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Pro poor Business Models for Aquaculture

Final Technical Report

to

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7. State of Project Implementation and Assessment

The project goal was to *identify innovative pro-poor business models and finance options for investments in small-scale aquaculture, consistent with the WorldFish mission of reducing poverty and hunger.*

The project team has successfully achieved this goal, and identified new opportunities and methods for private and public investment into small-scale aquaculture that have potential, if implemented at scale, to contribute significantly to increased productivity of small-scale aquaculture farms, increased sustainable fish production and poverty reduction among smallholders in the developing world. The improvement of small-scale aquaculture farmers towards sustainable and commercial oriented farmers is consistent with the WorldFish mission of reducing poverty and hunger, and relevant to various CGIAR research programs, but particularly the CRP 1.3 (Aquatic Agricultural Systems) and CRP 3.7 (Livestock and Fish).

There were five project outputs, and associated activities. Table 1 summarizes the state of activities, indicating completed or not completed activities. Further details of the activities conducted under each output are provided in the text following the summary table.

Output 1: Analysis of overall economical situation of small scale farmers in collaborative structures and existing value chains.

A literature review described a range of existing business models associated with private sector collaboration with smallholders in agriculture and aquaculture. Agriculture was included because of the greater experiences on business models smallholder agriculture. The review was also informed by interviews with selected key stakeholders in finance, production management and value chain organizations. Major findings from the review include:

- Smallholder farming dominates worldwide aquaculture production, with 90 percent of production from developing countries. With annual growth rates of 6 to 8 percent, aquaculture is the fastest growing sector within the global food production system. From the worldwide 500 million smallholder farms, there are approximately 20 million smallholder farmers engaged in aquaculture. Enhancing their horizontal and vertical business connections offers a chance for smallholders to capture a higher share in the constantly growing aquaculture sector.
- Due to the characteristics of aquaculture, the organizational and economical problems aquaculture farmers have to face are very similar to those of their peers in agriculture. Even though, small-scale farming can be economically feasible, smallholders forfeit apparently the opportunities that production on a larger scale can offer. Smallholders face constraints in resources like access to finance, information, management capacity, and technological capability. In addition, smallholders suffer disproportionately from external barriers like market imperfections and regulations. Accordingly, the probability of smallholders joining production networks, e.g. as direct or indirect exporters, or investment networks, is lower than that of large firms. In some cases, lack of access to markets may not be a concern, but in others opportunities are lost for increasing farm incomes and addressing poverty.
- Existing forms of smallholder aggregation reviewed include various forms of *horizontal* and *vertical* cooperation. Horizontal cooperation (*aggregation models*) mainly involves farmers undergoing some form of organization and aggregation among themselves, with less vertical (value chain) cooperation. Such aggregation can create an economy of scale, influence over other private and public stakeholders, and harmonization of the production technology used, products, input and output supply to a certain extent. Companies which purchase or deliver to aggregation models are working with multiple smallholders at once, thereby decreasing transaction costs. The specific organization forms include farmer associations, farmer organizations, lead farmers or nucleus farms and cooperatives. Other forms of horizontal aggregation and their positions towards value chain like farmer clusters, lead farmers and One Stop Shops were also critically reviewed.

Table 1: BMSA Project - state of activities, indicating completed (C), ongoing (O) or suspended (S) activities.

Output/Activity					Achievement	Adjustments made	Attachments
No.	Description	C	I	S			
Output 1: Analysis of overall economical situation of small scale farmers in collaborative structures and existing value chains							
1.1	Review existing academic and grey literature and material about finance of small holders in aquaculture based on public available information sources review of literature and research reports about existing cases of cooperation models in Indonesia and Bangladesh	✓			Review completed	Analysis of case studies in India, instead of Bangladesh	Annex 1
1.2	Interviews with selected key stakeholders in finance, production management and value chain organizations	✓			Interviews conducted with smallholders, finance and participants in value chain during field visits, workshop and other <i>ad hoc</i> opportunities		
Output 2: Economical, social and environmental assessment of the advantages, constraints and results of three models of collaboration							
2.1	Detailed description and data inventory of the 3 model types (i) a horizontally connected 'collaborative type' model; (ii) a vertically integrated 'cooperative type' model incorporating routes to market; (ii) a 'corporate type' model based on a separate management body with organization structure, responsibilities dependencies, value chain structures, evaluation of the finances for system inputs and outputs	✓			Description of three models types completed		Annex 2
2.2	Design of comparative business plans for the three models including service descriptions, economic, social and environmental feasibility checks and elaboration of the investment needs and returns of investments, guarantee systems and repayment controls	✓			Business plan for one model in detail analyzed and two other cases compared. Business plan modeled for the three types. Comparison of cases based on business plan framework		
2.3	Evaluation of the different models regarding finance opportunities and needs of included farmers and sustainability check.	✓			Financial landscaping of impact investments, accelerator and incubator finance conducted, on site activities delivered details on financial needs of smallholders		

Output 3: Case studies of the type immanent relationships within at least three farmer groups/clusters/cooperatives							
3.1	Selection of field cases for each model in Cambodia, and with material from Indonesia and other countries. Field studies in Cambodia of the selected cases economic production analysis, assessment of members responsibilities and rights, organizational structures, dependencies, financial demands and regulations and social connections	✓			Field studies completed in Philippines	Change of the country to Philippines	Annexes 3,4,5
3.2	Elaborate the adaptation costs and necessary capacities for the 'cooperative' model within the field studies, development of indicators for the finance demands and repayment models as well as for social , environmental and particular economic sustainability.	✓			Based on a Framework for Business Model development, existing businesses were examined according their needs to develop towards a corporate model		
Output 4: Preliminary conceptual model of the investment structure and finance vehicles							
4.1	Market analysis and modeling of selected variables of economic sustainability and causal network for social acceptance, Most Significant Change (MSC)	✓			Market analysis of different cases models discussed		Annexes 6 and 7 (workshop report)
4.2	Preliminary concept to adjust market needs strategy report for a investment strategy and investment vehicle for the cooperative model with simulating the portfolio risk and returns and drafted investment structure	✓			Concept prepared for an "Incubator" facility that would support aquaculture SMEs prepared for investment		
4.3	Workshop with discussion of reviews and case studies, business plans and the draft of the investment vehicle, development of a plan of dissemination and preparation of further research activities and implementation.	✓			Workshop conducted on 6-7 December 2012 in Penang, Malaysia. 16 participants from 8 countries and from GIZ HQ, Frankfurt, Germany.		

Output 5: Documentation and dissemination of the replicable structure of the corporate model with respect to different developing country conditions							
5.1	Publication of the results of the case studies in a policy brief with policy recommendations for the development of sustainable business structures for small holder aquaculture farmers with specific elaboration of the corporate model		✓		Partially done, will be published by WorldFish during 2013.		Annex 8
5.2	Technical paper as preliminary conceptual analysis of market demand , investment strategy and appropriate structures of finance of investments in small scale aquaculture and science paper		✓		Technical paper drafted, will be finalized in 2013		
Publications							
	Progress Report	✓					
	Final Report	✓					
	Journal Articles		✓				
	Policy Brief		✓				

- Vertical cooperation focuses more on inclusion of farmers and other partners within the respective value chains. Smallholder relationship models structure the collaboration with the aggregated smallholders along the value chain. The main criteria are the degree of intermediation between the stakeholders involved. Such vertical or partnership business models get most attention within inclusive business models in agriculture. Practiced forms of vertical partnership models are contract farming, deep procurement, intermediary models, franchise and some other business organization forms such as Trade link. The systems vary in terms of their interactions with small-scale farmers. All require various investments in the organization of collection facilities, trust building activities, training and supervision. The supply chain costs might be lower, but additional investment in service organization, training, quality assurance and price information system are required.

The draft review helped develop a conceptual framework for the research. The complete draft review, drawing together research from within the project, and more widely within WorldFish is provided as Annex 1. The draft is currently being prepared for journal submission.

Output 2: Economical, social and environmental assessment of the advantages, constraints and results of three models of collaboration

The second output involved more in-depth assessment around three proposed models of collaboration (i) a horizontally connected 'collaborative type' model; (ii) a vertically integrated 'cooperative type' model incorporating routes to market; (iii) a 'corporate type' model based on a separate management body with organization structure, responsibilities dependencies, value chain structures, and evaluation of the finances for system inputs and outputs. Data were obtained from review of selected projects available through WorldFish and partners, and participants in the December 2012 workshop. We used a description of the businesses, usually applied as a bankable business plan of companies, allowing us to think about the nature of the businesses, how to include smallholders into the desired aggregation structures, the sales and marketing strategies, how to project the profit and loss statement as well as about the demands for finance and sustainable recovery of the intended investments.

The comparative description of the business models shows that there is an evolution from farmer driven and supply driven management like in the horizontal model, towards more market and demand driven models in the vertical integration model, leading to a business version with a professional internal value chain management, market and demand driven. The sustainability and profitability follows the same path, finance opportunities might be even increasingly approachable for the more market oriented business models. But, more complex systems need more investment in technical and finance, and in building partnerships among value chain actors, including markets. They appear to date to be few, if any successful models involving aquaculture smallholders.

There is a clear improvement in the possibilities for social impact with the vertical integration models or the corporate model. In particular, the corporate model includes social impact as one a business strategy, farmers are treated as entrepreneurs and shareholders, less than as *de facto* employees. With improved organizational structures, possibilities for managing environmental impacts increase, though few studies have actually quantified environmental outcomes. Corporate models might also have access to impact finance, where social and environmental improvements are common requirements for finance.

The main *advantages of horizontal* models is the aggregation of needs, like input supply and better access to markets, but even the collective management of production schedules or resources (water). *Constraints* are the needed management capacity and the related costs for this management, here the businesses might struggle to create enough profit from collective sales or other incomes sources. The *results* are differentiated, some cluster, groups or associations are working well and the social impact of the collective production might be high. But some businesses might face problems with too low profit. There are several such examples within Asia of such

aggregations, including cases like the analyzed Taal Lake association and farmer cooperatives. In summary:

- *Advantages* include an aggregation of needs, like input supply and better access to markets, influence, and possibilities for collective management of production schedules or common resources, such as water.
- *Constraints* relate to the required management capacity and the related costs for management; the businesses might struggle to create enough profit from collective sales or other incomes sources.
- *Results* are variable, some cluster, groups or associations are working well and the social impact of the collective production might be high. Some businesses might face problems in sustaining organizations, particular if the profitability is too low or the models are designed as temporarily financed projects.

The *vertical integrated business models* exist in variations, but the main element is the demand and buyer driven connection to the market. The most visible organizational element is a collection centre or point for the aggregation of products and for quality control. The advantage for both partners is that the products are aggregated with expertise and potentially quality monitoring according the needs of the markets.

- *Advantages* include a greater degree of market interaction, with potential for improved prices or secure markets.
- *Constraints* might bring farmers in a high dependency from one or few buyers , with all the production risks remaining with the farmers. They might secure resources for few buyers over a long term. Social and environmental responsibility depends on the philosophy and interest of the buyer, but farmers often receive support in production management, finance and other input supply. Constraints are also the focus on the demand of the partner, often on one specific commodity and a specific quality. This can lead to a loss of diversity in production or to disconnection from former local markets.
- *Results* are variable, in form of security in sales, improved production, higher quality of the products and eventually better access to inputs like seed feed or finance are outweighing some of the disadvantages.

The *corporate business model* includes a strong element of commercial orientation of a network between farmers, a service unit and an overall management unit. The model potentially offers the most advantages through an internal organized training and certification procedures for the farmers. The implementation of a specific service, that is able to bridge this different businesses can bring strong social improvement towards the farmers and their communities through securing sustainability. Certain models, in the literature described as partnership business models might have elements of such corporate business models, particular the deep procurement models or trade link models. The marketing and service company might be supported by the public sector (e.g. NACSA, India) a joint venture or other forms of formal collaboration.

- *Advantages* targeting to connect different business 'worlds' the primary production sector, represented by a high numbers of small scale farmers and the world of modern value chains, oriented to demand high quality, uniform products on time and in big amounts. The implementation of a specific service, that is able to bridge this different businesses can bring strong social improvement towards the farmers and their communities through securing sustainability.
- *Constraints* could be the demand orientation for distant markets, which may lead to similar effect like in vertical models, changes in product diversity, product quality and disconnection from traditional markets.
- The overall *results* for such corporate models in form of positive economic impact for the farmers, positive social and environmental impacts seems potentially to create the most promising version of business models for small scale farmers, though requires significant capacity building and organizational development. .

In summary, the findings:

Markets - increasing market power from Horizontal to Vertical and to Corporate models, Vertical models might represent the interest from one partner only, Corporate models might have a wider market approach

Actors - while in horizontal models farmers are challenged to run the production, group management and marketing, these functions are increasingly separated and specialized in vertical and horizontal models. The corporate model offers the highest management quality and internal organization

Needs – horizontal models have the highest external demand for inputs (resources, training finances) Vertical models delivering some of the external needs as part of the business Corporate models are going for a complex of internal services to reduce external needs and channel particular finance internally

Profit - expectations are increasing from horizontal towards corporate models through more control and transparency about the profitability of each participating actor. Corporate models are potentially offering replication and scaling up as a system element.

Whilst profits and impact are likely to be greater from horizontal to corporate, each step requires an additional investment in time and capacity building, particularly for management.

Output 3: Case studies of the type immanent relationships within at least three farmer groups/clusters/cooperatives

Case studies were used to explore in more detail the relationships and outcomes within selected projects, available from WorldFish, or identified during the field visits in the Philippines. The analytical framework developed under Output 2 was used for each case study analysis:

The following case studies were examined, generally grouped into “horizontal” or “vertical” models. Findings of each case study are summarized below, with additional details in Annexes 3-5.

Generic type	Name	Country
Horizontal aggregation	Taal Lake Alliance,	Philippines
	Good Samaritan Multi Purpose Cooperative,	Philippines
	Coral and Giant Clam Farm	Solomon Islands
Vertical integration	Shrimp Farmer Cooperatives (GHERS),	Bangladesh
	Perishable Collection Centre Metro	Vietnam
	Aceh Aquaculture Enterprise (AAE)	Indonesia
	Shrimp Farmers Groups	India
	TGA Tilapia Farm	Philippines

Horizontal models in the analyzed cases tend to rely on some voluntary services from the farmers for management, with the possibilities of creating conflicts of interests. The models analyzed provide some advantages in marketing, and provision of input supplies to participants, but there is also a strong tendency to avoid collective marketing when small other market advantages for the individual farmers may occur. Product aggregation and marketing was still a weak element and the individual businesses interests from farmers might dominate (e.g. Taal lake). Horizontal models are often used to improve technology, targeting to harmonize the production or to achieve a certification status and start the collaboration with markets (Coral and Giant Clams). In the coral and clam farms examined in Solomon Islands, start up cost in form of hatchery, infrastructure, logistic and development management was very high and mostly financed by development organizations, not business.

Vertical integration models should be clearly demand oriented and include driving partner from the market (as in the case of TGA and Metro Vietnam). Overall need for the model is to achieve self

sustainability of farmers through higher economical efficiency of each farmer. Civil and public sector driven projects might have a difficult start, because investments in technologies, capacity building and product collection and logistic are with the farmers (Aceh AAE). AEE sees a need to build strong partnerships with other stakeholders, and to include local experts and members of the value chain. Other vertical business models share investments, particular the quality assurance for products, capacity building and the logistic of product aggregation (Metro Vietnam). Demand for capacity building is high, but more focused on production technology improvements, such as with Metro Vietnam where investments are made in extension, building up of human capacities and for active engagement with farm sites to assure quality control and better management.

In vertical models, we found more awareness about the social implications and needs. The social impact was mentioned to be higher in vertical integrated models. GHERS enhanced social capital for farmers by establishing links with other actors in the shrimp value chain, increased knowledge sharing opportunities and inter-household competition to increase incomes from aquaculture and an enhanced social safety net. A critical element can be the high dependency from the market partners, leading as a worst case towards a *de facto* employment status of the farmers. On the other side, farmers could have better access to finances, e.g. a micro-credit system, invented for the certified farmers in cooperation with the Agricultural Bank of Vietnam was serving the financial needs of farmers in the Metro model. TGA might be an example where a substantial need for finance on the farmer's site is required to start the collaboration. Whereby the whole model is much convincing and strong market oriented, the feasibility of the farmer's business plans for such an investment needs to be examined in more depth. The investment concept as a whole needs a due diligence and an environmental and social impact assessment.

The case studies showed that orientation to an aggregated of producers and products to be successful needs an element of vertical integration with the market. The challenge is to support the entrepreneurship spirit of farmers towards a higher efficiency and quality of the production and at same time to organize the sustainable connection to strong markets. Market and demand driven models occur to be more resilient and sustainable. Case studies in Aceh and India show positive social and environmental outcomes, though information on environmental outcomes is still limited.

Output 4: Preliminary conceptual model of the investment structure and finance vehicles

Investment structure: The investment structure for aggregation models associated with small-scale farmers involves several steps, which broadly conforms to that proposed by Dalberg (2012) as seen in the diagram below.



The key point that emerges from our analysis is that it takes time to build the social capital and management capacity of producer organizations, and that a “blended capital” type approach is necessary for investment in small-scale aquaculture, to address the different roles and influence of technical and financial investment along growth pathways. In a recent article,

Alison Bukhari from Dasra¹ noted that .. *“social impact doesn’t come without considerable support for the experimental stage of an organization’s development. If the substantial costs of such things as social impact measurement, market creation, training and high-calibre senior management are taken from investment capital, then sadly the business case for projected financial returns becomes unattractive to even relatively patient investors. And yet without all these early-stage inputs, it is highly unlikely that social impact can be successfully created.”* The substance of this statement appears to reflect the situation with small-scale aquaculture organizations.

Finance vehicles: A mapping of the finance options for small -scale aquaculture farmers was conducted, with a particular view on impact investment funding, i.e., funds needed for early growth of smallholder enterprises. This conceptual landscaping exercise for specific finance options and investment vehicles was intended to support the design of the business models.

From our field interviews, we conclude that informal or semiformal finance is still the dominant finance form for working capital for aquaculture smallholders. Such forms of finance, whilst clearly preferable to no finance, is for short-term requirements, such as feed and seed inputs, and not likely to support organizational development. A range of informal finance sources exists within value chain network and in the personal networks of the farmers e.g. input supply traders, saving & rotating saving and credit associations or cooperatives, self help groups, village saving, village loan associates, financial service associates, private lenders and family and friends.

The formal finance sector with commercial banks, development banks or non bank financial institutions is much more difficult to approach for bank loans or credits mainly because of scale and collaterals. Smallholders use therefore micro-finance or specific cooperation and in some cases governmental guaranteed micro-loans as formal finance sources first. Grants from international development aid, philanthropic donors or about corporate social responsible initiatives of the private sector might be necessary, but seldom are available for most smallholders.

A comparison of the finance needs of different models was presented as result of the team work in the workshop (see Annex 6). The project team concluded, that smallholders in aquaculture in developing countries face the same situation as smallholders in other business sectors - formal finance is available for the large businesses and for micro-business, but it is limited for small businesses. This is described as the ‘missing middle’. Aggregation of farmers and products is the key for the discussed business models to achieve an economy of scale within production and marketing, but as the financial mapping exercise showed, aggregation is also the key for finance of smallholders.

Micro-finance is a part of this impact investment and the mapping could show some examples about micro-finance e.g. the Vietnam Bank for Rural Development, Agro Bank Malaysia, National Bank for Agriculture and Rural Development, Land Bank Philippines, AMRET group lending Cambodia or VBAR group lending Vietnam. Some of the constraints identified were a lack of viable and profitable aquaculture projects and the attendant risks such as weather aberrations; peace and order conditions; poor technology; marketing or distribution problems. Fish farmers are often not considered creditworthy due to lack of collateral, low technical expertise and missing credit history. The loan asked by individual farmers is small, which may create high transaction costs. Recommendation to increase the access to micro-finance were discussed within the project by embedding the loans into aggregation models and networks, group lending etc to reach a critical size and to increase creditworthiness, training and knowledge transfer. None appear to have facilities for organizational development and capacity building associated with building successful aggregation models.

The landscape mapping examined around 300 impact investment funds regarding their applicability within aquaculture. More than 60 funds are involved in topics like aquaculture, agriculture, environment, social entrepreneurship, access to finance for smallholders and value chain improvements. Out of this group were 25 funds for a potential direct collaboration were

¹ <http://philanthropynews.alliancemagazine.org/pollination-and-blended-capital/>

identified; but a major concern expressed is the lack of pipeline projects. Whilst some new initiatives² are attempting to build stronger networks of experts, entrepreneurs, financial advisors and knowledge providers, who can help to build a pipeline for companies in the sector to support their readiness for impact investment and to provide training, the concern still remains that such initiatives are missing “bottom of the pyramid” type investments, and we conclude that more positive investments in organizational development is required.

Within the analysis about the opportunities of impact investment for small scale farmers the need to using the specific services of accelerators and incubators became obvious. Accelerators could help to build up businesses systems in the start up phase to prepare social entrepreneurs to partner with impact investors. Further, accelerators improve the management capability of small, growing businesses and assist enterprises to improve relationships with existing customers and to create sustainable revenues. Incubators nurturing innovative enterprises that have high growth potential to become competitive businesses through a number of services, finance, mentoring and networking of the enterprise. For development of new business models this support of the “early stage development” is required to install the basic business infrastructures, to prove the ability of the formed entity to add value to the products and to insert the served incubatees into the wider business eco-system. Because there was found only very rare specific capacity among the different impact investment funds to deal with aquaculture yet, it seems there is a high importance to build up specific capacities for such accelerator and incubator services for aquaculture. Sector-focused incubation and acceleration can ease the challenge of sourcing for candidates to place finance. Our conclusion is that investments into incubator/accelerator type initiatives will be essential to build a pipeline of projects for investment.

Output 5: Documentation and dissemination of the replicable structure of the corporate model with respect to different developing country conditions

Publications arising from the research are listed in Section 13.

8. Major Research Findings

Our research shows several key factors influence successful investment into small-scale aquaculture including: (i) profitability, productivity and risk associated with the technology; (ii) access to quality inputs such as feed and seed, and output markets; (iii) access to finance for operations and infrastructure; and (iv) management and organizational arrangements³. Management and organizational arrangements are important because some form of collective or aggregation and intermediary organization often required to reach large numbers of small-scale aquaculture farmers. Small business organizations are a diverse group of social enterprises that may include farmer groups, cooperatives, producer organizations or companies, or even specialized smallholder services, such as “one-stop shops” or service centers⁴. Such businesses create the economies of scale for large numbers of individual small holders to access technology, finance, markets and other services necessary for impact at scale. They also provide opportunities for business growth, and an entry point for external finance. Innovative business models built around such collective approaches also offer possibilities for farmers as shareholders to benefit from long term organization and enterprise growth, beyond the traditionally slim margins available to small scale producers.

Our investor dialogues during the project show that many commercial investors consider an up-front organizational investment in capacity building and organizational development as a long-term, risky and unattractive investment. But, our analysis (based on actual situations⁵), shows that investments can generate significant commercial returns over time, and with the right business model they are commercially viable, are capable of returning initial investments in the short to medium term and provide sufficient returns to reinvest in their own success; there therefore can be

² Mantra 2012 – Fish 2.0

³ www.worldfishcenter.org/resource_centre/WF_2798.pdf

⁴ www.agfax.net/transcript/agfax415.pdf

⁵ www.worldfishcenter.org/events/aquaculture-clinic-a-spark-good-ventures-worldfish-center

a strong business case for investment. In order to achieve this, innovative financial approaches are required.

Small (and medium) scale commercial aquaculture enterprises make up the majority of aquaculture producers in developing countries, yet they are often marginalized in accessing the technology, finance and markets needed to improve and grow. Market incentives for improvement are also weak, particularly for international markets where most buyer interest has shifted to large enterprises, leaving a highly skewed emphasis in many sustainability investments. Research has shown that investments targeted towards small aquaculture enterprises, the bulk of farmers near the base of the pyramid, can be commercially rewarding for investors, at the same time generating positive environmental outcomes and social benefits, such as employment, poverty reduction and a desired food source. As the international community seeks ways improve the sustainability of seafood, investments into the majority - small-scale aquaculture businesses in the developing world offer huge potential for delivering sustainable sources of fish, whilst positively impacting communities, the poor and vulnerable.

Accessing finance and funding mechanisms remains a key inhibitor for many small and medium sized aquaculture enterprises throughout the developing world to grow and invest in improved practices and value creation. Increasing access to financial services therefore remains a key for achieving impact at scale. Whilst a sound business case should be at the core of any investment, our research identifies the important role for patient, socially responsible (impact) investors during start up and early phases of business development. Early stage impact investment could play a critical role in helping viable enterprises grow and graduate towards more commercial funding. Creating market incentives and pull for improvement and shift to sustainable practices is also an important part of the equation.

Engaging with small and medium enterprises (SME) and communities in developing countries presents challenges for investors, particularly during early stages of growth. Our research indicates that investments in capacity building, business development skills and organizational support are often needed to transition or “incubate” promising SME aquaculture businesses. Organizational and management skills among SMEs commonly need enhancing and connections made to finance, technology and market partners for scale-able commercial investment. Philanthropy or donor grants may also have a role during early development stages, building capacity for many to take the first steps to engagement with impact and commercial investors that can help build businesses at scale.

Our research points to the need to invest in incubator facilities, supporting the early start up of scale-able small and medium sized aquaculture enterprises, cooperatives and farmer organizations, which have potential for high positive economic, social and environmental impact in the developing world. Its primary purpose is to help bridge the current divide between aquaculture SMEs in the developing world and investors seeking scaleable high impact triple bottom line investments in the aquaculture and the seafood business. A concept for this facility is attached as Annex 7.

9. Assessment of Research Findings

The research findings have important implications for WorldFish. WorldFish is committed to two key development challenges: 1) improving the livelihoods of those who are especially poor and vulnerable in places where fisheries and aquaculture can make a difference and 2) achieving large scale, environmentally sustainable, increases in supply and access to fish at affordable prices for poor consumers in developing countries⁶. Our aquaculture research has developed various pioneering aquaculture technologies, including improved strains of farmed tilapia⁷, integrated aquaculture-agriculture systems and coastal pond technologies with low environmental impact, for small-scale aquaculture farmers. Grant-funded projects in Asia, Africa and the Pacific, such as the Adivasi project with marginalized ethnic communities in Bangladesh⁸, post-tsunami aquaculture in

⁶ WorldFish strategy document - www.worldfishcenter.org/about-us/our-strategy

⁷ www.worldfishcenter.org/feature/fast-growing-nile-tilapia-bring-vast-benefits

⁸ www.thefishsite.com/fishnews/19150/teaching-the-ativasi-to-fish-for-a-lifetime-of-benefit

Aceh⁹ and smallholder subsistence aquaculture in Malawi, have shown significant social and economic benefits from investments in income and productivity enhancing aquaculture technologies among small-scale rural households. Moving to impact at scale now requires mobilizing more private investment and more partners. Commercial interest in aquaculture investment is probably at an all time high, yet much of this investment presently misses small-scale farmers.

The findings from BMSA provide clear directions for engaging private sector partners in investments into small-scale aquaculture, and creating a better enabling environment for private investment that has scope to support small-scale farmers move towards a commercial orientation. The WorldFish Board of Trustees (BOT) met in April 2012, and the initial business research was shared with the Board; the response was positive, and the BOT has approval to conduct further research in this subject area, and particularly to explore establishment of an “incubator” facility within WorldFish (Annex 7). Connecting farmers with an ‘organizational glue requires facilitation through new forms of intermediary organizations, but our research shows that such investments could generate significant social, economic and environmental benefits. We therefore see the implications of research findings at various levels:

Research: The findings provide a basis for further research by CGIAR and German research partners. The conceptual framework (market, actors, needs, profit/impact) provided through this research can be now used in new studies within value chains, particularly within WorldFish CGIAR program countries.

Donors: The findings provide a direction for donors (and perhaps philanthropic organizations) to invest in small-scale aquaculture in ways that support the transition of smallholders and their organizations to more sustainable businesses, eventually providing the basis for scale and impact. Investment in early stage development represents a challenge for many investors, yet significant social, economic and environmental outcomes could be created with a well timed approach. There are also opportunities to invest in supporting ecosystems and incubation initiatives that help prepare potential investments to the market, which would be appropriate for grant funding.

National governments and NARS: The Philippine case study showed that although public policy is on paper oriented towards small-scale aquaculture, in particular the NARS and the responsible public agencies (particularly the Bureau of Fisheries and Aquatic Resources) are in need of strategies that are more supportive of reaching scale. Farmers indicated that existing systems of extension services, market information and market access and finance are not covering their needs towards a commercial business development. Project findings provide the basis for re-orientation of approaches towards commercial development and impact. Policy level actions are required, and WorldFish will share results from the research during the ongoing CGIAR Research program development in the Philippines, seeking ways to implement findings.

Private investors: Donors and public policy can help prepare the environment for private investment. The analytical framework provides a basis for analysis of projects. While some impact finance funds may focus primarily on the financial support for small scale farmers, there are many implications to consider, such as the influence of traders, money lenders on farmers and their social networks. To increase the share of formal finance sector, the social and technological aggregation of farmers is a process which need time and herewith ‘patient capital ‘for investments. The landscape analysis exercise of impact investment funds showed, that aquaculture is a niche market for such finance funds. It might need more than the existing few fund opportunities to cover the demands of the millions of small scale farmers, who are delivering the most of aquaculture products and contributing essential to food security globally. Awareness building and marketing of the specific demands of the sector is the challenge. Investment in policies and strategies to support incubation and acceleration of small scale aquaculture farmer businesses through aggregation models e.g. the “organizational glue”, has received minimal attention to date, but is key in moving forward.

⁹ www.worldfishcenter.org/feature/fish-farms-help-post-tsunami-acehnese-communities

Continued work is needed to build awareness, develop supportive ecosystem, try models and share knowledge generated from smallholder business investments. Because aquaculture is, to some extents, a “niche market” compared to agriculture, there is possibly need to create more focused networking initiatives and funds, within and between countries.

10. Know-how transfer

Transfer of knowledge arising from the research has been conducted during the project, in several ways, and for several user groups. Below we summarize the major user groups, and activities conducted or planned to ensure that the research findings will be used.

Uses	Users	Project activities
Re-orienting research in CGIAR Research Programs (CRP) on Aquatic Agricultural Systems (1.3) and Livestock & fish (3.7)	CRP AAS and L&F scientists and national research partners	CRP scientists involved in Penang workshop; ongoing dialogue with CRP value chain scientists. Presentation of project findings to country program offices
Development of cooperative business plans in Aceh	Cooperatives in Aceh province of Indonesia	Seminar in Banda Aceh, Indonesia to members of provincial cooperative association
Public-private partnerships (PPP) for small-scale aquaculture investment.	Public and private investors and fish producers, donors, impact investors	Policy brief drafted
Seafood supply chains that include small-scale aquaculture	Seafood businesses	Presentation at Seafood Summit in Hong Kong (Sept 2012)
Investments by impact investment community in small-scale aquaculture enterprises.	Impact investors	Dialogue with impact investors. Presentations in workshop and selected conferences (Seafood Summit, Sept 2012). Financial landscape studies
Guiding public policy towards the requirements of poor consumers.	Governments and supporting donors.	Policy brief draft.
Influencing the international community to invest in small-scale aquaculture	Donors, aquaculture certification organizations, private investors, FAO/UN	Policy brief. Ongoing dialogues

WorldFish dialogue with investors has been particularly promising. In preparation for the workshop, a number of impact investors were contacted, and several have shown interest in investment in aquaculture. An early meeting organized in association with [A-Spark Good Ventures](#), brought together scientists, entrepreneurs, impact investors and other interested parties in Utrecht, Netherlands, in December 2011 to explore the opportunities of setting up a global facility for impact investment in aquaculture¹⁰. Following from the meeting, a new impact investment facility for aquaculture is being established. Research from the GIZ project has contributed to the development of this new impact investment facility. The major challenge now appears to be to prepare the project pipeline, and connect projects to investors, whilst learning and sharing experiences.

11. Training

The project has contributed indirectly to the training at different levels:

- Two interns received training during the project, of which one (Judith Emmerling) is now preparing a Masters thesis on the basis of the Philippines research.

¹⁰

Phillips et al. 2011 – www.worldfishcenter.org/resource_centre/WF_2798.pdf;

Phillips et al. 2012 - www.worldfishcenter.org/publications/inclusive-aquaculture-business-bottom-aquatic-pyramid.

- Training in economic analysis and data management was provided to the Aceh aquaculture cooperative (AAE) through one intern (Dima Konsewitch) who was based within the cooperative. A further training was provide by scientists from University of Hannover and WorldFish during a special workshop in Banda Aceh hosted by the Provincial Cooperative association (DEKOPIN).
- Other *ad hoc* training in business analysis was provide to WorldFish Philippines staff, BFAR staff and cooperative members and farmers during the field visit of an AQACON scientist and Judith Emmerling to the Philippines in early 2013.

12. Lessons learned

The project was generally implemented successfully, with good cooperation amongst the WorldFish and German research team, and with partners in the detailed “:case study” countries of Indonesia and Philippines.

During execution of the work plan, we learnt that some planned research activities could not be efficiently conducted in Cambodia. The constraint arose from the high disaggregation of the smallholders, less intention to develop towards collaborative production forms and high competitive situation in markets. The situation would not have provided us with enough case material to address the research questions, as planned. As result of a discussion with our local partners in Cambodia and the WorldFish country office in Philippines, the target country was changed to Philippines. The Philippines research proceeded well, though in the regions studied aquaculture farmers were generally “disaggregated”, and poorly connected to technical and financial services. These constraints need to be addressed to build inclusive businesses within the country.

The project team faced some problems to gather reliable economical data from farmers or cooperatives and other businesses. The nature of the business models needs reliable data from farmers and service companies. Within the Aceh case study, the data could be retrieved from the cooperative during a longer stay of the German intern at the cooperative headquarters in Bireuen, but still extensive verification of the data was required, and took longer than anticipated due to a fairly basic/limited data management system within the cooperative. A similar situation occurred in the Philippines. Such situations appear fairly widespread, and suggest a need to strengthen data collection and management systems within small-scale farmer businesses, and indicate how important detailed financial monitoring is for the planning and profit creation of such businesses.

The cooperation with the involved partners was very satisfying, with participants coming from different backgrounds and able to contribute to the project in specific ways. Of particular importance were the on-site activities in Aceh Indonesia, executed by the University Hannover and supported by one of the interns. For the first time, an in depth analysis of the business activities, cost and income structures of the vertical structured relationship model was made visible.

A high valuable contribution to the element of finance, incubation and sustainable development of business models was the collaboration with the company Innpact, which was particularly experienced in fund development and impact finance.

The support by the GIZ internship program was very much appreciated and enabled the detailed on-site studies in Philippines. A Masters thesis is under preparation by the intern, based on the extensive data collected and consultations within the country.

13. Future Research Needs

Commercial investment in smallholder farming is not an easy option; it takes time, it requires the right combination of technical and financial support, and it needs a core business model that is sustainable. Partners are important, particularly during the early development/growth phases.

The investment by GIZ in this research has contributed in several ways to creating a better understanding of the business models and outcomes from investments in small-scale aquaculture improvement projects, raised further awareness of the benefits from investment into small-scale

aquaculture improvements and created interest in investment. Below we identify key research needs:

- Economy of business structures in aquaculture including social, economic and environmental outcomes from the wide diversity of business types available across the developing world.
- Improving understanding and elaboration of impact pathways for investments into small-scale aquaculture enterprises.
- Social and economic aspects of business collaborations, both horizontal and vertical (along value chains), and the economy of smallholders and follow up over a longer time period.
- Research on business development should be accompanied by social-economic assessments and examination of the social implications within farmer communities, their informal networks and existing trading partners.
- Development of franchise systems for technical and financial services to support aquaculture SME development in Asia (and likely Africa)
- Deepen knowledge about the sustainable development of commercially oriented small-scale farmers and their communities by involvement in commercial business models.
- Meta-analysis about the application of the framework to a wider range of cases.
- Further *ex-ante* impact analysis of different business models.
- Sustainability requires that environmental assessment is more firmly integrated into small-scale aquaculture investment projects. Many emerging improvement projects appear to be focused on compliance with certification standards, rather than environmental outcomes, with an assumption that improvements will lead to environmentally positive outcomes. Research on environmental outcomes from investments in the different models is required.
- Small-scale aquaculture investment projects themselves need clearer guidelines and definitions – particularly as they increase in number. A credible framework of what constitutes an improvement project is necessary to help guide investment into this space, and also to provide the credible framework for other partners, buyers and investors to engage with. Such a framework for aquaculture improvement projects among small and medium enterprises, once agreed, could help further create market pull and investments for improvement.
- Sharing of outcomes from application of the different investment models, and role of grant vs. commercial funds for development impact.
- The need for supporting investments in aquaculture among the lower tier of small-scale farmers is increasingly evident. Investment funds, including impact investments, appear to be coming available, but capacity building will be essential to get many on this lower tier ready for investments. Investment if required in incubation facilities (such as Annex 7).
- Research implementation should also seek to build the coalitions and partnerships of investors and implementers that enable investment to occur at the scale necessary to create lasting improvement and impact.

14. Summary

Smallholder farming dominates worldwide aquaculture production, with 90 percent of production from developing countries. With annual growth rates of 6 to 8 percent, aquaculture is the fastest growing sector within the global food production system. From the worldwide 500 million

smallholder farms are approximately 20 million smallholder farmers engaged in aquaculture. Enhancing their horizontal and vertical business connections offers a chance for smallholders to capture a higher share in the growing aquaculture sector, and increase household incomes. The social and economic returns from investment in improving small-scale aquaculture can be very significant, at various scales, and at various levels, provided risks are managed, largely through organizational development.

Financial analysis of small-scale aquaculture improvement projects in Bangladesh, Indonesia and India showed significant social, economic and environmental benefits, at household and enterprise or community levels. Due to the characteristics of aquaculture, the organizational and economical problems aquaculture farmers have to face are very similar to those of their peers in agriculture. Smallholders face constraints in resources like access to finance, information, management capacity, and technological capability. In addition, smallholders suffer disproportionately from external barriers like market imperfections and regulations. Accordingly, the probability of smallholders joining production networks, e.g. as direct or indirect exporters, or investment networks is lower than that of large firms. The project analyzed existing forms of collaboration include various forms of *horizontal* and *vertical* cooperation and has identified business models and financing mechanisms for small-scale aquaculture farming. Key results from the project are:

- Better understanding of potential positive impacts from investment in small-scale aquaculture enterprises.
- Better understanding of positive environmental, social and economic values that can arise from investing in small-scale aquaculture enterprises, particularly through varying degrees of collaboration.
- Development of business models and “blended capital” approaches for investment in small-scale aquaculture, with ideas around different roles and influence of technical and financial investment along pathways for investing in small-scale aquaculture enterprises.
- Raised profile of the values arising from investment into small-scale aquaculture enterprises among public and private investors.
- Identification of impact investors with an interest to invest in aquaculture, and enabling WorldFish to engage with development of a new impact investment facility for aquaculture (Aquaspark) which is schedule for launch during 2013.
- Strengthened partnerships among various development and business stakeholders.
- Development of a concept for a WorldFish incubation facility intended to provide a development and learning platform to support early stage development of investable small-scale aquaculture enterprises.

Key follow up actions:

- Identifying partners and investors for the WorldFish incubation facility.
- Further advocacy of impact investors and in-country building of a pipeline of learning projects for impact investment.
- Further research on business models and economics of aggregations and the costs and benefits of investments, and improved understanding of development outcomes from the varied pathways of investment in aquaculture. Sharing outcomes from such business case research widely among GIZ, the impact investment community and other donors.

- Building a coalition among impact investors and potential projects – to better understand needs of both promoters and investors, and position an incubation facility where it can create greatest investment impact.
- Developing better understanding and elaboration of impact pathways for incubator and investment.
- Developing investment criteria and guidelines for impact investment, including identifying examples of good and bad investments.
- Developing a learning platform for impact investment projects, and for sharing and wide dissemination of the lessons learned.
- Raising awareness about the need for strengthening investment in intermediary organizations to build viable businesses

15. Publications, papers and reports

Draft publications available:

- (i) Draft paper on “Inclusive business models for small-scale aquaculture” which is in the final stages of preparation for submission.
- (ii) Policy brief with policy recommendations for the development of sustainable business structures for small holder aquaculture farmers with specific elaboration of the corporate model

Presentations:

- (i) Presentations to “*Impact investing in small-scale aquaculture enterprises*”, a session organized by WorldFish at the Seafood Summit, Hong Kong, 6-8 September 2012. The presentations are available on www.slideshare.com/worldfish.
- (ii) A series of presentations made to the project workshop (Annex 6).

Annexes

1. Literature review - inclusive business models (Output 1)
2. Collaboration models (Output 2)
3. Case study – Aceh Aquaculture Cooperative (Output 3)
4. Case study – Philippines trip report (Output 3)
5. Case study – Misc studies (Output 3)
6. Workshop report and presentations (Output 4)
7. WorldFish Incubator concept (Output 4 and 5)
8. Presentations made at the Seafood Summit, Hong Kong, (Output 4)