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## **Farm to Food Security: An Impact Evaluation of Tilapia Researches under Thailand Research Fund**

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### **Introduction**

Thailand is the leading producer of tilapia in the world. Tilapia is a freshwater fish that is important to the economy and society since 1965. Although the Tilapia industry is developing rapidly and continuously, most Tilapia farmers still face many problems. Hence, research plays an important role to solve the problems. Tilapia is today the most crucial fish species in Thailand mainly for food security. Such success is due to several factors. One important factor is the technology and innovation generated by research investment. The Thailand Research Fund (TRF) is dedicated to supporting long term research of Tilapia fish culture in Thailand. The Thailand Research Fund recognizes the importance of Tilapia culture and support of research funding in the form of a series of Tilapia projects since 2008. Tilapia research under TRF has been done for some time that has already generated outputs and outcomes which has brought to produce the impacts to Thai society. However, there is no systematic evaluation of the success of the research. This assessment will be useful to support research more effectively. Also, the study will be good information for future development of Tilapia research.

### **Objective**

The paper aims to evaluate the outcomes and impacts of funding provided by the Thailand Research Fund (TRF) on Tilapia research projects.

### **Methods**

There are two main types of data: secondary data such as research budget, research period, research utilization obtained from the TRF. Primary data include information from interviews with stakeholders, farmers and experts. This research is based on the OECD (1992) five principles: relevance, effectiveness, efficiency, impacts, and sustainability.

- (1) Relevance is whether the program is in line with the national policies of the research era and whether the objectives of the subprojects are consistent with the overall picture of the program.
- (2) Effectiveness is considered when the subprojects can response to the overall or main objective of the program.
- (3) Efficiency considers as the implementation of the program both time and resources are efficient?
- (4) Impact is considered when the program or a project can produce positive or negative impacts on economic, social and environment.
- (5) Sustainability is considered when the research project or program still can generate outcomes and impacts after the end of research support.

The method use to evaluate the research benefit is the change in economic surplus (Alston et al., 1998). Project evaluation is utilized (Evenson, 2001; EIARD, 2003). The economic investment indicators NPV, BCR, and IRR are utilized (Purdon and et al, 2001). Finally, data obtained from the consumer surveys, farmer surveys and the brainstorming sessions with various stakeholders are analyzed to generate the recommendation for the future research direction.

## **Results**

### **Tilapia Research Status**

Tilapia Researches under Thailand Research Fund (TRF) has been carried out for almost 20 years. The Tilapia research structure under Thailand Research Fund from 1999 to 2016 was classified along the impact pathways as Inputs, processes, outputs and outcomes are summarized as shown in Figure 1 along the research to impact pathway.

### **OECD Indicators using for Tilapia research impact evaluation**

The initial evaluation of the Tilapia research program by applying the OECD / DAC conceptual framework or the OECD / DAC development evaluation framework in all five aspects: relevance, effectiveness, efficiency, impacts and sustainability, found that the alternative livelihood development program Aquatic resources (Tilapia) projects are consistent, effective, efficient, impact generation and sustainable. The project has a wide range of benefits to society, especially the project entitled “Evaluation of risk factors on Nile tilapia (*Oreochromis niloticus*) culture industry in Thailand” produced the highest impacts to society. However, many research projects should still be transferred the research outputs to the users or stakeholders seriously. This will increase the value of the impact of research to society. The next part will be an economic analysis that will show the value of research investment more clearly.

### **Impact Evaluation**

Impact evaluation of the project on alternative career development and aquaculture resources (Tilapia) shows that there are many academic benefits generated from the researches e.g. the articles published in academic journals, academic works published in various media, teaching materials, academic conference or seminars, thesis and dissertations, in total 57 pieces or an average of 7.125 pieces per project or 2.44 pieces per researcher. The impact assessment after the completed research project, Ex-post evaluation (2007-2018) shows that the project create many benefits to society. Most benefits are generated in terms of cost reduction and increase productivity. The project analysis revealed that the Tilapia Project was worth the investment. The net present value of the project in 2007 was 95 million Baht or equivalent to 163 million Baht in 2018 (Table 1). The cost benefit ratio is 6.18 meaning that 1 Baht invested in Tilapia Research generated 6.18 Baht or 6 times of research investment. The internal rate of return was equaled to 53%. This is a very high return on investment compared to the opportunity cost of investment, or interest rates on loans or deposits in banks. It pointed out that the investment in the Tilapia research program has a tremendous impact on the economy and society.

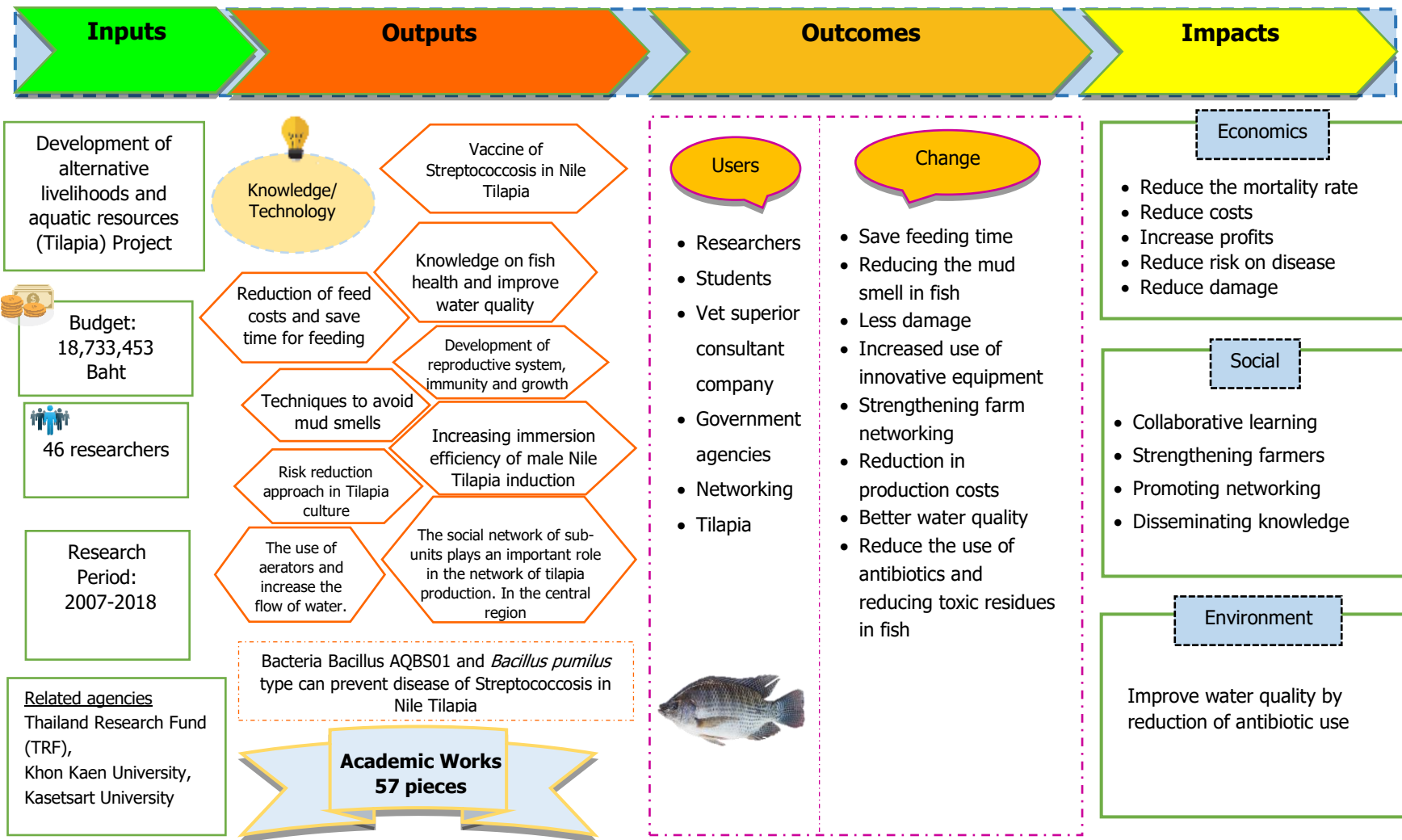


Figure 1: Research to Impact Pathway of Tilapia Research Program under Thailand Research Fund

**Table 1: Impact assessment of Tilapia Research under Thailand Research Fund**

Item	Ex-post Evaluation (2007-2018)
Present Value Costs: PVC <sup>a</sup> (Baht)	18,427,785
Present Value Benefits: PVB <sup>a</sup> (Baht)	113,863,974
Net Present Value: NPV <sup>a</sup> in 2007 (Baht)	95,436,189
Net Present Value: NPV in 2018 (Baht)	163,228,270
Benefit-Cost Ratio: BCR	6.18
Internal Rate of Return: IRR	53%

Remark:      <sup>a</sup> Present value in 2007      Discount rate at 5%

### **Conclusion and Recommendation**

The impact evaluation indicates that most Tilapia researches met the OECD criteria on relevance and effectiveness. However, to come across with the efficiency and impact indicators, users and adoption must play an important role. The sustainability indicator seems to be the most critical issue while farmers dis-adopt technology quickly after the project ended. In conclusion, the past Tilapia researches under the TRF's supports are worthwhile invested with the NPV of 2.75 million Euros; BCR is 6.74 and IRR equals to 55%. Thus, in order to extend the impacts from farm to global food security, future researches on Tilapia should be engaged more on target users' adoption in order to initiate higher economic impacts throughout the value chain. Future direction of aquaculture (tilapia) research in Thailand should support research in economics, marketing structure, throughout the value chain of the Tilapia culture. This is an important research issue. In addition, the fishery department should have a vision to produce Tilapia to the world market. Research on export processing feasibility study and plan for export of tilapia to overseas markets in the future is suggested.

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