

An Analysis of Thai Shrimp Farms' Compliance to the GLOBALG.A.P. Standard

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ABSTRACT

This study evaluated the current compliance of Thai shrimp farms to the GLOBALG.A.P. standard (The Global Partnership for Good Agriculture Practices) to identify practical corrective actions and their technical implications. Eighteen shrimp farms in Thailand, representing small/medium, single/group, and inland/coastal farms, were audited against the GLOBALG.A.P. criteria. The results indicated that the farms complied with only half of the criteria, with no significant differences associated with farm size. The level of compliance in the aquaculture base (AB) module (43-63%) was highest, followed by the shrimp species (SP) module (44-56%), the social (SC) module (40-65%), and the all farm (AF) module (17-44%). The major noncompliance areas were in the AF and AB modules. Noncompliance areas in the AF module were related to identifying environmental, risk, safety, health, and hygiene factors with regard to developing plans and procedures (including the emergency/accident plan and procedure) and implementing internal self-assessment and corrective actions. The most critical areas in the AB module were customer complaints and the recall procedure. The key adaptation strategies were developing farm management systems and document control for good practices and implementing activities to educate farmers and associated stakeholders about principles and practices of the GLOBALG.A.P. standard. The introduction of GLOBALG.A.P. standard will help improve product reputation. However, other issues need to be taken into account i.e. market demand and price premium to farmers, introduction of contract farming, and the availability of local auditors and certification procedure.

INTRODUCTION

The Thai shrimp aquaculture industry is a key sector of the economy, contributing significantly to foreign revenue. The industry garnered USD 2.8 billion in 2009 (Shrimp

Market Report, 2010) but it is now under pressure due to criticism associated with potential environmental consequences and social responsibility. Moreover, consumers are demanding that shrimp producers should demonstrate how shrimp is produced and

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delivered, including the quality of farmed shrimp inputs. Certification schemes have been introduced to the shrimp industry to promote adoption of best management practices along the supply chain and to assure consumers of the quality of shrimp products in terms of the environment and food safety. The framework of consideration for various certification schemes also extends to social issues related to labor, human rights, working conditions, and animal welfare (Jaffry *et al.*, 2004; Cowell, 2006; Greenpeace, 2007; O'Riordan, 2007; Lebel *et al.*, 2008).

The Global Partnership for Good Agriculture Practices (GLOBALG.A.P.), which was initiated by EU retailers, is an integrated standard with modular applications for different product groups, ranging from plant and livestock production to plant propagation materials and compound feed manufacturing. Its shrimp farm certification involves four applicable modules: AF (All Farm Module, for all type of farms), AB (Aquaculture Base Module, for aquaculture farm), SP (Shrimp Species, for shrimp farm), and SC (Social Module, for social matters related to the shrimp farm). The shrimp standard contains 247 compliance criteria and control points (CCPs) with 3 levels of compliance (major must, minor must, and recommendation level). Only the SC module has no level. After inspection by an inspector, the farm seeking certification shall pass 100% of major must CCPs and 95% of applicable minor must CCPs, but recommendation level CCPs are not mandatory. The Social Module shall be inspected and the inspection report shall be uploaded into the GLOBALG.A.P database prior to being granted the full certification.

Thai shrimp products are mainly for the export market, and the major markets are USA, Japan and EU with market share of 50, 20 and 13 % respectively. Half of the production relies on the US market and it is considered a high risk for having only one dominating market. Expanding to other markets will help the Thai shrimp industry to balance the export market. GLOBALG.A.P. certification in shrimp is becoming an issue of concern among shrimp farmers in Thailand. Though EU countries are major markets, Thailand has gained only 13% of the shrimp exporting values of Thailand without the requirement of GLOBALG.A.P. in the past (Custom Department, 2009). The demand for GLOBALG.A.P.-certified shrimp products is likely to extend to non-EU countries, which would make it more difficult for Thai processors and farmers to increase their share of the EU markets. However, adopting the GLOBALG.A.P. standard could turn into an opportunity for Thai shrimp producers to gain better access to the EU markets because their product could be distinguished in terms of premium quality. Producers would also be able to anticipate future trends in increasing demand for GLOBALG.A.P.-certified products from other importing countries.

It is essential to investigate the effects of the GLOBALG.A.P. standard on the adaptation strategies of Thai shrimp industry for sustainable competitiveness. In this study, small and medium sized shrimp farms were sampled to examine how well current practices comply with the GLOBALG.A.P. standard and to identify gaps between these practices and full compliance. Corrective actions needed in order to fully comply with

the standard were identified as guidance for practical implementation of the GLOBALG.A.P. standard, including the technical feasibility of adopting the GLOBALG.A.P. requirements clause by clause among different farm sizes/types.

MATERIALS AND METHODS

Identifying the study farms

Ninety eight farms (square root number of the current active farms in Thailand during 2009) were chosen from the three main

production regions of Thailand (central, east and south). Farmers were interviewed on their current practices against GLOBALG.A.P. requirements. Out of the 98 farms, 18 from different production sites in the central, east and south regions included small (single farms or group farms in the form of shrimp cooperative/club/association) and medium farms (see Table 1) volunteered for further survey as “inspection like” (a survey which was conducted like a formal inspection) to obtain information about current shrimp supply chains and marketing routes. The characteristics of the study farms are given in Table 2.

Table 1. Classifications of different farm sizes

Characteristics	Farm types		
	Small single	Medium single	Small group
Ponds (number of ponds)	<6	7–30	<6 (small size) 7–30 (medium size)
Annual productivity (tons)	40–80	>80	>200
Laborers (no.)	Family members only	Family members + workers (5–10)	Family members + workers (5–10)

Table 2. Characteristics of the studied farms in Thailand

Characteristics	Small single farms							Medium single farms							Small group farms						
	SS1	SS2	SS3	SS4	SS5	SS6	SS7	MS1	MS2	MS3	MS4	MS5	MS6	SG1	SG2	SG3	SG4	SG5			
Location (Region)	Ctr	Ctr	Etn	Etn	Etn	Etn	Etn	Etn	Etn	Etn	Etn	Etn	Etn	Stn	Stn	Stn	Stn	Ctr			
Type of farm	InLd	InLd	Cstl	Cstl	Cstl	Cstl	Cstl	Cstl	Cstl	Cstl	Cstl	Cstl	Cstl	Cstl	InLd	InLd	InLd	InLd			
Annual productivity (tons)	70	50	50	37	40	54	78	106	441	223	146	140	95	7	15	20	88	104			
Size of harvested shrimp (pcs/kg)	70–90	50–70	NA	50–80	30–55	NA	40–90	45–60	NA	40–90	32–70	30–70	95–160	70–180	85–105	60–105	45–120	45–120			
Certification (GAP/CoC)	GAP	GAP	GAP	GAP	GAP	GAP	GAP	GAP	GAP	GAP	GAP	GAP	GAP	GAP	GAP	GAP	GAP				
Traceability systems	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes			

Legend: Ctr = Central, Etn = Eastern, Stn = Southern, InLd = Inland, Cstl = Coastal, NA = Not available

Defining and assigning CCPs difficulty level

Four levels of difficulty (Diff. level) to improve the farms' current practices to comply with the GLOBALG.A.P. standard were defined as follows:

0 = **Capable**: Capable or needs additional actions or change some practices within current farm infrastructure and working system which involve negligible expenses/investment (< 1,000 Baht) to comply with the CCP.

1 = **Minor Improvement**: Needs some improvements on current practices within their current farm infrastructure and working system which involve minor expenses/investment (< 10,000 Baht) to comply with the CCP.

2 = **Major Improvement**: Needs restructuring of farm's infrastructure/working system, or hiring more people/sub-contractor/outsourcing services, or involving considerable expenses/investment (>10,000 Baht) to comply with the CCP.

3 = **Incompetent**: Cannot make any improvements without technical support from outside such as government/expert/consultant.

Diff. levels were assigned by the Stakeholder Expert Committee (2 experts from farms, 1 from hatchery, 1 from processing plant, and 1 from academe) to each of the GLOBALG.A.P.'s CCPs.

Assessing the farms' compliance with GLOBALG.A.P.

Checklist of Control Points and Compliance Criteria Integrated Farm Assurance were used to assess the compliance level of the farms' current practices with GLOBALG.A.P., specifically, Introduction V.3.0-2_30 Sep 07, All farm base V.3.0-2_30 Sep 07, Aquaculture –Shrimp V.1.0-Apr 08, and social criteria for shrimp farming V.1.0 -Apr 08 (GLOBALG.A.P. c/o FoodPLUS GmbH, 2007). Areas of noncompliance and corrective actions for the studied farms were identified. Different levels of each CCPs were analyzed in terms of technical feasibility and economic implications.

Because the recommendation level does not affect compliance to the standard, this analysis did not take into account the recommendation level CCPs. The total CCPs were less than the recommendation level CCPs, which considered 229 CCPs. The number of CCPs contained in each Module is 34 for AF, 141 for AB, 33 for SP, and 21 for SC.

RESULTS AND DISCUSSION

The studied farms complied with almost 50% of the applicable GLOBALG.A.P. criteria. It is worth noting that 19, 25 and 21% of the total criteria do not apply to medium single, small group, and small single farms, respectively (Figure 1). The current level of compliance among different farm types was very similar; the level of compliance of medium single farms was only 4% higher than small single farms and 6% higher than small group farms (Figure 2). With regard to specific modules, current practices in the aquaculture base (AB) module (43-63%)

had the highest level of compliance, followed by the shrimp species (SP) module (44-56%), the social (SC) module (40-65%), and the all farm type (AF) module (17-44%) (Figure 3). The comparison of compliance level among different farm types showed that the medium single farms performed best (43-59%).

The compliance level of all farms under 4 different assigned difficulty levels showed that Diff. level 0 = Capable (54-78%), Diff. level 1 = Minor Improvement (25-47%), Diff. level 2 = Major Improvement (43-61%), and Diff. level 3 = Incompetent at only 10% (Figure 4).

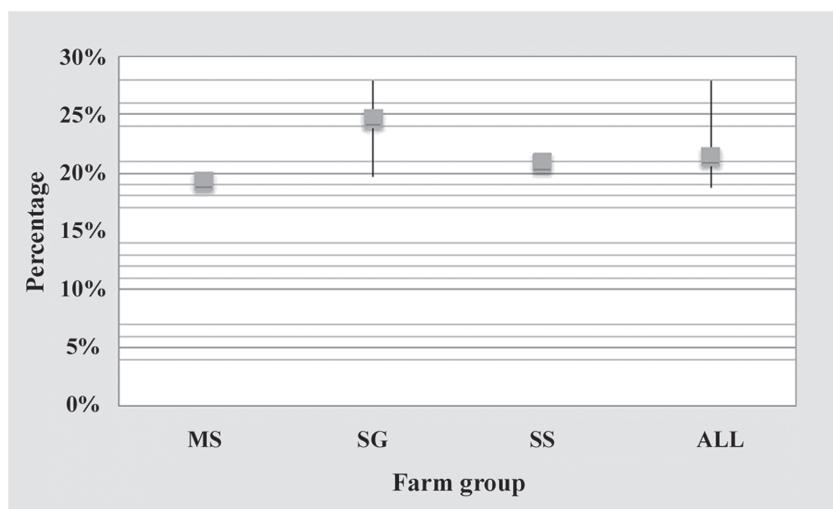


Figure 1. Percent of non-applicable compliance criteria (CCPs) on each farm group

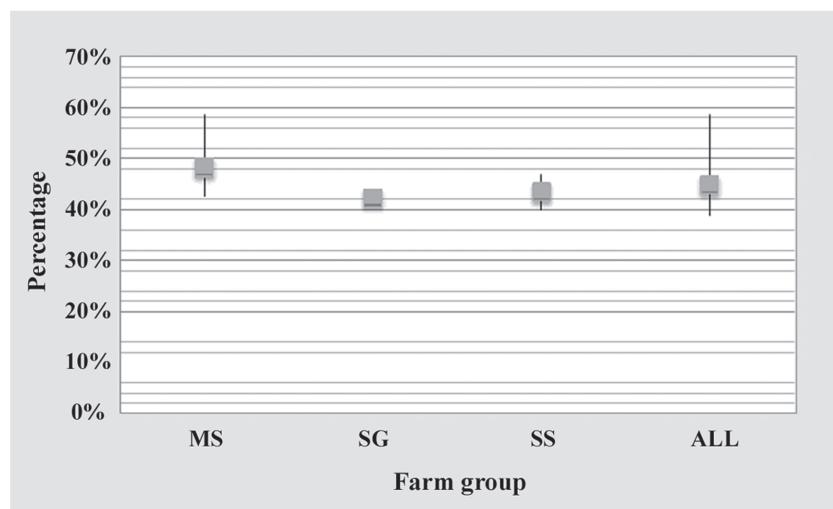


Figure 2. Compliance of each farm group

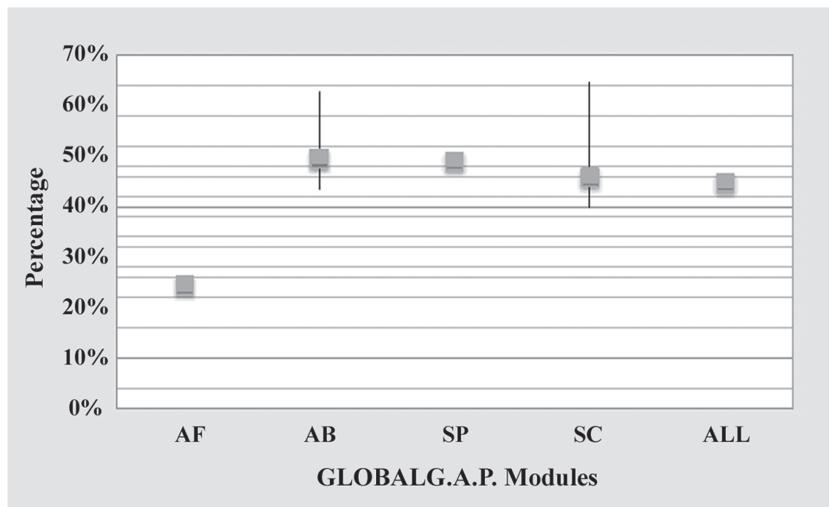


Figure 3. Percent compliance of Thai shrimp farms on each GLOBALG.A.P. module

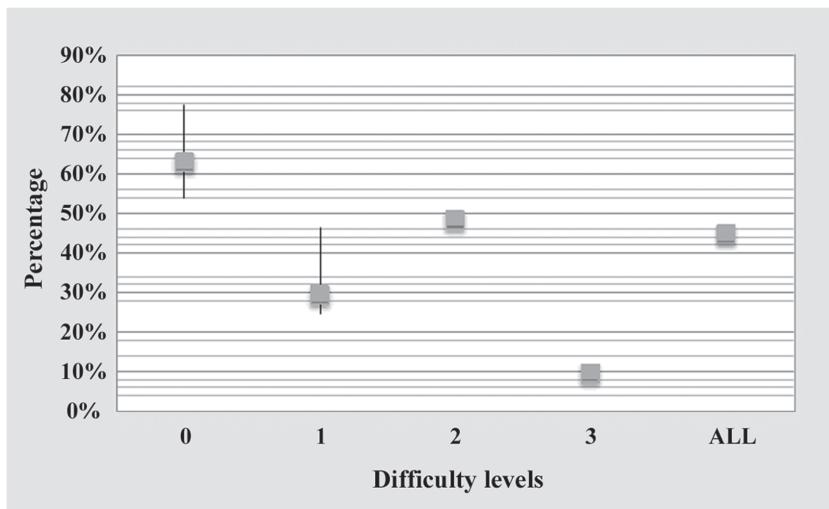


Figure 4. Compliance according to difficulty level

The high level of compliance in the Diff. level 0, AB and SP modules was mainly due to the implementation of GAP by the Department of Fisheries (DoF) as the minimum requirement for selling harvested shrimp to buyers who further process the raw shrimp into final products for overseas

markets. The requirements of GAP include farm and hatchery management in terms of water supply, post-larvae quality inspection, broodstock source, and shrimp health monitoring, which include records tracing movement and sanitary control of facilities, harvest processing, and transport to

processing lines (Department of Fisheries, 2003) (Table 3). These requirements are comparable with several criteria of the GLOBALG.A.P. The high level of compliance in the SC module of all farm types arises from national labor laws in Thailand, which regulate issues such as

minimum wage and working conditions (Ministry of Labour, 2010). Moreover, it is compulsory in Thailand to have land titles or similar documents to be approved by the DoF or local administrative unit (i.e. sub-district or tambon level) where the shrimp ponds are located.

Table 3. Scope of the Good Aquaculture Practices (GAP) implemented in Thailand (Department of Fisheries, Thailand, 2003)

Item	Scope
1. Site selection	Near water supply source, no pollution source, good means of communication and infrastructure, and legal ownership of land with the farm being registered
2. Pond management	General pond management includes farm and hatchery layout, pond preparation, water preparation, health checks of shrimp and broodstock, water quality monitoring
3. Feed, feeding, and post-larvae production	Use of registered and good quality feeds, effective feeding, production of live feeds according to requirements of larvae in each stage, use of registered chemicals and drugs for shrimp health management or water quality control
4. Post-larvae health management and disease treatment	Monitoring of shrimp health and disease infection, use of registered veterinary drugs according to the instructions provided
5. Sanitary condition of hatchery facilities	Sanitary control of hatchery areas and facilities, sanitary toilet with no contamination to hatchery production systems, good storage of shrimp feed, tools and equipment, good pest control system, good solid waste management, total and fecal coliforms in water below limits
6. Harvesting and transport	Planning of harvesting, harvesting method with shrimp quality control, movement documents for transporting
7. Data recording	Up-to-date data recording of farm and hatchery production activities

Even though there is a low different level of compliance among farm sizes and modules (except AF module), there are significantly different level of compliance on Diff. level. It is very interesting to note that Diff. level 2 had higher level of compliance than the Diff. level 1 which was easier. The reason is that most of the study farms have well-designed infrastructure and system, but

lack high level of good practices such as training, record keeping, work safety etc. The lowest level of compliance is Diff. level 3. All study farms faced the same difficulty related to identifying environmental, risk, safety, health, and hygiene factors with regard to developing plans and procedures (including the emergency/accident plan and procedure) which required a high level of technical support

by experts or government agencies. Small farms may have the ability to absorb the cost of compliance at Diff. levels 0 and 1, but not for levels 2 and 3. Medium to large farms will put more effort and investment if there are some incentives to cover their investment.

Farm auditing results revealed key areas of noncompliance with the GLOBALG.A.P. standard that could be classified into three main categories (Table 4): farm management system (i.e. management system, plan, procedures), human resources and facilities (i.e. responsible person, training activities, facilities), and documentation (e.g. quality manual, records, farm layout). In terms of management systems, the key noncompliance areas were mainly related to the environmental and risk management systems of farming activities, including the social environment. Identification of environmental, risk, safety, health, and hygiene factors that would lead to the development of plans and procedures for implementing related management programs, emergency and accident plans and procedures, and monitoring systems were not in place. Internal self-assessment and effective corrective actions were not documented. Additionally, procedures for dealing with customer complaints as well as recall procedures were not yet implemented.

With respect to human resources and facilities, the noncompliance areas were mainly related to training activities on environmental, risk, safety, health, and hygiene management for on-site workers, seasonal workers, and subcontractors so that they would be aware of the farming practices. Some farms had issues centered on needed improvements in infrastructure and facilities, such as site entry (fences, gates),

feed storage room, waste storage room, and emergency facilities. The communication between farm owners and workers was not formally recorded and no one was responsible for representing workers in discussions about workers' rights and labor laws.

Concerning documentation, the most problematic areas were associated with farm practice records to be kept for at least 2 years. The development of a quality manual (covering farm plan/layout, organization chart, environmental, risk, safety, health, and hygiene policies, plans, procedures, emergency plan, contingency plan), and the social criteria assessment and contract documents of all workers need to be done.

Among the four modules, noncompliance was found mainly in the AF and AB modules. In the AF module, they were related to the identification of environmental, health, safety, and hygiene risks, whereas the most critical areas in the AB module were the procedures to deal with customer complaints and product recalls. As a result of this study, suggestions on corrective actions have been proposed. The most notable measure suggested was to develop a farm management system which could identify, manage, and minimize risks with regard to environmental factors, health, hygiene, and food safety. Farming operation and management practices must be documented in order to monitor for better planning and management. Capacity building activities should be conducted to introduce and educate farmers as well as associated stakeholders (i.e. hatchery and feed mill operators, harvesting operator, and processor) to generate an understanding for the GLOBALG.A.P standard. Only then will full compliance be possible.

Table 4. List of the key areas of non-compliance with the GLOBALG.A.P. standard

Module	Key areas of non-compliance with the GLOBALG.A.P. standard		
	Management system (system, plan, procedure)	Human Resources and Facilities (responsible person, training, facility)	Documentation (quality manual, records, farm layout)
AF	• Internal self-assessment and effective corrective actions	• Health and safety training • Hygiene training	• Records of farming practices (2 years min.) • Farm plan or map
	• Risk assessment and management plan and procedures	• Persons to make decisions on the possible withdrawal of product	• Hygiene instruction • Warning sign of potential hazards
	• Emergency/accident plan and procedures		• Energy use records
	• Hygiene procedures		
	• Waste management plan and procedure		
	• Environmental and biodiversity plan, Environmental Impact Assessment and Risk Assessment		
	• Complaint procedure • Recall procedure		
AB	• Emergency/accident plan and procedures • Contingency plan • Pest control plan • Veterinary health and hygiene plan	• Site entry (fences, gates) • Emergency facilities • Non-absorbent material shelves for storing chemicals • Retaining tanks for spillage • Responsible person for making decisions on chemical use • Hygiene standard training	• Quality manual • Organization chart • Documented risk assessment • Written instruction to wash hands • Documents of chemical inventory • Material Safety Data Sheet (MSDS) for all chemicals • Documented pest control plan • Documented hygiene standard • Health and safety guide • Documented veterinary health and hygiene plan
	• Veterinary health and hygiene plan		
	• Pest control plan		
	• Contingency plan		
	• Emergency/accident plan and procedures		
SP	• Hygiene and pest control policy • Social criteria assessment	• GLOBALG.A.P. -certified broodstock and hatcheries • GLOBALG.A.P. -certified feed manufacturers	• Social criteria accessible to customers
SC	• Self-declaration of good social practices • Environmental impact monitoring systems	• Complaint procedure • Responsible person assigned to represent the workers • Two-way communication between farm owners and workers	• Records of all workers and subcontractors • Copies of work contracts

On-site technical services may be necessary, especially for the pioneer farms applying for GLOBALG.A.P.

The demand for GLOBALG.A.P.-certified shrimp will be a driving force for the Thai shrimp industry in sustainable competitiveness. The results from farm auditing indicate that Thai shrimp farms presently comply with only half of the GLOBALG.A.P. requirements. All farms perform best in the SP module. The performance of small/medium single farms is similar to the group farms in the AF and AB modules, except that the group farms perform better in terms of social criteria (the SC module). The noncompliance areas are mainly in the AF and AB modules. The noncompliance areas of the AF module are related to identification of environmental, risk, safety, health, and hygiene factors leading to the development of plans and procedures for related management programs, including emergency and accident plans and procedures; the implementation of internal self-assessment (monitoring systems); and the corrective actions to control or minimize the impacts. The most critical areas of AB module that are not yet in place are the procedures to deal with complaints from customers and recalls (the events of product withdrawal and notification to customers). To fill such gaps, the key adaptation strategies center on developing farm management systems (management system, human resource, and infrastructure/facility) with documentation of good practices. Capacity building activities should be conducted to introduce and educate farmers as well as associated stakeholders to understand the development, principles, and practices of the GLOBALG.A.P. standard clause by

clause. On-site technical services might be required especially for initial application. The time and financial investment should be fairly returned to farmers who are the main production unit adopting most of the requirements; i.e. benefits of premium prices should be distributed along the whole supply chain, not only to processors who are closest to buyers.

Shrimp farmers are under real pressure, from both internal and external demands, to demonstrate their production activities are founded on good practices covering environmental factors, risk, safety, health, and hygiene as well as social aspects (Lebel *et al.*, 2008; WWF, 2007; MRAG Ltd., 2008). The introduction of the GLOBALG.A.P. standard to shrimp products will certainly distinguish the quality of shrimp products, but not many farms will adopt the standard if there is no clear indication of market demand with premium price. Education and public relation activities are urgently needed. A guidebook of the GLOBALG.A.P. standard to interpret the criteria clause by clause, including guidance on practical implementation with detailed explanations of the assessment and verification methods along with an example of documentation, would be the most practical approach together with a “hands-on” training course. The distribution of benefits among various stakeholders along the shrimp supply chain will be another major concern, in order to justify costs, especially at the farm level. Contract farming is most ideal in this case, so that the processors can identify certified sources of raw materials up to the processing line. Another practical issue is related to the local auditors and certification procedure. All these issues should be taken into account by the GLOBALG.A.P.

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LITERATURE CITED

Cowell, J. A. 2006. Quality assurance, information tracking and consumer labelling. **Marine Pollution Bulletin** 53:650–656.

Custom Department, Thailand. 2009. **Statistical on Shrimp Import and Export.** Available online at <http://www.customs.go.th> (accessed on 29 May 2009).

Department of Fisheries, Thailand. 2003. **GAP (Good Aquaculture Practices) 2003.** Department of Fisheries, Thailand (in Thai).

Department of Fisheries, Thailand. 2008. **Statistical on Shrimp Import and Export.** Available online at <http://www.fisheries.go.th> (accessed on 29 May 2009).

GLOBALGAP c/o FoodPLUS GmbH. 2007. **The GLOBALG.A.P. Standard - Control Points and Compliance Criteria Integrated Farm Assurance: Introduction V.3.0-2_30 Sep 07, All farm base V.3.0-2_30 Sep 07, Aquaculture –Shrimp V.1.0-Apr 08, and Social criteria for shrimp farming V.1.0-Apr 08.** Greenpeace. 2007. **Challenging the aquaculture industry on sustainability: Technical overview.** Greenpeace.

Jaffry, S., H. Pickering, Y. Ghulam, D. Whitmarsh, and P. Wattage. 2004. Consumer choices for quality and sustainability labelled seafood products in the UK. **Food Policy** 29:215–228.

Lebel, L., P. Lebel, P. Garden, D. Huy Giap, K. Khrutmuang, and S. Nakayama. 2008. Places, chains, and plates: Governing transitions in the shrimp aquaculture production-consumption system. **Globalization** 5(2):211–226.

Ministry of Labour. 2010. **Labour Law in Thailand.** Available online at <http://www.mol.go.th/anonymouse/laws> (accessed on 20 June 2010).

MRAG Ltd. 2008. **Implications of international standards and certification scheme for aquaculture on small-scale producers.** FAO, Rome

Mungkung, R., S.H. Gheewala, P. Prasertsun, N. Poovarodom and N. Dampin. 2006. **Application of Life Cycle Assessment (LCA) for participatory environmental management along the supply chain of individual quick frozen Pacific white-leg shrimp (*Panaeus vannamei*).** Technical Report (in Thai), Thailand Research Fund (TRF).

O'Riordan, B. 2007. Certifying the
uncertifiable? Samudra report No. 48.
Industrial Aquaculture report.
p 30–34.

Shrimp Market Report. 2010. **Statistic of
Shrimp-March 2010.** Available online
at <http://www.worldtradestatistics.com>
(accessed on 30 April 2010).

World Wildlife Fund (WWF). 2007.
**Benchmarking study on international
aquaculture certification programmes.**
WWF Zurich, Switzerland and Oslo,
Norway.