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# Factors Affecting the Livelihood Outcomes of Households in the Mekong Delta of Vietnam

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***Abstract:***
*We explore factors affecting household livelihoods in the Mekong Delta region of Vietnam based on the Department for International Development (DFID)'s approach to sustainable livelihoods. We use the data from Vietnam General Statistics Office (GSO)'s Household Living Standards Survey in 2016. Observed data on livelihood assets are standardized according to the scale [0,1] and the value of livelihood results varies from 1 to 7, and the To bit regression model is used to determine the influencing factors. The result shows there is a positive impact of human capital, social capital and natural capital on farm livelihoods. The study also suggests that the ability to save and access to loans has a different effect on household livelihoods. That farm households save money instead of investing in production and business activities puts their livelihood results at a disadvantage. Meanwhile, accessing to loans has a positive impact on household livelihoods. The characteristics of housing, assets for daily life and regular expenditures for housing, electricity, water and domestic waste have not yet created many sources of household livelihoods. Farmers' purchase of durable goods during the year helps them achieve livelihoods results and generate more revenue in the future.*

***Keywords:*** *Farm household, livelihood capital, livelihood outcomes, the Mekong delta*

## 1. Introduction

The Mekong Delta region has the population of about 20 million people, with an area of about four million hectares, produces 50% of food production, 65% of fruit production, 75% of seafood production and contributes about 20% of Vietnam's GDP (GSO, 2018). The Mekong Delta plays an important role in Vietnam's economy (GSO, 2018). Not only contributing domestically, the Mekong Delta also contributes to ensure regional and international food security, however, in recent years, this region is often heavily affected by many threats (Carew- Reid, 2008; Van Manh, Dung, Hung, Kummu, Merz, & Apel, 2015; Smajgl, et al., 2015; Brown, et al., 2018). The Intergovernmental Panel on Climate Change (IPCC) has warned that the Mekong Delta is one of the three coastal plains that will be most severely affected by climate change and sea level rise. Sea level rise can make the Mekong Delta flooded and saline intrusion more serious. According to the conjecture from now until the end of this century, if the average sea level rises from 0.75 meters to 1 meter, at least 25% of agricultural land in the coastal area of the Mekong Delta will be submerged, about 75 % of current cultivated area will be saline in the dry season and about 40-50% of agricultural land will be affected by salt water even during the rainy season. This creates the risk that the region's rice production will decrease by at least half and Vietnam may be a country without exporting rice. The threat of food security, the phenomenon of declining natural resources, narrowing the cultivated area leads more uncertain livelihoods of the people.

To adapt to the impacts of climate change and socio-economic changes, farmers use their livelihood assets to build or adjust adaptive strategies (livelihood strategies). The farmers carry out the process in the context that they were affected by both the vulnerability context and formal regulations and informal social constraints (DFID, 1999; Chambers & Conway, 1992). Adaptation strategies of households in developing countries for extreme weather events and socio-economic fluctuations often include intensive farming, livelihood diversity or labor migration (McDowell and de Haan, 1997; Ellis, 2000; Paavola, 2008).

Livelihood strategies of households in each agro-ecological sub-region are not only affected by their ability to access livelihood capital sources but also by soil-related factors, accessing to water resources, market, production

experience, etc. In the process of implementing livelihood strategies, farmers will face different influencing factors. Therefore, the results of each household's livelihood will be different. It is necessary to identify the factors affecting the livelihood outcomes of households because they will be technical and policy intervention points to increase appropriate and reduced livelihood strategies, minimize failures in household livelihood development. The objective of this study is to: (1) assess the current status of household livelihood assets according to major farming activities; and (2) identify factors affecting the livelihood outcomes of farmers in the Mekong Delta in Vietnam.

## 2. Literature review

### *2.1. Livelihoods*

A livelihood is a means to make a living (Chambers and Conway, 1992). Chambers and Conway (1992) show a livelihood includes capabilities, assets (including physical and social resources). According to Allison and Ellis (2001) the concept of "livelihood" seeks to gather important factors affecting the vulnerability or strength of existing strategies of individuals or families. It includes mainly people's assets, the activities to create a full standard of living, to meet other goals such as risk reduction, and prevent others from accessing property. The consideration leads to the following definition of livelihood: Livelihoods include assets (natural, physical, human, financial and social capital), activities and access (organization centers and social relations) intermediary determines the living standards of individuals or households. Ellis (1998) expanded the definition of livelihoods by citing researches of others such as Berry, Hart and Bryceson who suggest a livelihood includes income, both cash and artifacts, as well as teams social functions (relatives, families, places of residence, villagers), gender relations and property rights to support and maintain a certain standard of living. Besides, social networks and relationship are also important in facilitating and maintaining the diversity of profitable investment. Ellis (1998) also stated that according to the study of Lipton and Gaag in 1993 and Blackwood and Lynch in 1994, a livelihood also includes access and benefits from social and public services which are provided by the state such as education, health services, roads, water supplies.

### *2.2. Livelihood Assets*

#### 2.2.1. Natural Capital

Most researchers think that natural capital are natural resources available in a certain territory, country or land (Ahmed, Allison and Muir, 2008). Scoones (1998) points out that natural capital includes natural resources (soil, water, air, ...) and environmental service (hydrological cycle, pollution sink, etc.). Carney's study in 1998 also suggests that natural capital includes land, water and biological sources such as trees, grasslands and biodiversity. Allison and Horemans (2006) argue that natural capital in the livelihood framework is sources of community support, society uses resources more sustainably. At the same time, this resource also improves the utilization of resources after rational harvest, improves accessibility, provides services by industry. Besides, it also helps to support degraded environment. In a recent study by Serrat (2017), it lists the components of natural capital: land and products, water resources and fisheries, trees and forest products, wildlife, and wild food. Fields and fibers, biodiversity, environmental services.

Natural resources are measured by Elasha et al. (2005) by collecting the following criteria: (1) productivity of grazing land is improved / restored; (2) average animal unit capacity per hectare of land; (3) average animal feed production per ton/ ha / year; (4) access to breeding land by marginalized communities; (5) effectiveness of breeding land management; (6) the sustainability of agricultural land is converted into breeding land; (7) quality of breeding land; (8) frequency of other nomads encroaching on pasture land.

#### 2.2.2. Physical Capital

DFID (2001) affirmed material resources including infrastructure and manufactured goods are necessary to support livelihoods. Infrastructure includes changes to the environment that help people meet their basic needs and be more efficient. Manufacturer goods are tools and equipment that people use to operate more efficiently. The following infrastructure components are often essential for sustainable livelihoods: means of transport; price; shelter; water supply and sanitation; energy; and access to information (communication). Serrat (2017) also agrees that physical resources are infrastructure including transportation, roads, vehicles, shelters, water supply and sanitation, energy, communications. There are also tools and technologies, equipment for production, seeds, fertilizers, pesticides, traditional technology.

#### 2.2.3. Financial Capital

The study of Scoones (1998) shows that financial capital is the capital base, including cash, credit, debt, savings, and other economic assets. In addition, it contains both the infrastructure and production equipment and technology needed to pursue any livelihood strategy. Ahmed, Allison and Muir (2008) argue that financial capital represents the financial resources that people use to achieve their livelihood goals. They are income, savings and credit. Serrat (2017) argues that financial capital is savings, credit and debt (formal and informal), bank deposit, pension and wage.

#### 2.2.4. Human Capital

Krantz (2001) defines human capital from a personal perspective as skills, knowledge, work capacity, health and physical ability for the successful pursuit of different livelihood strategies. Human capital represents skills, knowledge, labor and health that help people pursue different livelihood strategies and achieve their livelihood goals. Scoones (1998)

defines human capital as representing the skills, knowledge, working capacity, health and physicality of each individual, which are very important for the successful pursuit of strategies. Ahmed, Allison and Muir (2008) agree with Scoones (1998), they also believe that human capital is necessary. Meanwhile, Serrat (2017) argues that human capital is health, nutrition, education, knowledge and skills, working ability, adaptability. When viewed from a household perspective, human capital is defined by household size and by the education, skills and health of household members.

2.2.5. Social Capital

Krantz (2001) provides an overarching concept of social capital, which is social resources (networks, social claims, social relations, associations, associations) that people pursue different livelihood strategies require coordinated action.

DFID (2001) had more detailed analysis of social capital. In the context of sustainable livelihoods, social capital is considered as the resource that people draw in pursuing their livelihood goals. They are developed through the following three components: (1) networks and connection, possibly vertically (patrons / customers) or horizontal (among individuals with common interests) that increase trust and the ability to work together and expand access to wider organizations, such as political or civil agencies; (2) members of the groups are formalized; and (3) trustworthy, reciprocal and exchange relationships facilitate cooperation.

*2.3. Livelihood Strategy*

In the sustainable livelihood framework, livelihood strategies are understood as a combination of human activities and choices to achieve livelihood goals (Ellis, 1998; DFID, 2001). From another perspective, Ellis (2000) argues that livelihood strategies include production activities, investment strategies and reinvestment options. These strategies may be short-term responses such as dealing with shocks or risk management. Livelihood strategies can be positive, helping households become more resilient or possibly negative when the results are reflected in the decline in livelihood assets. In the most common sense, livelihood strategy is a way that people approach and use livelihood assets, in the economic, political, social, and environmental context to form a livelihood strategy.

*2.4. Livelihood Outcome*

Serrat (2017) argues that livelihood strategies are aimed at achieving livelihood outcomes. Decisions on livelihood strategies can be named as natural resource-based activities, non-resource and non-farm activities, migration and remittance, pension and allowance. Potential livelihood outcomes may include income, increased welfare, reduced vulnerability, improved food security, more sustainable use of resource base. The sustainable livelihood framework is considered by Allision and Horemans (2006) to show that the outcomes of livelihoods are sustainable if people can maintain or improve their living standards related to happiness and income or other human development goals. At the same time, it also minimizes their vulnerability to external shocks and trends and ensures their operations compatible with maintaining the natural resource base. Potential results include common indicators such as income, food security and sustainable use of natural resources. The results may also include enhanced asset base, reduced vulnerability and improved other aspects such as health, self-esteem, a sense of control and even maintenance of cultural assets and thus have a positive impact on vulnerability and asset base (Adato and Meinzen-Dick, 2002). DFID's sustainable rural livelihood framework indicates that livelihood outcomes include: more income, better health care, increased access to quality education, reduced vulnerability to shock, improved food security and using more sustainable natural resource facilities.

**3. Methodology**

To meet the research objectives, approaching sustainable livelihoods (DFID, 1999) is used to explore factors that motivate or hinder farmers from developing and implementing livelihood strategies to achieve expected results. The sustainable livelihood framework will delineate the relationship between household livelihoods with increased natural hazards and socio-economic changes. Farmers use livelihood resources to develop their livelihood diversification strategies to achieve the expected livelihood outcomes in the context of their impact by both the vulnerability context and the adjustment of official legal regulations and informal institutions of society (Figure 1). Households' (good or bad) livelihoods will affect the decision to increase or decrease their capital sources and farmers can adjust their existing livelihood strategies or develop new livelihood strategies (Figure 1). Previous studies have shown that when livelihood assets and activities are diverse, the resilience of livelihoods to adverse impacts of natural and socio-economic factors will increase (Adger, 1999; Ellis, 2000).

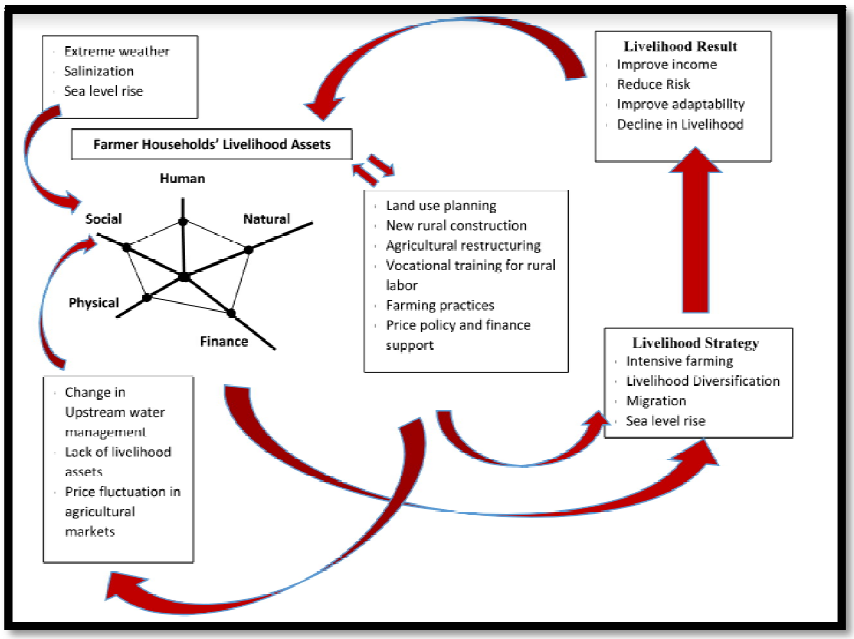


*Figure 1: Sustainable Livelihood Framework in the Mekong Delta (DFID, 1999)*

*3.1. Sampling and Data Collection*

This study used data which were taken from the Household Living Standards Surveys of the General Statistics Office in Vietnam in 2016. In this study, household livelihoods results are defined as the source of households' income with the main source of income from agriculture (cultivation, breeding, forestry, fisheries, other agriculture). After calculating, it is found that the largest source of in households' income is 7 and the lowest is 1. Therefore, the household livelihoods results will receive values from 1 to 7.

| Livelihood Capital | Variable | Explanation | Expectation |
|---|---|---|---|
| Dependent variable | | | |
| Livelihood outcomes of households | NuIncome | The number of household income sources | |
| Independent variables | | | |
| Human Capital | HuCa | Technical and professional qualification of the householder (1 = Through training, 0 = No training) | + |
| Social Capital | SoCa2 | Householder joins local association | + |
| Natural Capital | VNaCa | Cultivated land area (annual land, perennial land, forestry land) | + |
| Physical Capital | PhCa1 | Housing quality (1 = Villa; 0 = Semi-permanent and temporary house) | +/- |
| | VPhCa2 | Value of assets for daily life | +/- |
| | VSpCa1 | Purchase of durable goods in the year | +/- |
| | VSpCa2 | Regular spending on housing, electricity and water, and disposal of domestic waste | +/- |
| Financial Capital | FiCa1 | Ability to save (1 = Households have accounts, savings books at banks) | +/- |
| | FiCa2 | Ability to access loans (1 = Households borrow money or goods) | +/- |

*Table 1: Variable Description*

*3.2. Method*

Livelihood assets of households with the main source of income from agriculture are divided into 5 different groups: human, social, natural, material and financial. Each type of livelihood assets has similar content and properties. Livelihood results are expressed through the number of income sources of households measured from the above 5 livelihood assets. The Tobit regression model is used to determine factors affecting household livelihoods results when standardized independent variables vary from 0 to 1.

Tobit regression model has the form: $Y = b0 + b1X1 + b2X2 + ... + biXi$

In which, Y varies from 1 to 7 depending on the number of income sources of the household, b0: random error of the overall regression function; bi: regression coefficients; Xi: independent variables, affecting the livelihoods of farmers.

## 4. Results

*4.1. Livelihood Assets of Households by Income Group, Main Income Sources and Revenue Sources*

Each type of livelihood assets is aggregated from component livelihood assets with different scales so these observed values need to be standardized according to the same scale [0,1].

The formula for standardizing observation data takes the form:

$$O' = \frac{(Os - O\min)}{(O\max - O\min)} \quad (1)$$

Whereas:

O': Standardized value

$O_s$: Observation value s

$O_{min}$: The minimum value of observed data

$O_{max}$: The maximum value of observed data

This standardization process helps quantify qualitative values to summarize household livelihood assets then synthesize, compare and use as independent variables in analytical models.

Table 2 shows the differences in livelihood assets of households by 5 income groups from low to high. The richest group is also the group with the largest capital types (except social capital).

| Group | The Number of Observations | Human Capital | Social Capital | Natural Capital | Physical Capital | Financial Capital | The Number of Livelihood Sources |
|---|---|---|---|---|---|---|---|
| Poorest | 768 | 0.009 | 0.588 | 0.022 | 0.002 | 0.280 | 4.243 |
| Near poorest | 395 | 0.029 | 0.489 | 0.020 | 0.002 | 0.267 | 3.868 |
| Middle income | 278 | 0.041 | 0.462 | 0.021 | 0.006 | 0.242 | 3.746 |
| Near richest | 232 | 0.021 | 0.452 | 0.025 | 0.004 | 0.262 | 3.618 |
| Richest | 247 | 0.110 | 0.495 | 0.029 | 0.015 | 0.283 | 3.674 |
| | 1920 | 0.034 | 0.519 | 0.023 | 0.005 | 0.270 | 3.933 |

*Table 2: Livelihood Assets of Households According to 5 Income Groups*
*Calculation Results Based on GSO's Household Living Standards Survey in Vietnam in 2016*

Considering the livelihood assets of farmers according to the main source of income (Table 3), it is found that human capital and financial capital have the highest average value in the group of households with the main source of income from other agricultural activities (0.096 points and 0.313 points, respectively), while social capital received the highest value in the group of households with the main income from breeding (0.582 points), the group of households with the main income from forestry has the largest natural capital (0.037 points). Physical capital reaches the highest value (0.008 points) in the group of households with the main source of income from breeding.

| Group | The Number of Observations | Human Capital | Social Capital | Natural Capital | Physical Capital | Financial Capital | The Number of Livelihood Sources |
|---|---|---|---|---|---|---|---|
| The main source of income is from farming | 1,323 | 0.028 | 0.529 | 0.028 | 0.004 | 0.278 | 3.888 |
| The main source of income is from breeding | 262 | 0.063 | 0.582 | 0.010 | 0.008 | 0.275 | 4.095 |
| The main source of income is from forestry | 87 | 0.005 | 0.577 | 0.037 | 0.005 | 0.215 | 4.878 |
| The main source of income is from seafood | 217 | 0.030 | 0.366 | 0.005 | 0.005 | 0.228 | 3.524 |
| The main source of income from other agricultural activities | 31 | 0.096 | 0.294 | 0.029 | 0.005 | 0.313 | 4.155 |
| | 1920 | 0.034 | 0.519 | 0.023 | 0.005 | 0.270 | 3.933 |

*Table 3: Livelihood Assets of Farmers by Main Income Sources*
*Calculation Results Based On GSO's Household Living Standards Survey in Vietnam in 2016*

In terms of the number of income sources received by the farmers, human capital, social capital and natural capital reached the highest value with the farmers with the highest income of 7 (Table 4). Meanwhile, the physical and financial capital received the largest value (0.008 points and 0.386 points) with the farmers having only one source of income.

| The Number of Revenue Sources | The Number of Observations | Human Capital | Social Capital | Natural Capital | Physical Capital | Financial Capital |
|---|---|---|---|---|---|---|
| 1 | 13 | 0.000 | 0.614 | 0.025 | 0.008 | 0.386 |
| 2 | 198 | 0.016 | 0.264 | 0.018 | 0.005 | 0.188 |
| 3 | 455 | 0.032 | 0.462 | 0.020 | 0.006 | 0.236 |
| 4 | 662 | 0.037 | 0.537 | 0.023 | 0.004 | 0.272 |
| 5 | 385 | 0.036 | 0.613 | 0.024 | 0.005 | 0.312 |
| 6 | 167 | 0.040 | 0.647 | 0.031 | 0.004 | 0.357 |
| 7 | 40 | 0.081 | 0.756 | 0.032 | 0.002 | 0.238 |

*Table 4: Livelihood Assets of Farmers According to the Number of Revenue Sources*
*Calculation Results Based On GSO's Household Living Standards Survey in Vietnam in 2016*

*4.2. Factors Affecting Household Livelihood Outcomes*

| Tobit regression | | Number of obs | = | | 1920 | |
|---|---|---|---|---|---|---|
| | | LR chi2(9) | = | | 302159.35 | |
| | | Prob > chi2 | = | | 0 | |
| Log likelihood = | -7228115.40 | Pseudo R2 | = | | 0.0205 | |
| NuIncome | Coefficient | Std. Err. | t | P>t | [95% Conf. | Interval] |
| HuCa | 0.3981 | 0.0031 | 126.44 | 0.0000 | 0.3920 | 0.4043 |
| SoCa2 | 0.4572 | 0.0011 | 409.29 | 0.0000 | 0.4550 | 0.4593 |
| VNaCa | 3.4710 | 0.0157 | 221.41 | 0.0000 | 3.4403 | 3.5018 |
| FiCa1 | -0.0338 | 0.0019 | -17.84 | 0.0000 | -0.0375 | -0.0301 |
| FiCa2 | 0.1683 | 0.0013 | 133.51 | 0.0000 | 0.1658 | 0.1708 |
| PhCa1 | -0.0914 | 0.0015 | -62.65 | 0.0000 | -0.0943 | -0.0885 |
| VPhCa2 | -6.1963 | 0.0271 | -228.57 | 0.0000 | -6.2495 | -6.1431 |
| VSpCa1 | 2.5756 | 0.0256 | 100.61 | 0.0000 | 2.5254 | 2.6258 |
| VSpCa2 | -0.1530 | 0.0300 | -5.09 | 0.0000 | -0.2119 | -0.0941 |
| _cons | 3.6505 | 0.0010 | 3714.31 | 0.0000 | 3.6486 | 3.6524 |
| /sigma | 1.1822 | 0.0004 | | | 1.1814 | 1.1830 |

*Table 5: Results of Tobit Model on Household Livelihoods*

This study finds that:There is a positive influence of human capital, social capital and natural capital on the livelihoods of households. Specifically, in terms of human capital, the quality of labor associated with perceptions of household heads tends to make households to create more sources of livelihood. Besides, the social capital is considered through the level of participation in local association activities of the household head also positively affects the creation of many sources of livelihood for households. The factors of cultivating land indicate that agricultural production is often associated with the quantity and quality of land that households have. Thus, on the basis of agricultural cultivation and output products which are agricultural products, land has the greatest impact on livelihoods and creates more sources of livelihood for farmers.

There is an impact of financial capital and physical capital on the household's livelihoods results. In terms of financial resources, the ability to save and access to loans influences farmers' livelihood differently, that farmers save money instead of investing in production and business activities affects the livelihoods of households. Meanwhile, accessing to loans has a positive impact on household livelihoods. In terms of physical capital, characteristics of housing, assets for living and normal spending for housing, electricity, water and domestic waste do not create sources of household livelihoods. Farmers' purchase of durable goods during the year helps them achieve livelihoods results and generate more revenue.

**5. Discussion and Conclusion**

The Mekong Delta is affected dramatically by the impacts of climate change, changes of socio-economic factors, such as changes in upstream water use, flood and saline prevention, mechanization and price fluctuation of input materials and output of agricultural products. The research result shows that low-income households often face difficulties in livelihood assets (except social capital). Households with the main source of income from forestry activities face difficulties in human capital and financial capital, while households with the main source of income from fisheries activities face difficulties in natural capital. Households with low incomes also face difficulties in human capital. We also find a positive impact of human capital, social capital and natural capital on the livelihoods of households. At the same

time, realizing the impact of financial capital and physical capital on the livelihood outcomes of households, specifically the accessibility to loans brings a positive impact on household livelihoods. In addition, the purchase of household durable goods for farmers helps them achieve livelihoods and generate more revenue in the future.

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