
7	NT07	Farmers can stabilize the price of their products by joining the link	.811	.887
8	NT08	Farmers can reduce product consumption costs by joining the link	.562	.907
Commitments in the process of linking with firms (CK), Cronbach's Alpha = 0.974				
9	CK01	Farmers are ready to sign cooperation documents with firms	.908	.969
10	CK02	Farmers are willing to make commitments on linking with firms as well as third parties (researchers)	.870	.973
11	CK03	Farmers are committed to following the production process according to the instructions of the technical staff and recommendations of the agricultural sector	.948	.965
12	CK04	Farmers are committed to providing firms with information on the production process, use of varieties, medicines, harvesting time	.952	.965
13	CK05	Farmers commit to sell products to enterprises according to specifications, standards and quantity as the original commitment	.912	.969
14	CK06	Farmers are willing to follow legal constraints when linking with firms	.892	.971
Sharing benefits and risks between farmers and linked firms (CS), Cronbach's Alpha = 0.898				
15	CS01	Farmers are aware of the benefits brought about by linked with businesses (guarantee of output consumption; access to seed and plant protection services; stabilize the selling price of products; improve product quality)	.717	.889
16	CS02	Farmers are willing to take risks when linking with firms	.810	.855
17	CS03	Farmers are willing to share difficulties with firms when associating (difficulties in production, consumption ...)	.822	.856
18	CS04	Farmers receive technical support, training, capital ... when linking with firms	.781	.871
Management skills and business competence of linked firms (QL), Cronbach's Alpha = 0.850				
19	QL01	Farmers are willing to link with firms with good management ability	.727	.804
20	QL02	Farmers are willing to link with firms with production and business capacity	.693	.811
21	QL03	Farmers are willing to link with firms with reputable firms in the locality	.638	.825
22	QL04	Farmers are willing to link with large-scale firms	.712	.805
23	QL05	Farmers are willing to link with firms with linked experiences	.547	.850
Policy environment - Institutions related to the farmer contract between firms and farmers (MT), Cronbach's Alpha = 0.810				
24	MT01	The State and local governments have good policies on linking production and consumption in agricultural production	.659	.755
25	MT02	Develop a strategy and plan for the production of agricultural products that is suitable for linking	.653	.756
26	MT03	Local authorities select and implement appropriate farmer contracts	.593	.775
27	MT04	The role of the state and local authorities in promoting the farmer contract between farmers and firms (credit support, science and technology support)	.645	.759
28	*MT05*	*The role of associations in promoting farmer contracts between farmers and firms (Farmers' Union, Business Association,)*	.444	.814
Price issues that farmers are interested in in the process of implementing farmer contracts with firms (GC), Cronbach's Alpha = 0.747				
29	GC01	Farmers receive price support in case of crop failure or high price of inputs	.615	.615
30	GC02	Linked firms offer reasonable buying prices to farmers	.590	.590
31	*GC03*	*The company guarantees to make the purchase price as committed and not reduce the purchase price in case of crop success*	.769	.769
The level of participation of farmers in the linking process (TG), Cronbach's Alpha = 0.925				
32	TG01	Farmers are interested in associating with firms in production and consumption of products	.872	.
33	TG02	Farmers are willing to link with firms	.872	.

Source: Summary of the author (2019)

The summary results in Table 4 show that most of the scales had Cronbach Alpha coefficient in the range of 0.7-0.8 so the scales in this study were highly reliable. The results shown in Table 4 indicate that there were 3 observed variables excluded due to the failure of Cronbach Alpha coefficients and the total correlation (NT04, MT05, GC03).

4.3.2. Exploratory Factor Analysis (EFA)

After assessing the reliability of the scales, the author conducted an exploratory factor analysis to evaluate the convergence value and discriminant value of the independent and dependent variable scales.

Table 3. **Exploratory factor analysis results for the independent variables**

	Factor				
	1	**2**	**3**	**4**	**5**
CK04	.973				
CK03	.970				
CK05	.931				
CS02	.883				
CK01	.882				
CK06	.880				
CK02	.844				
CS03	.801				
CS04	.770				
CS01	.721				
NT07		.914			
NT05		.892			
NT06		.858			
NT03		.839			
NT02		.820			
MT03			.848		
MT01			.799		
MT04			.792		
MT02			.760		
QL02				.972	
QL01				.946	
GC01					.908
GC02					.852
Eigenvalues	10.668	2.442	2.156	1.492	1.081
Average variance extracted	46.384	57.004	66.380	72.865	77.563
	KMO = 0.909				Sig = 0.000

Source: Summary of the author (2019)

In this study, the KMO value was 0.909 (KMO > 0.7) and Bartlett's test of sphericity had a significant value = .000 (less than .05). These results suggest that factor analysis was suitable for these statements. In the extraction of the EFA, based on the initial eigenvalues greater than 1, the analysis output showed five components were the factors in this EFA. The percentage of explained variance was 77.563%. In all statements, the factor larger than 0.5 suggests that the statements can optimally explain variances of their related factors, and thus the questions are significant.

Thus, the factors after implementing EFA discovery factor ensure the ability to represent the original survey data and be eligible to perform multivariate regression analysis. Five factors were drawn from the implementation of the EFA analysis, including: Commitment and sharing of benefits and risks between farmers and firms in the linking process (X1), Household awareness about the benefits brought about by farmer contracts with firms (X2), Policy environment - Institutions related to farmer contracts between firms and farmers (X3), Issues related to management skills and enterprises capacity of link firms (X4), Price issues that farmers are interested in in the process of implementing links with firms (X5). Thus, the EFA factor analysis results have changed the group of variables compared to the original theoretical model.

4.3.5. Exploratory Factor Analysis for dependent variables

Result of the Kaiser Meyer Olkin value was .905 (KMO > 0.7) and Bartlett's test of sphericity had a significant value = .000 (less than .05). These results suggest that factor analysis was suitable for these statements. There are one dimension or component emerged from the EFA procedure based on the computed Eigenvalue >1.0. The extracted variance reached 93,617%. This has confirmed the ability to converge and perform well of the observed observation variables.

4.3.6. Testing model and hypotheses

4.3.6.1. Pearson's Correlation Coefficients

Pearson's correlation coefficient helps to check the collinearity of independent variables. Table 5 shows the correlation analysis between the level of participation of farmers in the linking process and other factors resulted with the moderate positive and significant correlation at $p < 0.01$.

The correlation coefficient of the level of participation of farmers in the linking process (Y) with the variable X1 has moderate correlation ($r = 0.734$, $p < 0.01$) which was followed by that of X2 ($r = 0.515$, $p < 0.01$), X4 ($r = 0.488$, $p < 0.01$), X5 ($r = 0.465$, $p < 0.01$), and X3 ($r = 0.422$, $p < 0.01$). Here the absolute value of Pearson correlation coefficient is less than 0.8, it shows collinearity is very less likely to exist.

Table 4. **Pearson's Correlation Coefficients**

	Y	X1	X2	X3	X4	X5
Y	1	.734	.515	.422	.488	.465
X1	.734	1	.597	328	.420	.352
X2	.515	.597	1	.260	.284	.358
X3	.422	.328	.260	1	.304	.404
X4	.488	.420	.284	.304	1	.184
X5	.465	352	.358	404	.184	1

Correlation is significant at the 0.01 level (2-tailed).

4.3.6.2. Multivariate regression analysis

Multivariate regression analysis was performed with 5 independent variables and the results of multivariate regression analysis were as follows:

Table 5. **Summary of regression model**

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Multicollinearity	
		B	Std. Error	B			Tolerance	Variance inflation factor (VIF)
1	(Constant)	2.102	.353		5.950	.000		
	X1	.732	.066	.523	11.010	.000	.553	1.807
	X2	.091	.072	.057	1.269	.000	.618	1.619
	X3	.231	.089	.105	2.598	.010	.768	1.302
	X4	.222	.047	.186	4.687	.000	.791	1.263
	X5	.281	.062	.184	4.518	.000	.757	1.321
	$R^2 = 0.634$		Adjusted R-squared = 0.628		$F_{(5,293)} = 101.452$		p=0.00	

The F-value of ANOVA Table 6 measures the statistical significance of the model. From above table it can be concluded that the fitted model is significant as P-value of F statistics is 0.00 and it is less than level of significance level ($\alpha = 5\%$). The value of VIF is $1 < VIF < 5$; it specifies that the variables are moderately correlated to each other. The small values of VIF corresponding to the variables show that there is no problem of collinearity.

The $R^2 = 0.634$, it means that 63.4% of the variation in the dependent variable Y is explained by the independent variable in the regression model, the remaining 36.6% was due to non-model variables and random errors. The adjusted $R^2 = 0.628$ gives the idea of how well the model generalizes. The difference between the R^2 and adjusted R^2 is 0.325 - 0.316 = 0.006; it means if the model was derived from the population rather than a sample it would account for approximately 0.6% less variance the outcome. Based on the regression analysis results, the regression equation was obtained as it is shown below:

Y= 2.102 + 0.732X1 + 0.091X2 + 0.231X3 + 0.222X4 + 0.281X5

5. Discussion

As described above, the degree of farmers participation in the link was classified according to five factors: Commitment and sharing of benefits and risks, household awareness about the benefits of contracts, policy environment, management skills and enterprises capacity of link firms and price issues. Regarding the factor of commitment and

sharing of benefits and risks, all 10 variables had factor loading scores between .721 and .973, and the top-3 factor loading scores were the farmers are committed to providing information for firms (CK04;.973), following the production process (CK03; .970), selling products to enterprises as the original commitment (CK05; .931). For the factor of household awareness about the benefits of contracts, there were 5 variables which had factor loading scores between .820 and .914, and the highest factor loading score was the farmers can stabilize the price of their products by joining the link (NT07; .914). For the factor of policy environment, there were 4 variables which had factor loading scores between .760 and .848. For the factor of management skills and enterprises capacity of link firms, there were 2 variables which had factor loading scores between .946 and .972. For the factor of price issues, there were 2 variables which had factor loading scores between .908 and .852.

The absolute value of β (Beta) in Table 5 indicates the order of importance of the independent variables. The variable with the highest β value is the relatively most important independent variable. On examining the contributions made by the independent variables in the model to the model, it was found that the Commitment and sharing of benefits and risks between farmers and firms in the linking process made the biggest contribution with the value of (β = 0.732). It was followed by the Price issues that farmers are interested in in the process of implementing links with firms, Policy environment - Institutions related to farmer contracts between firms and farmers, Issues related to management skills and firms capacity of link firms, Household awareness about the benefits brought about by farmer contracts with firms. In fact, these figures were 0.281, 0.231, 0.222, 0.091, respectively. All the factors in the regression model had a positive effect on participation of farmers (coefficient a_i > 0).

6. Conclusions and Implications

Based on data from the 300 farmers survey of Thai Binh province, using the method of economic statistical analysis, comparative method, exploratory factor analysis method. The study has analyzed the status of farmer contracts through basic links: First, the link between farmers and farmers in Thai Binh was vertical linkages. Farmers join together to create areas of specialized production of crop products with a larger scale and larger area. Second, farmer contracts between farmers and firms, between farmers and cooperatives have been vertical links. That both the farmer and the business are responsible for the product, information can be shared more easily, and product competitiveness is enhanced. Third, the research analyzed the farmer contracts between farmers and firms. This form will help develop the crop sector to achieve higher economic efficiency. The parties to the contract must be complied with the binding conditions as agreement, thereby improving the responsibility among the parties.

In order to strengthen linkage between firms and farmers in crop production. There are some possible solutions. First, completing the system and policy environment, especially the process of agricultural land accumulation. Second, strengthen the management capacity and business capacity of linked firms. Third, promoting the development of a value-added chain model. For example, reaching new markets, finding outlets for product consumption, bridging helps farmers reorganize the production of agricultural goods in accordance with the process, standards, and requirements for the quality of agricultural products that the market needs. Fourth, developing production links, concentrating agricultural land, applying science and technology into production, establishing production farmer contract chain of crop production.

Some limitations of this study should be noted. First of all, this study used 5-point Likert-type scales for measuring the dependent and independent variables. However, the small number of options may contribute to the low reliability coefficients for the variables of this study. Furthermore, the limitations of this study are limited research materials, limited literature review, limited knowledge on correlation and regression analysis. Research only summarizes theoretical concepts but it has not given out new concepts. It is recommended that future research has to focus on rich literature review and primary research on how correlation and regression can be effectively use in data analysis processes of quantitative methods.

References

[1] Bao Loan & Duong Thanh (2019). Link between Firms and Farmers: Motivation to develop commodity production. Newspaper business forum. https://enternews.vn/rao-can-thuong-mai-ngay-cang-phuc-tap-trong-xuat-khau-nong-san-159374.html

[2] Boehlje, M. (2000). Critical dimensions of structural change. Unpublished document, Department of Agricultural Economics. West Layafette: Purdue University.

[3] Carney, J. A. (1988). Struggles over crop rights and labour within contract farming households in a Gambian irrigated rice project. The Journal of Peasant Studies, 15(3), 334-349.
[4] Center for Flowers, Ornamentals Research and Development (2020). Linkages farmers and firms. http://ceford.vn/tin-tuc/tang-cuong-lien-ket-giua-nong-dan-voi-doanh-nghiep
[5] Cerny, B. A., & Kaiser, H. F. (1977). A study of a measure of sampling adequacy for factor-analytic correlation matrices. Multivariate behavioral research, 12(1), 43-47.
[6] Chu Nguyen Mong Ngoc (2008) , Analyze data research with SPSS. Hong Duc Publishing House. 38-41.
[7] Clapp, J. (1994). The toxic waste trade with less-industrialised countries: Economic linkages and political alliances. Third World Quarterly, 15(3), 505-518.
[8] Coe, D. T., & Helpman, E. (1995). International r&d spillovers. European economic review, 39(5), 859-887.
[9] Coe, D. T., Helpman, E., & Hoffmaister, A. W. (1997). North-south R & D spillovers. The Economic Journal, 107(440), 134-149.
[10] Cristobal, E., Flavian, C., & Guinaliu, M. (2007). Perceived e-service quality (PeSQ). Managing service quality: An international journal.
[11] Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. psychometrika, 16(3), 297-334.
[12] Delgado, C. (1999). Sources of growth in smallholder agriculture in sub-Saharan Africa: The role of vertical integration of smallholders with processors and marketers of high value-added items. Agrekon, 38, 165-189.
[13] Department of Agriculture and Rural Development of Thai Binh Province (2019). Summary of agriculture sector
[14] Dieppe, A., & Mutl, J. (2012). International R&D spillovers: technology transfer vs. R&D synergies. European Central Bank, Working Papers Serries, No.1504.
[15] Fujita, M., & Mori, T. (2005). Transport development and the evolution of economic geography. Portuguese Economic Journal, 4(2), 129-156.
[16] General Statistics Office (2017). Results of the Rural, Agriculture and Fishery Census.
[17] Giroud, A., & Scott-Kennel, J. (2006). Foreign-local linkages in international business: A review and extension of the literature. Bradford University, School of Management.
[18] Habidin, N. F. (2013). Critical success factors of Lean Six Sigma for the Malaysian automotive industry. International Journal of Lean Six Sigma. 60-82.
[19] Hatcher, L. (1994). A step-by-step approach to using the SAS system for factor analysis and structural equation modeling. Cary, North Carolina: SAS Institute.
[20] Hélène A. Ba , Yann de Mey , Sylvie Thoron , Matty Demont (2019). Inclusiveness of contract farming along the vertical coordination continuum: Evidence from the Vietnamese rice sector. Land Use Policy, 87, 104050. https://doi.org/10.1016/j.landusepol.2019.104050.
[21] Hirschman, A. O. (1958). The strategy of economic development (No. 04; HD82, H5.).
[22] Hudson, D. (2000). Contracting in Agriculture: A Primer for Leaders Research report 2000-2007. Department of Agricultural Economics, Mississippi State University. Industry, Wageningen Agricultural University, The Netherlands, 393-403.
[23] Hung Anh, N., & Bokelmann, W. (2019). Determinants of smallholders' market preferences: The case of sustainable certified coffee farmers in Vietnam. Sustainability, 11(10), 2897.
[24] Hussain, M. N., & Planning, S. (2000). Linkages between SMEs and large industries for increased markets and trade: an African perspective.
[25] Jackson. Jc & Cheacher. Ap. (1994). Contract farming in Zimbabwe: case studies of sugar, tea and cotton. In Little, PD & Watts, MJ (Eds), Living under contract. Madison, WI: University of Wisconsin Press.
[26] Kaiser, H. F. (1974). An index of factorial simplicity. Psychometrika, 39(1), 31-36.
[27] Kilmer, R. L. (1986). Vertical integration in agricultural and food marketing. American Journal of Agricultural Economics, 68(5), 1155-1160.
[28] Latif, S. A., Omar, M. S., Bidin, Y. H., & Awang, Z. (2012). Environmental problems and quality of life: situational factor as a predictor of recycling behaviour. Procedia-Social and Behavioral Sciences, 35, 682-688.
[29] Latif, S. A., Omar, M. S., Bidin, Y. H., & Awang, Z. (2018). Analyzing the effect of situational factor on recycling behaviour in determining the quality of life. Journal of Asian Behavioural Studies, 3(6), 11-17.
[30] Le Thi Kim Oanh, Vu Dinh Ton, Tran Huu Cuong, Philippe Lebailly (2016). Contract Farming as a Determinant of Promoting Tea Marketing

Channels for Small Producers in Phu Tho Province. International Review of Research in Emerging Markets and the Global Economy, 2(4), 955-972.

[31] Levin, R. (1988). Contract farming in Swaziland: Peasant differentiation and the constraints of land tenure. African Studies, 47(2), 101-120.

[32] Little, P. D., & Watts, M. (Eds.). (1994). Living under contract: contract farming and agrarian transformation in sub-Saharan Africa. Univ of Wisconsin Press.

[33] Mesquita, L. F., & Lazzarini, S. G. (2009). Horizontal and vertical relationships in developing economies: Implications for SMEs' access to global markets. In New Frontiers in Entrepreneurship (pp. 31-66). Springer, New York, NY.

[34] Nguyen Dinh Phuc, Phan Thi Diem, Giap Thi Thuy Dung & Ngo Thi Le Thuy (2017). Factors affecting the ability to join sugarcane production and consumption models of sugarcane growers with Gia Lai sugarcane thermal power company. Journal of Science - Hue University. 126 (5A). 43–61.

[35] Nguyen Tat Thang (2014), Research solutions to strengthen linkages between farmers, scientists and enterprises in agricultural production and business in the Red River Delta. Hanoi University of Agriculture. National political publishing house.

[36] Nguyen Van Chi (2020), Linking from production to consumption of agricultural products in Hanoi: reality and problems to be solved. Vietnam Gardening Association. http://www.vacvina.org.vn/xem-tin-tuc/lien-ket-tu-san-xuat-den-tieu-thu-san-pham-trong-nong-nghiep-ha-noi-thuc-tai-va-nhung-van-de-can-giai-quyet.html.

[37] Norris, M., & Lecavalier, L. (2010). Evaluating the use of exploratory factor analysis in developmental disability psychological research. Journal of autism and developmental disorders, 40(1), 8-20.

[38] Nunnally, J. C. (1978), Psychometric theory. McGraw-Hill.

[39] Olounlade, O. A., Li, G. C., Kokoye, S. E. H., Dossouhoui, F. V., Akpa, K. A. A., Anshiso, D., & Biaou, G. (2020). Impact of Participation in Contract Farming on Smallholder Farmers' Income and Food Security in Rural Benin: PSM and LATE Parameter Combined. Sustainability, 12(3), 901.

[40] Pasour, E. C. (1998). The potential impact of increased vertical integration on North Carolina grain farmers. North Carolina State University, Raleigh.

[41] Quang Sang (2019). Farmers and firms still find it hard to find common ground. The voice of Vietnam online. https://vov.vn/kinh-te/nong-dan-va-doanh-nghiep-van-kho-tim-tieng-noi-chung-896777.vov.

[42] Quynh Anh (2020). Enhancing the value chain linkage between cooperatives and agricultural product processing firms. http://baokiemtoannhanuoc.vn/goc-nhin-chuyen-gia/tang-cuong-lien-ket-chuoi-gia-tri-giua-hop-tac-xa-va-doanh-nghiep-che-bien-nong-san-142407.

[43] Reardon, T., & Barrett, C. B. (2000). Agroindustrialization, globalization, and international development: an overview of issues, patterns, and determinants. Agricultural economics, 23(3), 195-205.

[44] Royer, J. S. (1995). Potential for cooperative involvement in vertical coordination and value-added activities. Agribusiness, 11(5), 473-481.

[45] Runsten, D., & Key, N. (1996). Contract farming in developing countries: Theoretical aspects and analysis of some Mexican cases. Report prepared for the United Nations Economic Commission for Latin America and the Caribbean, Santiago, Chile.

[46] Saggi, K. (2002). Trade, foreign direct investment, and international technology transfer: A survey. The World Bank Research Observer, 17(2), 191-235.

[47] Sporleder, T. L. (1992). Managerial economics of vertically coordinated agricultural firms. American Journal of Agricultural Economics, 74(5), 1226-1231.

[48] Staatz, J. M., & Eicher, C. K. (1998). Agricultural development ideas in historical perspective. International agricultural development, 3.

[49] Thai Binh Statistical Office (2017). Social and economic situation in 2017.

[50] Tran Quoc Nhan (2012). Analyzing the causes leading to the weak implementation of contracts on the consumption of agricultural products between farmers and enterprises in Vietnam. Journal of science and development Viet Nam. 10 (7). 1069–1077.

[51] Unctad (2001). World investment report: Promoting farm contracts.

[52] Vellema, S. (2000). Technology and control in Philippine contract farming: the cases of asparagus production and maize seed production. International Journal of the Sociology of Agriculture and Food, 8(1), 25-34.

[53] Vo Huu Phuoc (2014), Researching and applying the model of linking 4 houses to rural agricultural production practices in Tra Vinh province. Academy of Social Sciences.
[54] Watts, M. J. (1994). Life under contract: contract farming, agrarian restructuring, and flexible accumulation. Living under contract: contract farming and agrarian transformation in sub-Saharan Africa, 21-77.
[55] Williams. S, (1985) The Mumias Sugar Company: a nucleus estate in Kenya. In Williams, S (Ed.), Agribusiness and the small-scale farmer. Boulder, CO: Westview.