

Project Title	Enhancing the capacity of Vietnam to reduce the losses of grain and grain quality in storage through improved training
Code: 1.11	
Australian Personnel	Dr George Srzednicki Dr Barry Longstaff
Australian Institution	University of New South Wales (UNSW)
Vietnam Institution	Sub. Post-Harvest Technology Institute in HCM city Plant Protection Department, MARD
Project Duration	July 2000 to June 2002

Project Description

This project will enhance the capacity in Vietnam to 'train the trainers', extension workers and staff responsible for the maintenance of quality of commodities during storage and marketing.

PHTI will provide flexible integrated courses on various aspects of post-harvest commodity quality management, with particular attention to containment and loss reduction. The training group will also be able to develop new training modules applicable to contaminant reduction in fruit and vegetables as strategies for monitoring and management of contaminants in vegetables are further developed.

Objectives

- a) This project will establish an improved training infrastructure and to train trainers and extension workers employed on the commodity storage environment
- b) The project will alleviate the national shortage of skilled trainers in the post-harvest domain and the problems that national and regional organisations face in training such trainers effectively and efficiently.
- c) The creation of a training centre in HCMC will allow the project to access the greatest pool of Vietnamese expertise in training for post-harvest. The project will also take regional issues into account, by conducting several training courses at three important regional centres in the second year.

Outputs and Performance indicators

Outputs	Performance Indicators
<p>◆ Establishment of a dedicated training facility at PHTI and HCMC, in the centre of Vietnam's major area of production of durable commodities. This facility would focus in training trainers in the commodity storage environment.</p>	<p>i) Purchase of computers for the PHTI centre ii) Purchase of portable gas detection equipment for practical sessions on fumigation iii) Development of training manuals and additional CAL modules in Vietnamese and English</p>
<p>◆ Conduct a series of training courses for industry trainers, combining the CAL approach with conventional lecturers and practical sessions</p>	<p>i) Conduct general course for 24 participants in HCMC, Year 1 ii) Conduct specialised training course, in parallel, on Fumigation, Drying and Mycology and Mycotoxins, in HCMC, Year 1 iii) Conduct general courses for 20 participants in Hanoi, Can Tho and Dak Lak, Year 2 iv) Conduct specialised training course, in parallel, on Fumigation, Drying and Mycology and Mycotoxins, in Hanoi, Can Tho and Dak Lak, Year 2</p>
<p>◆ Review of success of project and formulate implementation and maintenance strategies with PHTI</p>	<p>i) Produce implementation and maintenance manual, including a consideration of application to containment reduction and quality management strategies for fruit and vegetables ii) Incorporation of recommendations into the final report to AusAID</p>
<p>◆ Accountability</p>	<p>i) Produce interim reports to AusAID after 6, 12, and 18 months ii) Produce final report within a month of project's end iii) Submit financial reports after 12 and 24 months acquitting the expenditure incurred</p>

PROJECT COMPLETION REPORT

Executive Summary

The project had a single objective, to enhance the capacity of Vietnam to train trainers, extension workers and staff responsible for the maintenance of quality of commodities during storage and marketing. The project has been able to achieve or exceed all of its original performance indicators, despite major budgetary problems that arose as a result of the significant decline in value of the Australian dollar early in the project. The project has been able to establish a viable training infrastructure at the Post-harvest Technology Institute (PHTI), in HCMC, by providing computers, gas detection equipment and Computer-Assisted Learning (CAL) system. In order to address the budgetary issues, it was necessary to reduce the number of courses involving Australian personnel. A total of 102 people participated in these courses but, with additional people trained independently by PHTI and the Plant Protection Department (PPD), the total increased to over 300, almost double the original projection of 168. As PHTI had to limit numbers of participants in training courses, due to the limited number of computers available, there is clearly a considerable demand for training in this discipline. The participants ranged from commercial fumigators to university lecturers and included a high proportion of women. The activities of the Vietnamese collaborators have, therefore, more than compensated for the negative effects of the budgetary problems stemming from the exchange rate problems. The activities of our Vietnamese collaborators are very significant and indicate their appreciation of the potential of the technology that they have been provided with by the project. As the project progressed, staff from PHTI and PPD assumed increasing responsibility for conduct of training courses and, by the end of the project, they were running courses without Australian input. PHTI and PPD have indicated that they will use the system on an even greater scale in the years to come.

One issue that arose in the final review of the project, which should be considered by AusAID, was the need to develop a maintenance policy for the CAL software system. Technologies and protocols will change over time, and the CAL system will need to be updated to reflect these changes. The review committee thought that a workshop, conducted every 2 or 3 years would be able to address this issue. Funding would be needed to facilitate this workshop and the subsequent process of incorporating new information.

1. Project Description

Background and preparation

In Vietnam, the average annual paddy loss is 13-16%, equivalent to about 1.6Mt of harvested rice, valued in excess of AUS\$500 million. About a quarter of these losses occur in storage. Significant losses in quality also occur, in addition to these quantitative losses. The potential savings from preventing a 0.5% weight loss by improving the technical capability of the pest control workforce are thus considerable. The reduction in weight loss, achieved through improved implementation of storage practices, required to give a 10% return on the resources invested in this project is very small and is certainly much less than 0.5%.

By late 1999, a collaborative project between Indonesia, Philippines, Thailand, Vietnam and Australia developed a Computer-Assisted Learning (CAL) system to augment conventional training methods. The package encompasses most important issues facing staff involved in management of quality of grain in storage: grain drying, moulds and mycotoxins, and pests. The package was integrated with conventional lectures and practicals in training courses that were conducted in each country. Each course was conducted primarily in the local language. A review of the success of the Vietnamese component of this project, carried out with senior management of PHTI, concluded that the project had been very successful and had demonstrated considerable potential. They also recognised that this training approach would have further application in implementation of contaminant reduction and quality management strategies for fruit and vegetables. Factors limiting the widespread adoption of the technology in Vietnam include a shortage of suitable computer hardware and the need to train trainers in further development of new training modules and use of the package.

Adoption and integration of the CAL-based training system into the training regimes of the participating organisations will lead to more effective training programs, particularly as they have geographically-distributed workforces. There will also be substantial cost savings for training programs. This will contribute to improvements in technology transfer and training in the agricultural sector and, ultimately, to improved overall food security, through reduced losses of vital food grains, leading to general improvements in living standards. The more efficient use of chemical control measures will also reduce the environmental impact of such measures.

By enhancing the capacity of PHTI, PPD and UAF to train trainers and personnel involved in the management of commodity quality during storage, a wide range of groups will derive direct benefits, including: commodity processing and storage units, commodity export agencies, extension officers, and farmers associations. The project is perceived by the Vietnamese as being of particular benefit to local women, who have taken a great part in the management of agro-products quality during storage and processing.

Lead Institution

The Department of Food Science and Technology of the University of NSW has a long track record of successful collaboration with the Vietnamese organisations involved in the project. Work with the University of Agriculture and Forestry, in Ho Chi Minh City (UAF) began in 1993, with joint research work on the introduction of two-stage drying system for grain to Vietnam, ACIAR-funded project, PHT/1990/006 (Applications of in-store drying in the grain industry in South-East Asia), a project that also involved Thailand and the Philippines. This project was completed in 1997 and led to collaboration with PHTI, in Ho Chi Minh City, on detection of aflatoxin in maize and training of staff in the feed-mills in this area. Mr. Nguyen Le Hung, from UAF, was awarded a PhD scholarship from ACIAR in 1995 and he spent four years in the Department of Food Science and Technology of the UNSW working on the development of a continuous spouted-bed dryer. In 1998-99, a project (ACIAR project PHT/1997/131 (Computer-Assisted Learning as a tool to improve storage pest management in key ASEAN countries), jointly-funded by ACIAR and the AusAID APEC Support Program, enabled

UNSW to contribute a module on grain drying to the development and delivery of a computer assisted learning package. A demonstration training course was conducted, at PHTI, HCMC, in November, 1999.

Vietnamese partner institutions

The Post-Harvest Technology Institute

The Post-Harvest Technology Institute (PHTI) in HCMC, an institute within the Ministry of Agriculture and Rural Development (MARD), is responsible for research, training and extension for storage and processing of agricultural produce after harvest in Vietnam. They also operate the Food Commodity Control Centre, which is responsible for monitoring and quality certification of export produce. In the past, PHTI has collaborated with Universities, the Extension Department of the Ministry of Agriculture and Rural Development and with Australian agencies to organise training courses on aspects of grain storage and processing for staff of agricultural trading companies, the Plant Protection Department, the Department of National Reserve, and Universities from throughout Vietnam. Most recently, it has been involved with CSIRO Entomology and UNSW to develop a new computer-assisted learning system to improve training methods (ACIAR Project PHT/1997/131).

Plant Protection Department

The Plant Protection Department (PPD) is the government institution responsible for regulatory and quarantine security aspects of plant protection in Vietnam. Their role includes pest management and situation forecasting, conduct of treatment measures, plant quarantine and fumigation management, including the licensing of fumigators in Vietnam.

The University of Agriculture and Forestry

The University of Agriculture and Forestry, in Ho Chi Minh City, trains both undergraduates and graduates in varied branches of Agriculture and Forestry. The University also has strong reputation for scientific research. The Department of Processing and Conservation of Food and Agricultural Products of the University is particularly strong and has collaborated with Australia (UNSW) and other countries in research on grain dryers, with results that are being widely applied in the production field.

1.2 Context and rationale

Agricultural production is very important source of export income for Vietnam and over 70% of people living in rural areas are involved in agricultural production. Agricultural products constitute about 40% of Vietnam's gross national product and, in 1998, they exceeded AU\$ 6 billion in value, more than twice the value of that exported only 8 years previously. Almost 90% of this export income was derived from rice and 80% of the balance from coffee.

In Vietnam, management of quality of durable commodities whilst in storage is relatively underdeveloped and downgrading in quality of agricultural products, as a consequence of insect infestation, fungal spoilage, or presence of unacceptable levels of pesticide residues, is very common. Post-harvest grain losses in ASEAN region countries can be

quite high. Recent estimates suggest that average losses of paddy in Vietnam are as high as 16% of production, or about 3-3.5Mt valued at over AUS\$500 million. During the wet season, this figure may rise to 30%. Losses sustained during storage constitute about a quarter of the total and generally arise as a result of poor or inappropriate management. Current technologies will remain the most economic methods for disinfesting and protecting commodities for animal feed and seed but commodities for human consumption will increasingly be protected by non-chemical means. In this scenario, there will need to be an emphasis on reducing both residual insect populations within and close to storages. Grain hygiene has long been recommended as a control procedure but is rarely done properly in practice.

The Government of Vietnam has a high priority for upgrading procedures for maintaining quality and safety of agricultural products in storage. In addition, Vietnam is a signatory to the Montreal Protocol, which stipulates that use of methyl bromide as a general fumigant must be phased out by 2015, owing to its ozone-depleting properties. Methyl bromide is currently widely used in Vietnam as a rapid disinfestant and its future unavailability will require significant shifts in pest management strategies to compensate for its absence.

There are considerable differences between regions, in terms of the commodities grown and volumes produced. The bulk of rice production occurs in the south of the country and over 85% of export production is shipped out of the port of Saigon. Almost the same proportion of coffee production also goes through that port, although most is actually produced in the highlands.

1.3 Project objectives and scope at design

The project was designed to enhance the capacity of Vietnam's Ministry of Agriculture and Rural Development to train trainers, extension workers and staff responsible for maintenance of quality of commodities during storage and marketing. In the first year of the project, a training facility was to be established at PHTI, in Ho Chi Minh City, allowing the project to access the greatest pool of Vietnamese expertise in training for post-harvest operations. PHTI would provide flexible integrated courses on various aspects of post-harvest commodity quality management, with particular attention to contaminant and loss reduction. There would be conventional lectures and practical sessions, but the courses would also use the CAL system, which would be significantly enhanced. Several courses were to be run during this first year, ranging from an introductory generalist course to more specialised courses on topics such as fumigation, mycotoxin detection and grain-drying. In the second year, courses were to be conducted in various regional areas of Vietnam. This would allow staff in these regions to access all training resources, without need to travel to HCMC

This project would establish an improved training infrastructure and train trainers and extension workers employed in the commodity storage environment. The project would thus alleviate a national shortage of skilled trainers in the post-harvest domain and the problems that national and regional organisations face in training such trainers effectively and efficiently. By focussing at this level, the project would have greatest impact on uptake of best practices in commodity storage and thus on reducing post-harvest losses. This is highly relevant to AusAID's strategy in the CARD program

In achieving these project objectives, existing relationships between institutions in both countries would be further cemented and should lead to further productive collaboration in the future..

1.4 Implementation arrangements

The UNSW project team managed the activities within this project through Project Manager, Dr. Barry Longstaff. He visited Vietnam, at the beginning of the project, to meet with senior management of PHTI, PPD and UAF to plan course structure and discuss revisions and extensions of the CAL system. During this visit, Vietnamese and Australian responsibilities were finalised. Dr. Longstaff was then responsible for subsequent co-ordination and day-to-day management of course development and integration of course content into the revised computer-assisted learning package. PHTI were responsible for arranging purchase of equipment, obtaining quotes which were referred to the Project Manager for approval. PHTI were also responsible for the logistical arrangements for the various training courses.

2. Appropriateness of Project Design and Objectives

2.1 Appropriateness of Objectives

Objective No (1, 2, 3, etc)	Objective description	Appropriateness Rating
1	To enhance the capacity of Vietnam to train trainers, extension workers and staff responsible for the maintenance of quality of commodities during storage and marketing	5

2.2 Appropriateness of Design

PHTI and PPD attach considerable importance to this project because of increasing demand for improved standards of storage. With the loss of methyl bromide, storage managers will have to be more aware of the properties of available pest and quality management procedures. More specifically, fumigators must clearly recognise their responsibilities and understand basic and specialised fumigation techniques in both theory and practice, so as to be able to choose the most suitable method of fumigation for particular circumstances. They must also be aware of the impact of their actions on the environment, so as to minimise pollution, and maintain the safety of their co-workers and themselves. This means that licensing procedures will have to be more detailed and rigorous.

Improving standards of storage and processing are also of great importance in developing and maintaining a good international trading reputation. Arrival of infested or contaminated commodities in certain countries can result in a downgrading of status and mandatory treatment costs at the port of import. The ability to satisfy these needs is confounded by a critical shortage of appropriately skilled trainers and extension workers.

A previous project, funded jointly by AusAID and ACIAR, created a Computer-Assisted Learning (CAL) system that was judged to be a considerable success by PHTI management. It was felt that this represented a significant step forward in training trainers of quality management staff and also provided a unique suite of reference resources for practitioners. Factors limiting the widespread use of the CAL system were identified as shortages of skilled training personnel and of appropriate computer hardware. This project addressed both of these issues through purchase of relevant hardware and training of staff, both in disciplines relevant to commodity storage and in use of the system to train quality management staff. By focussing on training of trainers and extension staff, the project will have maximum impact.

Description of design feature	Appropriateness Rating
Establish a dedicated training facility at PHTI, HCMC, in the centre of Vietnam's major area of production of durable commodities. This facility would harness expertise of the majority of Vietnam's experts in various disciplines and could cater for trainees from all over Vietnam. It would focus on training trainers and practitioners.	3
Conduct of a series of training courses for industry trainers, combining the CAL approach with conventional lectures and practical sessions.	3
Review success of project and formulate implementation and maintenance strategies with PHTI	4
Accountability	4

3. Implementation Performance

3.1 Project Components and Outputs

Vietnam	Objective Description	Achievement Rating
1	To enhance the capacity of Vietnam to train trainers, extension workers and staff responsible for the maintenance of quality of commodities during storage and marketing	4

Output	Performance indicator	Performance Rating
1. Establish a dedicated training	1. Purchase of computers for the PHTI centre	4

facility at PHTI, HCMC	2. Purchase of portable gas detection equipment for practical sessions on fumigation	4
	3. Development of training manuals and additional CAL modules in Vietnamese and English	5
2. Conduct of a series of training courses for industry trainers, combining CAL with conventional lectures and practical sessions	1. Conduct general course for 24 participants in HCMC, Year 1	5
	2. Conduct specialised training courses in HCMC, Year 1	5
	3. Conduct general courses for 20 participants in Hanoi, Can Tho and Dak Lak, Year 2	4
	4. Conduct specialised training courses, in parallel, on Fumigation, Drying, and Mycology and Mycotoxins, in Hanoi, Can Tho and Dak Lak, Year 2	3
3. Review success of project and formulate implementation and maintenance strategies with PHTI	1. Incorporation of recommendations into the final report to AusAID.	4
4. Accountability	1. Produce interim reports to AusAID after 6, 12, and 18months	4
	2. Produce final report within a month of the project's end	4
	3. Submit financial reports after 12 and 24 months, acquitting the expenditure incurred	4

This project experienced 2 major problems. The first was the delay in beginning the project due to bureaucratic issues associated with the contract with AusAID/ITC. Protracted negotiations between the parties delayed the start of activities until December, 2000, with no extension of the completion date. The second problem was the sudden and unexpected decline of the Australian currency. The budget was developed when the exchange rate was AUD=0.6USD. In the first quarter of the project, before any money had been sent to the collaborating agency in Vietnam, the exchange rate had deteriorated

to AUD=0.48USD. As about 40% of the project budget was to be spent in Vietnam, this had a very significant impact on delivery of the specified outcomes.

3.2 Project Outcomes

The project has been able to achieve or exceed all of its original performance indicators, despite major budgetary problems caused by the exchange rate issue. The project has been able to establish a viable training infrastructure at PHTI by providing computer hardware, gas detection equipment and an improved CAL system. The number of courses involving Australian personnel had to be revised to address the budgetary issues, but a total of 102 people participated in these courses, compared to a revised projection of 112. However, with the additional people trained by PHTI and PPD, the total increased to over 300, triple the revised projection and almost double the original projection of 168. The participants ranged from commercial fumigators to university lecturers and included a high proportion of women. In meeting or exceeding all original objectives, the project has been an undoubted success.

The Vietnamese collaborators, PHTI and PPD, have been enthusiastic in their appreciation and deployment of the technology and training provided by the project and sustainability of the process into the future is secure. One issue that arose in the final review of the project, which should be considered by AusAID, was the need to develop a maintenance policy for the CAL software system. Technologies and protocols will change over time, and the CAL system will need to be updated to reflect these changes. The review committee thought that a workshop, conducted every 2 or 3 years would be able to address this issue. Funding would be needed to facilitate this workshop and the subsequent process of incorporating new information.

3.3 Sectoral Impact

The CAL system is designed to take cultural and sociological issues into account and adoption and integration of such a system into training regimes of participating organisations will lead to more effective training programs, particularly as they have geographically-distributed workforces. There will also be substantial cost savings for training programs. This will contribute to improvements in technology transfer and training in the agricultural sector and, ultimately, to improved overall food security, through reduced losses of vital food grains, leading to general improvements in living standards. More efficient use of chemical control measures will also reduce the environmental impact of such measures.

In Vietnam, average annual paddy loss is 13-16%, equivalent to about 1.6Mt of harvested rice, valued in excess of AUS\$500 million. About a quarter of these losses occur in storage. Significant losses in quality also occur, in addition to these quantitative losses. The potential savings from preventing a 0.5% weight loss by improving the technical capability of the pest control workforce are thus considerable. The reduction in weight loss, achieved through improved implementation of storage practices, required to give a 10% return on the resources invested in this project is very small and is certainly much less than 0.5%.

By enhancing the capacity of PHTI, PPD and UAF to train trainers and personnel involved in managing commodity quality during storage, a wide range of groups will

derive direct benefits, including: commodity processing and storage units, commodity export agencies, extension officers, and farmers associations

The project is perceived by the Vietnamese as being of particular benefit to local women, who have taken a great part in the management of agro-products quality during storage and processing.

3.4 Costs and Financing

To be done.

3.5 Monitoring of project

As indicated above, UNSW, through the Project Manager, was responsible for the managing and, therefore, monitoring progress of the project. As a result of the budgetary problems discussed elsewhere, and after expressing UNSW's concerns to ITC, it was necessary for the Project manager to visit PHTI and develop a revised and achievable set of outcomes with a new timetable.

Reports were compiled by the Project Manager and reviewed by Dr. Srzednicki, Professor Le Van To and Mr. Duc, prior to submission to AusAID every six months. Reports to the Government of Vietnam were the responsibility of Professor Le Van To and, later, Mr. Duc.

Acquittal of funds has been done in accordance with normal UNSW procedures and financial reports submitted to AusAID after 1 and 2 years.

3.6 Technical Assistance, Training and Capacity Building

The project has provided instruction to over 300 people in the past 2 years. They have come from diverse professional backgrounds, including professional fumigators, grain store managers, pest control operatives, university staff and other trainers, PPD inspectors. The people have all have gained greater knowledge and understanding of the complexities involved in maintaining commodity quality during storage. Those involved in training also developed new skills in using CAL as an integral part of teaching. Practicing fumigators who attended the specialist fumigation course are now aware of what is required to achieve 'best practice'. They are also now aware of occupational health and safety issues involved in fumigation. The project has thus directly addressed issues raised in Section 1.3, namely shortage of skilled trainers in the discipline and promotion of industry 'best practice' and has substantially enhanced the capacity of the collaborators to deliver highly effective, up-to-date training courses to this sector.

The Australian team were nominated in the original proposal and have worked together very effectively. Similarly, prior ACIAR and AusAID projects had already established good working relationships with the Vietnamese collaborators, which were strongly reinforced during this project. There was clearly a desire by both groups to continue to build on this productive relationship into the future.

This project was designed around running a range of training courses in major centres throughout Vietnam and, apart from being unable to run any in the coffee-growing highland region, because of budgetary problems discussed elsewhere, the goals were achieved. However, PHTI were able to carry out a course in Dac Lac independent of

Australian involvement. PHTI were forced to restrict the number of participants involved in most courses, primarily because of the limited number of computers available. This indicates a strong desire for improved training within the sector.

3.7 Management of Constraints, Issues, Risks and Change

This project experienced 2 major problems. The first was the delay in beginning the project due to bureaucratic issues associated with the contract with AusAID/ITC. Protracted negotiations between the parties delayed the start of activities until December, 2000, with no extension of the completion date. The second problem was the sudden and unexpected decline of the Australian currency. The budget was developed when the exchange rate was AUD=0.6USD. In the first quarter of the project, before any money had been sent to the collaborating agency in Vietnam, the exchange rate had deteriorated to AUD=0.48USD. As about 40% of the project budget was to be spent in Vietnam, this had a very significant impact on delivery of the specified outcomes. As a result, and after expressing UNSW's concerns to ITC and being advised to revise project outputs to compensate for the budgetary shortfall, it was necessary for the Project manager to visit PHTI and develop a revised and achievable set of outcomes with a new timetable.

3.8 Project Management

We believe that the project management has successfully addressed the issues mentioned above and all revised project objectives have been met or exceeded. We believe that the management performances of UNSW and especially the Vietnamese collaborating institutions (PHTI and PPD) have been excellent throughout. UNSW is rated as fully satisfactory, at 4, whilst PHTI and PPD are rated at 5, because they both ran several training courses, using the CAL system, training a total of about 200 people, without input from the Australian institutions.

4. Performance and Outcomes

4.1 Assessment of Performance Against Objectives and Design

The project has been able to achieve or exceed all of its original performance indicators, despite the exchange rate problems. The project has been able to establish a viable training infrastructure at PHTI, in HCMC, by providing computer hardware, gas detection equipment and an improved CAL system. The number of courses involving Australian personnel had to be revised to address the budgetary issues but a total of 102 people participated in these courses, compared to a revised projection of 112. However, with the additional people trained by PHTI and PPD, the total rises to over 300, triple the revised projection and almost double the original projection of 168. The activities of the Vietnamese collaborators have, therefore, more than compensated for the negative effects of the budgetary problems stemming from the exchange rate problems. The activities of our Vietnamese collaborators are very significant and indicate their appreciation of the value of the technology that they have been provided with by the project. They have indicated to us that they will use the system on an even greater scale in the years to come. As PHTI had to limit numbers of participants in training courses, due to the limited number of computers available, there is clearly a considerable demand for training in this discipline.

4.2 Sustainability

The collaborating institutions have indicated and clearly demonstrated their support for the project activities and are very keen to continue and expand their use of this training approach. As the project progressed, staff from PHTI and PPD assumed increasing responsibility for conduct of training courses and, by the end of the project, they were running courses without Australian input.

The major constraint to more widespread uptake of the approach is the limited number of computers available at present. However, the institutions involved have indicated that they will continue to invest in infrastructure in the coming years so that this constraint will become less significant.

The only recurrent issue is the need to update content periodically, as regulations and/or technologies change. This could be done most effectively through workshops (probably every two or three years) involving relevant agencies in Vietnam, Australia and other interested countries.

In terms of others impacts, improving the general level of training in this sector will lead to a variety of benefits which will add to the sustainability of the project outcomes. It will enhance Vietnam's ability to comply with the requirements of the Montreal Protocol as it phases out its use of methyl bromide as a general fumigant. More efficient use of chemical control procedures will reduce environmental contamination and improve worker occupational health and safety circumstances. Vietnam will be able to reduce losses of vital food grains, leading to general improvements in living standards.

Vietnamese women, who have taken a great part in the management of agro-products quality during storage and processing, will benefit from the project because the project is essentially gender-neutral, when compared to current training systems.

Overall rating of the sustainability of the project outcomes is between 4 and 5.

4.3 Development Impact

The project has built on previous investments by both AusAID and ACIAR, allowing for the full-scale delivery of an enhanced training package and program. By facilitating the transfer of this technology to Vietnam, the project has enhanced its capacity to train its trainers and consequently its commodity storage personnel, which will have a significant impact on regional development. This will allow these Vietnam to reduce its losses of vital food grains, leading to general improvements in living standards. As indicated above, it will also have environmental consequences because it will enhance Vietnam's ability to comply with the requirements of the Montreal Protocol as it phases out its use of methyl bromide as a general fumigant. More efficient use of chemical control procedures will reduce environmental contamination and improve worker occupational health and safety circumstances.

A further benefit will be an enhanced ability to provide clean, high quality commodities to export markets. This ability may also result in access to new, more demanding markets.

5. Conclusions

5.1. Overall assessment

In meeting or exceeding all original objectives, the project has been an undoubted success. Our Vietnamese collaborators, PHTI and PPD, have been enthusiastic in their appreciation and deployment of the technology and training provided by the project and sustainability of the process into the future is secure. Two issues arose in the final review of the project that should be considered by AusAID. First, there will be a need to develop a maintenance policy for the CAL software system. Technologies and protocols will change over time, and the CAL system will need to be updated to reflect these changes. The review committee thought that a workshop, conducted every 2 or 3 years would be able to address this issue. Funding would be needed to facilitate this workshop and the subsequent process of incorporating new information.

The second, broader issue involves storage of perishable commodities. Fresh fruit and vegetables are very important sources of income for rural communities and are, in many ways, more difficult to store than their durable counterparts. The processes and technologies involved are quite different from those employed in storage of durable commodities and in Vietnam and surrounding countries there is an overwhelming need to improve storage methods for perishable commodities. PHTI, in particular, would be very interested in participating in development of an equivalent computer-based training system for such commodities.

5.2 Lessons Learned

The biggest problem that faced this project, and probably all institutions involved in the first round of CARD, was the dramatic decline in value of the Australian currency in the first quarter of the project. The inability of AusAID to compensate for this gave rise to a number of consequences, not least of which was potential damage to Australia's image as a donor. For this project, about 40% of the budget was to be spent in Vietnam and the 20% devaluation had a major impact, requiring considerable revision of both number and location of training courses conducted and a reduction in visits by Australian workers.

The question that arises from this situation is how do lead institutions prevent this happening again? A normal mechanism would be the inclusion of a contingency item in the budget but this is not allowed under the rules of the CARD program. It is suggested that AusAID consider either allowing institutions to include a contingency component in budgets or for it or its managing agency to retain a proportion of the funds centrally for this purpose.