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## Helping small farmer communities in India: The development of a New Business Model for the cultivation of Azolla



### Team IMPACT

Carmen van Kruisbergen

Helma van Luttikhuizen

Juliette Oosterwegel

Chriss van Pul

Sookie Yiu

## Preface

Dear Mr. Ramachandran and employees of SEEDS,

We are pleased that we have the opportunity to support women in the Namakkal District by developing a New Business Model. As a finalist in the 1% Student Battle, we have learned a lot by using our skills and by being creative in our crowdfunding campaign. We truly hope that our plan contributes to the socio-economic enhancement of these women, their families and other farmer communities. We wish you all the best and good luck with this project!

Greetings,

Team IMPACT

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## Introduction

A 'New Business Model' (NBM) is developed in order to create a sustainable business model for the fair-trade production process of the agricultural product Azolla (fig. 1). The Azolla is a water plant which can be used as feed for livestock and as a bio fertilizer (Appendix I: Features of Azolla). The aim of this NBM is to enhance the socio-economic situation of 50 women in the Namakkal District who are selected by SEEDS. This is achieved by establishing a cooperation existing of these women, who implement this NBM with the primary support of SEEDS.



Fig. 1: Azolla

An NBM has three interrelated principles: multiple, shared and collective value creation. Value creation moves from one to a plural dimension, so not only economic values, but also social and ecological values are important. For Azolla this implies that the economic value is created by selling Azolla as feed for livestock. Moreover, Azolla contributes to the health of chickens and improves the size of eggs. This multiple value creation is realized through sharing, creating, exchanging, borrowing and saving.

The business model is implemented in two phases: the set up phase and the upscaling phase. Economical value is created by in the set up phase by offering the customers different membership options in the sales kit. These membership options offer the possibility to buy a certain amount of Azolla in kg. for a predefined period with discount. Secondly, social value creation relates to the employment and empowerment of women by taking into account the institutional context of India. Finally, ecological value will be created during the cultivation of Azolla in which no pesticides or other chemicals are involved.

To overcome the institutional barriers In India, the local partner SEEDS has an essential role since it has knowledge about the socio-economic situation. Most importantly, to make this NBM suitable for upscaling, a community network of different Indian tribes must be established, since they have different norms, values and regulations. As a result, shared understanding between these different tribes is created which contributes to a long-term survival of this cooperation.

## 1. Recommendations

The following recommendations are essential for the fair-trade production process of Azolla in the Namakkal District, in order to enhance economic security, social cohesion and empowerment of 50 women:

- Establishment of a cooperation consisting of the 50 selected women in the Namakkal District;
- Training of these women in production skills and business skills like sales, distribution and finance;
- Offer a sales kit consisting of Gold, Silver and Bronze memberships for customers. They pay in advance for a certain amount of Azolla in kg. for a predetermined period.

### 1.1 Customer Segments and Value Propositions

A distinction is made into customer segments for SEEDS and customer segments for the cooperation. The customer segment for SEEDS are the women in Namakkal, while the customer segments for the cooperation consist of the local market: 1) poultry farmers who need feed for livestock, 2) dairy farmers who need feed for livestock and 3) retailers who sell feed for livestock on local markets (Appendix III: Market Analysis). To meet the interests of the customers, Azolla needs to be positioned in the market by according to its special features, such as increased egg production for poultry farmers (Appendix I: Features of Azolla).

The cultivation of Azolla has social, ecological and economic value propositions for the customer segments (fig. 2). Essential is that the economic value proposition can only be achieved by first creating social and ecological value. Also the maintenance of customer relationships is important which is 1) transactional by providing income and 2) relational due to the memberships in the sales kit. This makes it essential for the cooperation to build relationships based on trust.

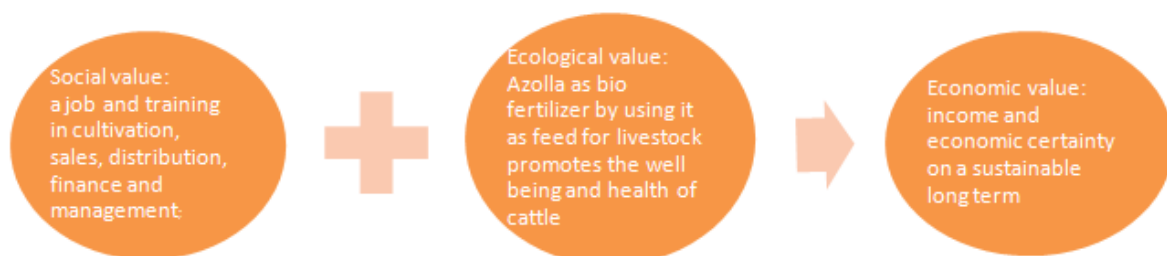


Fig. 2: Value propositions

## 1.2 Cooperation

A cooperation is established to meet the value propositions and to connect the 50 women with the local market as a supplier of Azolla. It aims to grow by achieving:

- Financial viability: providing a sales kit with membership options, so customers pay in advance which accelerates growth;
- Economic security: providing income to the women and their families;
- Social cohesion: due to open memberships all women can join the cooperation which stimulates social cohesion;
- Empowerment: providing skills and stronger bargaining position by working together (Appendix IV: Features of cooperation structure).

The cooperation consists of a specialized group of women which forms the management. They are selected by SEEDS and educate the other women in executing the key activities: Cultivation, Sales, Distribution and Finance (fig. 3). SEEDS is the most essential key partner In the set up phase of the realization of the NBM, since it trains the women in cultivation and hard business skills. Besides hard business skills, the women must also be trained in soft business skills such as confidence building, since they have a low strata in the society (Appendix III Market Analysis). Subsequently, due to peer-to-peer learning the role of SEEDS in providing skills decreases which makes the women more self-sustaining on the longer term.

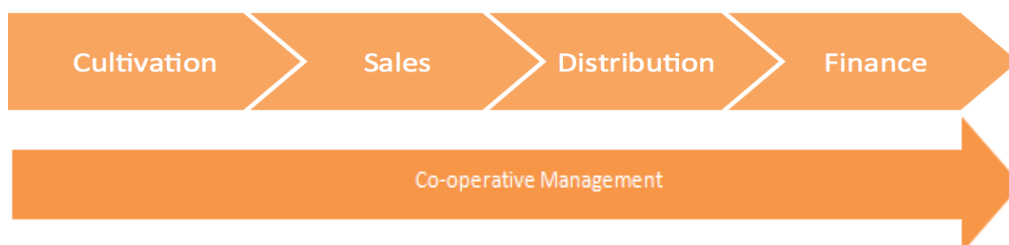


Fig. 3 Cooperation structure

## 1.3 Key Partners

Other key partners besides SEEDS are the 1) government, 2) Tamil Nadu Agricultural University which provides technical knowledge about the cultivation of Azolla, 3) competitors and 4) the OnePercentClub. Competitors are Monsanto and Syngenta, of which Monsanto has a monopoly on seeds in India, but many farmers are not able to pay the high prices for these seeds.

## 1.4 Key activities

During the set up phase the following activities are performed: training, production, sales and distribution. Next, the upscaling phase is described.

### 1.4.1 Set-up: Training

In the set up phase the women are trained in all key activities to gain overall knowledge and to become less dependent on each other. After this they become responsible for one key activity to become a specialist. To do this, SEEDS forms a training team, develops the training material and we deliver a manual guide for the training sessions that will be held by SEEDS. The training of women in the key activities is as followed:

1. The sessions start with a general presentation about the benefits of cultivating and selling Azolla. Since most women are illiterate, it is important to work with visualizations;
2. To train them in the cultivation of Azolla, the existing demo farm in Namakkal is used. This includes tanks filled with Azolla, to experience the cultivation process. The training team of SEEDS directs this;
3. Next to this, a simulation game will be organized in which the women are trained in all key activities of the cooperation. The training team of SEEDS directs the game. In this game the production and selling process of Azolla will be simulated. This simulation game is an activity that will be repeated, to give all the woman insights in different roles which are necessary to run a cooperation. Since different stakeholders can be identified within a cooperation it is important to make them visible in the simulation game (e.g. the roles of clients and investors).

### 1.4.2 Set-up: Sales

#### Sales kit membership options

Namakkal has over 100 poultry farms and around 50 dairy farms. To establish contacts with these customers a sales kit is used which offers them three membership options: Gold, Silver and Bronze. This membership option gives them the certainty for receiving a certain amount of Azolla in kg, for a predetermined period and with a discount, by paying in advance. This results in economic security and food security for livestock for both the customer and the cooperation. The membership options are as followed:

- 
- **Gold member: 300 kg Azolla for 3 months with a discount of 20%**

Normal price: 15.000 Rps (300 kg\*50 Rps) price with discount: 12.000 Rps

- **Silver member: 200 kg Azolla for 3 months with a discount of 10%**

Normal price: 10.000 Rps (200 kg\*50 Rps) price with discount: 9.000 Rps

- **Bronze member: 150 kg Azolla for 3 months with a discount of 5%**

Normal price: 7.500 Rps (150 kg\*50 Rps) price with discount: 7125 Rps

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Fig. 4: Membership options

During the set up, the 50 women cultivate a maximum of 1000 kg of Azolla a month with 150 water tanks. This is enough for almost one small poultry farmer with 2000 chickens (600 kg Azolla = 1000 chickens). Thus it is Important that the sales kit is a trial set in this phase, which is used as a trigger to familiarize the customers with the advantages of Azolla by providing a little amount to try. When the customers are convinced, the membership options are extended which makes the cooperation able to accelerate growth since investing in the enhancement of the key activities is made possible more quickly.

### **Ambassadorship for sales**

Ambassadors are selected for the key activity Sales. These ambassadors have a higher strata than the official target group of the cooperation, such as a tribal community leader, influential people or politicians. This is essential since the target group consists of women with low strata and low political empowerment, which can result in that they will not be taken seriously as an entrepreneur by the customers. The ambassador is also the gatekeeper for attracting other women with high strata which contributes to expanding the cooperation.

#### **1.4.3 Set up: Distribution**

### **Decentralized cultivation, centralized storage**

The cultivation of Azolla is decentralized, since the women cultivate three ponds of Azolla in their own backyard. However the Azolla is stored at one central place to be able to deliver a bigger amount of Azolla at once, which is essential to run the cooperation. This centralized location also creates a meeting place for the women which contributes to social cohesion in the cooperation.

#### **1.4.4 Set up: Finance**

In this phase SEEDS has an important role in managing the finances. However, step by step the co-operative management are also trained in these skills, so they become more self-sustaining. During the simulation game, the other women will also get familiar with a simplified view of the financial management. However they will not execute this key activity, but primarily the co-operative management.

#### **1.4.5 Upscaling phase key activities: Accelerate growth and become more self-sustaining**

Growth in the cooperation is accelerated by selling extended membership options and by the trust which is built between the cooperation and its customers. This results in investments and savings. Also conducted research by the Tamil Nadu Agricultural University to enhance the cultivation process, can be implemented due to investments. The role of SEEDs in the cooperation decreases and takes the form of an Advisory Board, which makes the cooperation more self-sustaining.

### **1.5 Cost-benefit streams**

The NBM creates economic, social and ecological costs and revenues.

#### **Economic**

The most important costs are the water tanks and seed for the establishment of three Azolla plots per women (Appendix V: Cost-benefit analysis). Based on the cost-benefit analysis of SEEDS, the cooperation has a revenue of around 1420 Rs. on a monthly basis in the set up phase. Furthermore, part of the profit will be shared by the women, the other part stays in the cooperation for further investments and as a buffer in case of unforeseen events.

#### **Social**

The social costs rely in a shifted position between men and woman in India (Appendix III: Market Analysis). A changed attitude into good will by the men towards women is essential, in order to support the new role of women in society. Next, the women are empowered by training and the c-operative structure. At last the cooperation creates a social safety net, since it provides income for the women which they can use to educate their children. empowerment of women.

#### **Ecological**

A possible cost of the cultivation of Azolla is land degradation. If the Azolla cultivation increases in amount, it will take up more space and could also lead to an increase in livestock. Another risk lies in the nature of the fern itself. Because it grows rapidly and if it is (accidentally) introduced to new areas, it could begin to choke river systems which previously flowed freely. The disposal of any water from the troughs must be managed to ensure that the plant is contained within the growing systems. Ecological revenues are the higher nutritional values compared to other food plants and that Azolla is cultivated without the use of pesticides.

### **1.6 Set up phase time frame**

This model shows the start-up phase of the cooperation. To establish the cooperation, the 50 women need to be trained in cultivation and business (sales, finance, distribution and self-confidence) skills. The training program involves a simulation game where the women are trained in all skills, to increase internal independency. This is where we will support if we get the opportunity to go to India. After this they will be specialized in one of the key activities so they become a specialist, which contributes to a working together culture. The influencing role of SEEDS decreases at the end of the set up phase, but still remains visible as an Advisory Board.

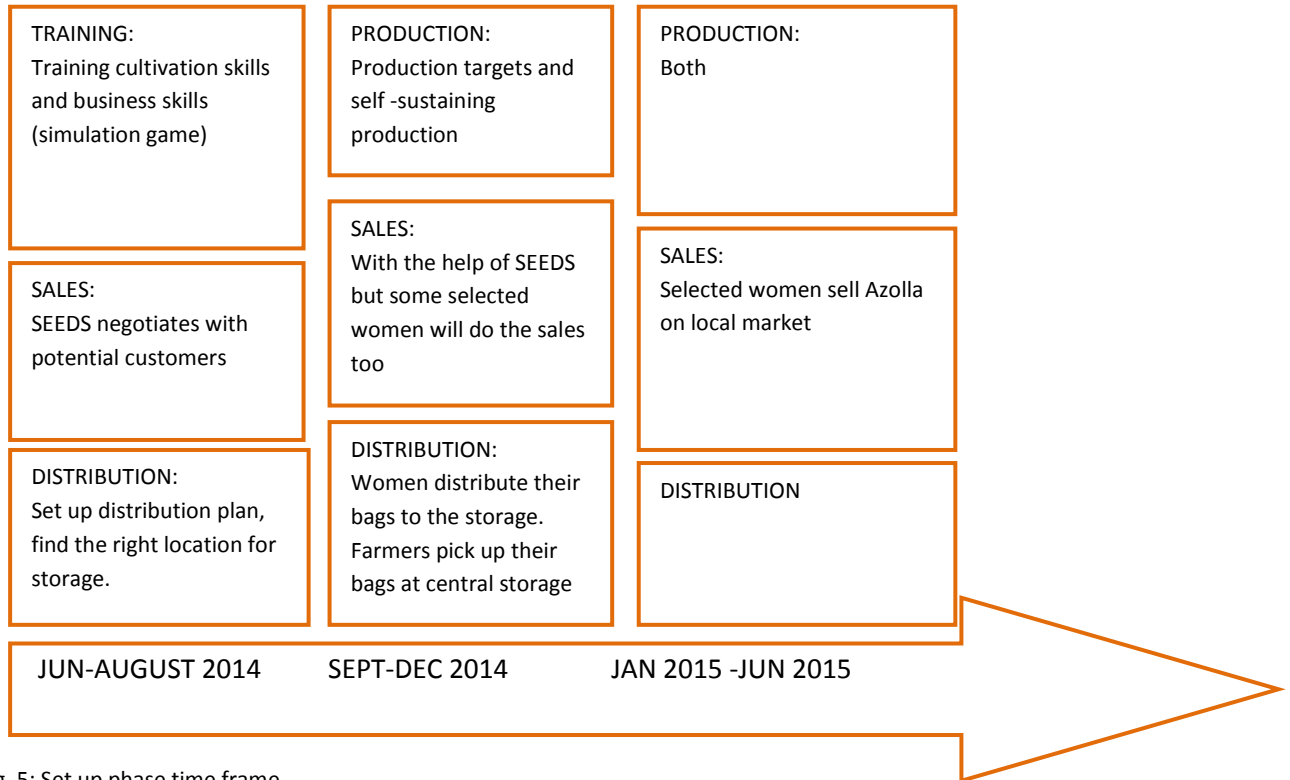


Fig. 5: Set up phase time frame

## Appendices

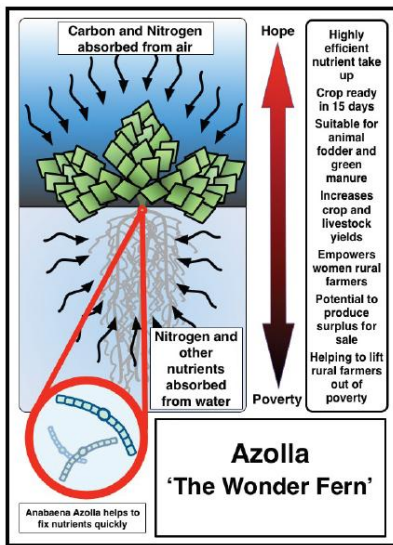
### Appendix I: What is Azolla?

The Azolla plant, also called 'the wonder fern', has several species, indigenous to different areas globally and is already widely used to manage the ecosystem within rice paddies. Features of Azolla are:

- Relatively easy to manage for cultivation;
- The currently used commodity is the education process in managing and utilizing it effectively (Norval, 2014);
- Azolla is rich in proteins, vitamins, minerals and growth promoter intermediaries and the carbohydrate and fat that the plant contains is very low. The composition of these features makes the plant an effective feed for livestock;
- The plant can be fed too many different animals like goats, pigs and rabbits. For poultry famers the weight of the broiler chickens increased and the egg production increased with the use of Azolla. For dairy animals it increases the milk production with 15 percent when 1.5 to 2 kg of Azolla every day (combined with every day feed);
- Next to the use of Azolla as feed, it can be used for the cultivation of paddies; on average it increases the production with 20 percent. The plant is in this case used as a bio-fertilizer for wetland paddy and is most used in China, Vietnam and the Philippines (Doing it naturally 2010).

In summary, this plant can be used as a bio fertilizer and as feed for livestock. In the district of Namakkal a lot of poultry farmers are potential customers to buy this plant as feed for livestock. In this district are no rice fields, thus using it as a bio-fertilizer is not economic viable (CrossRoads, 2010).

Fig. 1. Azolla 'The Wonder Fern'



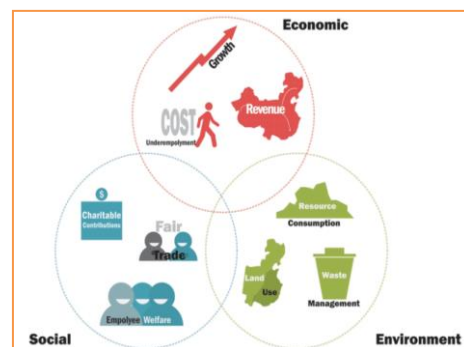
**Appendix II : What is a New Business Model (NBM)?**

Sustainability poses the question of whether there is enough for everyone, today and tomorrow. The answer is not simple. It involves more than saving or improving. It is about being ‘radically different’. It’s about transformation and transition. We need to work towards a different economy: from a linear economy to a circular economy. This requires a different way of thinking, living and organizing.

Sustainability in today’s business forms an increasingly important challenge for many organizations. To facilitate sustainability in business, New Business Models (NBM) are required. In these models, the complex concept of multiple, collective and shared value creation takes a central place. Value creation moves from one to a plural dimension, so not only economic values, but also social and ecological values are important. It also concerns shared value: the core is that people who participate in the process also benefit from the value they create together. Finally, it is a form of collective organizing: a process of co-creation and cooperation: creating value for a community. These principles are the opposite of the more traditional models that often focus on a single (economic) value perspective (Jonker, Tap and van Straaten 2012).

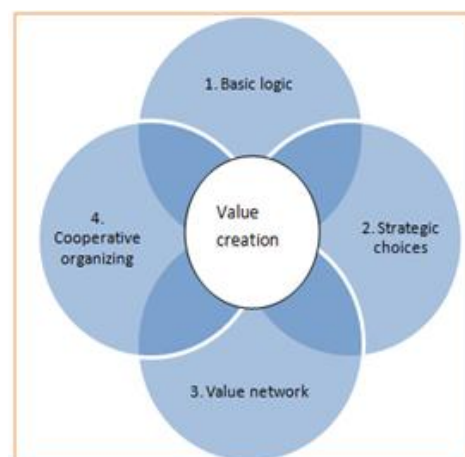
**2.1 Three values: economic, social and ecological**

In the New Business Model, transactions simultaneously generate economic, social and ecological value(s) (figure 3). These three values relate to the three P’s of People, Profit and Planet. Sustainability is embedded in these values. It is not just about earning money, but also about other things that create value, such as safety, caring for each other and caring for nature (Jonker 2012).



*Fig. 2. Multiple value creation*

Central in the value proposition of the New Business Model is ‘reciprocal value creation’. The NBM is concerned with the entire value network. What characterizes a value network compared to a more traditional value chain, is that there is a high degree of equality between the parties: they need each other; one cannot exist without the other. So NBM are based on the idea that organizations and communities build a



*Fig. 3. Basic elements NBM (Jonker, Tap and van Straaten 2012, p. 12).*

relation of reciprocal responsibility (Jonker, Tap and van Straaten 2012). This leads to four basic elements that can be distinguished (figure 4):

1. Basic logic (the values and assumptions that parties share with each other);
2. Strategic choices that are made;
3. Developing and maintaining a value network;
4. Cooperative organizing.

These four elements constitute the building blocks for mutual value creation and at the same time form an entry barrier for competitors. The 'earnings model' is not in the possession of any one organization or party, but in the hands of the collective (Jonker, Tap and van Straaten 2012).

## **2.2 Three currents: sharing, exchanging and creating**

Most of the NBM are categorized in one (or more) of the following three currents:

- *Sharing*

The sharing of social capital, time and skills is a phenomenon that recurs in many New Business Models. This type of New Business Models are focused on the formation of partnerships through which people, ideas, things, data and transportation are shared. Furthermore, in many of these business models, knowledge sharing and networking form an important basis for undertaking business. The term 'reciprocity' is related to this (Jonker, Tap and van Straaten 2012).

- *Exchanging*

The second current is 'exchanging'. This current is concerned with transactions that are made with alternative payment methods, such as points, credits, hours and saving systems. Furthermore, a model could be based on the pursuit of transactions without payment, such as the exchange of services ("if you maintain our website, we take care of your administration"). The models are characterized by including not only money to sources of capital, but also the social value of knowledge, networks and attention (Jonker, Tap and van Straaten 2012).

- *Creating*

The third and final current consists of 'creating'. New Business Models are trying in different ways to simultaneously create win-win situations and multiple values. For example, a business model can save energy, reduce CO2 emissions and also create economic profit. The transaction model is then linked with different objectives. It concerned with creating win-win situations (Jonker, Tap and van Straaten 2012).

### **2.3 Common denominator: establishment of relationships**

The common denominator within these three currents is the establishment of connections. Without connections and partnerships, you cannot create exchange and share. The connections often create all kinds of new configurations of different parties: cooperation between different, often not obvious natural parties. Individuals, local governments, neighborhood initiatives and large commercial enterprises are then connected with each other in new compositions. So a sustainable business model needs to make, facilitate and maintain connections and needs to create involvement and commitment (Jonker, Tap and van Straaten 2012).

### **2.4 Seven characteristics of NBM's**

At least seven characteristics of NBM's can be identified (Jonker, Tap and van Straaten 2012):

- 1) Forms of cooperative collaboration as a key principle;
- 2) The creation of multiple values: concerns striving for a balance between values like nature, money, care and so on;
- 3) Money is no longer the only medium of exchange. Also time, energy or care may be earned, used or exchanged. In line with this, the profit (surplus value) is shared with participants;
- 4) There is an economy based on needs and the utilization of these needs (now and in the future). To overcome the time delay between 'deserving now' and 'using later', forms of credit booklets are used, for example for energy, food or care;
- 5) Property (ownership) of the means of production is no longer central. "Having access to" is probably more important. From now on money is paid for use, not for possession;
- 6) Long term commitment of all partners is important. High level of reliability in the relationship is important;
- 7) And Finally: working with alternative types of 'money', such as points or time.

Most importantly, NBM's must be financially sustainable (they can sustain themselves) and linkages, connections and collaborations with partners must be created and maintained.

### Appendix III : Market analysis

Many factors need to be taken into account when creating a New Business Model for the cultivation of Azolla. This section elaborates on:

- Macro environmental conditions: developments in India which affect the New Business Model;
- Meso environmental conditions: developments in the direct environment of the New Business Model. The Five Forces model of Porter supports the meso analysis.

These conditions justify the choices that are made in the development and implementation of the New Business Model.

#### 3.1 Macro factors

##### *Free market economy*

Because of the free market economy the rapid population growth has increased the unemployment and poverty ratio dramatically. The middle class has advantaged from the liberalization of the market. However, on the country side the poverty still exist. The gap between people in the cities and people on the rural areas is large. India has the highest poverty concentration of the whole world (Kastenstelsel, 2014). Since the economic reform, subsidies for irrigation, fertilizers and electricity are taken away. Next to that, Monsanto, a company that sells genetically modified seeds, is pressuring the rural farmers to buy their overpriced seeds. The forcing nature of Monsanto is present even in the rural areas of India (Kastenstelsel, 2014).

##### *Inequality between man and women*

The relationship between man and women is unequal. Institutions play a significant roll. The difference between man and women originates from the cast system. Because of the still noticeable after effect of the cast system, women are discriminated. They are subordinate in daily life by man (Kastenstelsel, 2014). Many women will stay dependent their entire life on man. As a child she is dependent on her father, as a wife on her husband and as widow on her son. When women become widow they have a chance to become homeless. When this happens, they need to beg for money and can't live a financial healthy life anymore (Kunst en cultuur, 2011). Being financial independent will make the women in India less vulnerable in the future. However, being financial independent means generating money for a living. The high numbers of illiteracy is obstructing rural women from

starting up businesses or apply for a microcredit. The percentage of women being illiterate is 50% in India. This number can vary between the different regions (Verrijp and Willems, 2014). In Namakkal, male and female literacy were 82.5% and 66.5% in 2011 (Namakkal district, 2011)

Women are not allowed much freedom, they occupy low strata in the family and community and they are not political empowered (Ramachandran 2014). According to Vermeulen (2013), the deeply embedded institutions need to change before women will be allowed to start cooperations, getting financial independent and having a voice in the community. Framing is in this case one of the most important mains for changing institutional systems. This can for example be done by involving men that have a high status in the community and might be open for the idea of women working and maintaining a cooperative.

### **3.2 Meso factors**

*Available markets in Tamil Nadu: poultry and dairy*

The two fast growing livestock sectors in India are the dairy sector and the poultry sector, these sectors are commercialized which indicates that the sectors are under pressure of fast growing demand. Poultry is at this moment the most promising sector in terms of production and efficiency. The growth of the sector is about eight to twelve percent each year (Kotaiah, 2013). India holds the third position of the egg production in the world (Farm, 2012).

With the growth of the sector, the structure of the poultry production is changed. The sector is transforming from backyard production into a commercial system. Because of this shift investments have been made what resolves a rising line of the poultry sector (Agriculture and Customer Protection, n.d.). However, animal husbandry still has a large share in the sector. In most rural areas it is in the hands of small and marginal farmers. Nevertheless, even in these regions the poultry farming has developed into an industry. It becomes a profitable enterprise and provides a stable income to the rural farmers (Agriculture and Customer Protection, n.d.).

The Tamil Nadu region of India is characterized by the many poultry farms the area contains. The egg production in this region is the second biggest of India with a production of 10.8 billion eggs per annum. (Poultry development schemes, n.d.). With this number, Tamil Nadu accounts for more than 17 per cent of the poultry population country wide. Poultry, lorry transport and related businesses are the economic drivers of the town. Next to the egg production, many different crops are grown within Namakkal. The poultry sector develops in different speeds concerning the states of India.

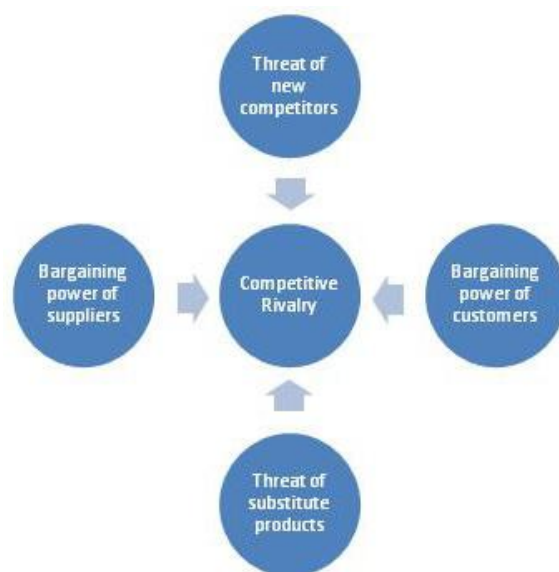
Table 1 shows different states and the development in the poultry sector (Bhardwaj and Kumar, 2005). These data could be leading in the choice for upscaling activities of the New Business Model.

Slow poultry developing regions	High poultry developing regions
Northern Region → Himachal Pradesh & Uttar Pradesh	Northern Region → Haryana and Punjab
North East & Eastern Region → Assam and N.E. States	Central region → Rajasthan
Central and Western Region → Madhya Pradesh and Goa	Western Region → Gujarat and Maharashtra
Southern Region → Kerala	Southern Region → Andhra Pradesh, Tamil Nadu and Karnataka
	Eastern Region → West Bengal

Table 1. Development poultry sector 2005

### 3.3 Five Forces model of Porter

The Five Forces model of Porters sheds light on sources of competitive rivalry. **The threat of new competitors** is significant by the ease of cultivating Azolla , due to the low costs and fast growing properties of the plant. Thus the threshold for competitors is low. In addition to that, a small investment is needed and there are low risks of crop failure. Moreover, the threat of existing competitors is relative high as well. As mentioned before, Monsanto holds the power of oblige farmers to buy there seeds for the crops. Next to Monsanto, Syngenta is an active competitor in India as well.



**The bargaining power of customers** is controllable in the New Business Model, due to the special sales kit that is design for the customers, which regulates the bargaining power. Customers can choose their own packet that fits them most. When contracts are signed, both parties have their obligations. However, the bargaining power might be higher when talking about the prices ranges

that will be set. Azolla is a product that will improve the quality of production, but it is not a necessary nutrition that has to be fed. The need for the customers is not of a substantial nature. This means that the cooperation cannot force high prices. The advantage of rural farmers as customers is the fact that formal communication systems do not (or hardly) exist. Forming a collective group of empowered customer demands will be hard.

The **threat of substitute products** is high since there is already feed for livestock available for the local farmers. However, the advantages of Azolla are more than only nutrition. With the specific advantages mentioned in the previous section, direct substitution might be hard to find. In addition to that, the plant can be seen as special as well because of the unique growing speed. Azolla is one of the fastest growing plants on the planet. Though, it does not need any soil to grow (Azolla Foundation, n.d.).

Finally the **bargaining power of suppliers** is low in the set up phase of the New Business Model, since the cooperation supplies Azolla by themselves. In upscaling phase the supply chain might be extended which indicates that the bargaining power of suppliers increases.

## Appendix IV: Features cooperation structure

### 4.1 Why a cooperation ownership structure?

A cooperation ownership structure is suitable for this case since its characteristics contribute to a socio-economic enhancement of the local farmer communities, for instance the provision of education. In addition to that, SEEDS has more than 20 years of experience in the establishment of cooperatives to enhance women empowerment. The characteristics of a cooperation are:

- Voluntary and open membership; all women can join, no matter what their degree of knowledge/skills/strata level is → stimulates social cohesion;
- Member economic participation;
- Autonomy and independence → results in higher commitment;
- Provision of education, training and information → simulation game, more discussed in depth later;
- Concern for the community → contributes to local farmer communities and higher socio-economic independence of women and their families.

The most essential general advantages of a cooperation for this case are: (Motiran & Vakulabhranam, 2007):

- Provides the women the opportunity to work together and in this way create a stronger bargaining position;
- Provides the possibility to share tangible resources (such as water tanks) and intangible resources (such as knowledge / cultivation skills) and in this way take advantage of economies of scale;
- Provides the possibility to share input costs such as water tanks, which results in increased income;
- Provides the possibility to create better access to information sharing compared with 'outsiders', which contributes to a better knowledge management and in this growth in the cooperation;
- Together the women have more control over the cultivation of Azolla, which results in a higher food security.

Finally, the major constraints of a cooperation below are tackled (Singh & Pundir, 2000):

- Lack of professionalism in management;
- Inability to attain financial viability;

- Lack of good internal work culture that does not contribute to growth of cooperations as business enterprise.

A cooperation management is developed by peer-to-peer learning, where women are trained in developing management skills by the management of SEEDS. Thus there is no lack of professionalism in management. Secondly, financial viability is achieved by collective and individual investments. Collective investments are investments by all women who are part of the cooperation and is a fixed percentage of the monthly revenue. On the contrary, individual investments are not a fixed percentage and the women can choose for themselves to invest or not. The advantage of individual investment is that the women receive a higher say in the cooperation in return, which has the objective to create a higher commitment towards the cooperation.

Most importantly, financial viability is achieved by the special financial packages which offers customers the option to pay in advance, in return for economic and livestock food security. In short, this means that customers pay in advance for receiving a # amount of kg Azolla, spread over for instance the upcoming three months (more about these financial packages in 4.3.3). It gives the customers economic security since they are guaranteed of enough food for their livestock, which results in the guarantee to sell for instance # amount of eggs or chickens. Thus they are more guaranteed of achieving their average monthly income. In addition to that, the financial packages result in economic security for the supplier too, since they are able to accelerate growth more easily by financial payments in advance.

Finally a good internal work culture is achieved by peer-to-peer learning and individual investments, of which the latter results in a higher commitment of the women.

#### **4.2 Key objective cooperation: break down poverty cycle and train hard and soft skills**

The key objective of the cooperation is to enhance socio-economic development of the local farmer communities in Namakkal. To show how this is achieved, see the figure below. The generation of income provides margins for savings. In turn, the savings are used as investments. For instance, a small truck can be bought for the transport of Azolla to the local market or technologies for a better cultivation of Azolla can be bought. As a result, investments accelerate growth which leads to the generation of (more) income. See the figure below that visualizes breaking down the poverty cycle.

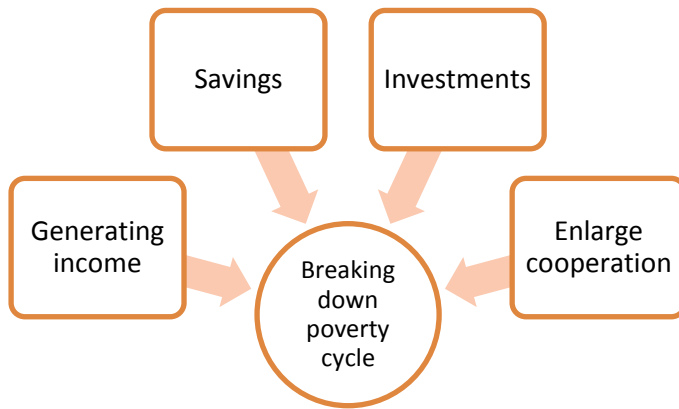


Fig.4: Breaking down the poverty cycle

To make this cooperation structure work, we can learn from Project Shakti created by Hindustan Unilever, since their target group also consisted of Indian women living below the poverty line and in rural areas (Neath & Sharma, 2008, p. 13). Gavin Neath is the Senior Vice-President of Corporate Responsibility by Unilever and Vijay Sharma is the former head of Shakti by Hindustan Unilever. One of their key lessons in achieving rural wealth creation and successful business operation, is that women with low strata and income need hard skills such as selling, as well as soft skills such as confidence building. Thus the cooperation management must also provide training in confidence building which results in social cohesion and a more sustainable future for the cooperation.

The social cohesion contributes to a more unambiguous vision which is needed to overcome future challenges. According to Neath & Sharma (2008, p. 16), “creating convergence between activities is the key to progress” and that working together and using infrastructure is an important part of the solution. The cooperation stimulates the creation of an unambiguous vision by training the women in all key activities (cultivation, sales, distribution and finance) at first and then specialize them into one of the parts. In this way every starting women has an overview of all key activities which enables them to create an overall vision of the cooperation. In addition to that this multi-task training lowers the internal dependency, since the women can replace each other quickly in case of sickness. As a result, the training in all key activities in the set up contributes to a lower internal dependency, but afterwards the specialized training in one of the key activities contributes to interdependency, since a group of women become experts in these key activities. This interdependency stimulates working together, which results in empowerment and social cohesion.

## Appendix V: Cost-Benefit analysis

Table 1: Cost-Benefit table cultivation of Azolla (SEEDS, 2014)

Sl.No	Details of Investment and Returns	Expenditures	Income
<b>1.</b>	<b>Investment Cost</b>		
<b>A</b>	Cost towards construction of Cultivation Tanks with low cost brick-cement Mortar- 3 nos ( 10x 3 x 1.5) @ Rs. 1000 per tank	3000	
<b>B</b>	Provision of Silpaulin Sheets to tanks @ Rs.150 per sheet -3 sheets	450	
<b>C</b>	Provision of Low-Cost Shade materials to tanks – LS	600	
<b>D</b>	Cost Towards Super Phosphate * 100 gm per tank * 3 tanks @ Rs.15 per 100 gm	45	
<b>E</b>	Application of Sand and Cow Dung to 3 Tanks for a year ( LS)	200	
<b>F</b>	Azolla Seedling * 5 kg per tank * 3 tanks @ Rs. 20 per kg	300	
	<b>Total Investment Cost</b>	<b>4595 Rps.</b>	
	<b>Beneficiary Contribution</b>	<b>1295</b>	
	<b>Grant to Women EURO 40 per head ( INR 80 per head approx)</b>	<b>3200</b>	
<b>2</b>	<b>Profit Analysis</b>		
<b>A</b>	Yield From 3 Pits * 20 Kg per month of Dry Azolla from @ Rs.50 per kg as sale price ( 20 kg x Rs.50)		1000
<b>B</b>	Self utility to livestock/agriculture Say 60 kgs harvested each month from one tank in wet form @ Rs.10 per kg of approx value		600
	<b>Total Income</b>		<b>1600</b>
<b>C</b>	Less reinvestment of mineral mixtures once in 7 days –Super Phosphate @ Rs.45 per week( ie) Rs.180 per month	180	
	<b>Gross income from yield and sale of Azolla Per month</b>		<b>1420</b>
	<b>Total Income Per year</b>		<b>17040 Rps.</b>

Two -third of the harvest is cultivated routinely from the tank, say daily or twice a week or weekly and dried. It is expected to have 60-80 kgs of wet Azolla monthly from a single tank. The yield from one tank will be utilized in a wet form for self need of livestock keeping; say 60-80 kgs and the yield from further two of the tanks, say 120-160 kgs will be utilized for drying and sales. On drying, the

Azolla diminishes to 15-20 % by weight and hence yield 10-15 kgs per tank per month. Hence three tanks are expected to harvest 20-30 kgs of dry Azolla in a month. So, per month a total of 1000 kgs of dry Azolla will be produced (20 kg \* 50 women). These dry Azolla will be bagged in 5 kgs, 10 kgs and 25 kgs. The standard market price of Rs.50 will be fixed per kgs.

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