

Multifunctionality of Peri-Urban Agriculture: A Case Study in Trau Quy Commune, Hanoi City

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Abstract— *The emergence of the concept of multifunctionality responds to a wide range of concerns about significant, worldwide changes in agriculture, particularly in peri-urban areas. Multifunctionality at farm level means that farms not only provide agricultural goods and food, but also services to the community as well as public goods. For two recent decades, rapid urbanization in peri-urban area of Vietnam has strongly impacted on livelihood of people whose livelihood used to be farm-based. The peri-urban residents have been facing with food insecurity and underemployment, particularly those who could not seek new jobs and constructed new livelihood strategies. Based on data collected from a survey of 60 peri-urban households who continue farming together with other off-farm economic activities in Trau Quy commune, this paper showed that farmers' maintenance of farming at different scales make agriculture play multifunctional roles such as income diversification, job creation, land conservation, food security, food safety, social network maintenance, greening and scenic services. In order to enhance the multi-functions of agriculture in peri-urban areas, governmental policy need to create the proper framework conditions for optimal development.*

Keywords— *Agriculture, Hanoi, Multifunctionality, Peri-urban.*

I. INTRODUCTION

Urbanization has been happening in Vietnam with bigger scale and higher speed for two recent decades. Rapid urbanization caused by population growth is accelerating the shift from farmland into urban land in Vietnam, particularly in peri-urban area (Hoi et al. 2003). It was estimated that over the period 1990-2003, the government had carried out the land acquisition of 697,417 hectares for the above use purposes (Le, 2007). Between 2001 and 2010,

nearly one million hectares of agricultural land, mostly in peri-urban areas, were acquired by the government for use in non-agricultural purposes, accounting for around 10 percent of the country's agricultural land (World Bank, 2011). Urbanization strongly impacted on livelihood of people who used to rely on farm-based income, particularly those who live in the peri-urban areas.

According to Kontgis Caitlin et al. (2014), peri-urban 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. 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." 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 peri-urban people have highly diverse livelihoods (Tubtim, 2012). In peri-urban of Hanoi, long-term residents try to diversify their livelihoods because they have been facing with food insecurity and seeking off-farm jobs as their farm land has been converted into non-farm used purposes by state's development strategies (Tuyen, 2014).

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). As a consequence, the economic role of agriculture in peri-urban areas declines. At the same time, however, there are signs that society formulates some new expectations on the role of agriculture. Besides an economic contribution from food production, society increasingly expects agriculture to contribute to environmental and landscape services, water management and flood control, social care and cohesion and so on (Van Huylenbroeck et al. 2007).

The term “multifunctional agriculture” emerged on the international stage as early as 1992, at the Rio Earth Summit. The emergence of the concept of multifunctionality responds to a wide range of concerns about significant, worldwide changes in agriculture and rural areas. The main aim of the notion of multifunctionality is to bring the above issues into a consistent framework.

Multifunctionality is argued to be the new unifying paradigm to bring post-modern agriculture in accordance with the new societal demands. It is emphasizing that in addition to producing food and fibre, agriculture also produces a wide range of non-commodity goods and services, shapes the environment, affects social and cultural systems and contributes to economic growth (Cahill, 2001).

The OECD Declaration of the Agricultural Ministers Committee (Maier and Shobayashi, 2001) defines multifunctionality of agriculture as follows: “Beyond its primary function of producing food and fibre, agricultural activity can also shape the landscape, provide environmental benefits such as land conservation, the sustainable management of renewable natural resources and the preservation of biodiversity, and contribute to the socio-economic viability of many rural areas. Agriculture is multifunctional when it has one or several functions in addition to its primary role of producing food and fibre.”

Multifunctionality at farm level means that farms not only provide agricultural goods and food, but also services to the community (social, recreational touristic, services, to mention the most popular) as well as public goods that are produced as secondary products: natural resources management, water control, landscape management

care and so on (Wilson, 2007; Moragues-Faus et al., 2013; Roberto Henke and Francesco Vanni, 2017).

There are two main approaches towards multifunctionality of agriculture at household level, which are: (1) supply approach and (2) demand approach. On the supply side (positive approach towards multifunctionality) evidence of the involvement of (professional) farmers in more multifunctional activities is difficult to gather, precisely because of the complex definition of multifunctionality. 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. It was revealed that the decision of a farmer to diversify depends not only on location or regional characteristics, but also on the characteristics of the farm and farmer himself. It appears that some farm types are much more appropriate to have multifunctional activities than others (Van Huylenbroeck et al. 2007). However, this way off thinking could not differentiate diversification from multifunctionality which can be assessed by looking at the demand side.

On the demand side more evidence is published. This evidence can be categorized according to the economic, social and environmental function (Hall and Rosillo-Calle, 1999):

- *The economic function*: agriculture remains a principal force in sustaining operation and growth of the whole economy, even in highly industrialized countries. Valuation of the various economic functions requires assessment of short, medium and long-term benefits. Important determinants of the economic function include the complexity and maturity of market development and the level of institutional development.

- *The social function*: the maintenance and dynamism of rural communities is basic to sustaining agro-ecology and improving the quality of life (and assuring the very survival) of rural residents, particularly of the young. On another level, the capitalization of local knowledge and the forging of relationships between local and external sources of expertise, information and advice are fundamental to the future of existing rural communities. Social viability includes maintenance of the cultural heritage. Societies still identify intensely with their historical origins in agrarian communities and rural lifestyles.

• *The environmental function:* agriculture and related land use can have beneficial or harmful effects on the environment. The multifunctional approach can help to identify opportunities to optimize the linkages between agriculture and the biological and physical properties of the natural environment. It is relevant to a number of critical global environmental problems including biodiversity, climate change, desertification, water quality and availability, and pollution.

The three functions are clearly interrelated. Their relative importance will depend on strategic choices at the local and national levels. The multiple functions may as already indicated be relevant at many scales, from local (household level), over national and regional, to global, and operate over different horizons – indeed some innovations and transformations may have short-term disadvantages, such as lower productivity, before leading to longer-term, overall economic and environmental benefits. This also explains the difficulty to find empirical evidence.

This paper follows the demand approach when looking at the multifunctional roles of peri-urban agriculture (PUA). By doing so, it is argued that PUA plays both economic and non-economic roles at household level in the suburb of Hanoi. For economic aspect, PUA contributes to households' income, food security, food safety, and creates job opportunities for family labors, especially for those who cannot find off-farm jobs in labor market. Regard with social aspect, livelihood security and maintenance of traditional social networks have been considered as significant roles of PUA.

Located in the East of Hanoi city, Trau Quy commune has a total area of 734.28 hectares and total population over 2.5 thousand people. Rapid urbanization is accelerating the loss of agricultural land in this commune which creates significant impacts on local residents. Up to 70% of inhabitants generate their income from off-farm activities such as: trade, services and wages. However, the rest of households in the commune still maintain their agricultural production at different scales and due to various reasons such as job creation, land conservation, food security, food safety, social network maintenance and green space creation.

Under such circumstances, the main objective of this paper is to show the multi-patterned way of change occurring on peri-urban farms in Trau Quy commune by discovering new professional ways to relate to the urban contexts, turning that into a driver of growth and

development in the framework of multifunctionality. The paper is based on secondary data from the Hanoi Department of Agriculture and on a survey of 60 peri-urban households who continue farming together with other off-farm economic activities.

II. METHODOLOGY

In doing research, primary data was collected from 60 households who still perform agriculture for different purposes in 4 villages in Trau Quy commune by doing survey by questionnaire and in-depth interview. The interviews from 39 women and 21 men whose families have been practicing peri-urban agriculture in Trau Quy commune. Interviews of key informants were carried out with the government officials, local agricultural extension workers and other stakeholders who are concerned with the practice of peri-urban agriculture in the suburb of Hanoi city. Purposive sampling procedures were chosen to select residents who practice peri-urban farming and stakeholders for interviews. Both quantitative and qualitative methods are applied in data analysis.

The surveyed households are classified into 3 different groups including: (1) Farm-based households whose livelihood strategies mostly base on agriculture production; (2) Combined households who have income from both on-farm and off-farm activities; (3) Off-farm households who mainly live on off-farm activities such as teachers, officers, petty traders, service providers, and workers.

III. RESULTS AND DISCUSSION

3.1 Urbanization and Livelihood Changes in Trau Quy Commune

Hanoi is the capital city of Vietnam but also the name of the province in where it is located. The city is situated in the heart of the Red River Delta at 21.03N and 105.85E (Nong et al. 2015). King Minh Mang gave name to the city in 1831 but Hanoi has been inhabited for millennia as it is a medieval town. In 1888 Hanoi City was established by the French colonial regime and later liberated from it in 1954. The province of Hanoi consists of 18 rural (Huyện) and 10 urban (Quận) districts which combine for 3329 km². The central city generally covers all urban districts, and the peri-urban area stretches out until the proximity to the city no longer structures the local dynamics (Pulliat 2015).

In 2008, the administrative boundaries of Hanoi expanded and now include the adjacent province of Ha Tay

(Nong et al. 2015). The recent expansion resulted in an increase of the population from 3.4 million to almost 7 million today which makes Hanoi become the country's second largest city after Ho Chi Minh City, former Saigon (GSO, 2015).

The previous researches showed that the main factor influencing the changes occurring in peri-urban of Hanoi is undoubtedly the rapid growth of the city since 1975. Furthermore, since the Doi Moi reforms of 1986 the economy has been steadily opened up to foreign exchange, foreign investment and tourism which promoted a flow of rural migration to Hanoi. The economic liberalization and its opening up to global markets, has led to the rapid development and physical growth of Hanoi, which has inevitably increased the demand for land for commercial and industrial purposes.

The rapid urban sprawl derives from two main processes: (1) Unstructured and (2) structured urbanization of land. (1) Unstructured urbanization is a result of the demographic growth mentioned above, where migrants from rural areas move into Hanoi and either rent or build a temporary house in the outskirts of the city. These types of constructions are officially forbidden by the law but local authorities often look the other way as corruption is inevitable (Pulliat, 2015).

The second process is (2) structured urbanization. It is characterized by expansions of the central city beyond its former limits. It is the outcome of increased housing needs and industrial development, and fueled by the public authority's eagerness to obtain a more modern image of Hanoi for international investors. The government mainly target farmland in the peri-urban areas for these state-sanctioned land seizures (Pulliat, 2015). This means that the state will compensate for the loss of land. In general, the

rapid urbanization of Hanoi involves heavy social adjustments for inhabitants as farm communities are forced to adapt to modern industrial ways of life.

In order to satisfy the rising land demand for urban expansion, most the farmland acquisitions have taken place in the Red River Delta which has a large area of fertile agricultural land, a prime location and high population density (B. T. Hoang, 2008). In Hanoi city, according to its land use plan for the period of 2000-2010, 11,000 hectares of land-mostly annual crop land would be taken for 1,736 projects related to industrial and urban development (V. S. Nguyen, 2009). Consequently, the encroachment of farmland at such a large scale has raised special concerns about rural household livelihoods. This farmland conversion would cause the loss of agricultural jobs of 150,000 farmers (V. S. Nguyen, 2009). Moreover, thousands of households have been anxious about a new plan of massive farmland acquisition for the expansion of Hanoi to both banks of the Red River by 2020. This plan will induce about 12,000 households to relocate and nearly 6,700 farms to be removed (Hoang, 2009). As a result, the landless households have been threatened in terms of food security.

In Trau Quy commune, according to the Land Law issued in 1993, each farm family member was allocated about 600 square meters to grow rice. Under the process of urbanization, agricultural land has been converted into other purposes such as park, resident, hospital, apartments and so on. In 2015, agricultural land per capita was 380 square meters. Land conversion not only negatively impacted on rural livelihoods, but also brought about a wide range of new opportunities for households to adjust their farming patterns and to diversify their livelihoods and sources of well-being.

Table.1: Peri-urban livelihood strategies in urbanization

Items	Unit	Quantity	Percentage
1. Livelihood strategy			
Farm-based	Household	10	16.67
Combination	Household	26	43.33
Off-farm-based	Household	24	40.00
2. Farm size			
Small	m ² /household	360 – 1,800	40.00
Medium	m ² /household	1,800 – 3,600	33.30
Large	m ² /household	Over 3,600	26.70
3. Agricultural products			

Rice	m ² /household	1752.90	14.20
Vegetables, flowers	m ² /household	188.00	1.20
Seedlings, fruit trees	m ² /household	3604.02	76.60
Mixed farm (crop, animal, aquaculture)	m ² /household	5568.00	10.40

Source: Surveyed data, 2017

The Table 1 demonstrated that households whose livelihoods rely on farming merely occupied 16.67 percent of the sample. Most of households live on the combination of on-farm and off-farm economic activities such as handicraft, pretty trading and services.

Not only livelihood strategies, but also agricultural production in urbanizing areas are extremely diverse in terms of: (1) Types of product such as crop cultivation (seedlings; fruits, rice, vegetables and flower) and livestock keeping (pig; chicken; duck and aquaculture: fish and frog; (2) Differences of link to market of households such as

mainly selling (seedlings, vegetables, animal and aquaculture products, semi-subsistence (rice, fruit and flower) and subsistence (rice); (3) Scale of production including small, medium and large scales.

The diversity of peri-urban agricultural activities is reflected by the diversity of actors, capital inputs and patterns of production available. PUA can reach from large-scale industrial production units such as intensive egg or poultry production farms or large plantations to a few chickens and traditional vegetables grown and kept on private or public areas.

Table.2: Purposes of agricultural production at household level

Purposes	Unit:%		
	On-farm	Combination	Off-farm
Main income generation activity	100	85.5	0.0
Keeping farmland as a property	85.0	75.0	50.0
Food security	45.0	25.0	93.8
Food safety	50.0	79.2	56.2
Job creation for family labors	90.0	87.5	31.2

Source: Surveyed data, 2017

It is important to distinguish between the different social groups involved in PUA as they face different constraints and opportunities and have different reasons to engage in PUA (Fuller 2003). Among on-farm households, whereas for the middle and better-off income ones, livestock keeping and crop cultivation, especially seedlings, can be seen as a response to growing market demand, for the off-farm-based and combination-based households it is in the first place a response to crisis where food security, food safety and off-farm job insecurity are in the foreground. Beside, keeping farmland as a property is considered as a reason for which households maintain agriculture in Trau Quy commune. Around 85% of households whose livelihood strategies depending on agriculture kept their farmland as collateral assets for their children. As Vietnamese land policy, people do not leave farmland abundant because of their property right. They mostly keep farmland to wait for a high compensation in the future if it is acquired for non-farm purposes.

3.2 Multifunctionality of Peri-Urban Agriculture

3.2.1 Economic Function

Income Diversification

According to (Maxwell, 2000), PUA contributes to household income which includes fungible income through the sale of produce and savings by not purchasing foods they already produced. In Trau Quy commune, although up to 70% of households has obtained their livelihood from off-farm activities, agriculture production has already made significant contribution to their income diversification.

For farm-based households, farming activities play a vital important role in income generation. The surveyed data showed that farming generates over 80 percent of total income for farm-based households and almost 50 percent for combined households. While farm-based and combined households' farm products are mainly sold (particularly seedlings, flowers, ornaments, pig and fish), off-farm counterparts produce only for family consumption. The

farming income is derived from rice, vegetables, flowers, seedlings, fruits, pig, poultry, and fish. In general, seedlings and fruit production were dominant sectors in Trau Quy commune. On average, seedling and fruit selling occupied the highest percentage of total agricultural income which equaled to 70 percent in farm-based and 58 percent in combined households. There has been dramatically changed in types of crop and animal in recent years. Before, rice was the main crops which was grown for both self-sufficient and selling. However, the rice area has been significantly decreased over years. Some farmers who come from families that have been cultivating rice for generations have given up farming because it fetches them too little money and turned into seedling and fruit production.

The most popular off-farm jobs which have been done by peri-urban residents were informal wage works such as: construction worker, doorkeeper, pretty trader, small restaurant owner, and service providers, especially building house for rent. When asked “why do you keep farming while your income mainly comes from off-farm activities?”, most of respondents supposed that they cultivated rice and vegetables for their family consumption for food safety. For example, households in the commune received almost 100 percent income from wage works including state officers, teachers, traders, workers, but they still do farming (only vegetable production) in their borrowed land, garden and not-in-used public land to ensure food security and safety. By doing so, they can save about five US dollars per day for vegetables which occupied approximately 5 percent of off-farm households’ income.

Employment Provision

The process urbanization and industrialization has rapidly increased which have both positive and negative impacts on employment in Trau Quy commune. A vast amount of farmland and residential land have been transferred into new urban areas, public infrastructure and

house for lease. Many households have benefited from the university and research institutes and new urban area nearby. Incomes from renting out houses to students and migrant workers make an important contribution to a majority of household. However, a number of residents become jobless in particularly who don’t have house for renting out or old and not-well-educated farmers and women who devote a half of their life to the farm activities. In addition, under the effects of rapid urbanization and industrialization, non-farm job opportunities in Trau Quy also increased. Many young people are likely to pursue non-farm livelihood strategies. They abandon their farmland to engage in more lucrative non-farm activities. The role of farmland has gradually been replaced by human capital such as skills and education which are crucial livelihood assets to take advantage of job opportunities. However, urbanization and industrialization will be a big challenge if youngsters are not well-equipped and well-educated to switch to a new stable job.

The Table 3 showed the level of time devoting to agriculture of family labor by gender. Overall, women spent a higher proportion of their time on farm activities compared to men. The percentage of women engaging in agricultural activities more than 80 percent of working hour accounted for approximately 58.6% which was 14.2% higher than men’s. About 6.9 % women in the family worked from 50 to 80% working hour in the farmland while this figure for men was about 4.9%. The proportion of men spending from 20% to 50% working hour (about 11.1%) and below 20% working hour (12.3%) on the farm were higher than those in women which equaled to 9.2% and 6.9% respectively. Likewise, the proportion of men who did not participate in agriculture was also higher than women’s. These findings suggested the feminization of agriculture in peri-urban area.

Table.3: Time devote to agricultural production

Level of time devote	Men		Women	
	Person	%	Person	%
> 80 percent working hour	36	44.4	51	58.6
> 50 - < 80 percent working hour	4	4.9	6	6.9
> 20 - < 50 percent working hour	9	11.1	8	9.2
< 20 percent working hour	10	12.3	6	6.9
No participation	22	27.2	16	18.4

Source: Survey data, 2017

Agriculture not only provides employment opportunities for family members but also for local labors or labors from neighboring communes. According to research, 60% of households hired at least an additional labor in agricultural production. Labor demand was tremendously high in the peak season when farmers had to prepare land, transplant, fertilize, pesticide spraying, weed, prune, and harvest. Family labors cannot do everything by themselves especially for households having larger-scale production and elderly households so that hiring labor has been a fundamental requirement. Female labors were mainly hired for skilled and meticulous works: transplanting weeding and harvesting activities while male labors were expected to undertake heavy tasks such as land preparation, fertilizing, watering or pesticide spraying.

Food Security and Food Safety

Urban and peri-urban agriculture contributes to food security, nutrition and livelihoods by providing for family self-consumption, thus contributing to healthy diet and allowing for saving on food expenditures. It is able to guarantee a minimum level of “food self-sufficiency”, especially for the poor with low purchasing power. Household food production in urban environments, covering a diversified range of food commodities will enrich the family food intake and provide for a healthier diet according to own culture and food preferences (FAO, 2008).

According to Muarik Ali et.al (2005), about 76% of cereals, 18% of aquatic food, and 11% of vegetables come from their own commercial production, while 21% of eggs and milk, 15% of fruits, and 12% of vegetables consumed by farm families comes from home gardens. About 10% of the fruit and vegetables, and 13% of egg and milk supplies for the city dwellers come from these gardens, suggesting the importance of local production of these foods for Hanoi’s residents. These data witnessed the function of PUA in food security.

The surveyed data showed that levels of food self-sufficiency are different among three groups of households. The reason is the fact that off-farm households keep farming for their families’ need, whereas farm-based and combined households produce for selling. The product types varies from group to group. While farm-based households cultivate seedlings (jackfruit, mango, longan, avocado and so on) and flowers, combined ones mainly produce fruits, vegetables and livestock keeping. In general, all groups only satisfied a small proportion of total food need of their family. Farm-based and combined households

tended to have higher food subsistence level than off-farm-based ones.

Combined households occupied the highest self-sufficiency level (about 33.3 percent of households could meet 100 percent of vegetables and 50 percent of households could meet 100 percent of rice). Off-farm households were able to meet requirements for vegetables because they made use of available land in balconies, roadside path and borrowed land from their neighbor, plastic, box and flat roof-top to grow. Food safety was the most common reason for which off-farm households keep farming as a woman who raises chickens and ducks in her garden said that: “*Every six months, I raise about thirty chickens and ducks. Every day, they give me ten eggs which are sufficient to feed six people in my family and in some special occasions like ancestor-worshipping days or New Year’s festival. I strongly believe that my eggs have higher quality than those bought at the market. Also, my chicken and duck meat have more taste than that is sold in the market*” (Mrs. Thai, face-to-face interviewed in Oct, 2017).

3.2.2 Social Function

With respect to social values, most empirical research concerns rural viability. It is shown that, in general, agriculture contributes to rural viability and might revitalize rural areas (Sharpley and Vass, 2006). A number of studies found that respondents are willing to pay an implicit price to prevent farmers to leave the agricultural sector related to the positive contributions to the viability of rural areas (Van Huylenbroeck, 2007). Moreover, Moon et al., (2005) showed many studies revealed that the willingness-to-pay increases with shifts to more multifunctional farming systems (e.g. integrated or organic farming) or that there is an extra willingness-to-pay for specific services (e.g.). This line of thinking looks at social function of agriculture as its positive externalities. By doing so, the authors did not pay attention to different meanings which was constructed by agrarian societies. This paper analyzes social function of agriculture from farmers’ view and peri-urban residents’ preferences towards multifunctionality. Thus, social function of agriculture is considered from livelihood security, land right security and peasant identity maintenance.

Livelihood Security

Livelihoods can be made up of a range of on-farm and off-farm activities which together provide a variety of procurement strategies for food and cash. Thus, each household can have several possible sources of entitlement

which constitute its livelihood. The risk of livelihood failure determines the level of vulnerability of a household to income, food, health and nutritional insecurity. Therefore, livelihoods are secure when households have secure ownership of, or access to, resources and income earning activities, including reserves and assets, to offset risks, ease shocks and meet contingencies (Timothy R. Frankenberger and M. Katherine McCaston, 1998).

As mentioned in previous section, peri-urban livelihoods are so diversified that about 51.14% of households in Trau Quy commune live on the combinations of on-farm and off-farm economic activities. It is found that a variety of households in the commune has benefited from their proximity to Viet Nam National University of Agriculture (VNUA) – a biggest university of agriculture in Vietnam with scale of 30 thousand students annually. They have earned their living from providing necessary goods and services to students such as accommodation, foodstuffs, small restaurants, coffee shops, clothes, mobile phones, laundry, recreation, repairing electronic devices, glossaries, and others. Those activities have emerged as the most important income sources for several households. This means that these households' livelihood strategy strongly relies on the up and down of the number of VNUA's students. In three years, under the impact of government policies on higher education, the number of students enrolling in universities in general and in VNUA in particular has been dramatically declined, thus demand for accommodation is sharply decrease. Further, the increase of new dormitories built by the university and individual households makes high competition among suppliers. This resulted surplus of room for rent and decrease of price. In this case, several households decide to keep farming as a strategy for their livelihood security. For example, Mrs. Bac – a 45 year-old woman interpreted why she decides to keep farming: *“My family has 15 rooms for rent which could bring us 15 million VND (700 US dollars) per month. However, as there are many new dormitories have been built for two recent years in our places, very few students came to rent our rooms. Income from room renting is not enough my family (living cost, children's tuition fees, etc). I have to cultivate 5 sao¹ of seedlings to supplement our income sources”* (face-to-face interviewed in Oct, 2017).

¹ One sao equals to 360 m²

There are some people who are retired from government offices, public organizations or companies also do farming as a supplementary income. In addition, a big group of residents who used to work as workers in industrial factories or as small traders became jobless due to financial crisis or policy changes decided to return to their hometown to do farming as major occupation. Mrs. Thang - a 56 year-old woman confided that: *“I used to run a small glossary shop in the marketplace where is not far from my home. However, the market was acquired by the government to build a new road. I became unemployed. Fortunately, I still had some pieces of farmland which have been allocated by the state since 1994. I decided to come back to do farming, mainly producing rice in order to not only meet our family consumption, but also sell to the local market to make some money”* (face-to-face interviewed in Oct, 2017).

Land Right Security

According to Vietnamese land law, land belongs to the state and gets allocated to individual households to cultivate with rights of transfer, rent-in, rent-out, heritage, mortgage, and compensation when the land is reclaimed by the state. Vietnamese land law also prevents farmers from land abandon. Thus, people in most peri-urban areas in general and in Trau Quy commune in particular decided to keep farmland for property right (waiting for transferring at a high price in the future or for compensation) by renting out at a very cheap price, by lending to neighbors or relatives, and by extensive rice cultivation (Phuong et.al. 2016).

Although many researches have shown negative impacts of agricultural land acquisition in the commune, some interviewees would like the government to acquire their land as soon as possible. They belongs to households who have not enough labor to conduct farm work because of their old age, bad health condition and migration. Mr. Van (a seventy-four years old man) said: *“I want the government to take out my farmland as soon as possible. I will soon reach the age of 75 years olds and I do not have sufficient energy to do farm work. I will send all the compensation to the bank as my savings. I hope that I can rely on monthly interest. I do not concern about the young generation. I think that when they don't have farmland, they have to think about their future by themselves”* (face-to-face interviewed in Oct, 2017).

In short, the rapid process of urbanization has both positive and negative impacts of the livelihood choices of people in Trau Quy. Nevertheless, land still remains one of

the most important assets for farmers which help them cope with and recover from stress and shock. A lot of households consider land as the main livelihood of production even if they don't take part in agricultural production especially for old people. Land also makes significant contribution to income source of a part of young farmers in Trau Quy although nowadays, youngsters do not actively engage in farm activities.

Social Network Maintenance

Vietnam has a long history of agricultural production. In the collectivization or liberalization time, farmers have operated their farm works based on their family labors and the support of mutual helps or reciprocity. In Trau Quy commune, farmers have helped one another in

farming activities such as land preparation, transplanting, weeding, watering, harvesting etc. Farmers have established a strong communication network based on their kinship, friendship, neighborhood. They worked together, made decision together, shared agricultural production experiences, joy and sadness. Therefore, agriculture played inseparable part of enabling rural people to achieve sufficient agricultural production as well as contributed important roles to the village culture.

Under the pressure of crop timing, farmers had to collaborate to save time and ensure crop be in season. They usually exchanged labor in land preparation, irrigation and harvesting in rice production or weeding, transplanting and harvesting in seedling production.

Table.4: Labor exchange in agricultural production

Situation	Household number	Percentage
Never exchange labor	11	18.3
Used to exchange labor	47	78.3
Still exchange labor	2	2.2
Total	60	100

Source: Survey data, 2017

Data in the Table 4 witnessed that traditional way of labor exchange seems to be disappear in Trau Quy commune. The proportion of household who still continue to exchange labor accounted only for 2.2% while 78.3 % of household used to exchange labor and 18.3% households never exchanged labor in the past. Up to 60% of interviewed households hired labor to assist them in agricultural production especially seedling production and rice cultivation. The decline in reciprocity might be affected by the market economy which encouraged the work of labor market and the contribution of mechanization in agricultural production.

However, reciprocity still exists among small scale households. Only 2 households who produce seedlings in the commune are keeping labor exchange. The reason is the fact that they cannot afford when rent is quite high. Reciprocity helps them to save labor cost and to ensure crops in season. Laborers will be exchanged during some main peak times such as transplanting and harvesting.

Cultural function of agriculture is also expressed by community-based decision making. Most farmers said that they frequently make daily contact with their kin, relatives, neighbors or friends in order to discuss issues related to agricultural production such as area of production, types of crop, productivity of crops, purchase of inputs, farming technology, marketing of agricultural products etc. They also mentioned that relatives, neighbors or friends

made contribution to their daily decisions. When they have to make decision making particularly in agricultural production, they often consult their relatives and friends. It indicated that the strong bond existed between farmers and farmers, farmers and the whole community.

In brief, urbanization has provided more off-farm activities which make people tend to less actively involved in agriculture especially young people. Community relationship has not been disappeared. Although farmers become less depended on their traditional networking, neighborhoods were a good indicator of cohesiveness and trust at local level. Neighborhoods exist when farmers exchange farming equipment, enjoy their leisure time, exchange information, share food, help each other in production and daily life etc. When neighborhood is maintained and strengthened, general help between farmers is more likely to occur.

3.2.3 Environmental and Recreational Functions

PUA does not only contribute to economic and social viability, but also provides environmental values by conserving agri-ecological and agro-environmental systems, which have an impact on society as a whole. Although it is clear of course that intensification of agriculture has caused negative externalities on the environment and biodiversity, PUA is part of the urban ecological system and can play an

important role in the urban environmental management system.

PUA may also positively impact upon the greening and cleaning of the city by turning derelict open spaces into green zones and maintaining buffer and reserve zones free of housing, with positive impacts on the micro-climate (shade, temperature, sequestration of CO₂). Degraded open spaces and vacant land are often used as informal waste dumpsites and are a source of crime and health problems. When such zones are turned into productive green spaces, not only an unhealthy situation is cleared, but also the neighbors will passively or actively enjoy the green area. The expansion of green areas within the cities favors their microclimate and helps maintain the biodiversity (Konijnendijk and Gauthier 2006).

This research more focused on recreational function of PUA. Planning Department HKSARG (2016) defined recreational farming involves growing of plants in and around cities, mainly in parks, community gardens, rooftops, balconies, schools, vacant government sites, and peri-urban areas, not for commercial purposes. In Trau Quy commune, recreational agriculture is practiced together with land right protection and income generation. There are a big change in land use types from two rice crops per year into vegetables or rice in the summer and flowers in the winter season. For recent three years, most of farmers have changed from growing mustard-green get seeds into growing for providing recreational good, particularly providing landscape for photo taking in blooming time. Besides, they have also grown other kinds of flowers such as daisy, rose, and carnation. Surrounding Trau Quy commune, there are a dozens of flower plantations which attract thousands of young people coming to take photo each day. Flower plantations bring benefits for both visitors (consumers) and growers. The flower plantations provides not only fun, but also good education opportunity for all visitors who spend time there. Mrs. Duoc – a middle woman in the commune has grown 1,000 m² of mustard-green. During the time of blooming (almost 3 months), her mustard flower plantation could attract a hundred of people coming to take photos a day. Normally, she charged only one US dollar per person per time, she could get about one hundred US dollars per day. Thus, farmer's income from this activity is as triple as from rice growing.

Recreational agriculture (with its diverse functions as leisure and recreational pursuit, environmental education, urban greening, part of income generation) is worthy of a close look with a view to better understanding the benefits that it may bring to city dwellers and how it may contribute

to improving the livability of the city and enhancing the environment for sustainable growth.

IV. CONCLUDING REMARKS

The loss of agricultural land in the rural-urban interface has been shaping the localization of farming in peri-urban areas of Vietnam. Under process of urbanization, peri-urban residents' livelihoods have shifted to off-farm-based. However, the emerging literature on the relationships between urban and rural areas emphasizes the strategic role of peri-urban farming, since agricultural activities in a highly urbanized environment have the potential to provide not only local food, but also a broad range of social and environmental goods and services to the urban dwellers. This article aimed at investigating the function of peri-urban agriculture in Hanoi through a case study of Trau Quy commune. The research showed that agricultural production in the commune is extremely diverse in terms of purposes of agricultural production (commercial or self-sufficient), types of product (rice, vegetables, flowers, fruits, seedlings, pigs, poultry and fish), scale of production (big and small) and technology application (intensive and extensive practices).

The case study investigated multi-functions of agriculture at household level in Trau Quy commune. Regarding to economic function, agriculture is still considered as a main source of income for some households while it lightly contributes to others through their food self-sufficient. Besides, employment provision is also vital economic function of PUA for those who could not find off-farm jobs outside the commune. In term of social function, land property right has contributed to agricultural production in Trau Quy. Although households do not want to practise farming anymore, they still keep their farmland in order to wait for compensation from the government if it is converted into other use purposes. Besides, agriculture also makes contribution to livelihood security. About 70% of households in the commune depends on off-farm activities. But many of them are facing with insecure livelihood (building house for renting out). In this case, agriculture might be a source of entitlement which constitutes their livelihood. In addition, agricultural production is a back-up plan for those who are unemployed and are seeking for new employment. The environmental and recreational functions are explained by greening and scenic values. In addition to their scenic values they attract thousands of tourists. Thus, farmers' practicing agriculture through ornamental plant and flower cultivation in Trau Quy commune as well as around Hanoi not only meets the

growing demand of farm products of the city, but also generates income for households.

In order to enhance the multi-functions of agriculture in peri-urban areas in general, in Trau Quy commune in particular, governmental policy should create the proper framework conditions for optimal development of the social, economic and environmental benefits of peri-urban agriculture, whilst reducing negative effects on public health and environment that some types of urban agriculture can have if improperly managed or not well located.

REFERENCES

- [1] Cahill, C., “Multifunctionality: towards an analytical framework”, *Tijdschrift voor Sociaal wetenschappelijk onderzoek in de Landbouw*, 16(2): 59–71, 2001.
- [2] Caitlin Kontgis, Annemarie Schneider, Jefferson Fox, Sumeet Saksena, James H. Spencer, Miguel Castrence, “Monitoring peri-urbanization in the greater Ho Chi Minh City metropolitan area”. *Applied Geography*. 53: 377-388, 2014.
- [3] Cecil Konijnendijk and Michelle Gauthier, “Urban Forestry for Multifunctional Urban Land Use”, in *Cities Farming for the Future: Urban Agriculture for Green and Productive Cities*, René Van Veenhuizen (Ed). International Development Research Centre: Ottawa, 2006.
- [4] FAO. *Urban Agriculture for Sustainable Poverty Alleviation and Food Security*. FAO: Rome, 2008.
- [5] Fuller, R. *Livestock and the Livelihoods of the Urban Poor: a background document*. Livestock Development Group, University of Reading, UK, 2003.
- [6] GSO. *The national internal migration survey*. Checked on 18 October 2017 at <https://www.gso.gov.vn/default.aspx?tabid=512&idmid=5&ItemID=16155>. 2005.
- [7] Hall, D., Hirsch, P., Murray, T., and Li. *Powers of exclusion: Land dilemmas in Southeast Asia*. Honolulu, HI: University of Hawaii Press. 2011.
- [8] Hall, D., Rosillo-Calle, F. “The Multifunctional Character of Agriculture and Land: the energy function (Background Paper 2: Bioenergy)”, in Trenchard, R. (Ed), *Background Papers: FAO/Netherlands Conference on the Multifunctional Character of Agriculture and Land*, (Rome (FAO). URL (cited on 23 May 2007): http://www.fao.org/mfcal/pdf/bp_2_bio.pdf. Maastricht, 12–17 September 1999.
- [9] Hoang, B. T. *Công nghiệp hóa nông thôn và những biến đổi trong gia đình nông thôn hiện nay (Nghiên cứu trường hợp xã Ái Quốc, Nam Sách, Hải Dương)* [Rural industrialization and changes in the life of Vietnamese rural families: A case study in Ai Quoc Commune, Nam Sach, Hai Duong)]. Paper presented at the Proceeding on the third international conference on Vietnam studies, Hanoi, Vietnam, 2008.
- [10] Hoang. *Thousands of Red River Farmer in Fear of Relocation*. Vietnam Investment News. Retrieved from <http://www.vietnaminvestment.net/news>. 2009.
- [11] Kanokwan Manoroma and Supranee Promthong. “Peri-urban Agriculture in Ubon Ratchathani City: Pressure and Persistence”. *Journal of Mekong Societies*. 14(1): pp. 41-62, 2018.
- [12] Le, D.P. *Thu nhập, đời sống, việc làm của người có đất bị thu hồi để xây dựng các khu công nghiệp, khu đô thị, kết cấu hạ tầng kinh tế-xã hội, các công trình công cộng phục vụ lợi ích quốc gia [Income, Life and Employment of Those Whose Land Was Acquired for the Construction of Industrial Zones, Urban Areas, Infrastructures and Public Projects]*, Hanoi, Vietnam, The National Political Publishing House, 2007.
- [13] LM van den Berg, M S van Wijk and Pham Van Hoi. “The Transformation of rural Life downstream of Hanoi”. *Environment and Urbanisation*. 15(1): pp. 35-52, 2003.
- [14] Mai Lan Phuong, Nguyen Phuong Le, Philippe Lebailly. “Contribution of Urban Agriculture at Household Level in Northern Vietnam: Case Study in Trau Quy Town, Gia Lam District, Hanoi City”. *Asian Journal of Agriculture and Rural Development Asian Economic and Social Society*. 6 (12): pp.229-239, 2016.
- [15] Maier, L., Shobayashi, M. *Multifunctionality: Towards an Analytical Framework*. OECD Publications Service: Paris, 2001.
- [16] Maxwell, D. “The importance of urban agriculture to food security and nutrition”. *Regional Management Unit*. Nairobi: CARE-East Africa. pp. 23-25, 2000.
- [17] Moon, W., Kuethe, T.H., Kraft, S.E., Esseks, J.D. “Public Preferences for Multifunctional Benefits of Agriculture: National Survey of Registered Voters”, *American Agricultural Economics Association Annual Meeting*, July 24–27, Providence, Rhode Island, conference paper. <http://agecon.lib.umn.edu/cgi-bin/detailview.pl?paperid=16514>. 2005.
- [18] Moragues-Faus A., Ortiz-Miranda D., Marsddsen T, “Bringing Mediterranean Agriculture into the

- Theoretical Debates”, in *Agriculture in Mediterranean Europe. Between old and new paradigms*, Ortiz-Miranda, D., Moragues-Faus A., and Arnalte Alegre E. (Eds.) Bingley: Emerald, 2013.
- [19] Mubarik Ali, Hubert de Bon, and Paule Moustier, “Promoting the Multifunctionality of Urban and Periurban Agriculture in Hanoi”, *Urban Agriculture Magazine*. 15:11-13, 2005.
- [20] Nguyen, V. S, “Agricultural land conversion and its effects on farmers in contemporary Vietnam”, *Focal*, 54: 106-113, 2009.
- [21] Nong, H. Doung., Jefferson Fox, Tomoaki Miuru and Sumeet Saksena, “Built-up Area Change Analysis in Hanoi Using Support Vector Machine Classification of Landsat Multi-Temporal Image Stacks and Population Data”, *Land*. 4: 1213-1231. DOI: 10.3390/land4041213. 2015.
- [22] Piorr, A., Ravetz, J., and Toscis, I. Peri-urbanization in Europe toward European policies to sustain rural-urban future. Retrieved November 17, 2015 from http://www.openspace.eca.ed.ac.uk/wp-content/uploads/2015/12/Peri_Urbanisation_in_Europe_printversion.pdf. 2011.
- [23] Planning Department HKSARG, *Planning for Recreational and Community Farming in Hong Kong. Public Engagement Booklet of Hong Kong 2030+: Hongkong*, 2016.
- [24] Pulliat, Gwenn, “Food Securitization and Urban Agriculture in Hanoi, Vietnam”, *Journal of Urban Research*, Special issue 7, Tales of the city, 2015.
- [25] Roberto Henke and Francesco Vanni, “Peri-urban agriculture: an analysis of farm typologies in Italy”. *NEW MEDIT N.* 3/2017.
- [26] Sharpley, R., Vass, A. “Tourism, farming and diversification: An attitudinal study”, *Tourism Management*. 27(5): 1040–1052. doi:10.1016/j.tourman.2005.10.025. 2006.
- [27] Timothy R. Frankenberger and M. Katherine Mc Caston, *From Food Security to Livelihood Security: The Evolution of Concepts*. Atlanta, Georgia: CARE USA, 1998.
- [28] Tran Quan Tuyen, “The Impact of Farmland Loss on Income Distribution of Households in Hanoi’s Peri-Urban Areas, Vietnam”, *Hitotsubashi Journal of Economics*. 55: pp.189-206, 2014.
- [29] Tubtim, T. “Migration to the countryside”, *Critical Asian Studies*. 44(1): 113-130, 2012.
- [30] Van der Ploeg J.D., Roep D. “Multifunctionality and rural development: the actual situation in Europe”, in *Multifunctional agriculture. A new paradigm for European agriculture and rural development*, Van Huylenbroeck G & Durand G (Eds.) Hampshire: Ashgate, 2003.
- [31] Van Huylenbroeck G., Valerie Vandermeulen, Evy Mettepenningen and Ann Verspecht, “Multifunctionality of Agriculture: A Review of Definitions, Evidence and Instruments”, *Living Review and Landscape Research*. 1(3). 2007.
- [32] Webster, D. “An Overdue Agenda: Systematizing East Asian Peri-Urban Research”, *Pacific Affairs*. 84 (4): pp.631-642, 2011.
- [33] Wilson, G.A. *Multifunctional Agriculture: A Transition Theory Perspective*. CABI: London, UK, 2007.
- [34] World Bank, *Recognizing and Reducing Corruption Risks in Land Management in Vietnam, Hanoi, Vietnam*. The National Political Publishing House, 2011.