

Households' Risk Perception of Pig Farming in Vietnam: A Case Study in Quynh Phu District, Thai Binh Province

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This research was conducted to explore households' overall perception of risk in pig farming and its relations to households' socioeconomic factors in Vietnam. The results reveal that meat price, epidemic diseases, and production cost are perceived as the most important sources of risk in pig farming. Supports from the government are associated with households' perception of less risk in information, market access and feed quality. Therefore, the government could have an important role to play in encouraging the growth of the pig farming sector by, for example, supporting households in contract farming, establishing information channels, and management market systems.

Keywords: risk perception, pig farming, multiple linear regressions

1. Introduction

In Vietnam, livestock has contributed significantly to the development of agriculture in rural areas (Tung et al. [15]). On average, the livestock sector has grown at a rate of 5%–7% a year; it accounted for 25.3% of the total output value of agriculture in 2011 (GSO [3]). Recently, pig farming has played the most important role in the livestock sector, with approximately 60% of rural households operating pig farms (Tisdell et al. [14]). Pig farming is the main source of meat for domestic consumption; small-scale pig farms account for approximately 64% of the total meat production in the country (Tung et al. [15]). Eprecht [1] demonstrated that pig farming made the greatest contribution to household income. However, Lapar et al. [8] indicated that small-scale pig farming households in Vietnam are faced with numerous risk factors such as poor genetic stock, low quality feed, animal diseases, and lack of access to timely and reliable market information. Moreover, households often lack requisite knowledge and information related to pig farming, which leads most of them to operate pig farms mainly in individual families. Although several studies have examined households' perceptions of risk in livestock in developed countries (Flaten et al. [2]; and Meuwissen et al. [9]), research on the risk perception of small-scale farming in developing countries, including Vietnam is lacking. Therefore, this research aims to provide empirical evidence on this field by identifying risk perception and risk perception in relation to socioeconomic factors in pig

farming in Quynh Phu District, Thai Binh Province, Vietnam.

2. Data and Empirical Methods

1) Data

The survey was conducted in August and September 2013 in Quynh Phu district, which is a rural area in Thai Binh Province, located in the Red River Delta, Vietnam. Quynh Phu district has an area of 205.6 km² in which 149.6 km² are under agriculture; it has a population of 241,000 people (GSO [3]). The district consists 36 communities and 2 towns. Two communities that have the largest number of pig fattening farms were selected. The questionnaire survey was conducted among 200 randomly chosen households from those who own pig fattening farms. Finally, 166 households returned complete questionnaire forms for analysis. The questionnaire survey included two main parts: (1) households' perception on sources of risk in pig farming, and (2) socioeconomic characteristics of the households. Related to the question on how to get households' risk perception of pig farming, the question was directly translated from Vietnamese into English as 'households were asked to rank the impact of each source of risk in pig farming on income from pig farming'. To exclude risk on any other things, the questionnaires specifically asked about risk of pig farming.

Risk perception is the subjective assessment of the probability of an uncertainty and the extent to which individuals are concerned about the consequences. Risk perception includes evaluations of the probability as well as the consequences of a negative outcome (Sjöberg et al. [13]). In this research, the consequence of sources of risk were rated on Likert-type scales ranging from 1 to 5, in

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which 1 represents very low impact and 5 represents very high impact on households' income/profit from pig farming. Based on the risk classification in agriculture given by Harwood et al. [6], Musser and Patrick [10], OECD [11], and other previous studies on risk perception (Flaten et al. [2]; Hui Zhou et al. [7]; Meuwissen et al. [9]; and Satit et al. [12]), 25 sources of risk in pig fattening were included in the questionnaire. After the preliminary survey, 18 sources of risk were selected to fit the actual situation on the study site.

2) Empirical method

Two distinct theories currently dominate the field of risk perception—the “psychometric paradigm” and “cultural theory”—in which the psychometric paradigm has gained wide credibility and popularity (Sjöberg et al. [13]). Since the psychometric paradigm was first presented in 1978, it has been employed in dozens of studies by several different researchers and for many different purposes (Wählberg [16]). One of the most important assumptions within the psychometric approach is that risk is inherently subjective. Specifically, the psychometric paradigm encompasses a theoretical framework that assumes risk to be subjectively defined by individuals who may be influenced by a wide array of psychological, social, institutional, and cultural factors (Sjöberg et al. [13]). This approach cannot be separated from the questionnaire and factor/regression analysis methods, as they have not been validated in any other manner (Wählberg [16]).

Based on the research on risk perception of Flaten et al. [2] and Meuwissen et al. [9], households' perception on risk is studied using descriptive analysis. The relationship between risk perception and socioeconomic factors are explored through multiple linear regressions. Before conducting the regressions, the number of variables was reduced using principal component analysis (PCA).

3. Results and Discussion

1) Socioeconomic characteristics of household

Most household heads were male and almost 70% of them had completed formal education in secondary school. More than 60% of the respondents in the study site considered pig farming as the main source of household income. Further, 78.3% of respondents operated pig fattening farms with less than 50 pigs in each period. The output revenue of these farms was less than one billion VND per year, thereby indicating that most of the pig fattening farms in the study area were small-scale ones

(GSO [3]). Such farms operated without being registered with the local government. Almost all households were part of groups such as farmer and livestock unions. By participating in these unions, the households expected to receive market information and technical support. However, in reality, the activities of these groups have not met the households' requirements. The local government has played a very limited role in providing households with knowledge of and training in appropriate techniques and relevant information related to pig farming. Therefore, most of the households indicated that their main source of knowledge of pig farming came from their experiences.

2) Sources of risk

The research was conducted on 18 sources of risk in pig farming. The second and third columns of Table 1 show the average scores of households' perceptions of each source of risk and the standard deviations of the scores, respectively. On average, the highest scores were given to the sources of risk related to meat price, epidemic animal diseases, and production cost. All these sources of risk had standard deviations of less than 1, thereby indicating a high level of consensus among respondents. The high scores for meat price and production cost are owing to the fact that the households cannot control the prices of inputs and outputs in production. Further, while 24.1% of households had contracts for buying feed, none of them had contracts for buying piglets and only one household had a contract for selling meat. Most farms were small-scale and operated in an old-fashioned and traditional manner. This made the prevalence and spread of animal diseases common in a wide area, thereby resulting in epidemic animal diseases becoming a major problem. These findings are similar to the results of some previous studies in the livestock sector. Satit et al. [12] indicated that the unexpected variability of the prices of inputs and outputs and epidemic animal diseases were the most important perceived sources of risk for farmers in the central and northeast regions of Thailand. Hui Zhou et al. [7] also indicated that price risk and animal diseases risk were the most serious according to the perception of dairy farmers. In the study area, households do not need to obtain licenses for the operation of pig farms, which indicates poor management by the local government. For example, most pig farms are located in or near the communities, while the environment protection law requires that pig farms must be located at a distance from

communities. Additionally, when households noticed fattening pigs were diseased or dead, most of them were able to sell these pigs easily in the local and distant markets. This reveals that consumers' food safety requirements did not affect pig farms. Although the local government has policies for supporting pig farms, but these are usually uncertain and short-term ones. Therefore, the sources of risk related to consumers' food safety requirements, environmental protection laws, and government support were perceived as the least important. Meanwhile, Hui Zhou et al. [7] also show that a change in government support was not perceived as important, but food safety issues were considered very serious in Chinese dairy farms.

Table 1 presents the component loadings for sources of risk in PCA. The number of variables was reduced for sources of risk using applied PCA. The results revealed that 6 components had eigenvalues greater than 1 and the total variance was 68.35%. The Kaiser-Meyer-Olkin (KMO) test for sample adequacy (KMO= 0.699) indicated that the data

accepted PCA from meritorious to middling (Hair et al. [5]). Variables with higher loading are considered more important and have greater influence on the name or label selected to represent a component (Hair et al. [5]).

According to loadings $\geq |0.5|$, components 1 to 6 can best be described as "Human and Environment risk", "Information risk", "market access risk", "Financial situation risk", "Production", and "Price volatility".

Component 1 is "Human and Environment risk" whose sources of risk are "family health conditions" and "unclean water".

Component 2 is "Information risk" whose sources of risk is related with regulatory information such as safety law and environmental protection law or market information captured by "number of middleman".

Component 3 is "Market access risk" named with a high loading given to "lack of markets".

Component 4 is represented the risk of interest rate and hence is called "Financial situation risk".

Table 1. Average score, standard deviation, and rotated component loadings for sources of risk

Source of risk	Mean	Std. Dev.	The most important component					
			1	2	3	4	5	6
Meat price	4.97	0.20	0.25	-0.16	0.04	0.03	0.32	-0.51
Epidemic diseases	4.77	0.53	0.18	0.01	0.21	0.11	-0.54	0.09
Production cost	3.99	0.62	0.06	-0.06	0.01	0.04	0.09	0.69
Family health conditions	3.49	1.79	0.51	-0.11	0.04	0.20	-0.02	-0.09
Untreated trash	3.30	1.52	0.45	0.10	-0.08	-0.02	0.02	0.06
Husbandry techniques	3.23	1.27	-0.14	-0.14	0.35	-0.25	0.07	-0.03
Unclean water	3.10	1.52	0.51	0.00	0.08	-0.17	-0.07	0.03
Quality of piglet	3.05	0.95	0.25	0.15	-0.07	-0.12	0.47	0.19
Ability to redeem loan	2.90	1.33	0.12	-0.14	-0.22	0.36	-0.09	0.20
Lack of markets	2.64	1.17	0.18	0.11	0.57	-0.04	-0.14	-0.09
Quality of feed	2.60	0.92	-0.05	-0.01	0.16	0.21	0.52	0.01
Food safety requirements of consumers	2.49	1.17	0.11	0.15	-0.35	-0.40	-0.10	-0.07
Poor market linkage	2.08	0.99	-0.11	0.01	0.48	0.04	0.03	0.11
Safety law	1.97	0.98	-0.08	0.53	-0.16	0.03	-0.13	-0.10
Interest rates	1.89	1.03	0.03	0.06	0.00	0.55	0.01	0.09
Environmental protection law	1.84	1.19	0.02	0.55	0.16	0.00	0.03	-0.03
Number of middleman	1.75	1.05	0.02	0.51	0.07	0.04	0.17	0.13
Government supports	1.56	0.75	-0.06	0.13	-0.07	0.46	-0.04	-0.32
Eigenvalue			4.4	2.3	1.8	1.46	1.24	1.07
Cumulative percentage of the variance explained (%)			16.91	30.78	42.22	52.67	60.77	68.35

Note:1) Loadings of $\geq |0.5|$ are in bold. Component 1: "Human and Environment"; component 2 "Information"; component 3 "Market access"; component 4 "Financial situation"; component 5 "Production"; and component 6 "Price volatility."

2) Sample size: 166, Self-survey 2013.

Component 5 is related with production and hence is named as “Production risk”. But it has a positive loading from the risk of “Quality of feed” and a negative loading from the risk of “Epidemic diseases”. It indicates that households that perceive high impact from quality of feed risk tend to perceive low impact from epidemic disease risk.

Component 6 “Price volatility” consists of two price risks: input price captured by “production cost” and output price captured by “meat price”. Although both price risks have high loading to component 6, their contributions have opposite directions. It implies that households that perceive high impact from meat price risk tend to perceive low impact from production cost risk.

3) Risk perception in relation to socioeconomic factors

Relationship between risk perception and socioeconomic factors were investigated by using multiple linear regression models. The multicollinearity phenomenon among independent variables was not a problem when conducting the regressions.

Socioeconomic factors that can affect households’ risk perception are listed in Table 2 (Flaten et al. [2]; Meuwissen et al. [9]; and Satit et al. [12]).

In the study site, the differences in production cost and breeding time among the pig farms are mainly dependent on the sources of feed and piglets. Government supports, particularly from the local government supports, can be classified into three categories: financial supports, information (laws and market) provision, and extension training.

The results of the regression models are presented in Table 3. For each of the independent variables, the table depicts the partial regression coefficients and the levels of significance for the two-tailed t-tests. All the models that represent the relationships show low goodness-of-fit. Gujarati [4] indicated that this is natural in cross-sectional data with several diverse observations. Previous research that utilized similar methodology also found low goodness-of-fit of the regression models (Flaten et al. [2]; Meuwissen et al. [9]; and Satit et al. [12]).

As shown in Table 3, households with high income, households specializing in pig farming, and households with more efficient pig production (or with less production cost) tend to think human and environment risk (component 1) to be less important, probably because such households are in better living conditions and better pig farming facilities.

Table 2. Description of independent variables in multiple linear regression models

Description	Unit	Code	Variable type	Mean	SD	Min	Max
Age of household head	Year	AGE	Continuous	47.45	6.64	28.00	70.00
Education of household head	Year	EDU	Continuous	9.95	1.69	5.00	16.00
Experience of household head in pig production	Year	EXP	Continuous	11.51	5.48	2.00	30.00
Total income	100 million VND/year	INC	Continuous	1.56	3.49	0.12	38.60.
Main Occupation	Dummy	MO	Dummy, taking the value of 1 if the household mainly work in pig farming; 0 otherwise	0.62	-	0	1
Breeding time	Month/period	TIME	Continuous	4.47	0.87	3.00	8.00
Production cost	Million VND/pig/period	COST	Continuous	2.93	0.72	1.01	4.77
Credit Policy	100 million VND Dummy	CREDIT POLICY	Continuous Dummy, taking the value of 1 if the household get government supports; 0 otherwise.	0.51 0.69	2.14 -	0.00 0	20.00 1

Note: 1) Currency exchange: 1USD = 21,036 VND (17/12/2013)

2) Sample size: 166, Self-survey 2013

Table 3. Results of multiple regression models for sources of risk

	Component 1 Human and Environment	Component 2 Information	Component 3 Market access	Component 4 Financial situation	Component 5 Production	Component 6 Price Volatility
AGE	0.0397 (1.70)	0.0578** (2.99)	0.0450** (2.68)	-0.0779** (-4.67)	0.0115 (0.73)	0.00569 (0.36)
EDU	-0.0455 (-0.55)	-0.0347 (-0.51)	-0.0250 (-0.42)	-0.0912 (-1.55)	0.0543 (0.99)	0.0737 (1.32)
EXP	-0.0321 (-1.18)	-0.0378 (-1.68)	-0.0631** (-3.23)	0.0837** (4.31)	-0.0358 (-1.97)	0.0010 (0.06)
INC	-0.0979* (-2.35)	0.0002 (0.01)	-0.0872** (-2.92)	-0.0318 (-1.07)	-0.0922** (-3.32)	-0.5102 (-1.80)
MO	-0.6770* (-2.37)	-0.3220 (-1.36)	0.2100 (1.03)	-0.4010 (-1.97)	-0.0974 (-0.51)	0.3940* (2.03)
TIME	0.1410 (0.79)	0.0022 (0.01)	-0.0411 (-0.32)	0.0878 (0.68)	0.0544 (0.45)	0.1870 (1.54)
COST	0.5410* (2.46)	0.2630 (1.44)	0.0697 (0.44)	0.4000* (2.55)	0.1550 (1.06)	-0.0779 (-0.52)
CREDIT	-0.0513 (-0.77)	-0.0458 (-0.83)	-0.0005 (-0.01)	0.0206 (0.55)	-0.1040* (-2.36)	0.0313 (0.69)
POLICY	0.2050 (0.69)	-1.3960** (-5.65)	-1.3060** (-6.10)	-0.2120 (-0.99)	-0.5420** (-2.72)	0.0340 (0.17)
_constant	-2.8170 (-1.51)	-1.5610 (-1.01)	-0.2760 (-0.21)	2.5070 (1.88)	-0.7380 (-0.59)	-1.8280 (-1.44)
R_{adj}^2	0.0550	0.2070	0.2770	0.2180	0.1170	0.0240

Note: 1) t statistics in parentheses, * p < 0.05, ** p < 0.01

2) Sample size: 166, Self-survey 2013, STATA 13

Relatively aged households tend to be concerned with information risk (component 2) since they do not have good access to regulatory information and market information. On the other hand, households with government supports seem to consider information risk as less significant since government supports can be the sources of such information.

Households with longer experience in pig farming, households with more income and households with government supports are less concerned with market access risk (component 3). It maybe because such households are likely to know more traders and more information.

The regression results indicate that older households are negatively associated with the perception of financial situation risk (component 4) probably because such households do not borrow money. On the other hand, household with longer experience in pig farming tend to perceive this risk as more important. Although we do not have direct evidence, this result can be interpreted by the possibility that such households depend more on borrowing. Moreover, households with less efficient production are also concerned with the risk of financial situation.

Component 5 shows opposite signs for epidemic diseases and quality of feed (Table 1). The regression results

concerning production risk (component 5) in Table 3 imply that households with higher income, households with higher debt, and households with government supports perceive feed quality risk as less important, but epidemic diseases risk more important. The results may indicate that such households can afford better quality feed and hence are less concerned with feed quality. On the other hand, since even such households have difficulty to control epidemic diseases, the risk of epidemic diseases is more significant for them.

According to PCA result in component 6, meat price and production cost have opposite signs (Table 1). Thus, the positive sign for the variable 'main occupation' in price volatility (component 6) implies that households specialized in pig farming consider production cost (input price risk) as more significant, while households engaged in pig farming as a secondary job perceive meat price (output price risk) as more important. The results indicate that input price management is the main concern of specialized pig households.

4. Conclusions and Implications

The results of this study reveal new information on households' overall perception of risk and risk perception in

relation to socioeconomic factors. Based on the findings of this research, the following are the implications for encouraging pig farming in the specific region of Vietnam.

Perception of sources of risk

1) Meat price, epidemic diseases, and production costs are the most perceived sources of risk in pig farming.

2) Sources of risk can be classified into six categories by PCA: human and environment, information, market access, financial situation, production, and price volatility.

Risk perception in relation to socioeconomic factors

1) Older households perceive greater information risk and market access risk, but lower financial risk. With more experience, households consider market access risk as less important, but are more concerned with financial risk.

2) Households with more income tend to perceive less human and environment risk, less market access risk, and less production risk due to feed quality.

3) Meat price and production cost are considered as important sources of risk in a pig fattening farm. More specialized pig households concern production cost risk as more important, while less specialized pig households consider more with meat price risk. Thus, the government should try to reduce the price volatility by, for example, supporting households in contract farming. Who benefits more, however, will depend on which price volatility will be reduced.

4) Government supports were found to be associated with households' perception of less risk in information, market access and feed quality. Thus, the government could have an important role to play in encouraging the growth of the pig farming sector by, for example, establishing information channels and management market system.

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