

## CHAPTER 2

### Literature Review

#### 2.1 Background of agricultural farming systems in Lao PDR

Farming systems research found that farming practices have three systems as a lowland agricultural, upland agriculture and plateau farming system. These systems share many of the characteristics and problems of the agricultural systems throughout the country of Lao PDR (Harvey, 1997). UNDP (2001) reported in national human development report, Lao PDR 2001. The characteristics of farming systems are showed in table 1. These farming systems share many of the characteristics and problems of the agricultural systems through in country of Lao PDR (Demaine, 1998).

**Table 2.1 Characteristics of farming systems in Lao PDR**

<b>Types and characteristics of farming systems</b>	<b>Problems on livelihood and food security</b>
<p><b>1. Lowland farming systems</b></p> <p>1.1. <i>Lowland rainfed farming system</i> is only single cropping of traditional glutinous paddy rice varieties (80%) within two to four varieties of different maturation and rice yield a round 2.5-3 tons/ha but some variety has very lower yield 1.1 tons/ha. Raising livestock is an important role as food and cash income in rural households.</p> <p>1.2. <i>Lowland irrigation farming system</i> has more advantage on water availability, so farmers can do cultivation two seasonal cropping of rice production (with irrigated land during</p>	<p>Food insufficiency, rice shortages about one to four months. Many households earn low income.</p> <p>Livelihood and food security status are slightly better than the non- irrigated farming systems.</p>

**Table 2.1 Characteristics of farming systems in Lao PDR (Continued)**

Types and characteristics of farming systems	Problems on livelihood and food security
<p>dry season and also rainfed) which has slightly higher yield. Some vegetable crops and raising livestock are still an important role as food and cash income for several rural households.</p>	
<p><b>2. Upland farming systems</b></p> <p>2.1. <i>Upland rainfed farming system</i> is usually shifting cultivation practice with upland rice and fallow land periods between 2-10 years. Rice yields has very low 1.4-1.5 tons/ha when compared with paddy rice. Another upland cropping system likes cash crops production (maize, fruit tree and vegetable) and raising livestock. Although, non-timber forest products is greater sources on food security and cash income for many rural households. Paddy rice is rapidly progressing where the land could possible to access water availability.</p> <p>2.2. <i>Highland farming system</i> is slightly the same as upland rainfed farming system. But cultivated land is differences at high level of the altitude which farmers grow climatically fruit tree (plum, peach and local apple) with inter cropping systems with vegetable crop and corn.</p>	<p>Food insufficiency, rice shortages about three to four months. So low income, health problem, high mortality rate and low life expectancy. People have limit access to roads, communication, education and health care services.</p>

**Table 2.1 Characteristics of farming systems in Lao PDR (Continued)**

Types and characteristics of farming systems	Problems on livelihood and food security
<p><b>3. Plateau farming systems</b></p> <p>3.1. <i>Plateau farming systems</i> is similarly to upland farming systems, but farmers cultivate more cash such as temperature fruit tree, coffee, tea, cardamom and vegetables. The land cultivation is quite large areas whereas replaced shifting cultivation. Farmers have a basic skill on cultivation techniques and used local varieties of crop production. Therefore, yield is so low when compared with improve varieties. Farmers believed that raised livestock (cattle, pig and poultry) is a best resource for their income and more secured in their food security</p>	<p>Many rural households have rapidly adapted to cash crops and commercial tree plantation.</p> <p>The livelihood strategies and living conditions are also facing problems with food security and farm wealth.</p>

Source: UNDP (2001)

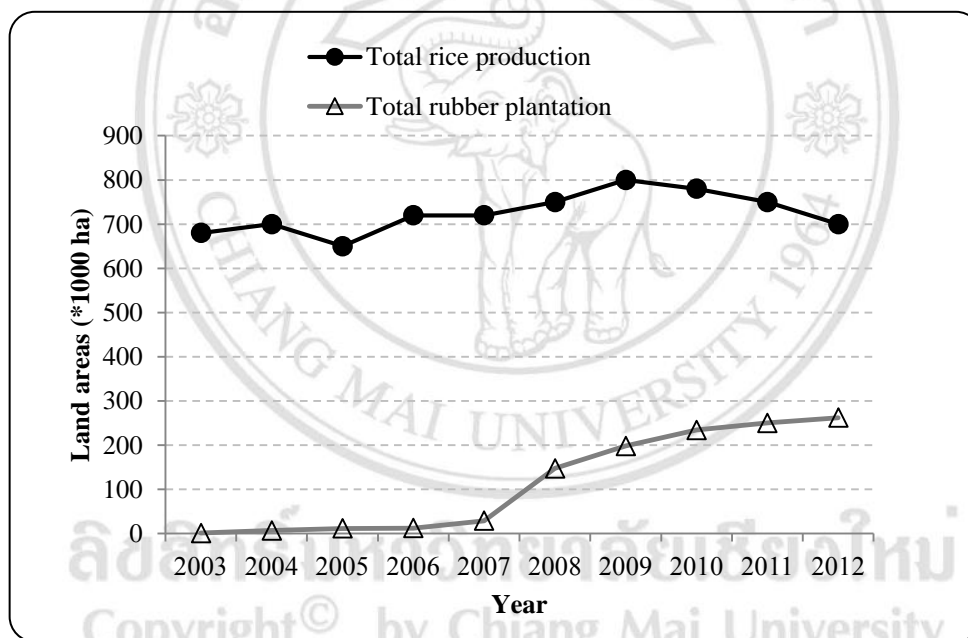
## 2.2 Trend of upland farming systems

Upland farming systems and livelihood strategies are under concerned by local policies on land allocation, and land area development. The aimed of these policies are emphasizing to reducing poverty and stabilizing farming systems. The agriculture system changes a rapid transition from subsistence based systems to commercial farming systems and improving agricultural production to meet regional demand needs at domestic market and export (MAF, 2010).

The risk of agricultural farming systems is influences by several factors (seasonal, drought, flooding and damaged from pest and disease occurring) which affects to rural livelihood and insufficiency on food security. The ranking on problems of rural livelihood and farming systems found that highest to lowest concerned is 1) affected from deserters (drought and flooding), 2) limited on agriculture land as paddy areas, 3) limited access to financial and low saving, 4) Pest & diseases damaged crop production,

5) insufficiency on food (low yield rice production) and 6) limited access to water availability (irrigation systems) for cultivation (LNST, 2005).

Upland farming systems on the Lao PDR are complex and diverse. Farmers have different characteristics of the practices farming systems from low land paddy fields to upland fields. The policies of government have supported the new technologies which improve the farm- productivities and farming systems to upland farmers. This solution is approach to recover the areas of shifting cultivation and promote long term the sustainable agricultural farming systems in the upland (Connell *et al.*, 2006). Transforming the traditional upland cropping system into rubber plantation were steadily increasing and expanding through several agricultural land of the country since (figure 2.1).

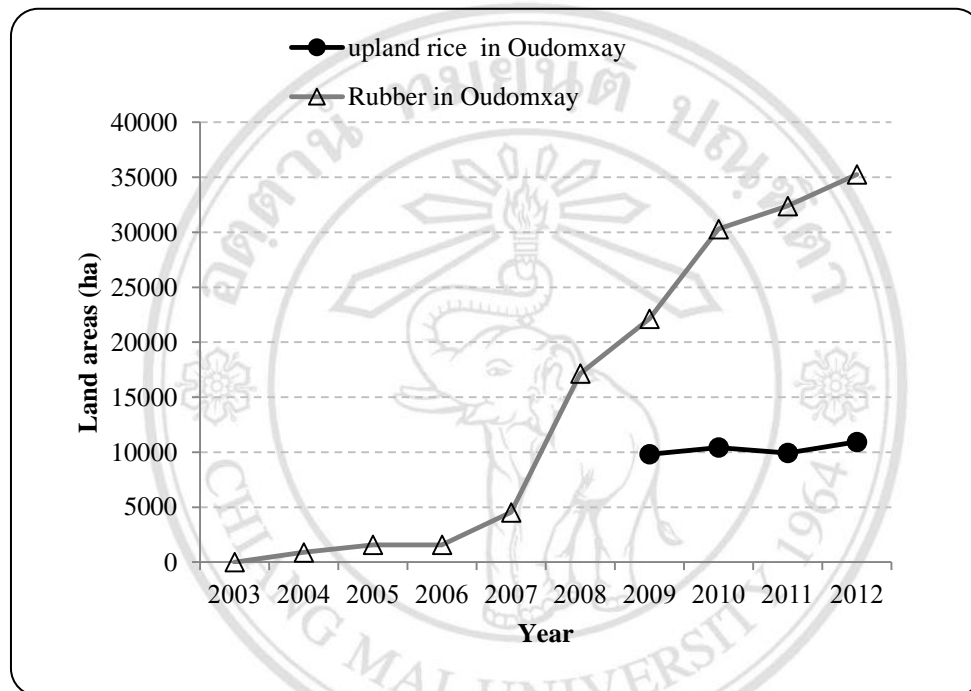


**Figure 2.1** The upland rice and rubber plantation areas during 2003-2012 in Lao PDR.

**Source:** MAF (2012)

Leek (2007) found that Oudomxay province has seven districts: Xay, Namo, La, Nga, Beng, Houn and Pakbeng district. This study will locate at Namo district whereas rubber plantation blooming (figure 2.2). Oudomxay province has a significant in the land use type which has 87 percent of upland areas and 13 percent of lowland areas. This district is poorest districts in northern part of Lao PDR. Many households are

facing to food insecurity and below poverty line that cause to 1)Low level of education in family member, 2)Insufficiency to produce food crop production to meet their food security need, 3)Shocks from environmental, economic-changed and natural disaster (drought, soil erosion, and flooding), and 4)Limitation of human capital. The climate condition has two seasons: dry seasonal started from November to April and rainy seasonal started from May to October (the average of annual rainfall 520 milliliter per year). The temperature is 17°C to 28°C and average of temperature over year is 22°C.



**Figure 2.2** The upland rice and rubber plantation areas during 2003-2012 in Oudomxay province.

**Source:** PAFO (2012)

### 2.3 Household vulnerability to food security and livelihood in the upland

According to the food security definition, there are four key factors (food availability, access to sufficient food, stability of food stocks and utilization of food). Household vulnerability to food security plays a significantly role in rural livelihood whereas it shown as insufficiency rice production to meet annual household's consumption needs (Khemmarath, 2005).

Bogale (2012) found that the level of household vulnerability to food insecurity has associated with many factors such as family size, land size holding by household, soil

fertility, and access to water resources. Another, degree of vulnerability depends on characteristic of risk and household ability respond, which is based on their household livelihood assets.

#### **2.4 Food security indicator**

Food availability is one of four key factors in the food security (food availability, access to sufficient food, stability of food stocks and utilization of food). Food available is adequate quantities of good quality foodstuffs available from farm production and from imports other food sources. Food availability presented as food balance which it consists in two parts: Usage (consumption use, animal feeding, industry use, immediate consumption and loss), and Resource (domestic production, balance of international trade and variation of the stocks). Variation of the food stocks is the amount of rice consumed during the year period (Khemmarath, 2005).

According to food security definition from FAO (2006) that it describes as below:

1. **Food availability:** the availability of food supply at all times that supplied food stuffs or food production while it adequate to food consumption by household needs. This is balance between food supply in domestic and food price from import (market availability). It is namely on available of land for produced food.
2. **Food access:** the access to basic food by household needs in daily consumption, expenditure, sufficiency of food, safety food, clean water, physical and economic access to food (power to buy food), and health life.
3. **Food utilization:** the utilization of food that adequate food diet, clean water, health care, physical needs and diversity of food consumption. It also brings an important non-food production to food security.
4. **Food stability:** the adequate of food availability, increase or decrease of shock can be signal in vulnerability from food security perspective

In the review of food security from Eicher (1990) found that has two sides of food security equation: First, increasing the food production, storage of food crop, and availability of food trade in the national. Second, poverty could cause of central hunger and malnutrition that shows a special in private and public sectors which needs to help poor farmers and landless increased (access to food through expanded their productions,

off-farm employment, new income from their production in farms). He said that promotes the food security which needs both side of this equation.

Food security is also defined as well as the ability of all households in the national. This shows in require the food diet (adequate of calories and nutrition) for household through the year. Food security has two interrelations between food availability through food production, storage and trade; and access to food through food production, food from market available, purchase or buy of food in the market by their incomes-earning or food transfer from relative. Food insecurity can occurred in both terms: short-run that results from intra and inter-seasonal shortfalls in food supplies and effectiveness of food demand; long-run food insecurity arises from a persistent failure of the economy to assure stability of long term food growth in food supplies for nutrition at risk of groups of people when population increased and consequence of income growth in urbanization that changes consumers demand on food (Rukumi and Bernsten, 1988).

Food security defines as access by all people at all times to enough food for active and healthy life. In contrast, food security is the conversed and distribution of the between chronic and transitory insecurity (Reutlinger, 1985). This could be link to access the availability of food and require from household. Food insecurity is a lack of access to sufficient food that is either chronic and transitory insecurity. Chronic is continuing of food diet by lack of resources to produce food production or require for food. Transitory insecurity is a temporary decline in a household's access to have enough food. These regard on their households' incomes (Reutlinger, 1985). Another definition, food security refers to propose the household's access to food that needs for healthy life of all member in family such as adequate of food safety, food quality and cultural acceptable (SCN, 1991). Household food security could also focus on the household's capacity to produce food that shows in women's work-load in farm and how their distribute food for household's members. This case could effect on food nutrition at household level (UNICEF, 1990).

In term of social, food security is regarding to household's food availability and food in markets. First, the cycling of food reproduction, and then it comes for social trade (marketing availability). There is consequence of seasonal trade such grain sale and purchased from other farmers between social communities that presents a role of debt (Watts, 1987). Definition of food security, World Bank (1990) reviewed that access by

all people at all times to sufficient food for healthy and productivities life which comprises to main elements: first, assuring the availability of adequate food and supplies (domestic and import); second, assuring the ability of household to require food. Other words, ability of household to produce food or earn income to purchase food for their family needs.

## **2.5 Household livelihood capitals**

Analysis of World Food Program Report (2006) showed that link between asset wealth and food security found in the livelihood strategies. The main characteristic of household vulnerability is greater scenarios to improve a farm resilience and sustainable livelihood development. The ability of livelihood strategies copes and recovers to shocks from natural deserter as well as relevance to food insecurity. The livelihood strategies provide positively trends to increasing household's food security and enhancing opportunity for sustainable livelihood. Vulnerability context is exposed particularly on trends, shocks and seasonality. These factors have sensitively to livelihood strategies (DFID, 1999).

### **2.5.1 Sustainable livelihood approach**

Agricultural farming systems can start from an initial diversification which moves into livelihood assets and lead to sustainable livelihood framework. It can eventually lead into form of household strategies on their farm activities. In particularly, household's labor may support effectively on-farm activities and off-farm activities. Household strategies play an important role in the livelihood assets. The household strategies could achieve their final outcome such household welfare-being, good profit from crop production, reduce risk from investment and resilience for their farm production. According to guideline from DFID (1999) the sustainable livelihood framework is tool to improve the understanding of livelihood assets, structure and process, livelihood strategies and livelihood outcome. This provides an important framework and individual components. The livelihood framework provides the understanding of procedure of livelihood strategies and outcome as bellow:

- *Vulnerability context* is starting point of livelihood framework which describes about shocks (shock of price changed, flooding, drought, soil erosion, pest and disease outbreak), trend (farming systems, crop production, marketing and policies), and seasonal



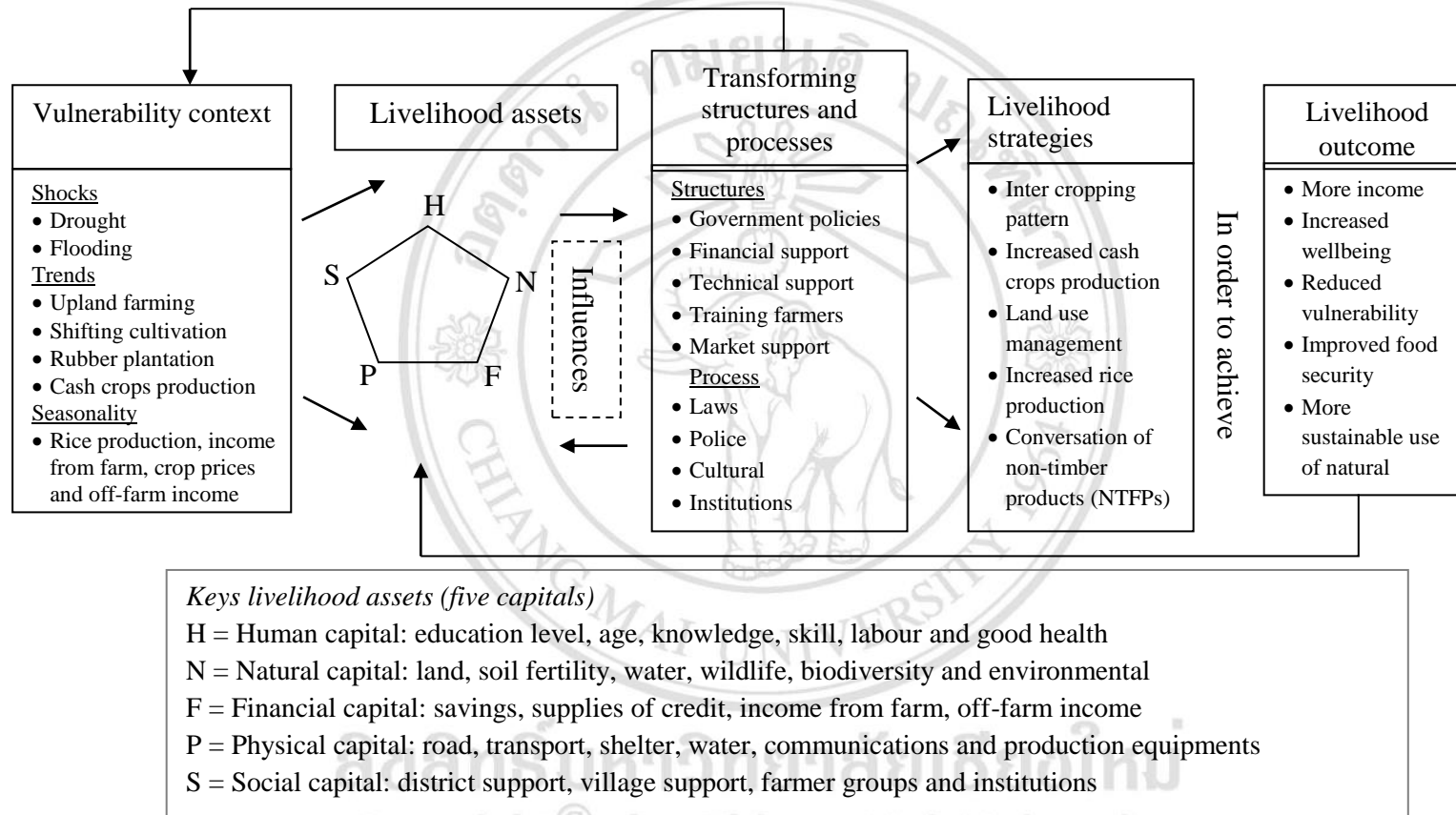
(crop production, farm-income, crop price, food availability, working opportunity and off-farm income). it helps the people to increasing access to their appropriate financial support and building their resiliencies for long term sustainable livelihood outcome. There is also achieving the livelihood strategies.

- *Livelihood assets* is the livelihood approach of the people to achieve the livelihood outcome that requires the range of their assets by combining the way of people to use their assets to ensure for survival. The livelihood assets have five capitals: human capital, natural capital, financial capital, physical capital and social capital. These are complexity relationship between five capitals.
- *Transforming structures and processes* are in the institutions, organizations, policies and regulation that shape livelihoods. There operate for all levels from household level to national level. It has effectively determine: a) access to several capitals, access to livelihood strategies, access to decision-making bodies and source of influences. b) term of exchange between different types of capitals, and c) returns of economic and otherwise to any given livelihood strategies.
- *Livelihood strategies* seeks to promote choice, opportunity and diversity of people strategies (to achieve productive activities, investment strategies, reproductive choices and etc.), which can achieve livelihood goals. Livelihood strategies include the how people combine their income generating activities, with way their assets used, they use the choice of their investments, and how they manage to preserve existing assets and income. Livelihood strategies may reflect underlying priority such as under risk diversify.
- *Livelihood outcome* is achievement of livelihood strategies and outcome categories. The categories examine the relation to the following: more income, increased well-being, reduced

vulnerability, improved food security, more sustainable used of the natural resource base, and social (relationship and status).



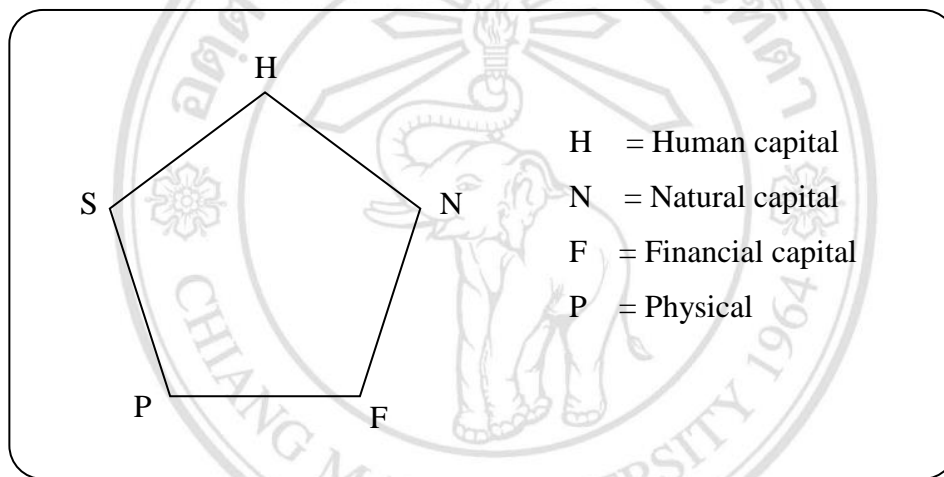
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**Figure 2.3** The sustainable livelihood framework

**Source:** Modified from DFID (1999)

The livelihood capitals are used to describe the people's access to assets. It is important the physical capital (roads, infrastructure, markets, basic supplies and etc.) that people could bring more benefits, natural capital associate with financial capital that people can loan to create or expand the crop production and livestock production which bring more outcome income to their households, social capital is meaning that people in communities has generated the transaction of their production and livestock while connects between communities and lastly human capital is knowledge, skills, ability of labour and healthy which brings the driving force in the productivities process. According to DFID (1999) that has five capitals as describe as below:



**Figure 2.4** The livelihood capitals as shown in the pentagon diagram

**Source:** DFID (1999)

### 2.5.2 Human capital

The human capital represents on the education, skills, knowledge, ability to work and good health that has an important role in the ability to pursue different livelihood strategies. Human capital could support the people to able achievements of their knowledge and skills which could attempt or access the education, training and health care. This could present both direct and indirect support (DFID, 1999).

*Direct support is throughout the process such as:*

- Reform of health service, education, and training policies
- Reform of health service, education, and training organizations

- Changing in the local institution culture, traditional, cultural value that limit to access to health care, education, and training which is especially on women in rural communities.

*Indirect support is feedback from achievement of livelihood outcome:*

- Health status is directly to income, food security (with relevant knowledge).
- Higher income is often reinvestment in education.
- Reduced vulnerability can reduce the birth rate (with knock on effects on nutrition and labour).

Nevertheless, human capital is an important capital in the creating of people access information, communities, technology, education, health and management of their knowledge on productivities process which could be effectively to their livelihood assets.

### 2.5.3 Natural capital

The natural resource stocks from which resource flows useful for livelihoods are derived the cycling of nutrition used and protection of erosion of soil fertility. Natural capital is necessary for people to survive in term of using farm land, fishing, gathering forest products, extract of mineral, water resources and environmental. These are potential resources for people to have a basic need in their households and also bring the food security and health through their farm production and direct support from natural resources such as land, water, wildlife, biodiversity and environmental. Thus, natural capital brings a significant income-earning opportunity. It might also exist of natural biodiversity (DFID, 1999).

### 2.5.4 Financial capital

Financial capital is finance resource that people use to achieve their livelihood and building block of availability of cash or equivalent which supports the people to adapt different their livelihood strategies. The financial support has two main sources:

- *Available stocks:* saving is the preferring of financial capital such as cash, bank deposit, equivalence to household asset such as land, housing, livestock, gold and etc. Financial support is also including loan or credit which both provide by institutions.

- *Regular flow*: the flow of money that excludes the income-earning. The most common types of inflows are transfer from state and deposit of money by post. There are differences between on off-payment and regular flow which a basic of people can plan investments. Although, the financial capital could not solve the problem of poverty because people could be not able to put their financial resource to used (DFID, 1999):
  - Lack of knowledge to save (small amount of money)
  - Constrained or transforming the structure and processes within under developed market and a poly environment which hides the micro-enterprise.

The financial capital is relatively to social capital which can help the groups of people to facilitate the lending approach or appropriating financial support. The available financial resource comes from whereas the people able the savings, supplies of credit or regular remittances or pensions, which supports their different livelihood strategies options.

#### 2.5.5 Physical capital

The physical capital comprises the basic infrastructure and producers need to support their livelihoods. The physical capital supports as common used for supporting their own accessed (transport, shelter, water, energy and communications), the production equipments and means that enable people to pursue livelihoods. The physical capital is also relating to public infrastructure such public roads, hospital, schools, communities building, adequate water supply (clean water and sanitation), and access to information within communities. Therefore, physical capital is providing good sources such as tools and equipments for producers that helps people to meet their basic need for increasing the productivity and more likely to combine with social capital to build the free market or access through rental or fee for marketing service. The physical capital is usually the potential for sustainable livelihood strategies (DFID, 1999).

#### 2.5.6 Social capital

Social capital is one important from five capitals of livelihood assets which formulate the groups of people to connect or network between communities. There creates the groups which people trust, working together and accept the rule. Social capital is

relationship of trust, social rules that people provide to co-operate, provide basic information needs, and reduce the transaction costs. The social capital is helping the people to have a great success with their income from productions (Financial capita), improving to manage the natural resources (natural capital), maintenance of public infrastructure (Physical capital), creating social network to share the information and knowledge between communities (social capital), and the sharing of experience and training supported which helps increasing human capital (DFID, 1999).

The social capital builds the social capitalist on strengthen of local institutions and leadership. This supports capacity building, training and education the people. The people could draw in pursuit of livelihoods strategies.

## **2.6 Household coping strategy**

Household's food security is also linked to livelihood capacity to cope with shocks, trends and seasonality. Thus, concepts of food security are relatively linked to vulnerability and natural hazards. Whereas level of household income and crop production are running into situations of food deficit and utilization of food in household. The vulnerability context, livelihood assets, livelihood strategies and livelihood outcomes are important key elements to use as household livelihood coping strategies (Kryger *et al.*, 2002). The indicator of household food security is relatively to measure how the households management to cope with a shortfall in food for consumption at household level. The impact of food aid affects on household food security in short-term and long term (Maxwell *et al.*, 2003; Mjonono *et al.*, 2009).

In term of food security is relatively to household food stock as well as the domestic food production (the domestic food production is referring to crop production and ability to earn income to buy a food for households. Food availability is a function of the combination of domestic food stocks, commercial food imports, food aid, and domestic food production that these factors could determine the food supplied available at household level and at regional or national level. However, these factors are determined the resource endowment of the household that it can defined at the set of household productivities, which food production could referred to meet their food security objectives need (Riely *et al.*, 1999).