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# Contract farming and organic rice production in Laos – a transformation analysis

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## **Executive Summary**

As in many least developed countries the farmers in Laos are heavily dependent on subsistence based agriculture production for their livelihood. A key for increased welfare for the rural population in Laos is to increase their profits of small scale farmers and generate a higher income per capita. One possible way to increase the profits and income for smallholder farmers may be to convert in to organic rice production for the export market, since the international market for organic rice is growing, consumers are prepared to pay a premium price for organic products and conditions for organic rice production are favourable in Laos.

Organic rice farming has grown in Laos during the last decade as greater volumes of organic rice are produced and exported. Organic rice is mainly produced by smallholders in donor projects or by contract farmers supplying contract farming companies.

In this thesis I try to determine the causes behind this structural transformation by incorporating evolutionary economic theory (Schumpeter, 1911; Dahmén, 1950 and Marmefelt, 1998) which focuses on entrepreneurial innovations and creditors as the basis for changes in the economy. By performing a Dahménian transformation analysis of the transition from conventional- to organic rice production within the development block around rice production in Laos, I try to determine the transformation pressure causing the transformation to take place. Emphasis is in particular given to the role of contract farming in this process. I investigate to what extent the contract farming firm can be regarded as a Schumpeterian banker, a concept introduced by Marmefelt (1998), that can coordinate the development block around rice production by providing credits to the entrepreneurs within the development block.

The analysis shows that two types of transformation pressures are likely to have caused the farmers to convert to organic rice production. First of all it is likely that the relatively higher price paid for organic rice (42 percent higher than conventional rice) has convinced farmers to make the transition. This type of transformation pressure can be seen as a market pull type, as it originates from an increased demand in the international market, which in turn increases the relative price for the product. The analysis further shows that a production method innovation had taken place by the introduction of new inputs, made available by the contract farming

firm. This has led to an increased productivity which, combined with the premium price, generated higher profits for the organic contract farmers. The production method innovation can be seen as a market push type of transformation pressure originating from the supply side.

In this thesis I argue that it is unlikely that the transformation would have occurred without the involvement of the contract farming firm. On their own, farmers did neither have the means to grow the organic rice, nor the proper market channels to process and sell the organic rice on the international market. I argue that the contract farming firm's ability to facilitate price signal information from the international market to farmers, provide access to the new market thru market links, and provide credits for new inputs as well as technical assistance essentially made the transition to organic rice possible.

However the analysis also shows that the contract farming firm had a limited ability to fulfil its role as a coordinator in the evolvement of the organic rice production, in terms of a Schumpeterian banker, because of limited abilities to solve bottlenecks in the value chain. The reason for this is mainly limited financial resources to finance complementary investments in other parts of the development block.

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## 1. Introduction

Lao Peoples' Democratic Republic is one of the poorest countries in Asia. It ranks 138 of 187 on the Human Development Index, and is classified as a Least Developed Country by the UN, with 27 per cent of the population living on less than one dollar per day (UNDP 2011).

As many least developed countries, the country is heavily depending on subsistence based agriculture – mainly rice production- for employing and feeding its population, with approximately 75 percent of the labour force employed in the agriculture sector and an agriculture sector share of more than 30 percent of GDP (IRRI – statistics year 2009). Rice is the predominant crop grown in Laos. It is grown on 800 000 hectares which is almost all of the arable land (IRRI – statistics year 2009)

A number of problems hinder the transition in to commercial based agriculture production, including limited access to the international market, insufficient market information, financial constraints, and lack of knowledge on how to improve productivity. Therefore, income levels of small holder farmers remain low.

One possible way for farmers to increase their profits, and in the end the welfare of the rural population, may be to change in to organic agricultural production, in particular the niche market of organic rice, as consumers in industrialized countries are willing to pay a premium price for organic products (Paull, 2009) and the demand for organic rice currently is increasing on the world market (Ellis et al, 2006 and Manivong et al, 2009). Organic rice farming has grown in Laos over the last decade as an increasing number of Lao farmers convert to organic rice production and greater volumes of organic rice is produced and exported (*interviews with: Thou Butharat, Khamsavang Mingboubpha, Agung Nugroho and Bruno*). Conditions for producing organic products are favourable in Laos because of its previously low use of chemical inputs resulting in relatively uncontaminated soil (Manivong et al, 2009). Thus, farmers do not have to make any costly modifications of their land in order to convert from conventional to organic rice. To increase the farmers' profits it is essential to increase commercial integration, in particular to get access to international markets. To produce organic rice for the export market may therefore be a more suitable option for Lao farmers to access the international market, and to increase their profits, instead of competing

on the conventional rice market with countries such as China and Vietnam. With its small population and poor infrastructure, Laos does not have the comparative advantage for industrialised commercial rice production.

Organic rice is mainly produced by smallholders or by contract farmers supplying contract farming companies. Grass-roots NGOs have also played a seminal role in promoting the movement, facilitating conversion to organic methods, organizing farmer groups, providing training and marketing support for small farmers, and in certification.

This thesis will focus on the role of contract farming of organic rice, which is an institutional arrangement for economic development, which has been heavily promoted by the government, donors and development organizations in Laos (Fullbrook, 2007). Under this arrangement, a contract farming firm will contract farmers to produce a specific crop and to a specified volume and quality. This is ultimately expected to reduce the risk for both parties as the farmers will get a reliable buyer and market for their product and the contract farming firm will be guaranteed the supply of the demanded crop (Fullbrook, 2007).

The number of contracted organic rice farmers has increased from 2,000 in 2004 to 6,000 in 2009, and the number of hectares that the farmers were growing organic rice on increased from 800 hectares in 2004 to 7,000 hectares in 2009 only in Vientiane Province, Laos (*interview with Khamsavang Mingboubpha*).

In this thesis I will analyse the transformation process from conventional to organic rice, incorporating evolutionary economic theory (Schumpeter, 1911; Dahmén, 1950 and Marmefelt, 1998). I will try to determine the specific causes for the transformation by means of a Dahménian transformation analysis, and I will in particular look at the role of contract farming as institutional arrangement and a potential tool to increase small holder farmers' income by facilitating market linkages, provide the necessary support, and inputs that enable small holder farms to make the transition into commercial organic production for the export market.

I will investigate to what extent the contract farming firm can be regarded as a coordinator within the development block that assist in the diffusion of new innovations and provide credits to the entrepreneurs within the development block.

The importance of new innovations for the process of economic development was emphasized by the well known and widely quoted economist Schumpeter (1911). According to him, the entrepreneur can innovate the production process by adding new types of factors of production to the production method that will make it possible to produce more output with less or the same amount of inputs or factors of production. This can be seen as the essence of economic development. Schumpeter's ideas and concepts have influenced scholars such as Dahmén and Marmefelt who have developed Schumpeter's concepts further.

Dahmén (1950) meant that a coordinator within a development block can enhance and speed up the completion of a development block by resolving structural tension in the evolutionary process of economic development.

Building on the important work of Schumpeter, Marmefelt (1998) studied the institutional forms for the interaction between entrepreneurs and creditors and called them *bank-industry networks*. He argues that the creditor/bank could also act as a coordinator within the network of entrepreneurs and finance other entrepreneurs in other sectors that are connected to the other entrepreneurs in the network thru complementarities. These types of bank-industry networks can be seen as a form of Dahménian development block argues Marmefelt (1998) and the bank would thus act as a coordinator within the Dahménian development block.

## **2. Purpose of the study**

The purpose of this thesis is (1) to analyse and determine the causes for the transition from conventional to organic rice production in Laos and (2) to determine the role of contract farming as an institutional arrangement in the transformation process.

My hypothesis is that the main driving force behind the transformation into organic rice production is the increasing international market demand for this product that has led to a relative price increase for organic rice. It is likely to believe that the higher relative premium price paid for organic rice provides incentives for both farmers and contract farming firms to take advantage of this new business opportunity.

To determine the causes for this transformation I will use Dahmén's (1950) transformation analysis. The transformation analysis method is primarily used to evaluate historical economic events and determining the causes for the transformation of the economic structure.

A quantitative econometric method, most commonly used when economists analyse structural change, may not always be an appropriate method when investigating the dynamic processes of transformation as it may leave out important reasons for the transformation by omitting important variables. Dahmén's approach for determining the causes behind structural changes is in my view somewhat more unconditional. His analytical framework considers both endogenous and exogenous factors at different levels of aggregation, from macro to micro level and allows for both quantitative and qualitative methods for determining the causes behind the transformation.

Another reason for why I am using Dahmén's analytical framework is that aggregated data was not readily available for the specific analysis of the transformation in to organic rice production in Laos why more qualitative methods were needed to analyse the transformation process.

### **3. Theoretical Framework**

Dahmén (1950) developed his transformation analysis framework based on the theoretical ideas of Schumpeter (1911, 1939 and 1942) who laid the foundation for what is called evolutionary economics.

Schumpeter (1934) emphasised a few factors that he argued were responsible for economic development in the short run. According to Schumpeter, the two key-players in economic development are the entrepreneur and the creditor. He argues that the entrepreneurs' innovations are the driving force behind the transformation of the economic structure. And the creditor provides the crucial credit for the entrepreneur to get power over the means of production by paying for the existing and already in use means of production to be able to put them in to use in some other type of more efficient production.

Schumpeter further describes how the economic structure in a society is transformed by the help of entrepreneurial innovations. These innovations can according to Schumpeter comprise of new combinations of factor of production or resources, new products or products with another quality, new methods of production or new types of marketing, new types of

organizations, new sources of supply of raw material, and new markets. According to Schumpeter, the transformation process involves crowding out old activities by combining the existing factors of production in a more efficient way and thereby improving the quality of the economic process by transforming a given number of inputs to a larger number of outputs than before and thus leading to productivity growth. Schumpeter called this process within firms the *creative destruction* as old systems of capital and knowledge are replaced or destroyed by new systems of capital and knowledge (Schumpeter, 1942). Thus old establishments/firms are destroyed, or transformed, by technical innovations that create the new improved systems. This process will, according to Schumpeter, continue until the diffusion of the innovation thru imitations of the innovation is so widespread that the economy will have reached a new equilibrium, although at a higher level of economic development (Schumpeter, 1934).

### ***3.1 Dahmén's theory of the transformation process***

Dahmén (1994) agrees with Schumpeter's basic relationships and argues that Schumpeter provides a suitable microfoundation for macrotheories of economic development, but argues that, in order to look into transformation dynamics, one must leave the aggregated level of total production and focus on what is happening within enterprises and the interplay between enterprises at the meso-level.

When Dahmén develops his own take of the transformation process he tries to establish a few relationships that govern the process. As a foundation for these relationships he primarily uses two concepts called "structural tension" and "development blocks" (Dahmén, 1950).

***Structural tension*** was illustrated by Dahmén (1994) with the use of a metaphor of a growing plant; "After a primary underground stage, creating a growth potential, a plant starts growing above the ground whereas for the time being nothing happens below the soil. After a time this has led to an unbalanced situation which stops the growth but makes the roots system enter a secondary stage of development. This in its turn results in a new lack of balance between growth potentials and actual growth. This sets off a renewed growth of the plant above the ground. Such a biological "development block" ends up in a stable balance when the plant is capable of shedding seeds...If one stage of the process is decisively hampered, the other stages are doomed to wither away." (Dahmén, 1994:6) The structural tension can in other words end up in a balanced situation or in a new structural tension.

Dahmén further argues that, in order to resolve structural tension, investments and innovations need to be made in complementary areas to support the initial innovation and entrepreneur. These investments form a sequence of complementarities that together form a *development block* (Dahmén, 1950). He uses the example of electrifying the railroad system to explain structural tension in relation to development blocks, and concludes that the investments in electrifying the trunk lines will not be profitable unless the feeder lines are also connected to electric network, and the operation of the new railroad will not be profitable until industries have grown up in the surrounding territory. This example describes how one innovation was not enough to complete the entire development block but rather it caused a structural tension that made necessary investments in other areas and sectors take place.

### ***The need for a coordinator in the evolution of a development block***

According to Dahmén there is need for a coordinated approach to investments in order to remedy any structural tension. He claims that an innovation's potential may not be fulfilled and the development block will remain incomplete without complementary investments. As pointed out by Carlsson and Henriksson (1991) with reference to Dahmén (1950) a coordinated approach to complementary investments is essential to get rid of bottlenecks in a firm's production chain.

Dahmén (1950) argues that the development blocks consist of entrepreneurs and bankers in a mutual network, where financiers coordinate entrepreneurial activities.

Another scholar who has built on the important work of Schumpeter is Marmefelt (1998). He studied the institutional forms for the interaction between entrepreneurs and creditors and called them *bank-industry networks*. He argues that the creditor/bank could also act as a coordinator within the network of entrepreneurs and finance other entrepreneurs in other sectors that are connected to the other entrepreneurs in the network thru complementarities. These types of bank-industry networks can be seen as a form of Dahménian development block argues Marmefelt (1998) and the bank would thus act as a coordinator within the Dahménian development block. Marmefelt calls this coordinator a Schumpeterian banker. Marmefelt (1998) argues that a Schumpeterian bankers will both provide the necessary credits for entrepreneurial innovations, and will assume the risk of the use of that credit much like a venture capitalist, but will also perform the function as a coordinator in the development

block by financing other economic agents that are important for the evolution of the development block.

I will in this thesis try to determine if contact farming as an institutional arrangement and the contract farming firm can perform the function of a coordinator much like a Schumpeterian banker that Marmefelt (1998) introduced in his work.

### ***3.2 Dahmén's Transformation Analysis***

*Structural tension* causes something that Dahmén (1950) refers to as *utvecklingstryck* (transformation pressure). He argues that economic development takes place when a positive or negative transformation pressure appears. In Dahmén's view the two sides of transformation pressure reflect the struggle between new and old.

The positive side reflects the advent of innovations which could be in the form of a new method of production or a new product<sup>1</sup>. The negative side means the discontinuing of the old methods of production because they have become too costly or inefficient. The negative side can also mean the discontinuing of products that are no longer demanded by consumers, as new products has taken its place (Dahmén, 1950).

Dahmén (1950) defines an innovation of a new method of production (a method innovation) as when a new factor of production is added to the current production function. An example of this could be a new type of machine (a new factor of production) that makes it possible to keep the same production volumes even though the input of the other factor of production, for example labour, now can be lower. An innovation of a factor of production or an input thus has to be something new that was not available earlier.

Dahmén (1950) defines an innovation of a new product as a product with totally new characteristics that has never existed before.

In Dahmén's (1950) transformation analysis framework he defines when the positive and negative side of the transformation occurs and he also defines the different types of transformation pressure.

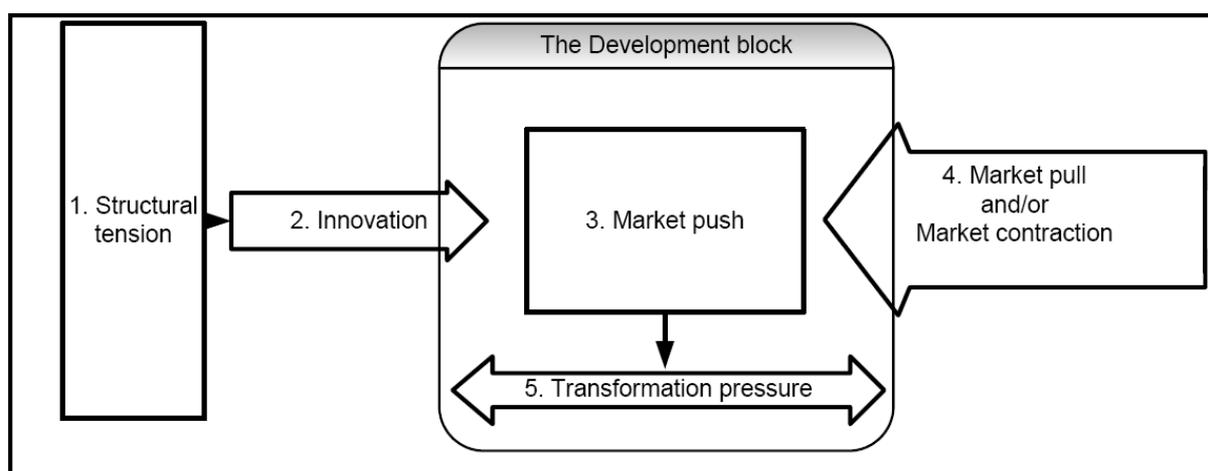
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<sup>1</sup> Dahmén's definition of innovations is somewhat narrower than Schumpeter's (1934) definition.

He argues that the positive side of the transformation occurs when there is an increased demand for a firm's products. The two types of transformation pressure that are of the positive type are *Marknadssug* (Market pull - translation used by Cöster, 2007) and *Marknadsutvidgning* (Market push - translation used by Cöster, 2007). The transformation pressure of the *market pull* type occurs when the demand for the firm's products increase for reasons exogenous to the firm. A transformation pressure of the *market push* type occur on the other hand by increasing the firm's market share thru the firm's own actions (for reasons endogenous to the firm) such as by innovations in the firms product, products with higher quality, lowering prices or increased marketing or by innovating the production method. However the introduction of new methods and products that generates a shrinking demand for the firm's products can be a matter of *Felinvesteringar* (Malinvestments) because the firm has invested in a combination of factors of production that makes the final product too expensive with a shrinking demand as a result. In this case the firm has made a mistake that is not directly related to the struggle between new and old products or methods of production (Dahmén, 1950).

The transformation pressure called *Marknadskrympning* (Market contraction - translation used by Cöster, 2007) is the only negative type of transformation pressure that arises when the demand for the firm's products are decreasing for reasons exogenous to the firm. In my analysis, I will use the same translations as Cöster (2007).

The following diagram will illustrate the relation between different concepts in Dahmén's analytical framework:



**Figure 1.** The concepts in Dahmén's analytical framework, as illustrated in Cöster (2007)

## 4. Method

My contribution will be to make a Dahménian transformation analysis of the transformation of the rice production into organic rice production in Laos. I will try to determine the type of transformation pressure that has been responsible for the transformation of the rice production and analyze the contract farming firm's role in this transformation process.

I have chosen to analyse the transformation of rice production as rice is the predominant crop grown in Laos (IRRI – statistics year 2009). The reason for analysing the transition from conventionally grown rice to organically grown rice has to do with the fact that Lao farmers are reluctant to convert already prepared rice paddy cultivation fields into fields for other crops once the considerable preparation investment has been made (Eyhorn et al, 2008). Because of additional costs for changing from an already established practice the most likely choice for a Lao rice farmer who would like to grow something else would be a different variety of rice rather than a different type of crop. This type of historically bound choices is in economics referred to as *path dependence* (Puffert, 2009). Path dependence refers to the phenomenon of when economic outcome is the result of a historical path rather than being a decision based on the current market conditions.

In this thesis the path dependence phenomenon can be applied to the rice farmers decision to convert to organic rice production rather than to some other type of production because the production methods used in both conventional and organic rice production are quite similar which makes the transition fairly uncomplicated.

Because of this I will only compare the two different production methods of conventional rice production and that of organic rice production in my thesis and the inputs and factor of production that goes into these types of production as this would constitute the two main choices of production for Lao rice farmers in this case.

Currently the domestic market in Laos for organic rice is limited and this is why the international market for organic rice is primarily analysed in this thesis. Another difference in demand between the domestic- and international market has to do with what type of rice is sold. On the world market the major demand is for nonglutinous (white rice such as jasmine rice or basmati rice) while the domestic Lao market are demanding glutinous (Sticky rice)

(*interview with Agung Nugroho*). Glutinous rice accounts for 80 to 90 percent of the rice consumed in the Lao PDR. (Njoman et al, 2006).

When performing a transformation analysis one will focus on trying to determine the transformation pressure that has caused the transformation in the economy. Dahmén argues that changes in demand and supply on the input-, factor- and product market, with consequent relative price - and relative cost changes for inputs, factors of production and products, cause such transformation pressure (Pålsson Syll, 1997). Therefore I will investigate the relations that Dahmén suggests in the changes of demand and supply for products, inputs and factors of production and relative price changes for these factors on the input-, factor- and product market.

Rytkönen (2004), who uses Dahmén's analytical framework in her own study, states that transformation pressure arises at different levels and sources, therefore they have to be analysed at different levels of aggregation; from macro level, meso level and micro level.

### ***Sources of data***

I will use both qualitative and quantitative sources of information. To perform the transformation analysis I will look at some aggregated information on demand for organic rice on the international market that I will acquire from previous reports along with some supply and export data for produced organic rice in Laos that I have extracted from interviews with researchers researching rice production in Laos and from interviews with practitioners within organic rice production in Laos. For information on supply and demand for different inputs and factors of production I have used different sources. I have used primarily interviews for acquiring this data which by no means make it complete, but it included the most important aspects as I see it. To make the relative price analysis I have mainly used a previous case study by Setboonsarng et al (2008) for comparing economics of production between organic contract farmers and conventional non-contract farmers from the same agro-ecological zone in the Vientiane province in Laos. I will also use this study for the purpose of investigating the role of contract farming as an institutional arrangement in the transformation process. The study concerns a contract farming firm called Lao Arrowny Corporation. It is one of the larger contract farming firms focusing on organic rice production in Laos. In addition to the case study I have also made interviews with representatives from Lao Arrowny Corporation to

determine its ability to act as a coordinator within the development block around rice production.

Furthermore the interviews will provide some information on possible constraints limiting the future development of the development block around rice production and for the organic rice production in particular.

**4.1 How to determine the transformation pressure**

**Constructing a Transformation analysis Matrix**

For the purpose of determining what type of transformation pressure that has caused the transformation of the rice production I have constructed the following analysis matrix. It takes into account changes in relative prices on the input-, product-, and the factor market as the result of different transformation pressure from either the demand side or the supply side.

Pressure from the demand side	Relative Price changes on different markets depending on transformation pressure		
	Product market	Input market	Factor market
Market Pull	↗	↗	↗
Market Contraction	↘	↘	↘
	↘	n/a	n/a Market Push T1
	n/a	n/a	n/a Market Push T2
			Pressure from the Supply side

**Figure 2.** The Transformation analysis matrix

As specified in Dahmén’s (1950) theoretical framework the following applies. A transformation pressure can originate from the supply side or from the demand side. Transformation pressure that originate from the demand side are caused by changes in the demand for the firms products. This type of transformation pressure could be of the market

pull or a market contraction type. Market pull occurs when the demand for the firm's products are increasing for reasons exogenous to the firm. Market contraction on the other hand occurs when the demand for the firm's products are decreasing for reasons exogenous to the firm. A market pull will cause the relative price to increase for the demanded product on the product market. This will in turn attract more assets to production which will cause the relative prices for the needed inputs and factors of production to increase (see Schön, 2011) who is utilizing and expanding on Dahmén's (1950) analytical framework in his own research).

The opposite will happen if the transformation pressure is of the market contraction type. The relative price for the demanded product will now decrease as the demand for the product is decreasing. This will in turn decrease the demand for resources for production and therefore the relative price for inputs and factors of production should fall.

In case the transformation pressure originate from the supply side, it is a matter of the supply sides innovations of new products or new production methods. In case of a transformation pressure of the market push type T1 (*as I will call it*) it is a matter of a refined production method that will increase productivity. This will lower the relative price of the product on the product market according to Schön (2011). How it will affect the demand for different inputs and factors of production and consequently the relative prices on the input- and factor market depends on the individual case (thereof the n/a indication in the matrix) .

In case of a transformation pressure of the market push type T2 the producer will enhance the quality of product, come up with a new product or better its marketing. This may not necessarily lead to any changes in the use of inputs or factors of production, and therefore the relative price for inputs and factors of production may not change either (thereof the n/a indication in the matrix). Depending on what the producer will innovate the relative price for the product may differ.

Since it is difficult to determine relative prices changes caused by a market push transformation pressure I have made complementary interviews to try to determine if there has been any entrepreneurial innovation that may have affected the demand for the firm's products.

#### ***4.2 The main shortcomings of the research***

I will now comment on some of the shortcomings in this thesis and how this may affect my ability to draw any definite conclusions.

There have been great difficulties in extracting useful and specific aggregated data on production volumes, export volumes etc. for organic rice. The reason for this is primarily that organic rice production is still a fairly new phenomenon and a limited part of the total rice production in Laos why government agencies in Laos has not made any systematic attempts at mapping this sector. However by interviewing several people that are somehow involved with organic rice production in Laos I have managed to get some notion of trends on production volumes and exports that can support my conclusions.

Likewise data on demand and supply of different inputs and factors of production have been difficult to come by, but the interviews that I made can also shine some light on these issues.

The difficulty of finding accurate price information from previous years on inputs, factors of production and for the final product of organic rice made it difficult to evaluate the relative price differences between conventionally produced rice and organic rice. This is of course a problem since the analysis is based on relative price evaluations. However by using the specific case study by Setboonsarng et al (2008), that contains relative price information, and along with follow up interviews with the same contract farming firm as in the study I can draw some conclusions about the causes for the transformation in this specific case. Because of this the conclusions made in my thesis will have limited explanatory value for the general causes for the transformation. However, in spite of these limitations I would argue that my conclusions made about the contract farming firm's importance for the transformation process are likely to apply in the general case of organic contract farming.

#### ***4.3 Previous Research***

##### ***Setboonsarng et al (2008), Rice Contract Farming in Lao PDR: Moving from Subsistence to Commercial Agriculture***

This study is considering contract farming “as an institutional arrangement that links farmers to consumers in foreign or domestic markets and links farmers to vital inputs” (Setboonsarng et al, 2008:1) in economies where market failures caused by “imperfect market information,

poor infrastructure, and few links to buyers in the marketing chain” (Setboonsarng et al, 2008:1) are constraining the small holder farmers from increasing their income and reducing rural poverty.

The study is useful in my own analysis because it compares economics of production between organic contract farmers and conventional non-contract farmers who are growing rice in more or less the same agro-ecological environment and social conditions. The study has sampled almost 600 farmers to base the comparison data on. The study contains detailed price and cost comparisons. The contract farming company in the study is called Lao Arrowny Corporation and is a joint venture between a Lao and a Japanese firm that was established in 2002. The company’s business idea is to contract farmers in Laos to produce Japanese rice for export to Japan.

The comprehensive comparisons in the study between organic contract farmers and conventional non-contract farmers will be used in my own analysis section to evaluate relative prices for inputs, factors of production and the final rice product, with courtesy to Setboonsarng et al (2008).

A note regarding the use of data from the study is that the labels used in my data tables; contract and non-contract, refer to if the farmer is contracted or not contracted to produce organic rice. The *contract* label refer to those farmers who are contracted to produce organic rice and who I will refer to as *organic contract farmers*. The *non-contract* label refer to those farmers who are not contract farmers and who doesn’t grow organic rice - I will call them *conventional non-contract farmers*.

### **Paulina Rytönen (2004), *Fruits of Capitalism – Modernisation of Chilean Agriculture 1950-2000***

Rytönen’s work is important for my study as she perform a Dahménian transformation analysis of the agriculture sector in a developing country. The Dahménian approach is developed for analysing structural transformation within the capitalist productive system, but in a developing country many of the smallholder farmers are in between a non-capitalist/subsistence productive system and capitalism. In order to use Dahmén’s transformation analysis on the agriculture sector Rytönen combines Dahmén’s methodology

with theories of ‘peasant agriculture’. The study therefore provides some insights and consideration to keep in mind in my own study.

The study also shows the importance of including the meso- and micro level perspective and not just the macro level in the analysis to understand the causes behind the structural transformation of the agriculture sector. Because of the different levels of analysis Rytönen came to different conclusion than much of the previous research on why the Chilean agriculture sector had such a rapid growth rate from the 1980s and 1990s. Rytönen pointed to the importance of the growing international market demand as a significant type of transformation pressure rather than liberal policies and changes in institutional arrangements.

In order to perform a Dahménian transformation analysis I first have to determine what inputs and factors of production that are used in the production. I will come to this in the next section but to put things in perspective I will start by illustrating the typical rain-fed lowland rice production process.

## **5. Background**

### ***5.1 How does conventional rice farming in Laos work***

In Laos there are two seasons: The rainy season from April/May thru October/November and than there is the dry season from December to April. Most lowland farmers will only grow rice during the rainy season, planting the rice seeds in April/May and then harvesting it in September. The rainy season rely on rain for input of water, as the name suggests. The second season, the dry season, uses irrigation to pump the necessary amount of water from the Mekong River.

As the rainy season is approaching rice farmers will start by preparing their paddy fields from the off-season. One person from the farm household will then use a hand-held/Thai tractor with a plough connected to it to cultivate the virgin land. Typically the rice farmers own one hand-held tractor per household or rent it for the necessary work. As the rain comes during the monsoon the fields will be filled with water and it is time to plant the rice. The rice plant is not a water plant by default and doesn’t actually need the fair amounts of water used in Asian rice farming, but it will tolerate large amounts of water due to the rainy season’s heavy

rainfall. The use of the large amounts of water in the fields is rather a production method which help to protect the rice from weeds.

A patch, often in the middle of the rice field, is prepared as a seedbed where they spread the rice seeds by hand, also called the nursery bed. Once the rice has been planted it takes about one month before the rice plants are ready to be transplanted to the rice fields. The farmers may use a machine with rotating cultivators connected to the hand-held tractor to do something called “puddling” which is done to create a smooth and loose soil that is favourable for the rice plants. The rice plants will now be separated and planted with a predetermined spacing on the rice paddy fields. This process is done by hand in Laos and in most other developing countries and may require up to 15-20 people per hectare.

When the transplanting is finished the rice plants will grow and mature until it is time for the harvest in September. The farmers may during this time regulate the water level in the fields and clear the field from weeds and fight insect pests by spraying the plant in the field with some pesticide about 2 weeks after transplanting.

Right before harvest the fields will be drained from water. At harvest the farmer may again have to hire labour to be able to cut all the rice plants by hand, and moving the harvested rice plants of the field and into the threshing machine. The threshing machine is commonly rented and used for separating the paddy grains from the stalks. The rice grains will then be stored in the farmers storage house and the rice will be divided up for sale and some of it approximately one third of the harvest will be retained by the farmer for own consumption and for seeds for next years rice plantation. Some of the paddy-/rough rice will be taken to a rice mill to separate the husk, which is the outermost cover of paddy, from the rice grain. This is done several times in a year so that the farmer can sell or consume some of the stored rice.

Once the rice has been harvested the farmer may use some type of tractor pulled cultivator to get rid of roots, weed, and loosening the soil for better aeration. In the off season the farmer will let cows and buffaloes graze the grass in the fields to keep weeds at bay and to naturally fertilize the fields with excrement from the animals along with some chemical fertilizer that is also spread on the fields in the off-season to speed up the decomposition of rice husk and other plants that require mineralized nitrogen to decompose.

### ***Organic rice farming as opposed to conventional rice farming***

For an organic rice farmer the course of event is a bit different but not that much.

The main difference is of course the non-use of chemical inputs in the production.

The production method may also use more labour input because of the lower efficiency of organic pesticide that cannot prevent weed as efficiently and so more of the weed needs to be removed by hand. The use of compost will also require more labour to collect and distribute on the fields. The mass of compost needed will amount to several tonnes rather than a few hundred kilos of chemical fertilizer.

Other than that the production is not much different to conventional rice production.

Now that I have explained how the rice farming process works I will continue with the Dahménian transformation analysis. In order to make the transformation analysis as specified in the beginning of this method chapter, I first have to identify the different inputs needed in the production of organic rice as well as the factors of production used.

### ***5.2 What is needed in terms of factors of production and inputs to produce organic rice***

#### ***The inputs used in organic rice production in Laos***

##### **Rice seed**

There are mainly two types of rice varieties grown in Laos: *Non-glutinous varieties*, such as white jasmine rice, and the *glutinous varieties*, such as sticky rice (*Martin Dunn – interview*).

In the Lao Arrowny case Japanese varieties of non-glutinous rice called japonica and kosihikari are used. The rice seeds provided by the contract farming firm are developed to be higher yielding than the farmers' local rice seeds (*Khamsavang Mingboubpha – interview*).

There isn't any specific 'organic' rice seeds as all types of rice varieties can be grown organically.

For the supply of rice seeds the farmers will usually retain some of the previous rice harvest to use as seeds for next season or they can purchase it from rice mills, on the rice market or borrow seeds from the rice banks, receive it as credit in kind from village revolving funds, or as in the Lao Arrowny case from the contract farming company. All rice seed is milled why the price for rice seed is naturally higher than the price paid for rough/paddy rice.

##### **Organic fertilizer**

There are different types of organic fertilizer such as compost, guano, peat or common buffalo/cow/pig/chicken manure or green manure.

### *Compost*

The compost used by organic farmers is made up of their own plant waste such as burnt rice husk, straw and manure from whatever animals they are raising. In order for the rice plants to be able to use the nutrition content in the compost it first has to decompose into a mineralized form. This takes time and the compost is therefore spread in the rice fields in the dry season on several occasions. Since the bio-nutrient levels in these products are very low, compared to inorganic fertilizer the amount of compost used must be substantial to accomplish the same yield as for a conventional rice farmer (*Martin Dunn, Tony Taucher – interview*).

Therefore the labour input is somewhat higher when using compost compared to chemical fertilizer, but most of the work of collecting and spreading the compost is performed by the farmer's family and doesn't require any additional hired labour (*Agung Nungroho – interview*).

*Guano* is the manure from for example *Bats*. It is an effective fertilizer due to its high levels of phosphorus and nitrogen.

“If the farmers are using a limited, high fertility natural resource, such as bat dung, then that may well be cheaper than inorganic fertilisers, and, in rain-fed situations may even produce more rice than inorganic fertilisers (because of better water holding capacity of the soil). But bat dung is a very limited, non-renewable resource, which can hardly be replicated on a large scale” (*Trevor Gibson - interview*).

*Peat* is organic material that is semi-decomposed in an anaerobic environment such as in a swamp where the organic material is covered with water. This environment means decomposing the organic material without oxygen. Peat is for natural reasons in limited supply why the use of this type of fertilizer can only be a compliment to other types of organic fertilizer.

*Green manure* are plants that can fix atmospheric nitrogen in a form that plants can use, by containing nitrogen-fixing symbiotic bacteria. The plants are from a wide range of species like sweet clover, and legumes such as peanuts, pigeon peas, cow peas, mungbeans, soybeans,

velvet beans, and vetch. Pigeon peas have proven to have promising fertilizing properties (Roder *et al*, 2005). These plants are traditionally grown in rotation to add nitrogen to the soil that has been depleted when growing and harvesting other grains (Roder *et al*, 2005).

The main consideration when it comes to using organic fertilizer is that plants do not use organic nutrients but only take up mineralized inorganic nutrients. Thus, before they can take advantage of organic nutrient the organic material has to be mineralized to the inorganic form thru decomposition. During this process the decomposing microorganisms get priority for the nitrogen in the organic material and it will not be available to the plant. The process is well known as nitrogen immobilization (Richard Tinsley - *interview*). Thus the decomposition in itself will use nitrogen that crops will need during their growth.

Therefore the time for the organic material to decompose also needs to be taken into account when comparing it to the use of chemical fertilizer which is more readily used by the rice plant.

### ***How much fertilizer is used and what is the total cost***

To get a sense of the needed proportions of different organic fertilizers the following rough calculations may be enlightening and are based on an interview with soil scientist Richard Tinsley:

Firstly, approximately 2/3<sup>rds</sup> of most nutrients such as nitrogen, phosphorus, and potassium (N, P, K) are removed from the soil with the grain at harvest. Thus if you are using the rice straw from the harvest, even after being converted to manure by the cattle or water buffalo, you will need the straw from at least 3 fields concentrated on one to get the same nutrient levels in the soil as before the harvest (Richard Tinsley - *interview*). Organic farmers would therefore have to buy or gather straw from neighbours to get the desired fertilizing effect.

The nutrient concentration in organic material is highly variable and depends on the degree of concentration of animal *excrement* or compost and the amount of moisture.

For example for a 5 tonne rice yield per hectare (which is a higher yield than most Lao farmers get, mainly because they are using less inputs, but also for other reasons) the farmer needs to distribute approximately 100 kg of nitrogen per hectare. If using the most concentrated and cheapest inorganic fertilizer available, Urea<sup>2</sup>, it roughly has 50% nitrogen

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<sup>2</sup> Urea is the main nitrogen-containing substance in the urine of mammals. It was the first organic substance that scientists were able to produce synthetically. This is the most widely used inorganic fertilizer by conventional

content and except for maybe Guano (bat dung), other types of organic fertilizers have even less nitrogen content. Thus it will take 200 kg of urea to meet the demand.

By comparison most organic residues, such as compost, will have less than 1/10th the amount of nitrogen content thus instead of 200 kg you will need a couple tons (*Richard Tinsley - interview*).

In the Lao context most organic farmers will use 3 to 5 tonnes of compost per hectare that will more or less produce the same yield as for those conventional rice farmers who uses some chemical inputs (*Agung Nugroho – interview*).

Because of the large volumes and bulkiness of organic fertilizer and especially compost, consideration must also be taken of not just the actual cost of the input material, but also the needed labour input to spread the fertilizer in the rice fields. This discussion will be continued in the section on labour input.

### **Pesticide and/or insecticides, herbicide, fungicide, and weedicide**

In organic rice production these are organic versions of the chemical versions and are developed using Neem leaves, nicotine from tobacco, or natural herbs for example. These types of products are less effective than chemical ones. They are less expensive than chemical substitutes if the farmers produce it themselves. But they may be more expensive if they need to buy the product of the market, since the organic products are less effective the farmers will need to apply more of it to produce the desired effect.

### **Water**

In Laos the most common type of rice production is that of the rain-fed low-land production, and most farmers in the Vientiane province use rain as their main water supply, but some farmers also have access to supplementary irrigation with water from the Mekong river. (*Setboonsarng et al, 2008*)

### **Fuel**

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rice farmers and has quite concentrated nutrient levels. Other inorganic fertilizers used by conventional rice farmers are the 15-15-15 and 16-20-0 ammonium nitrate fertilizer (*Richard Tinsley and Martin Dunn - interview*).

Fuel is used for the tractors and for other machines. Even though most villages in Vientiane municipality are connected to the power grid the machines used are mostly running on diesel. Nationwide electricity is not supplied to all villages why machines running on fuel are necessary. Any changes in prices of fuel will naturally impact the farmers and the use of their machinery, but because of similar use of machines in both organic and conventional rice production it should not impact the transformation (*interview with Agung Nugroho*).

### ***The factors of production used in organic rice production in Laos***

#### **Land**

“On average, a contract farming household owns 2.48 ha...” They use that land for growing food for their own consumption but also for growing commercial crop on their commercial plot. “The average commercial plot is 1.11 ha of contract farmers...where they would grow the organic rice” (Setboonsarng et al, 2008). The average landholding of about 75 percent of the farmers range between one to five hectares (Sengxua et al, 2009).

#### **Labour**

The production structure in the agriculture sector in Laos is predominantly labour intensive. Machines are used for some procedures such as soil preparation etc. but machines cannot replace manual labour entirely. The manual labour used for seedling, transplanting and harvest are currently the only option for Lao farmers regardless if they are conventional rice farmers or not (*interview with Martin Dunn*).

#### **Capital**

Such as hand-held tractors/thai tractor, plows, power tillers, rice threshing machines, rice-husking machines, rice mills, winnowing machinery and low-lift irrigation pumps.

The so called thai tractors are now very common and have basically replaced all use of water buffaloes for preparing the soil for plantation and transportation. Normally every farmer has their own tractor, but some also borrow or rent the machine.

The use of the hand-held tractors is the same in both organic and conventional rice production (*Agung Nugroho - interview*).

Threshing machines are used in the harvest to separate the grain or seeds from the husks and straw, is the step in the chaff-removal process that comes before winnowing. Threshing

machines are mostly rented at harvest time. Winnowing is a method for separating grain from chaff. It is also used to remove weevils or other pests from stored grain. Then a rice-husking machine would be used to clean the rice.

Lao farmers may also use some agriculture buildings for storage. Most farmers own a cart to their tractor to transport the produce between the field and the village (NSC, 2004).

It is also common to have loans at the agriculture promotion bank which is a government subsidised state bank with the purpose of providing farmers with loans. On average farmer have a 2 million kip loan with a monthly interest rate of approximately 3 percent (Setboonsarng et al, 2008).

## **6. Analysis and Results**

Now that I have specified what inputs and factors of production that are used in organic rice production I will continue the Dahménian transformation analysis of the product-, input- and factor market. I will focus on analysing changes of demand and supply for products, inputs and factors of production along with relative price changes on the different markets to investigate where the transformation pressure originated from and what type of transformation pressure it was that caused the transformation over to organic rice production.

I will also try to determine the role of contract farming as an institutional arrangement in the transformation process and if the contract farming firm can perform the function of a coordinator within the development block around rice production.

As stated by Dahmén, increased- or decreased demand for the firm's products on the product market it will result in either a positive or negative transformation pressure. Since we are seeing an increased demand for organic rice in the international market (Ellis et al, 2006) we can exclude a negative transformation pressure and I will therefore focus on determining what type of positive transformation pressure we are looking at. Since a positive transformation pressure can be either of the market pull type or of the market push type this is what I will have to find out.

I will start by investigating the product market, evaluating the relative price difference between the price received for the organic rice product and the price received for the conventionally produced rice product. The highlighted figures in section 6.1 thru 6.4 are all

extracted from tables in Setboonsarng et al (2008) and will also reappear in tables 1 thru 3 in these sections to summarise different prices and cost for inputs and factors of production.

### ***6.1 Transformation analysis of the product market***

#### ***A price comparison of paddy rice***

From the survey by Setboonsarng et al (2008) I could gather prices information on rough rice/paddy rice per kg for both organic and conventional rice. These prices reflect what farmers were offered for their rice in the year of 2004. The survey covers both organic contract farmers and conventional non-contract farmers in the Vientiane Province. As shown in this study, the price paid for organic rice was significantly higher than the price paid for conventional rice varieties. Organic contract farmers received an average price of **1 911** kip per kg for their paddy rice, which is equivalent to approximately 180 US dollars per ton (with the 2004 exchange rate of 10 585.38 kip/US dollar). Conventional non-contract farmers received an average paddy rice price of **1 344** kip per kg for their conventional rice varieties. That is equivalent to approximately 127 dollars per ton with the same exchange rate used above. This price is still higher than the average annual rice price for rough rice in Laos from 2004 which was 116 dollars per ton (IRRI - FAO statistics 2004). In Laos the price for rice can vary a lot between regions due to poor market information and few common markets. The price will also vary depending on what time of year the price is measured. (Njoman et al, 2006). These are likely to be the reasons for why the annual average price differs from the local price measured at one point in time in time.

The average price paid for organic rice (1 911 kip/kg) was **42 percent** higher than the price paid for traditional varieties (1 344 kip/kg). From the result of the relative price comparison I would conclude that the higher relative price paid for organic rice on the product market constitutes a significant transformation pressure on the rice production. The transformation pressure is of a positive type since there is an increased demand for organic rice. The relative price increase for the organic product indicates that it is a transformation pressure of the market pull-type as the increased demand for organic rice on the world market causes the relative price to increase for organic rice. To determine if there was a simultaneous positive transformation pressure of the push-type I will have to evaluate if there were any entrepreneurial innovations that may have caused the change in demand for organic rice. I will get to this analysis in section 6.4.

To summarise in Dahmén's terms it is likely to believe that the increasing demand for organic rice in the international market caused structural tension within the sector of rice production, calling for solutions to meet this demand. The increasing demand resulted in an upward pressure on the prices for organic rice which has led to a relative price increase for organic rice compared to conventional rice. This exerted a transformation pressure of the market pull type on rice production in Laos that originated from the demand side. Since the price for the rice is predetermined in the contract (*interview with Khamsavang Mingboupaha*), farmers can compare the cost of production to the revenues gained and determine if the organic contract production will generate a higher profit than conventional rice production. Under the assumption that farmers are profit maximizing they were convinced to make the transition over to organic rice production because the organic rice fetches a premium price compared to conventional rice varieties. A majority of the farmers expressed that the most important aspect influencing their decision to become organic rice contract farmer was the higher price they were paid for their products according to Setboonsarng et al (2008).

As will be discussed in section 6.5 it is likely to believe that the farmers themselves did not act on this opportunity, but rather the contract farming firm facilitated the connection between the increasing market demand and the supply of organic rice by facilitating the price signals to the farmers and then the relatively higher price convinced farmers to join the contract.

I will now continue the transformation analysis for the other markets, starting with the input market and then the factor market.

### ***6.2 Transformation analysis of the input market***

On the input market the use of inputs are somewhat different between conventional rice production and organic rice production, the most obvious being the use of chemical inputs in conventional rice production but not in organic rice production.

The aspect that is mostly discussed regarding the use of organic versus in-organic inputs has to do with the inputs efficiency. The general opinion amongst researchers and practitioners is that organic inputs are less efficient and very labour intensive to use because you would need more of it to accomplish the same output (*interview with Agung Nugroho, Tony Taucher and Richard Tinsley*). However there has not been any thorough investigation determining the

exact efficiency of the different types of organic inputs sold on in the Lao market and in the Lao context (*interview with Trevor Gibson and Tony Taucher*). But the general opinion and also what can be determined by common knowledge of the efficiency of chemical versus organic inputs is that you would have to use more of the organic inputs to accomplish the same effect (*interview with Richard Tinsley*).

Farmers in the transition process would therefore have to evaluate not only relative price differences between inputs but also the extra volumes needed of organic inputs and assess if they will be compensated enough by the higher market price paid for the organic rice.

### *Fertilizers*

According to Setboonsarng et al (2008) the highest material costs is for fertilizer and rice seed for organic as well as for conventional rice producers. Even though the fertilizer price per kg is more or less the same for organic and in-organic fertilizer, organic contract farmers incur a higher total cost for fertilizer: on average **814,000** kip/ha for organic bat manure compared to **528,000** kip/ha for conventional chemical fertilizer because they need to use more of it to get the desired effect.

### *Seeds*

The seed price per kilo for organic contract farmers is somewhat higher (**2,842** kip/kg) than for conventional non-contract farmers (**1,913** kip/kg) because they use a specific variety called japonica and kosihikari (Japanese types of non-glutinous rice) (Setboonsarng et al , 2008 and *interview with Kahmsavang Mingboubpha*). Organic contract farmers also have a significantly higher total seed costs compared to conventional non-contract farmers, **283,000** kip/ha compared to **81,000** kip/ha (Setboonsarng et al, 2008). It is likely to believe that the much lower total cost of rice seed per hectare for conventional non-contract rice farmers is not a result of a lower relative price for conventional rice seed only but also a result of a much lower use of purchased seeds. Normally a rice farmer in Laos would use 80 to 100 kilos of rice seed per hectare (*Agung Nugroho – interview*). But after making calculations based on total seed cost and the seed price it seems like a conventional non-contracted farmer would use only 40 kg of rice seed per hectare. This result confirms my suspicion of a lower share of purchased seed input. Since the conventional non-contracted farmers did not buy as much seed as the organic contract farmer they would have to add extra seeds from their own rice storage. This would reflect the common practise amongst Lao farmers to retain some of the harvest as rice seed for the next season. Therefore they may not have to purchase as much rice

seed as an organic contract farmer who has to use the specific Japanese rice variety that is stated in the contract with the contract farming firm.

*Pesticides*

The cost for pesticide is very low for both organic and conventional rice farmers (310 kip/ha and 330 kip/ha respectively) which indicate the low usage of pesticide for organic and conventional rice production alike (Setboonsarng et al, 2008 and interview with Agung Nugroho).

In the table below the total material costs and prices of inputs are specified for organic contract farmers and conventional non-contract farmers and are extracted from the comparative case study by Setboonsarng et al (2008). All data in the tables 1 thru 3 are extracted from this study. All values in the tables 1 thru 3 (see below) are significantly different in the mean comparison between contract and non-contract farmers except for those values that are marked with a (\*) which are not significantly different at the 10 percent level (p-value). I have still chosen to include none significant values as they provide an indication of the cost proportions of organic and conventional rice production.

Variables	Contract	Non-Contract
Total Material Cost (1,000 kip/ha)	1,474	920
Seed cost (1,000 kip/ha)	283	81
Seed price (kip/kg)	2842	1913
Fertilizer cost (1,000 kip/ha)	814	528
Fertilizer price (kip/kg) (*)	3,347	3,231
Pesticide cost (kip/ha) (*)	310	330

**Table 1.** Showing the prices and cost of different inputs.

Source: Setboonsarng et al (2008).

The total material cost in this case shows that the organic contract farmer incur a higher total cost than the conventional non-contract farmer. This is because the organic rice producers will incur a higher cost of using the specific inputs of seed and fertilizer from the contract farming firm. The high cost for the organic production means a form of transformation pressure that should discourage farmers from making the transition over to organic production.

However as I will show in section 6.4 profit levels for organic contract farmers are much higher than for conventional non-contract farmers and so the final decision on whether to convert to organic or not for the farmers will be based on comparing costs of production with the additional revenues gained from the premium price paid for the organic product along with the increased physical yield generated from the improved inputs used that in the end would generate a higher profit.

### ***6.3 Transformation analysis of the factor market***

In the development block surrounding rice production the factors of production are essentially the same no matter if the production is organic or conventional. Both types of production require more or less the same quantities of land and capital in the form of cash, machines, storage facilities etc. The factor of production that may differ is that of the labour input (*interview with Martin Dunn and Agung Nugroho*).

Even though the development of rice production in Laos is relying more on machines today than on draught animals or manual labour, many procedures in rice farming still requires manual labour that can not be replaced by machines. Labour is somewhat a scarce resource in Laos. Statistics show that the labour force employed in agriculture is declining compared to the total work force in Laos (IRRI – statistics 2008). This should put an upward pressure on salaries paid to agriculture labour as they are becoming less abundant. An explanation for this is the development of other areas of employment, primarily in the urban areas, that is attracting more of the rural workforce because they may be less labour some. This leads to a higher competition for the agriculture worker which should cause the salaries to increase.

Salaries for hired labour have increased, but only to the same extent as the annual inflation rate. Thus the production cost for hired labour has followed the common price trend. The cost for hired labour today is approximately 30,000 kip per day/and worker (*interview with Martin Dunn*).

According to Setboonsarng et al (2008) the labour input in organic rice production is much higher than in conventional rice production using on average 147 days of labour per hectare compared to 88 days per hectare for conventional rice production.

This can be interpreted as a labour productivity decrease since an organic farmer will have to use almost twice as many labour days as a conventional rice producer.

The main reasons for the increased labour input in organic rice production has to do with the spreading of the bulkier organic fertilizers such as compost and more frequent weeding because of the use of less effective organic weedicide (Setboonsarng et al, 2008 and interview with *Agung Nugroho*).

But even though the need for labour input is higher in organic rice production the organic contract farmer household will stand for up to 80 percent of the total labour input as opposed to 67 percent in the conventional non-contract farmer household (Setboonsarng et al, 2008). And because the organic contract farmer family will use more of their own family labour as opposed to hiring labour the organic farmers do not suffer any direct cost for this but the farmers will suffer the opportunity cost of doing something else.

Except for the family labour, farmers usually hire labour for about 25 days per hectare and season for the transplanting, seedlings and for harvest (*interview with Martin Dunn*). The hired labour cost is quite high, accounting for approximately 1/3<sup>rd</sup> of the total production costs for rice farmers (Setboonsarng et al, 2008).

If labour became relatively more expensive this may have a negative impact on the transformation into organic rice production since the production methods used require more labour than in conventional rice production. A higher relative price for labour should decrease the demand for this factor of production and farmers should look for alternative factors of production or try to change the production method so that less labour will be used. This should have the opposite effect and make farmers reluctant to convert into organic rice production. But since the general solution to the increased labour requirement in the production is to use more of the family labour (Setboonsarng et al, 2008 and *interview with Agung Nugroho*) than the transition into organic rice production is not directly dependent on relative price changes for labour. The factor to consider for the farmer is mainly a question of opportunity costs for the additional labour input in organic production.

In the following table the use of labour as well as the cost of labour and capital is specified.

Variables	Contract	Non-Contract
Rental machine cost (1,000 kip/ha) (*)	136	166
Total Labour days	146,4	87,8
Hired Labour (days/ha) (*)	26	24,1
Ratio of family labour in total labour (%)	80	67
Cost of hired labour (1,000 kip/ha) (*)	783	792

**Table 2.** Data extracted from the study by Setboonsarng et al (2008).

The share of the labour cost of the total cost is much higher than the machine rental cost. This does not imply that machines are less costly to use in the production but merely indicates that the use of rented machines are less costly than the use of hired labour. This may also be an indication of farmers using less rented machines because they own their own machines to a greater extent. But as I have mentioned before machines and manual labour are not perfect substitutes in the Lao rice production and so even though machines may be relatively cheaper to rent it does not mean that farmers could just use machines in their production.

Related to the cost of using machines is of course the use of fuel. This is formally an input but will affect the usage of machines in the production and therefore I will comment on it in this section. An increase in fuel prices will also increase the relative cost of using machines. The fuel price has increased more than the annual inflation rate leading to an increase in the total production cost (*interview with Martin Dunn*). However this price change should impact conventional and organic farmers alike as they use their machines in similar ways (*Agung Nugroho - interview*). But if prices on fuel go up so will the prices for chemical fertilizer as the production process of producing chemical fertilizer requires fossil-fuel. Price changes in fuel should therefore impact conventional rice farmers more than organic rice farmers (*Agung Nugroho - interview*).

According to the table above the days of hired labour do not differ significantly between organic contract farmers and conventional non-contract farmers and that is also the case with the cost of hired labour. This indicates that both types of rice production use more or less the same amount of hired labour. I come to this conclusion because as I mentioned before organic contract farmers use more labour days per hectare than conventional non-contract farmers, but at the same time they use more of their own family labour in the production which means that they do not need to hire any additional labour. If the days of hired labour is the same than the

cost of hired labour should also be the same since the price for labour should be the same for both contracted organic farmer and conventional non-contracted farmer, which the insignificant difference in hired labour cost indicates.

When analysing the factor market it became clear that the production method used for organic rice production meant an increased use of labour in the production. Although the increased demands for labour in the organic rice production the relative price for hired labour on the factor market has remained the same (*interview with Martin Dunn*). A possible explanation for this is was that more or less all of the additional labour required in the organic production was performed by the farmers themselves meaning that the increased labour demand would have no impact on the relative price for hired labour. But even though the organic farmer did not suffer any direct cash cost for the additional need for labour the farmer still suffered the opportunity cost of not being able to do something else with his/her time. Therefore the need to use extra labour in the production of organic rice can exert a transformation pressure that would work in the *opposite* direction making farmers reluctant to make the transition over to organic rice production.

#### **6.4 Comparing the profitability of organic and conventional rice farming**

The following table will show the yield produced, the premium price paid for the organic product, the total cost of production, the revenue from the harvest and finally profit levels.

<b>Variables</b>	<b>Contract</b>	<b>Non-Contract</b>
Nr of Households	332	253
Revenue (1,000 kip/ha)	5,237	3,527
Rice Price (kip/kg)	1,587	1,344
Rice price of organic rice (kip/kg)	1,911	
Yield (kg/ha)	3,272	2,603
Cash Cost (1,000 kip/ha), i.e. Total Cost	2,251	1,778
Ratio of hired labour cost of cash cost (%)	32	45
Cost of hired labour (1,000 kip/ha) (*)	783	792
Profit per area of land (1,000 kip/ha)	2,924	1,751

**Table 3.** Reproduction of table 1. from Setboonsarng et al (2008).

As shown in the table above the production costs were higher for the organic contract farmer than for the conventional non-contract farmer, but at the same time the price for organic rice and the yield for the organic production were higher which resulted in higher average revenue and a higher profit for the organic farmer.

The higher yield for the organic contract farmers was the result of more effective inputs of seed and fertilizer that was made available by the contract farming firm. This can be seen as a production method innovation. The high yield production method innovation may also have convinced farmers to make the transition over to organic production since it would mean that they could produce more rice to sell. This change could be compared to a Dahménian transformation pressure of the market push type T1 that originated from the supply side and which indicate a refined production method that increased productivity. According to Dahmén's theory this type of transformation pressure should decrease the products relative price because the supply of produced organic rice would increase. However Lao Arrowny failed to meet the market demand in 2004, exporting only 540 tons of rice against the potential demand for up to 10,000 tons according to Setboonsarng et al (2008) study. The unsaturated demand would therefore still put an upward pressure on the prices for the organic rice despite the increased productivity.

Even though the more efficient inputs were relatively more expensive the increased yields that they produced in addition to the premium price paid for organic rice led to an increase in the farmer's revenues. Since the revenues increased more than the additional cost of the new inputs the organic contract farmers received higher profits compared to conventional non-contract farmers. Based on the assumption that farmers are profit maximizing the higher profit is likely to have convinced farmers to make the transition over to organic rice production.

However some studies show that smallholder farmers are not always profit maximizing, but rather base their decisions on trying to avoid disasters (Shahabuddin et al, 1986; Griffin, 1974) as they are exposed to numerous sources of risks. According to Njoman et al (2006) annual drought and flooding are the most serious constraints to rice cultivation in the Vientiane province, Laos. Thus the increased risk of using a for Lao conditions unproven crop, such as the Japanese rice varieties promoted by the contract farming firm Lao Arrowny Corporation, that may not withstand drought and flooding may discourage farmers from making the transition even though the price paid for this crop is higher. To avoid harvest failure, by using

already proven crops, may therefore be a stronger incentive for smallholder farmers than to increase their income by adopting an unproven crop that offers a higher price argues Rytönen (2004).

Evidence that contradicts the notion of disaster-avoidance behaviour and gives some support to the profit maximizing notion in this transformation is that a majority of the farmers expressed that the most important aspect influencing their decision to become organic rice contract farmer was the higher price they were paid for their products according to Setboonsarng et al (2008). Also the fact that farmers, in fairly large numbers<sup>3</sup>, have made the transition over to organic contract farming may indicate that they are less exposed to risks and/or that the increased income is a stronger incentive for these farmers.

### ***6.5 The contract farming firm's role in the transformation process and in the evolution of the development block***

I will now try to determine the importance of the contract farming firm in the transformation process and its ability to coordinate within the development block around rice production.

According to general economic theory it is the market/price signals that will govern individuals behaviour, but often the signals (market or policy) doesn't cause the economic agents to act in accordance argues Rytönen (2004). In the case of an existing export market demand for a particular product, organic rice in this case, the market signals may not reach the smallholder farmers, and therefore makes it difficult for them to act on it. The lack of price signals in rural areas is a sign of market failure which causes prices to vary widely across provinces (Njoman et al, 2006). Farmers with limited market access do not have knowledge of market prices for their products and often farmers are offered a price by traders which they cannot compare to the price on the common market because of their limited knowledge of it. Contract farming may be a way to improve this argues Setboonsarng et al (2008:17): "Contract farming appears to be particularly appropriate for rural areas where transport infrastructure has recently been established and in transition economies where institutions to facilitate market exchange are in an early stage of development." So by communicating price information from the world market the contract farming firm is contributing to increase farmers' knowledge of relative prices.

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<sup>3</sup> The number of contracted organic rice farmers has increased from 2,000 in 2004 to 6,000 in 2009 in Vientiane Province, Laos (interview with Khamsavang Mingboubpha).

Another reason for smallholder farmers for not acting on price signals on the international market may be because of the problems for the farmers to adapt to this new situation. For example if the demand is for a product that the farmers are currently not growing than the contract farming firm will contribute by providing credit, the necessary inputs and technical assistance to make the transition over to the demanded production possible.

The institutional arrangement of contract farming will also reduce the risks of making the transformation of farmers' production since the contract agreement will guarantee that the contract farming firm will purchase the farmers' products and at a predetermined price. By contributing with all of these factors the farmers will assume less of a risk in entering into a new business adventure and a new production method.

To sum up, the importance of the contract farming firm in the transformation process can be derived from its ability to facilitate links to the international market, communicating price information from the international market that due to market constraints in Laos is difficult to come by for farmers, and contributing with necessary credit to afford needed inputs for the organic rice production as well as providing technical assistance on how to grow the organic rice.

Hence, I would argue that it is unlikely that the transformation process would have taken place without the involvement of the contract farming company and that it is unlikely that the farmers themselves would have made the transition to organic rice without the assistance of the contract farming firm since they did not have the means to grow organic rice nor had the proper market channels to sell it.

### ***Determining the contract farming firm's ability to coordinate within the development block***

I will now assess the contract farming firm's ability to act as a coordinator within the development block of rice production. The contract farming firm may act as coordinator in the conventional way by linking to other economic agents in the value chain, such as input suppliers and to processing industries, in order to more successfully produce, process, sell and distribute the farming goods on the market. In interviews with a company representative from the contract farming firm Lao Arrowny Corporation I was told that the company both had links to suppliers of inputs and processing industries such as mills to ensure a steady flow of inputs and of processed rice to sell on the export market (*interview with Khamsavang*

*Mingboupha*). The contract farming firm also provided farmers with access to a larger market than individual farmers normally could through traders or their local market. And because Lao Arrowy Corporation is a joint venture between a Japanese company and a Lao company they had knowledge of the international market as well as the domestic market with developed trade relations and marketing channels for the export market (*interview with Khamsavang Mingboupha*). All of these features make the contract farming firm an important coordinator within the development block around rice production in the conventional sense.

However to perform the coordinating role in terms of a Schumpeterian banker the coordinator must also be able to act as a creditor and finance entrepreneurial innovations as well as financing complementary economic agents in order to improve the evolution of the development block argues Marmefelt (1998). By making complementary investments in other parts of the development block bottlenecks in the product value chain may be solved and the development block can develop more smoothly (Carlsson and Henriksson (1991) with reference to Dahmén (1950)).

I will now try to assess if the contract farming firm can perform the function of a coordinator in terms of Schumpeterian banker by determining if the contract farming firm provides credit for entrepreneurial innovations as well as for complementary investments to other economic agents within the development block.

One of the difficulties for smallholder farmers to transform its production system is because of their lack of access to finance. Most of the informal-, small- and medium enterprises in Lao PDR have pointed out that one of the major obstacles for developing and expanding their businesses is the lack of access to affordable finance (ADB and WB, 2007; NSC, 2004) Small holder farmers are generally very cautious when it comes to changes and to make own investments argues Rytönen (2004) with reference to Griffin (1974). Small holder farmers in Laos lack enough own equity to make investments for developing their production and to make a malinvestment may be harmful for their livelihood and food security (*interview with Agung Nugroho*).

Contract farming as an institutional arrangement can supply this much needed finance for farmers and the arrangement is also expected to reduce the risk for farmers as they will get a reliable buyer and market for their product (Fullbrook, 2007). The contract farming firm will

offer the farmers credit in cash or in kind for inputs to the production, such as seed or fertilizer that holds a higher quality than what the farmers can normally access in their local market or have the financial means to buy (*interview with Khamsavang Mingboupha*). Contract farming therefore has a role to play in offering a steady stream of credit to the contracted farmers that they can use to improve their production. Contract farming can in this respect be compared to other institutional arrangements that are providing credit to small holder farmers. Microfinance institutions is such a financial institutions that could supply this type of credit. However microfinance initiatives in Laos do not usually give any other production support or offer technical assistance on how to improve the farmers' production. To offer technical production assistance is common for contract farming firms (Fullbrook, 2007). This additional support from the contract farming firm will probably help farmers to make use of their credit in a better way and make them more successful when changing their production.

Microfinance institutions' main objective is to provide small loans to business vendors or farmers and their intent is not to finance entire development blocks. Microfinance institutions are therefore more like what Marmefelt (1998) is referring to as an arms-length banker. An arms-length banker will only have short business like relations to its customers while a contract farming firm may be compared to what Marmefelt (1998) refers to as a Schumpeterian banker within a bank-industry network that has more long term relationships with their customers. By maintaining long term relationships with the contracted farmers the contract farming firm may extract private financial information from the contracted farmers that can reduce the transaction cost when providing credit and this will make the credit even cheaper for the farmer (Marmefelt, 1998).

Based on the information above I argue that the contract farming firm can in some ways be compared to a Schumpeterian banker because it can provide credit to the contracted farmers, but if the contract farming firm can provide credit to other economic agents in the development block remains to be analysed in the next section.

***Can the contract farming firm provide credit to other important economic agents?***

I will try to determine this by analysing the main constraints that are obstructing the full potential and the development of the development block around rice production and organic rice production in particular.

### ***Main constraints for completing the development block***

“All rice production, including organic rice production, is constrained by the very poor post-harvest handling and milling procedures and facilities available in Laos. Although the situation is improving, Lao companies are incapable of meeting international standards for exports to major organic rice importing companies. While this includes organic certification, sanitary and physio-sanitary regulations are probably more important. This is a big constraint to Lao rice exports, especially because certified organic rice is in very limited demand in Laos.” (*Andrew Wilson – interview*)

The main constraints/bottlenecks that are limiting the expansion of organic rice farming and the completion of the development block around rice production in Laos have partly to do with institutional conditions and partly to do with bottlenecks in the product value chain.

The institutional factor that is limiting the expansion of organic rice farming is the lack of an internationally recognised organic certification body in Laos. The LCB (Lao Certification body) doesn't have the capacity or the resources: no proper testing facilities, no funds to manage an organic extension and supervision service, and most definitely not to international standards (*Tony Taucher – interview*). The lack of such facilities makes any attempt to certify the organic rice very costly, especially for the farmers who will have to incur the cost of getting an external inspector from ACT-Thailand (the Organic Agriculture Certification agency in Thailand) to inspect the production as well as the mills used for processing the rice if the organic rice is meant to be exported. The low international market recognition for organic rice from Laos also hampers the expansion as it is more difficult to market and sell these products on the international market. Thus certification costs are high and the amount of work required by farmers to operate internal control systems is substantial compared to the compensation they receive from the market (*Agung Nugroho – interview*).

In the contract farming case of Setboonsarng et al (2008) the rice grown by contracted organic farmers was not sold as certified organic rice but rather as plain organic. This simplified the production and processing of the rice since it did not require certification. When comparing to

the donor based PROFIL project the certification problem has made the project revert to producing organic rice for the domestic market instead of for export as the certification standards and regulation are so much higher for the international market (*interview with Agung Nugroho*).

“Overall, my experience is that the potential for certified organic rice in Laos is quite limited until the entire rice sector is reformed” – *Andrew Wilson*

The constraint relating to the product value chain has to do with the post production process of milling (and additional processing). The milling facilities in Laos does not have milling procedures that meet physio-sanitary international standards for export which makes rice exports directly from Laos very limited. The milling facilities are also too small scale to be able to process enough rice volumes to bring down the processing cost making any attempt to compete with the surrounding countries in terms of price difficult (*interview with Andrew Wilson*). “Logistics costs and export bureaucracy also make the final cost of Lao rice more expensive on the international market” – *Andrew Wilson*

This description by Andrew Wilson was also confirmed by the contract farming firm Lao Arrowny Corporation as the limitations in post processing proved to be a big problem for the contract farming firm. Even though the contract farming firm had relations with processing mills in Laos, they proved to have an insufficient processing capacity and used milling procedures that did not meet international requirements for export of rice (*interview with Khamsavang Mingboubpha*). Because of this bottleneck in post processing the contract farming firm had to transport the rough rice into Thailand for processing that met the requirements in order to export the rice to Japan. This meant high transport costs. Without sufficient in-house processing capabilities in Laos the cost of processing became too high and limited the export volumes which eventually caused the contract farming firm to terminate the business venture in 2009 (*interview with Khamsavang Mingboubpha*).

The limited abilities of the processing mills in Laos could have been overcome if the right measures were taken and the necessary investments were made. If the contract farming firm was a Schumpeterian banker in the true sense they should have provided the necessary credit for investment in the milling sector so that they could overcome the difficulties. But that did not happen and so one can question the abilities of the contract farming firm to perform the function of a coordinator within the development block of rice production. The explanation to

why the contract farming firm did not supply credit to the milling industry was because of its limited financial resources (*interview with Khamsavang Mingboubpha*).

## **7. Conclusions**

My analysis shows that there are two likely reasons for why farmers have chosen to make the transition from conventional to organic rice production.

The first reason was that organic rice farmers received a much higher price per kilo for organic rice than for conventionally produced rice. The price difference of over 40 percent, caused by an increased demand for organic rice on the world market, is likely to be an important reason for the transformation. This indicates a transformation pressure of the market pull type originating from the demand side in Dahmén's (1950) terms. This result confirms my hypothesis that the international market demand and its willingness to pay a premium price for organic rice caused the farmers to make the transition into organic rice production.

The second important reason was that thru a production method innovation the farmers increased their productivity and were able to produce a higher yield. This change meant that organic farmers could increase their revenue and ultimately their profit. This transformation pressure was of the market push type originating from the supply side in Dahmén's (1950) analytical framework. The production method innovation came about because the contract farming firm supplied the new and more effective inputs of rice seed and fertilizer. This innovation helped to increase yield and the total supply of organic rice. However the contract farming firm was still unable to meet the demand for organic rice because of constraints in the development block around rice production, particularly because of bottlenecks in the Lao post processing milling capabilities.

The two reasons can be treated as separate causes for the transformation, but may have been even more convincing causes for the transformation in combination. When combining the higher relative price paid for organic rice and the increased yield it led to an increased profit for the organic contract farmers. The higher profit is likely to have provided even greater incentives for farmers to make the transition into organic rice production.

Based on the following arguments I argue that it is unlikely that the transformation process would have taken place without the involvement of the contract farming company.

First of all the contract farming firm was able to provide links to the international market and secondly communicating the price information from the world market to the farmers that commonly had few other sources of price information. Thirdly the contract farming firm provided the organic farmers with more effective and high yielding inputs that were formerly unavailable. The new inputs transformed the production method enabling farmers to increase their yield. In addition to the former reasons the contract farming firm was also important for the transformation process because it provided the farmers with much needed credit for acquiring the necessary inputs used in the new type of production and also by providing the farmers with technical assistance on how to produce the organic rice. In addition contract farming as an institutional arrangement will reduce the risk for farmers to change their production since the contract farming firm agrees to purchase the farmers output and the farmers are also promised a predetermined price for their production that is specified in the contract.

This shows that the contract farming firm had an important role to play in the initial transformation process. However they were unable to fulfil their role as a coordinator in terms of a Schumpeterian banker in the development of the organic rice production because they did not invest in the milling sector to solve the problems with the post processing in Laos that constrained the development. The reason for why they did not invest in complementary industries was because the contract farming firm did not possess the financial means to do so. This meant that the expansion of the organic rice production was slowed down and ultimately led to the closing of the contract farming firm and its venture in 2009.

As explained in the shortcomings of this thesis the conclusions made here are mainly based on the specific case of the contract farming venture of Lao Arrowny Corporation. The conclusions may therefore have a limited explanatory value for the general causes for the transformation in to organic rice production. However, in spite of these limitations I would argue that parts of the conclusions, in particular the conclusions regarding the contract farming firm's importance for the transformation process are likely to apply to other organic contract farming initiatives in Laos, since the institutional arrangement of contract farming implies similar properties for example the ability of contract farming to reduce the risk of

selling the farmers output when farmers are changing into some other crop production by guaranteeing that the contract farming firm will buy the farmers output.

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<http://irri.org/our-science/targeting-and-policy/world-rice-statistics>

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