

**EX POST EVALUATION OF STDF PROJECT
“A SOUTHEAST ASIAN PARTNERSHIP TO
BUILD CAPACITY FOR FRESH AND
PROCESSED FRUIT AND VEGETABLE
PRODUCTS” IN THAILAND AND VIETNAM
(STDF/PG/326)**

(THE MACBETH PROJECT)



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DECEMBER 2015

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ACKNOWLEDGEMENT

The author would like to thank all the members of the MACBETH project team at Can Tho University (CTU) in Vietnam, Kasetsart University (KU) in Thailand and Michigan State University (MSU) in the United States of America for the friendly and warm welcome and outstanding level of support that made the evaluation of the MACBETH project both interesting and enjoyable.

Thanks also to all the beneficiaries and stakeholders in Thailand and Vietnam who gave up their time to cooperate with the evaluation process. Their help and support was of vital importance and ensured a successful outcome for the evaluation.

Picture Credits – Title page:

1. Mr Phan Quoc Manh Hung owner and manager of Hung Phat JSC in Vietnam holds' his Macbeth training certificate. Mr Hung used the MACBETH training as a springboard to obtaining ISO22000:2005 certification. This standard has opened the door to high value markets in the EU, Japan and US.

2. Ms Waraporn manager of the Wang Nam Khiao non-toxic vegetable cooperative used the MACBETH training to implement GMP in her pack-house and obtain the Organic Thailand certification. Implementing food safety standards have increased sales by 18% and her customer base has grown by 10%.

All pictures used in this report were taken by Dr Andrew Graffham of the Natural Resources Institute (NRI), University of Greenwich.

Exchange Rates:

US\$1 = 35.9453 Thai Baht (THB)

US\$1 = 22,167.4 Vietnamese Dong (VND)

Exchange rates correct as of 18 December 2015

GLOSSARY

ACFS	National Bureau of Agricultural Commodity & Food Standards (Thailand)
ASEAN	Association of South East Asian Nations
AVRDC	Asian Vegetable Research and Development Centre
CTU	Can Tho University (Vietnam)
DANIDA	Danish International Development Agency
DC	Distribution Centre
EU	European Union
FAVRI	Fruit and Vegetable Research Institute (Vietnam)
FDA	Food and Drug Administration (US & Thailand)
FOSTAT	Food Science & Technology Association of Thailand
FSM	Food Safety Management
FSMA	Food Safety Modernization Act (US)
GAP	Good Agricultural Practice
GFSI	Global Food Safety Initiative
GMP	Good Manufacturing Practice
GFSP	Global Food Safety Partnership
HACCP	Hazard Analysis Critical Control Point
IFC	International Finance Corporation
IPPC	International Plant Protection Convention
IPM	Integrated Pest Management
IQF	Instant Quick Frozen
ITC	International Trade Centre
JSC	Joint Stock Company
KU	Kasetsart University (Thailand)
MACBETH	Market Access through Competency Based Education and Training in Horticulture
MARD	Ministry of Agriculture and Rural Development, Vietnam
MRL	Maximum Residue Limit
MSU	Michigan State University (USA)
NRI	Natural Resources Institute (UK)
OARD	Office of Agricultural Research & Development (Thailand)
QA	Quality Assurance
RASFF	Rapid Alert System for Food and Feed (EU)
RIA1	Research Institute for Aquaculture No 1 (Vietnam)
SOFRI	Southern Horticultural Research Institute (Vietnam)
STDF	Standards and Trade Development Facility
TOT	Trainer of Trainers
UNIDO	United Nations Industrial Development Organization
VASEP	Vietnam Association of Seafood Exporters & Producers

EXECUTIVE SUMMARY

In November to December 2015 an ex-post evaluation of the STDF funded STDF/PG/326 MACBETH project was carried out in Thailand and Vietnam. The goal of MACBETH was to improve market access of fruits and vegetables from Thailand and Vietnam to high-value domestic/export markets. The project focused on the development of a competency-based education and training platform for selected fresh/processed fruit and vegetable value chains, and the provision of customised training. It was intended that training be delivered using a combination of traditional face-to-face instruction and internet-based e-learning. The emphasis was on: (i) improving the capacity of small-scale, less technically developed producers and processors to meet national and international standards; and (ii) enhancing the ability of government agencies, universities and the local private sector to support capacity building and market access initiatives for these groups.

The MACBETH project developed and tested key components of a harmonised, competency-based educational platform on food safety measures for fruit and vegetable value chains targeted at buyers, suppliers, processors and primary production levels. In partnership with local experts, the MACBETH team adapted generic educational content and learning materials for manufacturing, supplied by MSU, to make them available in local languages. Additional material was added to make the content appropriate for local conditions. Training material for primary production was developed jointly by KU and CTU. The harmonised, competency-based learning modules and materials were institutionalised through key universities, research institutions, local government extension agencies and major food businesses all of whom were involved in implementing the project.

In the judgement of the evaluator the MACBETH project was highly relevant for the beneficiaries and fitted well with the strategic goals of the STDF. The delivery was effective with most outputs being achieved within the life of the project. Although the limited internet access in rural areas in both countries forced the project away from blended learning towards a purely face-to-face approach the project retained the websites with training materials in local languages as e-resource. It was unfortunate that the trainee assessment tools were not developed or implemented during the life of the project. The project overcame numerous difficulties and made efficient use of available resources to deliver a wide reaching face-to-face training programme to supplement the excellent resource base of electronic training materials. The project had a significant and lasting impact on management of food safety risks within fruit and vegetable value chains in Thailand and Vietnam. All of the beneficiaries visited have gained benefits in terms of improved market access, higher incomes and lower levels of product rejections. The outputs of the MACBETH project are being sustained at field level through integration into the training programmes of the government extension services and private sector driven training programmes. Both universities have integrated the training content from the project into their academic/professional programmes.

It is recommended that future projects of this type be of 3-5 years duration and have a higher level of resources to allow for greater mentoring support of trainees. The private sector should be involved at the project design stage and cost-sharing options should be explored. The applicant and key project partners should engage with key public sector agencies (such as MARD in Vietnam) at the design stage to leverage support from national governments at a senior level and increase the potential for long-term sustainability of the project outcomes. Future e-learning platforms should incorporate trainee assessment tools developed against recognised national standards as these would add value to any training certificates issued.

1.0 INTRODUCTION

1.1 Context of the project

Thailand and Vietnam are important producers of fresh and processed vegetables, with rapidly growing retail and high-value domestic markets. Both countries traditionally export regionally to markets such as China, Indonesia and Malaysia that do not normally demand strict food safety standards. Since 1985 Thailand has developed high-value exports to the EU, US and Japan. By 2010 this trade was worth over US\$2.2 billion per annum. However, data from the EU rapid alert system for food and feed (RASFF) showed an upward trend in rejections of Thai fruits and vegetables on food safety grounds. In 2010 alone there were 61 rejections, 55 of which were associated with pesticide residues. Vietnam started to export to high-value destinations around 1995 but major growth in exports did not start until 2008. In 2010 exports were worth US\$460 million, there were only 3 rejections recorded by RASFF. The rationale of the MACBETH project was that non-compliance with food safety standards would restrict access to high-value domestic and international markets.

It is interesting to note that by 2014 the value of fruit and vegetable exports from Thailand and Vietnam had grown to more than US\$3.3 billion and US\$1.5 billion respectively, with more produce going to the EU, Japan and the USA. RASFF data shows that alerts for Thailand have fallen from 61 in 2010 to 16 in 2015 (including 8 pesticide MRL violations). In contrast for Vietnam RASFF rejections have risen from 3 in 2010 to 28 in 2015 (including 19 pesticide MRL violations). The picture for Thailand is one of better management, whereas for Vietnam there appears to be an ongoing food safety management (FSM) problem that becomes more apparent as export volumes increase.

1.2 Project summary

In July 2010, the STDF working group approved a project application (STDF/PG/326: "A Southeast Asian Partnership to Build Trade Capacity for Fresh and Processed Fruit and Vegetable Products") submitted by Michigan State University (MSU) in partnership with Kasetsart University (KU), Thailand and Can Tho University (CTU), Vietnam.

Contracting between the WTO and MSU took place in December 2010 with the STDF contribution amounting to US\$581,665 and in kind contributions by the implementing partners worth US\$137,610. The project started on January 1st 2011 and inception workshops were held in Thailand and Vietnam in March 2011. At the inception meeting the project was re-branded as Market Access through Competency Based Education and Training in Horticulture (MACBETH) Project. For all practical purposes STDF/PG/326 was known only by the acronym "MACBETH" and this is how the project will be referred to in the rest of this report. The original end date was 31st December 2012 but the STDF approved a 6 month (no-cost) extension to 30th June 2013 in October 2012. This was to mitigate against the effect of unforeseen delays in implementation due to severe flooding and drought conditions in Thailand early in the project.

The goal of MACBETH was to improve market access of fruits and vegetables from Thailand and Vietnam to high-value domestic/export markets. The project focused on the development of a competency-based education and training platform for selected fresh/processed fruit and vegetable value chains, and the provision of customised training. It was intended that training be delivered using a combination of traditional face-to-face instruction and internet-based e-learning. The emphasis was on: (i) improving the capacity of small-scale, less technically developed producers

and processors to meet national and international standards; and (ii) enhancing the ability of government agencies, universities and the local private sector to support capacity building and market access initiatives for these groups.

The MACBETH project developed and tested key components of a harmonised, competency-based educational platform (see Annex 1) on food safety measures for fruit and vegetable value chains targeted at buyers, suppliers, processors and primary production levels. The competency frameworks were closely aligned to international requirements as outlined in the Codex Alimentarius General Principles of Food Hygiene, other Codex standards, and authoritative references on international best practices for food safety and other SPS measures were also used. In partnership with local experts, the MACBETH team adapted generic educational content and learning materials for manufacturing modules, supplied by MSU, to make them available in local languages. Additional material was added to make the content appropriate for local conditions. Training material for primary production was developed jointly by KU and CTU. The harmonised, competency-based learning modules and materials were institutionalised through key universities, research institutions, local government extension agencies and major food businesses all of whom were involved in implementing the project.

The project logframe envisaged the use of internet-based e-learning solutions to provide a scalable platform that could potentially reach thousands of stakeholders. KU and CTU launched websites to disseminate the localised educational modules to stakeholders as open educational resources. All the modules were pilot tested and refined prior to use in a series of face-to-face training programmes in Thailand and Vietnam. Lead trainers were identified and trained in the use of materials for improved food safety and SPS management. Participants in the capacity building programmes were trained as trainers thus providing a much larger pool of trained experts embedded into the value-chains and supporting organisations. Attempts were also made to link participants to potential high-value market opportunities within Thailand and Vietnam and export destinations. At the end of the project KU and CTU committed to maintaining the e-based training resources developed under the MACBETH project to improve sustainability of the outputs of the project.

As lead implementing organisation for MACBETH, MSU entered into separate sub-contracts with KU and CTU for specific activities under the project (essentially all in country activities were sub-contracted to KU and CTU). KU and CTU cooperated extensively throughout the project (essential for development of harmonised training materials). This included mutual visits of project staff to their counterpart institutions, site visits in each country to compare production/processing methods and approaches for food safety management (FSM) and to share training materials and techniques.

MSU reported on progress with the MACBETH project through an inception report, four bi-annual progress reports, and a final project report. Key project documents are available on the STDF website. Copies of the source material (in English) for the manufacturing modules can be found on the MSU food safety knowledge network websites (see Annex 2 for web links). The primary production modules (good agricultural practice – GAP) are available in Thai and Vietnamese on the MACBETH websites hosted by KU and CTU. These materials are quite distinct and country specific and harmonised in terms of overall content and competency levels. Unfortunately this material is not available in English. Copies of all the Thai materials are also available on DVD and all the Vietnamese presentations (but not video sequences) are available on CD. Activities were monitored under the supervision of

senior staff at MSU, KU and CTU against the outputs stated in the original project document.

Prior to the MACBETH project CTU had already developed a HACCP module (with DANIDA funding) for delivery within their food technology degree programme as part of preparing students for employment in the export orientated aquaculture industry. KU included food safety management and good agricultural practice in their degree programmes prior to MACBETH. They had also worked closely with the Ministry of Agriculture (MoA) to provide food safety management training to over 600 SME's since 1999. In 2002, KU worked with the MoA to introduce the concept of good agricultural practice to farmers in the area around Bangkok as part of the Thai Governments "Cluster of Western GAP Programme".

1.3 Objective of the evaluation

The objective of the ex-post evaluation of STDF/PG/326 was to:

- Verify whether the project achieved the objectives set out in the project document;
- Identify if the project contributed to any of the higher level objectives of the STDF identified in the logical framework attached to the STDF Medium Term Strategy for 2015-2019 (e.g. measurable impact on market access, improved domestic SPS situation, and/or poverty reduction);
- Identify key experiences, good practice and lessons of interest to the beneficiaries of the evaluated project, as well as to STDF Working Group members and development partners more broadly (including for future STDF programme development).

1.4 Evaluators independence

The evaluator was completely independent having never worked directly for STDF or been a beneficiary of STDF project funds. The evaluator had no prior relationship with any of the organisations or persons met during the evaluation and hence there was no conflict of interest.

2.0 METHODOLOGY

2.1 Method used

The evaluation was divided into two parts. In the first part, the evaluator made a review of the project documentation and websites to gather information relevant to the evaluation questions and to assess whether the training materials developed by the project were easily accessible to potential users. For the checks of the websites the evaluator looked at how easy it was to open or download files, whether all modules were present in a usable form and what content was used for training. The evaluator also looked at access histories (where possible) and the presence or absence of useful features such as links to external websites.

For the second part of the evaluation, the evaluator developed two sets of questions, one for the main partners, i.e. MSU, KU and CTU (37 questions) and the other for beneficiaries (8 questions). These questions were designed to provide information to feed into the responses to the main evaluation questions. All questions were sent to STDF for comment prior to being used.

The questions were administered mainly in face to face interviews in Thailand (30/11/15-4/12/15) and Vietnam (6/12/15-11/12/15). In these countries opportunities

were taken to visit field locations to assess evidence of success associated with the MACBETH project. The evaluator looked at participant lists from the various training programmes held in Thailand and Vietnam and made a selection to provide representatives of the different types of beneficiaries (local government extension services, research institutions, farmers & farmers' cooperatives, pack-house and processing facilities, supermarket retailers, exporters and standard setting organisations). For MSU, their questionnaire was administered via a Skype conference.

2.2 Sources of information

The evaluator consulted the following documents and websites as part of the evaluation followed by meetings (face to face & electronic) with the implementing partners and a range of stakeholders in Thailand and Vietnam. Full details of all documents, websites and stakeholders consulted are provided in Annex 2.

3.0 FINDINGS AND ANALYSIS

3.1.1 Relevance

Effective management of food safety risks is of key importance for access to higher value markets both nationally and internationally, as well as the health and well-being of domestic consumers. Thailand and Vietnam have developed exports of fruit and vegetable products to major markets such as the EU and US as an excellent income earning opportunity. However, as export volumes increased so did the levels of rejections due to non-compliance with food hygiene and wider SPS requirements. Thailand and more recently Vietnam have sought to manage foodborne risks better taking a farm to fork approach to management of food safety risks. Access to up-to-date information and training is essential but key stakeholder organisations (such as KU and CTU) lacked knowledge of the latest developments in food safety management and were only familiar with face to face training techniques.

Face to face training is a good approach for training but is resource intensive and therefore often only reaches a small percentage of potential beneficiaries. A modern alternative is distance learning making use of internet and smartphone technology (so called e-learning) to reach large numbers of people at much reduced cost. Distance learning has many obvious benefits but does rely on good internet access and is not suited for practical demonstrations. Blended learning is a hybrid approach that combines or blends e-learning with face to face skills training and discussion sessions.

Blended training is a very useful approach as it allows the factual content and assessment of a course to be delivered to 1000s of trainees over the internet far more efficiently than face to face training. Components of the course that deal with practical skills are still best delivered in a face to face environment hence the preference for blended learning rather than purely electronic systems. The key determinant is access to an appropriate level of communications technology. Blended learning works well in the US and EU and is increasingly usable in Asia (but MACBETH highlights the limitations in rural areas).

According to KU, face-to-face training remains essential for working with farmers, packing and processing facilities and government extension officers in rural areas in Thailand due to the limited access to the internet. Urban users (such as major supermarket retailers and export businesses) have much better internet access. For these users, a blended approach combining electronic learning and face to face sessions would be most effective. The e-learning platform has a lot of potential for

updating of knowledge especially as internet access continues to improve and extend to more remote areas.

Face-to-face training remains essential for Vietnam. The website is most effective in providing an electronic resource that can be accessed by major food businesses and larger institutions such as CTU and Southern Horticultural Research Institute (SOFRI). CTU appreciates the theory and future potential of blended training for scale-up of training activities but this will only be possible when the infrastructure for broadband internet improves. Under current conditions TOT courses offer a way to spread the training message more widely. The personnel trained in electronic training techniques by staff from MSU have created a valuable resource in readiness for future improvements to internet access. It is not easy to say when the communications infrastructure in the Mekong Delta will reach the necessary level but the region is developing rapidly with major investments in roads and bridges.

In Thailand all previous programmes implemented by KU were paper based. The MACBETH project introduced the novel concept of electronic or blended training with an e-platform for learning resources. Access to international knowledge and perspective was also extremely important for upgrading existing efforts in Thailand. KU benefited extensively from the exchange visits to the USA. Staff had an opportunity to understand the US viewpoint on food safety especially the concept of "food defense"¹ and to see the workings of the development of the produce safety rule first hand. Staff learned a lot about practical aspects of GAP including IPM and better ways to make information more accessible and farm friendly. Prior to MACBETH KU had never taken a farm to fork approach to FSM and were unaware of the importance of this approach. Material and approaches seen in the US were incorporated into the GAP training back in Thailand and KU has also opened discussions with ACFS in the light of the US experience as to whether GAP and a farm to fork approach to food safety should become mandatory or remain as voluntary requirements. KU chose various training opportunities to maximise on capacity building for KU staff. Several staff attended 2 week courses at UC-DAVIS (California) chosen for its practical approach to food safety training. A member of KU staff made a film of demonstrations (delivered by UC-DAVIS in California) of safe practices for fresh-cut fruits and vegetables. Attendance at the training events in the US and the film of the demonstration of safe practices proved invaluable for use in the MACBETH training back in Thailand.

The MACBETH project was an entirely new concept for CTU in Vietnam with relatively little material to build upon. CTU and SOFRI obtained new knowledge and understanding of key issues and concepts from involvement in MACBETH and created a whole new resource of training modules in Vietnamese. The MACBETH material has been integrated into the established programmes of both institutes. Thus material from MACBETH is now included within CTU's mainstream teaching programme at post-graduate level. The opportunity to travel to the US was of great importance to the CTU starting with an opportunity to understand the US concept of "food defense"¹. CTU staff attended the GFSI conference in Orlando in 2012 and were exposed for the first time to the concept of an integrated approach to food safety management throughout the value chain (farm to fork). Previously CTU considered each part of the chain separately. CTU continues to benefit from the GFSI news update service and regular exchange of information with colleagues at KU in Thailand. On the recommendation of KU, the CTU team attended the UC-

¹ Food defense is defined under the US Bioterrorism Act of 2002 as "activities associated with protecting the nation's food supply from deliberate or intentional acts of contamination or tampering."

DAVIS HACCP course as part of the MACBETH project. This was a valuable course as it included practical demonstrations of the application of HACCP in actual food industries which have since been adapted into CTU food safety programmes.

The rationale for the MACBETH project was driven by the need to manage food safety and other SPS risks within selected fruit and vegetable value chains in Thailand and Vietnam. An absence of good national data on foodborne disease for these countries makes it difficult to assess the overall situation. However, food safety risks are an ongoing issue that is evolving with time. Climate change is increasing some known risks and causing others to emerge. Changes in national and international regulations make it essential to update food safety systems and associated training materials. For example the US has finalised their Produce Safety Rule and the Rule for Preventative Controls for Human Food and Animal Feed under the Food Safety Modernisation Act (FSMA). In the EU the 2011 outbreak of *E.coli* 0:104 in sprouted seeds is driving regulatory change on microbiological risks. Private standards such as GLOBALGAP have made their requirements for management of microbiological risks more stringent. As such the need for updated training programmes and better controls will remain and it is vitally important for those involved in international trade to understand the international perspective on key issues.

3.1.2 Effectiveness

According to the final project report, the MACBETH project had 32 deliverables deriving from the original project logframe. Of these some 91% were completely achieved within the life of the project (including 6 month extension) although delivery schedules did diverge from the original workplan (see section 3.1.3). This was a very creditable achievement given the various unforeseen circumstances that interfered with implementation of activities (especially in Thailand). In this regard the project did develop excellent training materials for good agricultural practice (GAP) and food safety management in processing in Thai and Vietnamese in both paper and electronic formats. This material included presentations, field-based training posters, manuals and films of training sessions and field visits that included practical demonstrations of good practices. These materials were made available via websites in Thailand and Vietnam which have not been updated since the end of the project but were still fully functional in December 2015. In addition in Thailand, KU produced a DVD of all of the training materials including videos. In Vietnam CTU provided trainees with CDs containing copies of all presentations and paper extension manuals. However, films could only be accessed via the CTU hosted MACBETH website.

A series of training of trainers (TOT) sessions were conducted in Thailand and Vietnam that resulted in a cadre of 335 and 349 expert trainers for Thailand and Vietnam respectively in GAP & FSM, embedded within the fruit and vegetable value chains and supporting organisations. In addition the project trained a total of 143 personnel in electronic/distance learning techniques across both countries. This was an entirely new area for Thailand and Vietnam and MACBETH created a cadre of experts who are likely to be invaluable in years to come as internet communications continue to develop.

The project had ambitious plans to facilitate market linkages for project beneficiaries, though the final project report says this was only 50% achieved due to time constraints. When the evaluator interviewed MSU they were of the opinion that the output had not been fully achieved during the life of the project as there was too little time and they did not have a strong commercial partner with a supply chain ready to link to the beneficiaries of MACBETH. However, field visits by the evaluator in

Thailand and Vietnam showed that in the 2 years since the end of the project, most of the beneficiaries visited had used the MACBETH training to implement FSM/GAP standards and gain greater access to higher value markets. For example an organic vegetable cooperative in Thailand had increased access to high value supermarket retailers by 10%, sales volumes had increased 18% and wastage had fallen from 20% to just 5%. In Vietnam a processor of fruits and vegetables, who had no standards in place at the time of the MACBETH project, had used the MACBETH project as a springboard to ISO22000:2005 certification. Compliance with this standard enabled him to expand sales into the EU, Japanese and US markets.

Two significant deliverables identified in the project document were not delivered at all by the project. The first of these was tools for assessing competency of trainees. MSU said that they ran out of time and were unable to include these tools as part of the MACBETH project. However, MSU developed and tested pre- and post-training assessment tools, based on the MACBETH material, as part of a World Bank / Global Food Safety Partnership (GFSP) funded programme in northern Vietnam just after the end of the MACBETH project. While these tools have been integrated into a distance learning course promoted by MSU, they were not given to KU or CTU. In the opinion of the evaluator, this was a pity as assessment is a key part of a truly competence based learning system. KU and CTU had not really considered assessment of trainees' competence and said that this was not part of normal practice for them in field-based vocational training although it is obviously at the very core of their academic courses. In Thailand the Director for quality assurance at SIAM-MAKRO said that introduction of a competency based assessment system, with various levels of competency, would add value to the training material going much further than the current system of purely attendance based training certificates. KU are keen to explore this further with SIAM-MAKRO and the Thai National Bureau of Agricultural Commodity & Food Standards (ACFS). Access to the assessment tools, developed and tested by MSU after the end of the MACBETH project, would be of great value in this context.

The other deliverable that remained undelivered was distance or blended learning courses. This was an important part of the original work-plan but in practice the level of internet access for the majority of project beneficiaries in Thailand and Vietnam was insufficient to support distance or blended learning approaches. For this reason, all of the actual training was done face-to-face and the KU and CTU teams and their beneficiaries saw this as the most effective way forward for the foreseeable future. The major use for the internet was to provide urban based beneficiaries with access to training resources online and links to important websites for news and information on SPS issues. However, many beneficiaries in Thailand and Vietnam see electronic training as the key for the future, with internet access as the only barrier to adoption. The major expected advantage is the ease of updating of information and ability to reach large numbers of people within a value chain. In both countries some beneficiaries talked about the potential of using mobile phone based applications (such as "LINE") to provide some of the training content. It appears that even in rural areas there is much better access to smartphone technology than broadband internet. This point merits further investigation.

Simply delivering training programmes does not lead to improved implementation of international standards or better access to high-value markets. The teams at KU and CTU concluded that success is mostly due to a high level of commitment, motivation and understanding by those implementing FSM and GAP driven by market demand. The chances of success are greatly enhanced if support is provided by well-resourced food businesses as part of a policy for vertically integrated supply chains. The field visits in Thailand and Vietnam provided positive and negative examples of

these conclusions. In Thailand and Vietnam the producers and small-scale processors interviewed all showed a high level of commitment and motivation to implement improved standards for GAP in primary production and FSM in packing and processing of fruits and vegetables. All were able to demonstrate a good understanding of the training messages provided by MACBETH and plenty of evidence of good practices were seen in the field.

In Thailand adoption of improved standards was driven by market demand. Support came from government extension agencies. Buyers often offered a premium of 15% for compliance with better standards and larger companies such as SIAM-MAKRO were running training programmes incorporating MACBETH training materials for their suppliers at no cost to the supplier. Overall all beneficiaries in Thailand were satisfied that the benefits of implementing national standards (such as Q-Mark, Thai-FDA GMP and ThaiGAP) far outweighed the cost of implementing and maintaining certification. There was much less confidence in GLOBALGAP, which was seen as over complex and expensive but necessary for certain markets such as fresh vegetables for export to EU supermarket retailers.

The experience in Vietnam was somewhat different. Major food processing companies involved in exports to the EU, Japanese and US markets had found implementation of processing standards (that include HACCP) to be highly beneficial for accessing high value markets with benefits far outweighing costs. However, ANTESCO JSC a producer of tinned and instant quick frozen (IQF) fruits and vegetables in An Giang Province commented on the difficulties and costs of implementing primary production standards (such as GLOBALGAP) for small-scale farmers. Many of their farmers were unable to implement GLOBALGAP successfully even with free technical support from the processing company. There had also been cases of misinterpretation of the GLOBALGAP standard by auditors whereby farms had been failed for having traditional grave sites within the production areas. Discussions with growers of purple fleshed sweet potato and onion yielded a similarly negative picture with regard to GLOBALGAP. GLOBALGAP certification had been 100% subsidised by local government in Vinh Long and Soc Trang Provinces for the first year in the hope that this would open the door to high value export markets for small-scale growers. Certifications were not maintained once subsidies stopped. This was partly due to a lack of demand for GAP standards from Chinese and Indonesian buyers, the main clients of small-scale growers in the province. In a few cases Malaysian buyers had started to ask for GLOBALGAP certification but the price paid for produce did not cover the costs of maintaining GLOBALGAP certification.

Within the MACBETH project, the partners had to battle against the negative impacts of delays in MSU finalising sub-contracting of activities to KU and CTU, contractual financial problems, adverse weather conditions in Thailand, and the underlying problem of time constraints associated with a two year project. Normally it would be reasonable to expect the first 6 months of a project to be dominated by issues of sub-contracting and setting up of project management systems. In the MACBETH project, a combination of circumstances delayed sub-contracting and hence smooth disbursement of project funds to Thailand and Vietnam by around 11 months. In both Thailand and Vietnam, translations of sub-contract documents and complex approval processes caused delays. This was made worse by the US requirements for due diligence that required access to sensitive financial data from KU and CTU before sub-contracts could be approved by MSU. Disbursement of funds was delayed by administrative problems at MSU, KU and CTU. As a result, both KU and CTU reported having to run the project for most of the first year on limited advances from MSU supplemented by "borrowed" departmental funds. For Thailand, matters

were made worse by severe flooding followed by droughts that disrupted project activities completely for 6 months and interfered with fieldwork for the best part of 12 months. It is a measure of the commitment of the MACBETH partners and their beneficiaries that they were able to overcome these difficulties and deliver most of the expected project outputs to a high standard within the life of the project.

The final factor affecting the delivery of key outputs was of course internet access. This has already been discussed at some length earlier in this section. However, it is worth mentioning that, with the exception of major food businesses located in urban areas, the universities and major research centres, none of the beneficiaries interviewed in Thailand and Vietnam were able to access the MACBETH websites. The evaluator with access to broadband internet was able to access the sites and was able to watch SWF format video files on the CTU hosted site. MP4 format files on the KU and CTU websites could not be accessed online. They had to be downloaded; this took between 2 and 30 minutes depending on file size. This would obviously be impossible for users with limited internet access. It is important to have a good understanding of the capabilities of the internet across the intended target areas in advance of implementation and to tailor solutions to match available capacity. The MACBETH project started on the assumption that internet access in Thailand and Vietnam would be sufficient and then adapted rapidly during implementation to deliver a good product that met the beneficiaries requirements.

3.1.3 Efficiency

All of the project deliverables were completed within budget, but the challenges described in section 3.1.2 caused delays to implementation of activities that were compounded in some cases as delivery of several activities were dependent upon completion of other activities. Some 23% of deliverables were achieved on time and 30% were achieved with minor delays of less than 6 months duration. However, some 47% of deliverables, including most of the key activities of the project, were delayed by between 7 and 12 months when compared to the target dates given in the original work-plan. As a result, much of the project work was compressed into the final 10 months of the project (including the approved extension period). It is highly creditable that the MACBETH team in both countries could achieve so much in such a limited time. However, the compression of delivery time is almost certainly responsible for errors noted on the Thai and Vietnamese websites and the Thai DVD whereby some resources are missing, duplicated or misloaded. The time delay was also responsible for the non-delivery of the training assessment tools (these would have been general tools for assessment of distance and blended learning programmes applicable to almost any topic), the relatively limited level of mentoring and follow-up of trainees in both countries, and the inability to fully realise the support for development of market linkages within the life of the project. To be fair to the MACBETH teams, the switch from blended and distance learning to entirely face-to-face training increased the pressure on time and resources and the teams did an excellent job in reaching out to such a wide range of geographically diverse beneficiaries in the limited time available.

Given the delays in implementation that were beyond the control of the MACBETH teams, it was entirely reasonable to extend the project by 6 months and this extra time proved invaluable in giving the teams sufficient time to complete delivery of the training programmes and making the project websites fully operational.

The project budget was a reasonable sum for delivery of a two year training programme relying heavily on distance and blended learning. In practice the same level of resources were used to deliver a far more resource intensive face-to-face training programme over a two and a half year period. In the original plan, it was

envisaged that much of the training material would already be available in English from MSU and only requiring translation. In reality translation proved more complex and resource-intensive due to the complex concepts involved, and the KU and CTU teams rightly chose to build in a large amount of additional material (including locally relevant case studies) to maximise local applicability. All of this required additional time and expenditure of resources for field visits to document the case studies.

The GAP training courses had to be developed without access to any off the shelf material from MSU. KU had the advantage in having been involved in previous GAP training programmes but the material still required extensive updating and conversion into electronic formats (previous material was all paper-based). In Vietnam, CTU teamed up with the Southern Horticultural Research Institute (SOFRI) to develop a complete training package for GAP from first principles. KU and CTU worked together to standardise competence levels and to harmonise content but it was still necessary for each country to develop their own material due to language difficulties and differences in agricultural systems in the two countries.

In the opinion of the evaluator, the MACBETH project as delivered in practice was highly cost-effective using the available resources to maximise the delivery of the activities. A portion of the budget was used to allow personnel from KU and CTU to make exchange visits and attend training courses in the USA. As discussed in section 3.1.1, the exchange programme was excellent value for money building the core capacity of the main partners in Thailand and Vietnam to understand modern thinking on farm to fork approaches to food safety and SPS management and establishing valuable links with industry bodies that are still feeding updated information into the training programmes of KU and CTU.

3.1.4 Impact

The evaluator made field visits to farmers, processors, exporters, food retailers and local government extension agencies in both countries. The feedback from respondents was positive indicating better management of food safety risks within the supply chain, improved access to higher-value markets (domestic and export) and greater sales both in terms of volume and value.

Thailand

In Thailand the manager of the Wang Nam Khiao Vegetable Cooperative reported that her customer base has increased by ~10%, and her sales have risen from 140 tonnes to 170 tonnes per annum (18% increase). She attributed the increased sales to a better out-turn percentage with lower levels of rejections. Post-harvest wastage is down to ~5% by volume (formerly ~20%) due to implementation of better harvesting and post-harvest practices following the MACBETH training. The value of product has also increased due to improved access to high-value markets. Some of the profit has been re-invested in the business to provide a second temperature controlled truck. She was able to provide such a precise picture due to the improved record keeping system introduced as a result of the MACBETH training programme.

The Assistant Director for QA at SIAM-MAKRO in Thailand monitors monthly data for key product indicators such as levels of rejections, detection of contaminants and any unsafe products. She has observed a downward trend in detection of contaminants and rejections of products since the SIAM-MAKRO comprehensive food safety management programme was developed following involvement in the MACBETH project. She also noted that SIAM-MAKRO has greater confidence to buy from small-scale farmers and processors and has expanded procurement from these groups following the MACBETH project.

Overall it was clear that the MACBETH project had made a real impact on beneficiaries' access to markets and income levels. Data from SIAM-MAKRO in Thailand, who buy from 442 suppliers of fruits and vegetables in North Eastern Thailand, was suggestive of a much reduced level of SPS risks as a result of widespread adoption of FSM standards. All of the sites visited by the evaluator showed plenty of evidence of good practice in operations on farm and in packing and processing facilities.

According to KU, the MACBETH project has been most successful in areas where there were resources and motivation for implementation of food safety management systems. The examples of the growers and processors visited by the evaluator during the field visits and the work of SIAM-MAKRO all show that the MACBETH project was worthwhile. The obvious long-term impact of MACBETH has been the creation of a publically available resource of high quality training materials for food safety management in the Thai language. Other impacts have been more subtle. For instance, KU said that prior to MACBETH the various KU teams involved in different parts of the value chain tended to be separate and would not have seen the value in working together. Exposure to the GFSI as part of MACBETH made KU aware of the need for an integrated farm to fork approach and this in turn brought the agriculture and food processing teams together. KU also realised the importance of being market driven rather than operating independently of players within the value chain. As a result strong and lasting partnerships were built with the Department of Agriculture, ACFS and major food businesses. Relationships with CTU and MSU were also strengthened. KU's profile and prestige was raised as a result of MACBETH and staff benefited professionally especially from the chance of international exposure via the exchange visits to the US and Vietnam.

Vietnam

In Vietnam SOFRI have observed a big increase in farms certified to international standards such as GLOBALGAP (they have done 30 implementation projects since the MACBETH training). Several cooperatives in Long Anh are now selling seedless lemon to Netherlands and US markets, and several others are selling dragon fruit to the EU having obtained necessary certifications. Members of these cooperatives attended the MACBETH training and SOFRI believe that the MACBETH project played a key role in developing awareness and understanding of GAP and FSM to a point where certification was possible. The owner and manager of the Hung Phat JSC (fruit and vegetable exporter) said that the MACBETH training was the springboard to his eventually getting ISO22000:2005 certification. This standard has enabled him to gain greater access to higher value markets in the EU, Japan and US. Farmers from the Vinh Chau District Onion Farmers' Cooperative noted that implementation of GAP has increased farm incomes of its members by reducing the number of product rejections by ~50%.

The major impact in Vietnam has been increased knowledge for the farmers and local government extension officers of the importance of food safety management in production and processing of fruits and vegetables. Prior to the MACBETH project there was limited awareness among the project beneficiaries of this key issue. This is an important outcome as Vietnam seeks to develop exports of fruits and vegetables to high value markets. CTU has improved its capacity to provide training and support on food safety management and has also greatly raised their profile with the private sector and also with local government offices in provinces across the Mekong Delta region. CTU said that the local government offices in Vinh Long and Soc Trang Provinces had recommended CTU to offices in other provinces and CTU has received invitations from these provinces to participate in training activities.

3.1.5 Sustainability

The outputs of the MACBETH project are being sustained at field level through integration into the training programmes of the government extension services and private sector driven training programmes. Both universities have integrated the training content from the project into their professional programmes and academic curricula.

The longer term sustainability of the outputs of the MACBETH project will be based mainly on the level of commitment and motivation of the various stakeholders in Thailand and Vietnam and also potentially across the ASEAN region. All parties need to recognise the importance of investing in food safety management and have the necessary resources both in terms of finance and skilled personnel to support the investment. The MACBETH project was based around electronic solutions to training requirements and information provision. For this reason sustainability is also affected by the level and type of internet access available to stakeholders within the various value-chains.

KU designed their website for easy access and maintenance for sustainability beyond the life of the project. KU and CTU signed a partnership and MoU for future joint activities. KU has created a database of contacts developed during the MACBETH project and continues to interact with major players such as SIAM-MAKRO. Some of the MACBETH training material has been incorporated into KU's BSc courses (course 01052444 food plant sanitation & the food safety and nutritional counselling program). In addition in September 2014 KU ran a 4 day TOT course for academics that included much of the MACBETH training material supplemented with other modules dealing with food processing and food chemistry. CTU said that they have incorporated the outputs of MACBETH into their core teaching programmes and SOFRI has integrated the MACBETH training material on GAP and GMP into their mainstream training programmes for farmers and agro-food industries. The MACBETH content has been integrated into the training programmes of the local government extension services in both countries. In addition discussions with the beneficiaries showed that SIAM-MAKRO has integrated the MACBETH training modules into their training and support programme for suppliers. The MACBETH GMP courses became the basis for SIAM-MAKRO's own GMP course in support of their GMP standard.

One of the major factors influencing sustainability is commitment and motivation by the various stakeholders. The outputs of MACBETH have been integrated into the normal activities of all the beneficiaries met and the major retailer and support agencies have enhanced their capacity for food safety management training thanks to the MACBETH project. Funding does remain an issue for the universities and extension services. In both countries, there were plenty of requests from stakeholders involved in value chains for more training programmes on a similar or greater scale than MACBETH, but it was evident that the universities are unlikely to engage unless external funds are found due to the resource intensive nature of purely face-to-face training. This will of course change as blended learning becomes more practical and training costs fall. In the meantime, both SIAM-MAKRO in Thailand and the two major export businesses interviewed in Vietnam raised the issue of cost-sharing. SIAM-MAKRO saw food safety management as a public good and would be happy to cost share to develop a new programme. They would be happy for this to be in the public domain and available to all rather being exclusive to their supply base. The Assistant Director for QA at SIAM-MAKRO commented on electronic training resources that she had seen in use at TESCO in the UK and said she was sure this could be adapted for use in Thailand. The companies in Vietnam are already running training programmes for their own suppliers that have benefited

extensively from the MACBETH project. They would support training on a cost-sharing basis for all interested parties. In the Vietnamese case, the companies are still very much focused on face-to-face training as internet access is less developed in Vietnam than Thailand.

The MACBETH projects plan for sustainability was evidently build around the concept of an internet based e-learning platform with distance learning and blended training courses. This was partially achieved by the project team and the websites are all in place and fully functional as of December 2015. However, the training material is not setup for e-learning in its present form and the sustainability plan of MACBETH did not take account of mainly face-to-face training. There is also a risk that the material will gradually become obsolete as the websites have not been updated since the end of the project in June 2013. However, the positive drive seen in both countries indicates that the outputs of MACBETH will likely be taken forwards and updated as part of future programmes initiated by KU and CTU.

3.2 Overall judgement

The MACBETH project key rationale was to use training throughout the value-chain to improve food safety management and expand market access for fruit and vegetable processors in Vietnam and Thailand. In this context the project was and continues to be highly relevant for the beneficiaries and fits well with the strategic goals of the STDF. The delivery was effective with most outputs being achieved within the life of the project. Although the limited internet access in rural areas in both countries forced the project away from blended learning towards a purely face-to-face approach the project retained the websites with training materials in local languages as an e-resource. It was unfortunate that the trainee assessment tools were not developed or implemented during the life of the project and this would certainly be an important feature to build into future programmes.

The project overcame numerous difficulties and made efficient use of available resources to deliver a wide reaching face-to-face training programme to supplement the excellent resource base of electronic training materials. The project has had a significant and lasting impact on enhancing management of food safety risks within fruit and vegetable value chains in Thailand and Vietnam. All of the beneficiaries visited have gained benefits in terms of improved market access, higher incomes and lower levels of product rejections.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Main conclusion

The MACBETH project's approach was most useful for building strong partnerships both locally and at regional level. The development of standardised training content helped to strengthen the institutions involved and the market driven approach allowed for better targeting of the beneficiary groups. Two years was too short a time frame for this type of project. The development of the training programmes was achievable but the delivery of better market linkages was too optimistic within the life of the project, even if after the MACBETH project beneficiaries did improve their market linkages. In addition both leading partners had incorporated the outputs of MACBETH into their core programmes. In Thailand, SIAM-MAKRO have used the MACBETH outputs to develop their own GMP training programme. The Ministry of Agriculture has incorporated MACBETH modules relating to GAP at local level in areas targeted by the MACBETH project. In Vietnam, SOFRI has integrated the GMP and GAP outputs into their own training programmes working with government and private sector partners. There is surely a case for supporting KU and CTU to widen this uptake by exploring ways for government to implement the outputs of

MACBETH at national level via the extension services and to widen the re-mit beyond fruits and vegetables.

Blended training is a very useful approach as it allows the factual content and assessment of a course to be delivered to 1000s of trainees over the internet far more cheaply than face-to-face training. Components of the course that deal with practical skills are still best delivered in a face to face environment hence the preference for blended learning rather than purely electronic "distance" learning systems. The key determinant is access to an appropriate level of communications technology. Blended learning works well in the US and EU and is increasingly usable in Asia but interviews with MACBETH beneficiaries highlighted the limitations of internet access in rural areas, even in Thailand at locations within 50km of Bangkok.

Other than building partnerships and expanding capacity of the partners via the exchange programme with US institutions the MACBETH project's greatest achievement was the creation of an excellent electronic resource of high quality training material in Thai and Vietnamese that was harmonised both in terms of fundamental content and competency level between the two countries. Having this material readily available on the internet is a great asset for food safety and GAP trainers in Thailand and Vietnam who often struggle to find good quality material in their native language. The approach taken could well be expanded in future to provide harmonised training materials for the ten member states of the ASEAN group as part of implementation of ASEANGAP. The development of ASEANGAP has included a process of harmonisation and mutual recognition of national standards and regulations that promise to allow for acceptance of national standards for market access across the entire region. The MACBETH concept would fit well allowing for the development of common training resources across an entire region.

Limitations to broadband internet access mean that face-to-face training will remain the technique of choice for some years to come in Vietnam and Thailand. However, the MACBETH e-resource could be developed into an e-learning platform in future especially if proper assessment tools were developed against recognised national standards for professional education.

MSU said that in their opinion for effective gender integration it is necessary to start at management level. In both countries senior managers of the project were women and in Thailand the entire project team was female. There were no issues in Thailand where gender equity appears to be an automatic part of any project. In addition KU targeted young farmers especially young women engaged in farming. Vietnam was different with a more male farming community but CTU made effort to ensure equity and made special effort to work with minority groups such as the Khmer-Krom farmers who grow onions in Soc Trang Province. For CTU professional competence is the key criteria for selecting trainees they do not believe in any bias for gender or other issues and felt that the lists of trainees demonstrate a fair distribution with regard to gender. It is interesting to note that the Khmer-Krom onion farmers said that the MACBETH training was the first programme to include women in sharing of key knowledge. As a result the women had more knowledge and power in the decision making process within their cooperative.

4.2 Recommendations

4.2.1 Specific recommendations

- MSU should share the trainee assessment tools that they developed, as part of a GFSP-funded activity in Vietnam following the end of the MACBETH project, with CTU and KU, accompanied by information to show the rationale behind the development of such tools and their potential application;
- MSU should provide electronic copies of the English language source material for the food safety management in manufacturing basic and intermediate levels to STDF as these could be valuable for development of future projects;
- KU and CTU should update their MACBETH websites to remove the errors and omissions in the training material identified by the evaluator;
- KU should revise and re-issue their MACBETH project training DVD as it was clear that all of the beneficiaries would appreciate access to this material.
- CTU should consider packaging the films of the training sessions and training modules into a DVD for distribution to stakeholders.
- There is clearly a case for supporting KU and CTU to work with their respective governments to promote wider uptake of the outputs of MACBETH at national level via the extension services.
- It would be beneficial to explore options for future GFSP supported activities to refine, further develop and roll-out the materials developed under the MACBETH project (with due credits/acknowledgements).

4.2.2 General recommendations

- This type of project should really run for 3-5 years and have a higher level of resources to allow for greater mentoring support of trainees;
- In future projects focused on food safety training and capacity building, the private sector should be involved more actively at the project design stage and cost-sharing options should be explored;
- Projects such as MACBETH that involve multiple countries and partners should not be overambitious when defining timescales for finalising operational arrangements including sub-contracting of activities;
- Future e-learning platforms should incorporate trainee assessment tools developed against recognised national standards as these would add value to any training certificates issued;
- Consideration should be given to extending the outputs of MACBETH to the 10 member states of ASEAN as a route to development and adoption of harmonised training systems in support of ASEANGAP as a mutually recognised and harmonised standard for trade within ASEAN.

5.0 LESSONS LEARNT

The MACBETH project used a value-chain approach for the development of training material as opposed to the more usual one size fits all generic approach often taken by food safety training projects. There are merits to both approaches but MACBETH demonstrated clear advantages in taking a solid generic base and then tailoring the training content to specific value chains via value-chain specific examples of good and bad practice. Stakeholders found it easier to relate to their own products and marketing systems. This resulted in much better uptake of training messages as evidenced by the positive impacts seen during the evaluation.

Another successful feature of MACBETH was the development of regional partnerships and private sector linkages. Closer links between KU and CTU allowed them to cooperate in developing very high quality harmonised training materials for GAP. While collaboration with major private sector players helped to ensure sustainable uptake and wider promotion of the outputs of the project, the experiences point to even greater potential to encourage and build more robust and targeted public-private partnerships in support of food safety capacity building. In particular, such partnerships should actively engage larger private sector stakeholders involved in the production and export of fruit and vegetables about their food safety management needs, and the needs of their suppliers, and consider options to address these needs on a cost-sharing basis. Major export businesses could be expected to contribute to the costs of developing and implementing food safety training programmes, which would also benefit small and medium sized enterprises and small farmers.

Food safety risks continue to evolve driven by climate change, new processing and handling techniques and consumption practices in the target markets. As a result, it is essential to invest in updating of knowledge on management of food safety risks and emerging issues affecting trade. Training programmes need to be updated to remain relevant and re-fresher training is important to ensure that all stakeholders continue to maximise opportunity for trade at minimum risk to public health. It is therefore wise to think about how to keep training materials relevant and up-to-date, as early as possible.

In training activities based on e-learning or blended learning, it is important to have a good understanding of the real access of the intended users / beneficiaries to the internet in advance of implementation so that solutions can be tailored accordingly. Access to an appropriate level of communications technology is essential. While there is growing potential for blended learning in Asia, there are still limitations in internet access in rural areas, even in areas relatively close to major cities like Bangkok.

In terms of wider lessons, the biggest issue was engagement with national governments and getting buy-in and support from government at a senior level. This proved extremely difficult in the MACBETH project. In Thailand, KU were fortunate to be able to engage easily with senior officials at ACFS but most implementation activities were conducted at sub-national level. In Vietnam, CTU were unable to get traction with MARD during the life of the project and relied on support from local government. This was most likely due to the wide geographical separation of CTU in Can-Tho in the South of Vietnam and MARD's offices in Hanoi in Northern Vietnam. As a result, there was little cooperation with another STDF funded project (STDF/PG/259), implemented by FAO in Vietnam, even though synergies between the two projects were strong. MSU suggested that STDF could play a bigger role at the design stage in future projects using the leverage of the WTO SPS Committee to

encourage government engagement and support for projects like MACBETH. However, it is clear that all projects should be demand driven and it could be argued that it is the task of the applicant to ensure a strong degree of local ownership and commitment at the project design phase.

The teams at KU and CTU identified some additional lessons for project design and implementation:

1. Access to international viewpoints is invaluable for developing food safety training programmes that support access to international markets.
2. The project duration was too short and funding limited. Projects should be of 3 years duration (minimum) and better resourced to allow for wider coverage and greater depth of training with mentoring and ongoing support built into the programme.
3. More time should be allowed to make a more objective selection of farmers to participate in the project. Ideally the project would identify farmers that would most benefit from this type of training in the short to medium term but such a refined selection process would take a longer time.
4. More effort should be made at the design stage to reduce delays due to problems with sub-contracting and dispersal of funds. In effect the main partners need to put systems in place in advance of project approval rather than using up valuable implementation time in simply getting sub-contracts approved by all parties.

Annex 1 List of education and training modules produced by MSU, CTU and KU

Basic food safety management for processing course

Module No.	MSU	CTU	KU
1. Introduction to food safety management	NA	✓	✓
2. Facilities & Environment	✓	✓	✓
3. Personal Hygiene	✓	✓	✓
4. Water Quality	✓	✓	✓
5. Pest Control	✓	✓	✓
6. Cleaning & Disinfection	✓	✓	✓
7. Specifications	✓	✓	✓
8. Product Contamination (control of)	✓	✓	✓
9. Control of Foodborne Hazards	✓	✓	✓
10. Food Allergens	✓	✓	✓
11. Incident Management	✓	✓	✓
12. Corrective Actions	✓	✓	✓
13. Control of Non-Conforming Product	✓	✓	✓
14. Traceability	✓	✓	✓
15. Question & Answer Session	NA	✓	NA

Intermediate food safety management for processing course

Module No.	MSU	CTU	KU
1. Management Responsibility	NA	✓	✓
2. Document Control	✓	✓	✓
3. Procedures	✓	✓	✓
4. Supplier Qualifications & Approval	✓	✓	✓
5. Supplier Performance	✓	✓	✓
6. Complaint Handling	✓	✓	✓
7. Control Measures & Monitoring	✓	✓	✓
8. Product Analysis	✓	✓	✓
9. Training	✓	✓	✓
10. Facilities Layout & Process Flow	✓	✓	✓
11. Equipment Maintenance	✓	✓	✓
12. Staff Facilities	✓	✓	✓
13. Waste Management	✓	✓	✓
14. Transport & Storage	✓	✓	✓
15. Introduction to HACCP	✓	✓	✓
16. HACCP Principle 1	✓	✓	✓
17. HACCP Principle 2	✓	✓	✓
18. HACCP Principle 3	✓	✓	✓
19. HACCP Principle 4	✓	✓	✓
20. HACCP Principle 5	✓	✓	✓
21. HACCP Principle 6	✓	✓	✓
22. HACCP Principle 7	✓	✓	✓
23. Food defense	✓	✓	✓

Basic Level Good Agricultural Practice (GAP) Course – Thailand Only

1. Introduction to GAP
2. Role of standards in commercial agriculture
3. Food safety for farm & packhouse
4. GAP requirements sessions 1-3
5. GAP requirements sessions 4-6
6. GAP requirements sessions 7-8
7. Produce Specifications

Intermediate Level Good Agricultural Practice (GAP) Course – Thailand Only

1. Quality Control
2. Production Plans
3. Management of waterborne risks
4. Risks associated with fertilisers
5. Integrated Pest Management (IPM)
6. Safe use of plant protection products
7. Alternatives to conventional chemical pesticides
8. Training materials
9. Hygiene
10. Traceability
11. Quality management systems part 1
12. Quality management systems part 2
13. Standard operating procedures
14. Work instructions
15. Risk assessment on the farm
16. Food safety checklist for farm & packhouse

Basic & Intermediate Level GAP Course – Vietnam Only

1. Introduction
2. Site history
3. Animal control
4. Cleaning & disinfection
5. Personal hygiene
6. Water usage
7. Propagation materials
8. Harvesting
9. Produce handling
10. Waste management
11. Record keeping
12. Purchasing
13. Self-assessment
14. Traceability
15. Corrective actions
16. Specifications
17. Management of food safety incidents
18. Control of foodborne hazards
19. Food defense
20. Safe use of plant protection products
21. Farm visit (video)
22. Packhouse visit (video)
- 23-26 Question & answer sessions 1-4

Annex 2 Sources of information used for the evaluation

Documents

1. Development of GAP for fruits and vegetables in Thailand. W. Wannamolee, ACFS presented at a GLOBALGAP TOT meeting in Kuala Lumpur, July 2008
2. STDF/PG/326 Project grant application form (May 2010)
3. STDF/PG/326 Inception report Jan-Mar 2011
4. STDF/PG/326 Project report Jan-Jun 2011
5. STDF/PG/326 Project report Jul-Dec 2011
6. STDF/PG/326 Project report Jan-Jun 2012
7. STDF/PG/326 Project report Jul-Dec 2012
8. STDF/PG/326 End of Project report Jan-Jun 2013 including annexes 2 & 3
9. STDF Draft document: Clarification of linkages and roles for STDF/PG/326 and STDF/PG/259 dated 30-07-2010
10. STDF Medium-term development strategy for 2015-2019 (STDF document 510)
11. MACBETH Thailand project DVD

Websites

1. Centre for Agricultural Information Office of Agricultural Economics www.oae.go.th
2. GFSI Global Markets Programme www.mygfsi.com
3. MACBETH website Thailand <http://macbeth.agro.ku.ac.th>
4. MACBETH website Vietnam <http://fskn.ctu.edu.vn>
5. MSU food safety knowledge network websites <http://www.fskntraining.org> & <http://foodsafetyknowledgenetwork.org>
6. RASFF Portal <https://webgate.ec.europa.eu/rasff-window/portal>
7. STDF website www.standardsfacility.org
8. Thai agricultural standards website www.acfs.go.th/eng
9. Thai food law and regulations website www.fda.moph.go.th/eng
10. Thai Fruit and Vegetable Producers Association www.thaifruitvegassoc.com
11. Vietnam Fruit and Vegetables Association www.vinafruit.com
12. Vietnam Trade Promotion Agency www.vietrade.gov.vn

Stakeholders consulted

The evaluator held meetings (face to face or electronic) with key personnel from the three institutions involved in project implementation (CTU, KU & MSU). In addition the evaluator looked at participant lists from the various training programmes held in Thailand and Vietnam and made a selection to provide representatives of the different types of beneficiaries (local government extension services, research institutions, farmers & farmers' cooperatives, pack-house and processing facilities, supermarket retailers, exporters and standard setting organisations). A list of all stakeholders interviewed is provided below (table 1).

Table 1 List of stakeholders consulted

Organisation	Respondent	Relevance
Can Tho University	Prof Ly Nguyen Binh Prof Le Nguyen Doan Duy Prof Ngo Phuong Dung	Lead partner Vietnam
Kasetsart University	Dr Warapa Mahakarnchanakul Dr Chitsiri Rachtanapun Ms Atachara Sankhom Dr Roongnapa Korpraditskul Dr Chuanpis Aroonrungsikul	Lead partner Thailand
Michigan State University	Dr Deepa Thiagarajan and Dr Les Bourquin	Implementing organization
National Bureau of Agricultural Commodity & Food Standards (ACFS), Thailand	Ms Korwadee Phonkliang (Senior Standards Officer)	Organisation responsible for agricultural standards – participated in training courses in Thailand
Wang Nam Khiao "non toxic" Cooperative – Thailand	Ms Waraporn (Manager of cooperative society)	Vegetable production & packing - participated in training courses in Thailand
Office for Agricultural Research and Development (OARD) Region 4	Ms Sumitra Peasaschar (GAP adviser)	Extension advice - participated in training courses in Thailand
Kham Sakaesaeng Chilli growers & processors cooperative	Cooperative leader	Chilli production & processing - participated in training courses in Thailand
Kamphaeng- Saen vegetable growers & packhouse cooperative	Ms Som Som Samong (Farm Adviser for GAP)	Vegetable production & processing + regional training centre - participated in training courses in Thailand
SIAM MAKRO (Supermarket retail / wholesaler)	Ms Jutarat Pattanatorn (Assistant Director Quality Assurance)	Buyer with integrated supply chain - participated in training in Thailand
Ultra Farm Co Ltd (Packhouse & small-scale outgrower scheme)	Mr Pakpoom Ittilittikul (General Manager)	Supplier to SIAM-MAKRO - participated in training in Thailand
SOFRI (R&D consultancy advice and training on standards for horticultural crops inc VIETGAP & GLOBALGAP)	Dr Phong, Dr Dien & Mr Son (SOFRI staff)	Training & advice centre - partner & participants in training in Vietnam
Hung Phat JSC, My Tho Industrial Zone, Tien Giang Province	Mr Phan Quoc Manh Hung Owner & Manager	Processor & exporter - participated in training in Vietnam
ANTESCO JSC, An Giang Province	Mr Nguyen Quoc Cuong (Factory Manager) & Ms Nguyen Thi Thanh Thuy (QA Manager)	
Sweet Potato Farmers' Cooperative plus Binh Tan District Sub-Dept of Agriculture & Rural Development representative	Mr Nguyen Vau Tua (Chairman of the Cooperative) & Ms Ba Vo Ngoc Tho Pho Phong (ext officer) + 7 farmers	Grower & processor cooperatives plus local government extension office – participated in the training in Vietnam
Onion Farmers' Cooperative plus Vinh Chau District Sub-Dept of Agriculture & Rural Development representative	Mr Son Minh Thauh (Chairman of the Cooperative) & Mr Luu Khauh Dong (ext officer) + 1 farmer	