

An analysis of factors affecting residents' perception of peri-urban agriculture in Hanoi, Vietnam

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CHRONICLE

Article history:

Received: May 30, 2020
Received in revised format:
May 30 2020
Accepted: June 30, 2020
Available online:
July 1, 2020

Keywords:

Peri-urban agriculture
Resident
Perception
Factor

ABSTRACT

The paper investigates residents' perception of peri-urban agriculture and analyzed factors affecting their perception of agricultural roles in a suburb area of Hanoi city. The research results indicate that although on-farm income has been decreased in comparison with off-farm ones, most of respondents still see agriculture is important because of its income contribution, job provision, food security and food safety, land property right and communal relationship maintenance. Household's livelihood strategy is the most vital factor affecting residents' perception of agricultural income contribution and employment creation, whereas educational level influences their perception of agricultural roles in food security and food safety most. Further, respondents' age strongly affects their idea of maintaining communal relationship through peri-urban agricultural production.

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1. Introduction

In recent decades, urbanization has become a common phenomenon in developing countries including Vietnam. Under the impacts of process of urbanization and peri-urbanization, the peri-urban economy has made remarkable changes, in which non-agricultural economic activities are increasingly dominant (Van Huylbroeck et al., 2007; Teniwut et al., 2019). Rigg (2001, 2002) and Elson (1997) pointed out that people's livelihood in rural areas are gradually shifting from agriculture to non-agriculture. One of important reasons is the fact that agricultural land has been converted into non-farm purposes. Population of Hanoi city has been annually growing at 3%, reaching 3.2 million in 2007 (Danielle, 2010). Further, the capital city expanded its administrative boundary in 2008 (included Ha Tay province), doubling the population to 6.4 million, thereby making it the second largest city in Vietnam after Ho Chi Minh City (HSO, 2009). According to Hanoi's 2011–2020 land-use plan, about 35,500 ha of land, mostly annual crop land, were converted into non-farm used purposes such as industrial zones, residential areas and transportation (Vietnam Government, 2018). In this process, about 500,000 farm labors have been affected. The rapid conversion of agricultural land to urban uses has raised a concern about food provision for urban populations and livelihoods of peri-urban famers (Pham et al., 2015). The encroachment of urban areas into agricultural areas also resulted in fragmentation and isolation of farmlands (Aguilera, 2011), resulting in negative impacts on crop productivity, increasing labor and other expenses, and preventing the use of modern and mechanized equipment (Markussen et al., 2013; Cu et al., 2020). On the contrary, many scholars also looked at urbanization and peri-urbanization from positive view. They argued that the shift in rural livelihoods towards non-agriculture is due not only to the decline of agricultural land but also to the diversity of non-agricultural employment opportunities. Furthermore, Rigg (2005) asserts that agriculture is increasingly seen as a secondary livelihood strategy and as inferior to non-agricultural strategies. Therefore, agriculture becomes an unattractive economic activity for young labor force. However, the reality in peri-urban areas of Hanoi shows that agricultural and non-agricultural livelihood strategies have been and will exist simultaneously in a community, even within a household itself. Although in many localities, people's income is mainly generated from non-agricultural economic activities, many households

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still maintain agricultural production for due to different reasons. The question is why peri-urban people decided to maintain agricultural production. In order to give answers, this paper analyzes factors affecting peri-urban residents' perception of agricultural roles in Hanoi.

2. Literature Review

According to Kontgis et al. (2014), periurban is defined as region between agricultural and urban area where urbanization has been occurring rapidly. Similarly, Piorr et al. (2011) define peri-urban as a transitional zone between rural and urban areas. These zones typically have a higher population density than rural areas, as well as limited agricultural land and less infrastructural development than the town or city they are adjacent to. Many scholars have discussed the position of the peri-urban area in the context of post-agrarian societies. Hall et al. (2011) identify peri-urban as a site of interaction between rural and urban people in some Southeast Asian countries. They have found out that the peri-urban area is characterized by high population mobility, the conversion of farmland to non-farm usage, infrastructure provision by government, and the growth of inequality and uneven development between disparate groups of people (cited in Kanokwan and Supranee, 2018). Peri-urban is defined differently depending on how it is used in the economic, academic, and political context. Regarding to land price and landscape, there is an in-flow movement of migrants going to peri-urban area due to cheaper land price and good environment. These new residents of the peri-urban area have brought with them their own lifestyles, values and expectations of peri-urban areas. Together with new coming residents, many long-term periurban people have highly diverse livelihoods (Tubtim, 2012). For Quertamp and de Miras (2012): "...it could be said that periurbanization occurs at the same time as the countryside disappears and the city is built on its external limits. Periurbanization is neither a permanent state nor a given place, not an intangible urban landscape; but it is a double process: it is a rural retreat if the location is exactly at the edge of the urban front; at the same time, this concept covers an urbanization in the making, observing how this urban front evolves and how this territory is urbanized (land rent, functions, architecture, density, etc.). The periurbanization has certainly a spatial aspect but could be basically a dynamic inclusion process of places and people to create new landscapes in urban logics. This exceeds geographical dimension and also refers to economic, sociological, institutional and cultural components". Whereas, Webster (2011) explains that "peri-urbanization refers to a process in which rural areas located on the outskirts of established cities become more urban in character, in physical, economic, and social terms, often in piecemeal fashion." Regarding to economic and social aspects, periurbanization made significant changes in peri-urban residents' livelihoods and their lifestyle. One of these changes is the role of agricultural sector in the trend that economic roles of agriculture in peri-urban areas decline. Even though, several researches convinced very important roles of peri-urban agriculture. Van der Ploeg and Roep (2003) gave some indication of how many farmers in Europe are involved in different diversification categories such as (1) agri-tourism, on-farm processing activities, nature and landscape management, (2) organic farming, high quality production and regional products or selling through a short supply chain. Similarly, Brinkley (2012) evaluated benefits of peri-urban agriculture based on both market and nonmarket values and showed that the benefits of farmland extend far beyond the local community and should be viewed in a regional context.

At household level, Tuyen (2014) indicated that in peri-urban of Hanoi, long-term residents tried to diverse their livelihoods because their farm land has been converted into non-farm used purposes by state's development strategies. At the same time, they maintain farming at small scale for: (1) serving the consumption needs of the family; (2) diversifying sources of income; (3) avoiding economic risks; (4) dealing with an increase in food price in the market; (5) creating more jobs for family workers; (6) ensuring livelihood security as well as land property right (Nguyen and Le, 2013). Various studies tried to investigate factors influencing on perception of peri-urban dwellers towards agriculture and on their farming practices (Ida Naziera Ngahdiman et al., 2017, Mwangi, 2015). While Karen Wanjiku Mwangi (2015) concluded that urban population is a key factor contributing to an increase in urban agriculture in Nairobi County, (Ida Naziera Ngahdiman et al. (2017) showed that economic benefits, age and education level influenced urban dwellers to practice urban agriculture. But the factors affecting peri-urban residents' decision of maintaining agricultural activities have rarely been touched so far.

3. Data and Methods

This study was conducted in selected areas of Gia Lam district, a suburb region of Hanoi city. A total of 60 respondents were selected by using stratified random sampling technique. The survey was conducted among households who live in the villages where agricultural land has been rapidly into non-farming purposes. The questionnaire was designed based on the research objectives. Respondents were interviewed face-to-face during data collection. Descriptive analysis and Ordinal logistic regression were used to identify factors which affect the decision of agricultural maintenance of peri-urban residents rather than the one affect their agricultural practices. Ordinal logistic regression is a statistical analysis method that can be used to model the relationship between an ordinal response variable and one or more explanatory variables. When it is necessary to control possible confounding factors or even when there is a need to take several factors into consideration, special multivariate analysis for ordinal data is the natural alternative. There are various approaches, such as the use of mixed models or another class of models, Probit for example, but the ordinal logistic regression models have been widely publicized in the statistical literature (Abreu et al., 2008). Ordinal logistic regression is an extension of logistic regression where the logit (i.e. the log odds) of a binary response is linearly related to the independent variables. If instead the response variable has k levels, then there are k-1 logits. A major assumption of ordinal logistic regression is the assumption of proportional odds: the effect of an

independent variable is constant for each increase in the level of the response. Hence the output of an ordinal logistic regression will contain an intercept for each level of the response except one, and a single slope for each explanatory variable.

$$\text{Log} [P_i/(1-P_i)] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \varepsilon_n$$

P_i : probability of an outcome $\leq i$

a_i : intercept for outcome $\leq i$

X_1, X_2, \dots, X_n : Independent variables.

In this research, ordinal logistic regression is used to explain factors that affect individual's perception on multifunctional agriculture. The model consists of 6 independent variables:

$$\text{Log} [P_i/(1-P_i)] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_6 X_6 + \varepsilon_i$$

where:

The dependent variables are ordinal response variables including: D₁: Income contribution of agriculture; D₂: Job provision; D₃: Food security; D₄: Food safety; D₅: Land property right; D₆: Maintenance of community relationship. The Likert scale is used to allow the individual to express how important of different roles of agriculture to them. The Likert scale consists of 5 levels which ranges from: 1. Very important to 2. Moderately important; 3. Neutral; 4. Slightly important; 5. Not important. The independent variables that affects the individual's perception towards maintaining agriculture are classified into 4 main groups:

- (1) Human resources variables
 - X₁: Age of respondent
 - X₂: Gender of respondent
 - X₃: Education of respondent
 - Economic variable
 - X₄: Income of respondent
- (2) Livelihood strategy
 - X₅: Livelihood strategy
- (3) Regional variable
 - X₆: Place of residence

Table 1

Description of variables

Variables	Description
Dependent variables	
D ₁	Individual perception on income contribution
D ₂	Individual perception job provision
D ₃	Individual perception on food security
D ₄	Individual perception on food safety
D ₅	Individual perception on land property right
D ₆	Individual perception on maintenance of community relationship
Independent variables	
<i>Human resources variable</i>	
X ₁	Age of respondent at the date of interview. This variable is coded into 4 categories: 1. Below 40; 2. From 40 to 59; 3. Above 59
X ₂	Gender of respondent. This variable is coded into 2 categories: 0. Female; 1. Male
X ₃	Education of respondent. This variable is coded into 5 categories: 1. Primary education; 2. Secondary education; 3. High school education; 4. Vocational education; 5. Under graduated education
<i>Economic variable</i>	
X ₄	Yearly income per household. This variable is coded into 5 categories: 1. Below 100 million VND; 2. From 100 to 199 million VND; 3. Above 199 million VND
<i>Livelihood strategy variable</i>	
X ₅	Livelihood strategy. This variable is coded into 3 categories: 1. Farm-based household; 2. Combined household (on-farm and off-farm incomes are relatively equal); 3. Off-farm household
<i>Regional variable</i>	
X ₆	Place of residence. This variable is coded into 3 categories: 1. Far from the center; 2. A little bit far from the center. 3. Center

4. Results and Discussion

4.1 Demographic Characteristics of Respondents

Table 2 presents a summary of dependent variables in the model. Overall, agriculture performed vital roles to households. Average values ranged between 2.82 and 2.33, explaining performance perceptions between level 2 (Moderately important) and level 3 (Neutral). Respondents perceived that the best role of agriculture is helping them food safety, followed by maintenance of community relationship, land property right and income contribution ranked third and fourth respectively, to end up with food security.

Table 2
Summary of dependent variables

Variables	N	Mean	
		Sample mean	Std. Error
Income contribution	60	2.70	0.172
Employment provision	60	2.48	0.140
Food security	60	2.33	0.105
Food safety	60	2.82	0.166
Land property	60	2.78	0.170
Maintenance of community relationship	60	2.80	0.173

Source: Survey data, 2017

Table 3 reports some descriptive empirical results on factors affecting the decision on maintaining agriculture of peri-urban residents in the suburb of Hanoi. Respondents were so heterogeneous that their demographic and socio-economic characteristics differently influence their perception and decision.

Table 3
Summary of independent variables

Variables	Household	Percentage
Human resources variables		
<i>Age</i>	Below 40	8.3
	From 40 – 59	58.3
	Above 59	33.3
<i>Gender</i>	Male	38.3
	Female	61.7
<i>Education</i>	Secondary	41.7
	High school	46.7
	University	11.7
Economic variable		
<i>Income per household</i>	Below 100 million VND	16.7
	From 100 to 199 million VND	46.7
	Above 199 million VND	36.7
Livelihood variable		
<i>Livelihood strategy</i>	Farm-based households	33.3
	Non-farm households	26.7
	Combination households	40.0
Regional variable		
<i>Location</i>	Far from center	16.7
	A little bit far from center	40.0
	Center	43.3

Source: Survey data, 2017

4.2 Analysis of Factors Affecting by Ordinal Logistic Regression

As stated in previous section, this research tries to investigate the trend for which factors affect residents' perception of peri-urban agriculture rather than to find the marginal effects. This means that the instantaneous rates of change are not measured and analyzed. The results of ordinal logit model are presented in Table 4.

Table 4
Ordinal logit model

INDEPENDENT VARIABLES	DEPENDENT VARIABLES					
	Income contribution	Employment provision	Food security	Food safety	Land property right	Maintenance of community relationship
Human resources variables						
<i>Age</i>	-.516	.289	-.441	-.353	.499	-.990**
<i>Gender</i>						
- Male	.320	.945	.967	-.468	.339	-.064
- Female	-	-	-	-	-	-
<i>Education</i>						
- Secondary	-2.918	3.665*	6.946***	4.547**	.004	2.511
- High school	-3.484	2.916	5.700**	3.642*	.377	2.551
- University	-	-	-	-	-	-
Economic variable						
<i>Income</i>	-.083	.277	.227	.346	-.404	.208
Regional variable						
<i>Location</i>						
Far from center	-1.589	-5.689**	-5.264**	-2.126	-.226	-2.230
A little bit far from center	-1.322	-4.403**	-8.827***	-5.614	-.831	-3.355
Center	-1.275	-4.162*	-5.216**	-.429	-.938	-2.113
Livelihood variable (Livelihood strategies)						
Farm-based	-3.917***	-3.522**	-.854	-.382	.331	.689
Non-farm-based	2.471**	-2.034**	.047	.399	-1.121	-1.217
Combination	-	-	-	-	-	-
<i>SAMPLE SIZE</i>	60	60	60	60	60	60
<i>PSEUDO NAGELKERKE R²</i>	0.752	0.482	0.452	0.529	0.113	0.383
<i>-2 LOG LIKELIHOOD</i>	108.417***	123.858***	93.783***	127.315***	163.770	144.254***

Source: Authors' Computed

Note: (1) ***, **, * denotes significance at the 1%, 5% and 10% level; (2) "Female", "University" and "Combination" are reference variables.

Firstly, for income contribution, only livelihood strategy is statistically significant among variables (age, income, gender, location, educational level and livelihood strategy). The coefficient of farm-based household equals to -3.917 which is less than zero. This indicated that agriculture is likely to be more important in farm-based households compared to combination ones. Pseudo R squared equals 0.752 which suggests that 75.2% of the dependent model can be significantly explained by independent variables at 5% level of significance.

Secondly, place of household and livelihood strategy appeared to significantly affect individual's perception about agricultural roles in job provision. Regardless the place where residents live, job provision is likely to be important for households in all villages. Very surprisingly, agriculture plays more curial role in job providing for residents living in the center village. Likewise, farm-based households and are likely to higher ratings than off-farm households and combination households because its coefficient has the smallest value among three groups. Pseudo R value is 0.482 which suggests that 48.2% variation of dependent variable can be significantly explained by the model at 5% level of significance.

Thirdly, place of household and educational level have a significant influence on individual's perception of agricultural role in food security. The education level's coefficient has the positive sign of and statistical significance. This result reveals that the higher qualification respondents acquire, the more important role of food security they acknowledge. Pseudo R squared equals 0.452 which suggests that 45.2 % of the dependent model can be significantly explained by independent variables at 5% level of significance

Fourthly, education level has significant impacts on individual's perception toward food safety. The coefficient of the secondary level is 4.547 which is higher than that in high school level at 3.642. The respondents who have the low level of qualification are less likely to recognize the importance of agriculture in term of food safety. Pseudo R squared equals 0.529 which indicates that 52.9% of the dependent model can be significantly explained by independent variables at 5% level of significance.

Fifthly, there are no significant differences in the evaluation of land right security in maintaining agriculture have been found by age, income, gender, location, educational level and livelihood strategy.

Finally, resident's perception about maintenance of community relationship is significantly affected by age. The negative sign on the statistically significant coefficient indicates that when people get older. They are likely to value positively the role of maintenance of community relationship of agriculture. Pseudo R value is 0.383 which suggests that 38.3% variation of dependent variable can be significantly explained by the model at 5% level of significance.

Briefly, the results of ordinal logit model have provided an empirical analysis of factors affecting peri-urban residents' perception and decision of maintaining agriculture in the context of urbanization. It is indicated that educational level shapes individuals' perception of agricultural roles. Particularly, individuals with a greater level of education have more positive perception of agricultural roles in food security and food safety. In addition, as the older people get, the more likely they value positively the role of maintenance of community relationship thanks to existence of agriculture. However, gender doesn't have significant effects on residents' perception and decision. In terms of livelihood security, farm-based households appreciate roles of agriculture in job provision and income diversification.

4.3 Discussion

The results of the regression analysis have shown the factors influencing peri-urban residents' perception and decision of keeping agriculture together with other livelihood strategies in the context of urbanization and periurbanization in Hanoi. Although surveyed data shows that up to 70 percent of total households' income were generated from off-farm activities, peri-urban residents in Hanoi still perceived important role of agriculture in income contribution. This finding is supported by (Maxwell, 2000; Mai Lan et al., 2016) when they stated that peri-urban agriculture contributed to household income which included fungible income through the sale of produce and savings by not purchasing foods they already produced. However, farm-based households tend to more appreciate income roles than combined and off-farm ones. Regarding job provision, survey data showed that although the number of laborers working in farming only decreased significantly, the number of laborers engaged in agricultural production still accounted for a large proportion. The reason is the fact that workers, businessmen or government officials still participate in agricultural production of the family during peak seasons or outside working hours. This shows that agriculture not only plays a role in creating jobs for family/unskilled workers who cannot change jobs, but also contributes to effectively exploit and family labor force. Further, similar to Kitahara's argument (2004), in the context of globalization when off-farm jobs such as workers in FDI enterprises and service providers are insecure, agriculture become more important in its role of employment provision. Although other scholars witnessed that urban and peri-urban agriculture play a vital role in food security for urban dwellers (FAO, 2008; Zasada, 2011; Filippini et al., 2018; Michelle Chihambakwe et al., 2019), surveyed data and results of ordinal logit model convinced that peri-urban residents in Hanoi decided to keep farming because of food safety rather than food security. This means that they do farming for their health rather than for their income. However, perception of agricultural roles in food safety varied among respondents in the trend that the higher educational level they have, the better they value self-produced food.

Together with economic benefits, a number of researches showed non-economic benefits of peri-urban agriculture in soil preservation, peri-urban environment protection and landscape (Rosillo-Calle & Hall, 1999; Zasada, 2011). Besides, peri-urban agriculture presents its role in maintenance of traditional relationships in a community such as labor reciprocity and communal sharing in production and life. This study indicates that respondent's age is the most important factor influencing on perception of this social role of peri-urban agriculture. The finding is supported by Ibrahim and Ahmad (2014). According to them, peri-urban agriculture could be seen as humanness contribution to solving the ever increasing crisis of food in urban center.

In sum, in peri-urban of Hanoi city, agriculture is appreciated in terms of income contribution, employment provision, food safety and maintenance of communal relationship. Residents' perception of peri-urban agricultural roles is not homogenous among respondents depending on their livelihood strategies, educational level and age.

5. Conclusion

Urbanization and periurbanization are inevitable processes, particularly in developing countries including Vietnam. In recent years, urbanization and periurbanization have taken place in Hanoi with larger scale and faster speed. This caused both positive and negative impacts on employment and livelihoods of peri-urban residents who used to be full-time farmers. Several researches indicated that peri-urban livelihoods tended to rely on off-farm rather than on-farm activities because agricultural land has been converted into non-farm purposes. This study shows that peri-urban residents in Hanoi still perceived agricultural roles in terms of economic and non-economic aspects. Comparing to other industries, cash income from agricultural production is relatively small, especially in the households whose livelihood strategies are combined on/off-farm and off-farm. However, peri-urban residents in Hanoi still perceived important role of agriculture in income contribution. Besides, agriculture is appreciated in terms of employment provision, food safety and maintenance of communal relationship. The results of ordinal logit model indicated that educational level shapes individuals' perception of agricultural roles in food security and food safety in the trend that the greater level of education a person has, the more positive perception is. In addition, as the older people get, the more likely they value positively the role of maintenance of community relationship thanks to existence of agriculture. In terms of livelihood security, farm-based households appreciate roles of agriculture in job provision and income diversification. Gender doesn't have significant effects on residents' perception and decision.

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