

World Fresh Agri-Supply Chain Project, Bangkok, Thailand

Promoting Supply Chain Integration

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Preface

This report is the result of the rather unique co-operation between private sector companies, government institutes and research institutes of both Thailand and the Netherlands. Together they have made a start to tackle the problems of agri-supply chain development in Thailand with a special focus on the upstream performance. We hope that the co-operation in this phase has laid the foundation for the following phases in the near future within and beyond this specific project.

Section 2.1 was prepared by Prof. Saroj Aungsumalin and his team from Kasetsart University. The other parts are from the hands of Dave Boselie and Jan Buurma of LEI.

The managing director,

A handwritten signature in black ink, appearing to read 'L.C. Zachariasse', written over a horizontal line.

Prof. Dr. L.C. Zachariasse

Executive summary

Executive summary

Concerning the vegetable market segment there are two preferred farming systems for World Fresh –TOPS in the short and medium term:

- conventional professional growers;
- and intelligent pesticide management systems.

Both the Integrated Pest Management (IPM) and the organic production systems are still in a pioneering phase. Full development of the organic sub-sector might take 10 years. It is therefore recommendable for TOPS not to position itself in the organic segment but instead focus on clean 'non-toxic' products.

Marketing is a weak element in the curriculum of the Farmer Field Schools for IPM in Vegetables. Linking the FAO/IPM-project and the Agri-Supply Chain project will have advantageous effects for both projects.

'Organic' means produced without use of any artificial fertilisers and synthetic pesticides, and certified to the standards of the International Federation of Organic Agricultural Movements (IFOAM). This production system is still in the pioneering phase, and an IFOAM membership does not yet exist in Thailand.

'Toxic free' means produced without the use of hazardous pesticides, and certified to the Maximum Residue Limits (MRL) values specified by the FAO Codex. This production system is ripe for implementation, and systems for certification do already exist in Thailand.

There are various labels for 'toxic free' vegetables in Thailand. They vary between departments of the Ministry of Agriculture and their regional branches. This situation is confusing for the consumer and introduction of one national label is desirable.

Certification promises mutual benefits for distribution centres and advanced growers, i.e. good quality producers. The consequence of certification probably will be that less advanced growers drop out. This is no problem for the point of view of quality, but a fast or forced implementation might result in a decreased supply level. The consequences and eventual solutions of such a decrease should be considered in advance.

Suppliers perform many important functions. It is very difficult to bypass or reduce their roles. To improve the supply chain, in the short run, TOPS should expand and improve the role of selected suppliers, especially leading farmers/suppliers.

In the long run, TOPS should initiate to strengthen the co-ordination and co-operation among TOPS, extension office, local agricultural co-operatives, local farmers' associations input suppliers and farmers to mobilize concerted efforts to supply fresh, safe and high quality products to WF or TOPS (provincial branches) directly.

Growers' associations have the potential to bring mutual benefits for the WF distribution centre and the vegetable growers. Through an improved production planning the WF distribution centre may expect a more regular supply and the growers may expect

smaller price fluctuations. The establishment of growers' associations needs an organisational effort, but the beneficial effects for the supply chain partners seem promising enough. Important conditions for the success of growers' associations are good technology, good management and honesty.

Monitoring and analysis promise mutual benefits for input suppliers, vegetable growers and the WF distribution centre. The input supplier may gain a better competitive position in their market. The distribution centre gets production costs information for their value added chain policy and the vegetable growers get improved inputs and management tools. As a whole the understanding between partners in the supply chain will improve.

Integrated Chain Management is a new phenomena for the horticultural sector in Thailand. The phenomena includes subjects like high service levels, year-round supply, certification of production processes, product quality specifications, and checks on pesticide residues. Related subjects are setting up growers' associations, organisation of large horticultural enterprises, different types of certificates, crop performance monitoring, record keeping of pesticide and fertiliser use, human resource management, integrated pest management. It is desirable to make the stakeholders in the vegetable supply chain familiar with the before-mentioned subjects. The stakeholders in this case include managers of vegetable farms, supervisors of growers' associations, suppliers of supermarket chains, policymakers from the government, certification agencies.

An overall picture of production centres for vegetables and fruit is lacking in Thailand. Gathering the district level agricultural census data in a databank, and combining them with geographic information could be very useful. The resulting system is important for several kinds of planning activities at government, trade and industry level.

1. Introduction

This report presents the results of the research in Pre-phase 2 (February - March 1999). This phase has been an intermediate stage in the agri-supply chain project of World Fresh Limited. The overall project aims to:

'To ensure that fresh products (fruits, vegetables, meat, poultry and fish) bought daily by millions of Thai citizens are of good quality, safe, clean and fresh against competing prices.'

During the board meeting of the agri-supply project on January 7, 1999 it was agreed that Pre-phase 2, titled 'Promoting Supply Chain Integration', should cover four major objectives:

- improve the functioning of the upstream supply chain by organisational development and institutional strengthening;
- assess the possibilities to develop a monitoring system for a value-added product system;
- start building up a knowledge infrastructure by incorporating local research and extension institutes;
- design a development process from which a 2-year action plan (containing the interventions required and milestones to be achieved) can be derived.

These topics have been addressed on basis of a number of case studies of priority crops (i.e. vegetables and fruits). In close co-operation with World Fresh and Novartis a crop selection was made:

- organic vegetables;
- sweet corn;
- cabbage;
- carrot;
- guava;
- and mango.

Fieldwork has been executed in Bangkok, Ayuthaya, Pathum Thani, Rayong, Chiang Mai and Chiang Rai. (For the program of Pre-phase 2 see appendix 1).

Chapter 2 of this report presents the findings of the mission. It elaborates upon current farming systems, preferred farming systems, organic vegetables, Integrated Pest Management (IPM) for vegetables and the current practices concerning certification labels. In chapter 3 an analyses is made of the stakeholder perceptions of the various people who are involved in the supply of vegetables to World Fresh. By combining the findings of the

researchers concerning the farming systems, and certification practices with the perception of the individual stakeholders it was possible to design a program of activities for Phase 2.

The proposed activities for phase 2 are presented in Chapter 4. The research team has found that the problems related to upstream supply chain integration require additional attention in two major fields:

- structuring of the certification system to guarantee quality and safety and gain consumer confidence;
- set up a value chain analysis model in order to monitor costs at each level of the supply chain and identify major improvement areas.

Acknowledgements

The project team for this phase consisted of Miss Pennapa Krasae-in, project leader (World Fresh), Prof. Saroj Aungsumalin, Dr Tawil Krutkul, Mr. Nugool Kornyuencyoung, Ass. Prof. Mrs. Juthatip Patrawart (Kasetsart University) and Jan Buurma and Dave Boselie (LEI).

Their research would not have been possible without the financial support from the Foundation for Agri Chain Competence (AKK). Furthermore the research team would like to thank all the people who have been willing to answer our questions, share their opinions and introduce to us their farms, companies and institutes. (A list with the names of the people interviewed is included in appendix 2). Evidently the following analysis reflects the researchers' opinions and they take full for any error or misconception.

2. Findings of pre-phase 2

The first part of our fieldwork had the character of a reconnaissance mission to get a clear understanding of the current farming and trading practices, perceptions, behaviour and interaction of the stakeholders involved.

One of the most important challenges of the agri-supply chain project is to guarantee safe products of a high quality and competitive price. In order to achieve this goal we addressed the following questions:

- what is the current vegetable marketing system;
- what are the main farming systems for vegetable growing currently;
- what farming systems have most potential to develop a long term supplier relationship with World Fresh;
- what is the current position of organic vegetable farming;
- what have been the experiences of Integrated Pest Management in vegetables so far and what are the perspectives for the near future;
- what is the actual state of the safety-certification systems?

Section 2.1 first starts with a brief description of the current vegetable marketing system.

2.1 Current vegetable marketing system

This section explains the current marketing structure of cabbage, sweet corn and toxic free vegetables which were some of the products selected by the World Fresh (WF) management to be included in the agri-supply chain project. Data were collected in March through interviews, farm visits and direct observations of numerous farmers, TOPS' suppliers, other suppliers, co-operative employees and extension officers in Bangkok, Greater Bangkok areas, Chiang Mai city, nearby districts and remote production areas.

It is obvious that everything cannot be taken into consideration in analysis. In this explanation, the system is defined first in terms of direct market participants. They include consumers, TOPS supermarket, World Fresh, TOPS' suppliers and farmers (End-figure 3.1, first row). Other external components that directly affected the performance of market participants can also be included. They are, for example, credit policies and institutions, legal elements and technical farm producers and suppliers. However, in this explanation, for simplicity they are not shown in the figure.

TOPS' consumers are basically high income and medium income consumers. The products are sold at higher prices. These groups of consumers, however, are able and willing to pay more for higher quality products as compared to those sell in normal fresh markets.

At retail level, in addition to TOPS, there are many other competing supermarkets. They include, for example, Central supermarket, the Mall supermarket, Robinson supermarket, Jusco supermarket, Macro and Food Land. They have the same target group, i.e. high income and medium income consumers. The competition is quite high both in Bangkok and big provincial cities.

There is another type of retail outlet. It is called 'fresh market' which is a place where most low-income consumers buy their food and vegetables. There is a grey area, though. Few high-income consumers buy vegetables in fresh markets and, similarly, few low-income consumers buy vegetables in supermarkets. The proportion of grey area is larger in big provincial cities and is smaller in Bangkok. However, the volume of business in Bangkok alone may be as large as those of provincial cities combined together.

With regard to vegetable suppliers, TOPS has its own suppliers. They supply their vegetables to TOPS through WF. Many of them are considered big suppliers. They either handle a large variety of vegetables or a large quantity of selected number of vegetables. In order to maximise the utilisation of their resources and to minimise risk, most suppliers have to have outlets other than TOPS. The suppliers sell their vegetables to other supermarkets as well. Since TOPS and other supermarkets require only high quality products but low quality products have to be purchased from farmers too, suppliers, then, have to sell some of their assembled vegetables, including those rejected by TOPS, in fresh markets.

Similar to TOPS' suppliers, other suppliers sell their vegetables to various supermarkets and normal fresh markets. Actually they also sell vegetables to TOPS. This is done indirectly through TOPS' suppliers. Some of them supply regularly. Others supply occasionally, when TOPS' suppliers cannot find enough vegetables to meet their targets.

Both TOPS' suppliers and other suppliers have their own groups of sub-suppliers or sub-assemblers. They play very important roles. Without these sub-suppliers, the assembling jobs cannot be accomplished. They help assemble vegetables from farmers who are scattered over places. Many of them are in remote areas. For example, in the case of cabbage, most of which is grown by hilltribes in rugged mountainous areas in Chiang Mai province close to the Myanmar border. It is more than 100 kilometres from the city of Chiang Mai. Only 4WD trucks can be used to transport both people and merchandises. One of TOPS' suppliers indicates that 30-40 sub-suppliers help it run the business.

Sub-suppliers perform many important functions. In addition to buying, assembling, grading and primary processing, they also provide technical know how, seeds, fertilisers, chemicals, market information, etc. to farmers. Some of sub-suppliers provide credit both in cash and in kind, especially to their contracted farmers. Suppliers perform functions similar to sub-suppliers and many more. They have to do marketing research, forecasting, production planning and experiment and development. Some of them provide working capital and vehicle to sub-suppliers. They follow new technical development, both overseas and domestic, very closely. Some of them buy seeds and chemicals directly from abroad and become a distributing agent. Given the important roles, suppliers are very close to and also receive trade credit from input suppliers.

At the farm level, farmers sell vegetables directly to suppliers and indirectly through sub-suppliers. Some of them are contract farmers. However, many of them are independent farmers. They can sell either to TOPS' suppliers or other suppliers. In spite of that, they

usually sell to regular suppliers. In other words, independent farmers who sell their vegetables to TOPS' suppliers usually do not sell their vegetables to other suppliers and vice versa. Cultural way of thinking, the fear that suppliers will not come back to buy in the future and other services provided by suppliers may be the main factors explaining such behaviour. This is clearly observed among farmers in remote areas. Farmers who are located close to cities, i.e. in a radius of around 50 kilometres from the centre of the city, for example, Hang Dong and Sarapee districts in Chiang Mai and Rangsit and Pathum Thani in Bangkok, sell their vegetables directly at TOPS and other supermarkets. Farmers also sell directly to consumers.

It is found too that many TOPS' suppliers are farmers themselves, for example, in the case of sweet corn and toxic free vegetables. Actually, before becoming TOPS' suppliers, they are leading or big farmers in that particular fields. They are advanced, capital intensive, with very high level of education (one of them graduated in Engineering another got Ph.D. degree) and a large reserve of working capital. They grow various kinds of vegetables and sell the products not only to TOPS but also to other supermarkets as well. These farmers/suppliers provide technical know how and production planning to contracted and other small farmers.

There are some farmers' groups. Their members are small farmers. Some of them are members of agricultural cooperatives or farmers' associations. These small farmers receive financial support, materials, technical and marketing advice from extension officers. When compare to big farmers/suppliers, these farmers are less advanced and employ less capital-intensive production technology. However, some of them, especially among farmers' leaders, are smart, efficient and can compete very well against bigger competitors.

Conclusions

Suppliers perform many important functions. It is very difficult to bypass or reduce their roles. To improve the supply chain, in the short run, TOPS should expand and improve the role of selected suppliers, especially leading farmers/suppliers.

In the long run, TOPS should initiate to strengthen the co-ordination and co-operation among TOPS, extension office, local agricultural co-operatives, local farmers' associations input suppliers and farmers to mobilize concerted efforts to supply fresh, safe and high quality products to WF or TOPS (provincial branches) directly.

2.2 Preferred farming systems

The project team was confronted with a wide spectrum of production systems during the field visits and discussions with growers, traders and other stakeholders in the vegetable sector. All those production systems have their own characteristics and perspectives with regard to use of agro-chemicals, development context and certification level (cf. Kieft, 1994). The several impressions were classified in five contrasting groups, in order to bring some clearness in the discussion. The five contrasting groups are presented on this page,

together with their main characteristics in the fields of agro-chemicals, development and certification.

The production systems mentioned in figure 1.1 mark a continuum from conventional production with high use of agro-chemicals to organic production without any use of agro-chemicals.

Characteristic	Conventional local market growers	Conventional professional growers	Intelligent pesticide management	Integrated pest management	Organic
Synthetic pesticide use	high	high	reduced	low	none
Artificial fertiliser use	divergent	optimal	balanced	balanced	none

Figure 1.1 Qualifications of five production systems for vegetables in Thailand according to use of agro-chemicals

Figure 1.2 provides a similar overview of the development context of the farming systems which is different over the distinct trajectories of the continuum. The local market growers are mainly supported by the Agricultural Extension. The professional growers have a higher knowledge level and are mainly supported by input suppliers. Both groups are moving gradually towards either Intelligent Pesticide Management or Integrated Pest Management.

Characteristic	Conventional local market growers	Conventional professional growers	Intelligent pesticide management	Integrated pest management	Organic
Institutional support	agricultural extension	input suppliers	input suppliers	FAO-project non-Form.Ed	various NGO's
Development approach	top-down	participative	participative	bottom-up	bottom-up
Development objective	technology application	yield security security	save product	pest prevention	sustainable agriculture
Development phase	struggling	standing	arising	pioneering	pioneering

Figure 1.2 Qualifications of five production systems for vegetables in Thailand according to development context

Considering the current development contexts of both groups, the following evolutions are probably going to happen in the near future. The professional growers with their participatory interaction with input suppliers will move to Intelligent Pesticide Management in short term. The incentive being the request of their buyers (e.g. supermarkets) to produce save products and to get a certification from an external agency. The local market growers will move to Integrated Pest Management. The incentives being pressure from the Agricultural Extension and the need to get rid of their high costs of pesticides and fertilisers. Conversion to organic production seems a bridge too far for the time being. Various NGO's are promoting organic production, but up to now their activities failed to result in a membership of the International Federation of Organic Agriculture Movements (IFOAM). An overview of the above mentioned certification trajectories is shown in figure 1.3:

Characteristic	Conventional local market growers	Conventional professional growers	Intelligent pesticide management	Integrated pest management	Organic
Certification standard	none	none	FAO-codex	FAO-codex	IFOAM
Certification level	none	none	process and product	product	process
Certification agency	none	none	departments	agricultural departments	agricultural still lacking
Certification label	none	none	non-toxic	non-toxic	organic
Residue analysis	public health	supermarket	agricultural departments	agricultural departments	not relevant

Figure 1.3 Qualifications of five production systems for vegetables in Thailand according to certification framework

Conclusions

Concerning the vegetable market segment there are two preferred farming systems for World Fresh –TOPS in the short and medium term:

- conventional professional growers;
- and intelligent pesticide management systems.

2.3 Integrated pest management (IPM) for vegetables

Intelligent Pesticide Management and Integrated Pest Management represent quite different approaches in the plant protection discipline. Supporters of Intelligent Pesticide Management (especially chemical companies) put their trust on the agro-chemical solutions for the control of pests and diseases. They focus at reduction of pesticide use through

improvements in application techniques, forecasting systems, more effective pesticides, herbicide resistant crops, biological engineering. They feel committed to meet the Maximum Residue Limits of the FAO Codex, in order to safeguard Public Health.

Supporters of Integrated Pest Management (especially government agencies) put their trust on the agro-ecological solutions for the control of pests and diseases. They focus at the reduction of the dependency on pesticides through improvement in cultural practices, crop rotation, resistant varieties, biological control agents, physical and mechanical control. They consider pests and disease attacks as symptoms of unfavourable production circumstances and/or disturbances in the agro-ecosystems. Consequently they accept synthetic pesticides only as a last resort. Under this system the Maximum Residue Limits of the FAO Codex can be easily met, owing to the low frequency of pesticide applications.

In Thailand only recently a program for the introduction of Integrated Pest Management techniques has been set up by FAO in co-operation with the Department of Agricultural Extension and the Department of Non-formal Education. The mission team had the opportunity to visit a field demonstration day in Mae Suai (Chiang Rai) during which a first group of 25 IPM trainers graduated from their training course (TOT for IPM in vegetables). In the next stage these trainers will set up farmer field schools in their own home-districts (distributed over five provinces in the North of Thailand). The TOT-program of FAO will probably expanded to other provinces in the near future.

Conclusions

- currently Integrated Pest Management (IPM) production is in a pioneer phase;
- the marketing component (in terms of product specifications like uniformity, taste, colour, etc.) is lacking in the curriculum of the training-of-trainers (TOT) within the IPM program;
- nevertheless, IPM is an indispensable component of Good Agricultural Practices and can be considered as essential for the long-term improvement of horticultural production.

2.4 Organic vegetables

Organic production has internationally accepted standards, concisely expressed in the standards document of the International Federation of Organic Agriculture Movements. These standards are (IFOAM, 1989):

- to produce food of high nutritional quality and sufficient quantity;
- to work with natural systems rather than seeking to dominate them;
- to encourage and enhance biological cycles within the farming system, involving micro-organisms, soil flora and fauna, plants and animals;
- to maintain and increase the long-term fertility of soils;
- to use as far as possible renewable resources in locally organised agricultural systems;

- to work as much as possible with a closed system with regard to organic matter and nutrient elements;
- to give all livestock conditions of life that allow them to perform all aspects of their innate behaviour;
- to maintain the genetic diversity of the agricultural system and its surroundings, including the protection of plant and wildlife habitats;
- to allow agricultural producers an adequate return and satisfaction from their work including a safe working environment;
- to consider the wider social and ecological impact of the farming system.

The mission team has visited a number of vegetable growers who were experimenting with organic farming techniques. They apply compost, biological control by predators and net-houses within their farming systems. However, currently organic farmers seem to operate quite solitary; this means that they experiment by themselves and that exchange of knowledge and experience hardly takes place. Furthermore the marketing system does not guarantee a careful and separate handling of organic products. Products are easily mixed up at collection points and tracking and tracing is impossible due to the fact that products are incidentally bought from various sources when main suppliers are not able to deliver the required demand. There is no monitoring and certification system available to support the organic market segment.

Conclusions

- 'Organic' means produced without use of any artificial fertiliser and synthetic pesticide and certified to the standards of the International Federation of Organic Agricultural Movements. A membership of the International Federation of Organic Agricultural Movements (IFOAM) does not yet exist in Thailand;
- the organic production system is still in a pioneering phase; full development of this sub-sector might take 10 years;
- it is therefore recommendable for TOPS not to position itself in the organic segment but instead focus on clean 'non-toxic' products.

2.5 Certification labels

Since 1995 the Ministry of Agriculture and the Ministry of Public Health have been running a program called 'Vegetables, Pesticide Safe Production' (see: Pesticide Residues Analysis Section, 1999). The aim of this program is to protect the consumers within the country and to promote exports. A surveillance program for pesticide residues analysis was set up by the Department of Medical Science (DMSc.) and the Food and Drug Administration (FDA) as early as 1994.

The issue of food safety has been gaining attention. There is an increasing consumer awareness about health and safety aspects of food consumption. A reflection of this is the frequent newspaper coverage on this topic:

- BP (26-2-99): 'Crop Protection Ads Labelled Misleading. Producers Admit Dangers Downplayed';
- BP (9-3-99): 'Toxic Vegetables Face Ban. Campaign Launched to Protect Consumers';
- BP (6-3-99): 'Chemical-free Vegetable and Fruit Campaign';
- BP (9-3-99): 'Branching Out: Though small in size and with a limited budget an NGO in Suphan Buri province is offering green alternatives to Thai farmers and consumers';
- BP (8-3-99): 'Testing Times. Test Kits for Food'.

On page 14 we can see that there is a number of stakeholders involved in the quality control, certification and surveillance of the safety of fresh food products. However these efforts are quite fragmented between the various levels of the food-supply chain. At primary production level two departments (the Department of Agriculture and the Department of Agricultural Extension) of the Ministry of Agriculture have set up their own certification programs. (For the organisational charts of the Ministry of Agriculture, DOA and DOAE see appendices 3, 4 and 5). Figure 2.1 on next page gives some of the main characteristics of both programs:

Certification Agencies		
Criteria	DOA	DOAE
Actual area coverage	BKK region (51 growers)	<76 provinces (? growers)
Laboratory	BKK	<76 provincial capitals
Tracking and tracing	bar-code: - product info - area info - grower info	grower number (provincial)
Certification specifications	FAO-WHO codex	FAO-WHO codex
Certification practices	- farm visit - residue test - every crop - expiry 1 year	- farm visit - residue test - every crop
Certification level	product/process	product
Label	1 (non-toxic)	1 (non-toxic) for each province
Support service	Training/extension	
Expertise	Multidisciplinary	Extension workers

Figure 2.1 Current certification labels of DOA and DOAE

The Ministry of Public Health (Department of Medical Science) is preparing to establish its own certification label in addition to the regular surveillance activities that they perform on public markets, in shops, supermarkets and retail outlets in Bangkok and the provinces.

At retail level similar surveillance activities are performed by various other organisations like: the Food and Drug Administration, the Bangkok Metropolitan Authorities, NGO's, and provincial offices of Public Health.

Conclusions

- the production system is ripe for the implementation of certification to the 'Maximum Residue Limits (MRL)' values specified by the FAO-Codex;
- the existence of multiple labels (varying between the departments of the Ministry of Agriculture) for 'toxic free' vegetables is confusing for the consumers;
- TOPS should use the opportunity to support the introduction of one national label (and develop its own logo for 'toxic free' products).

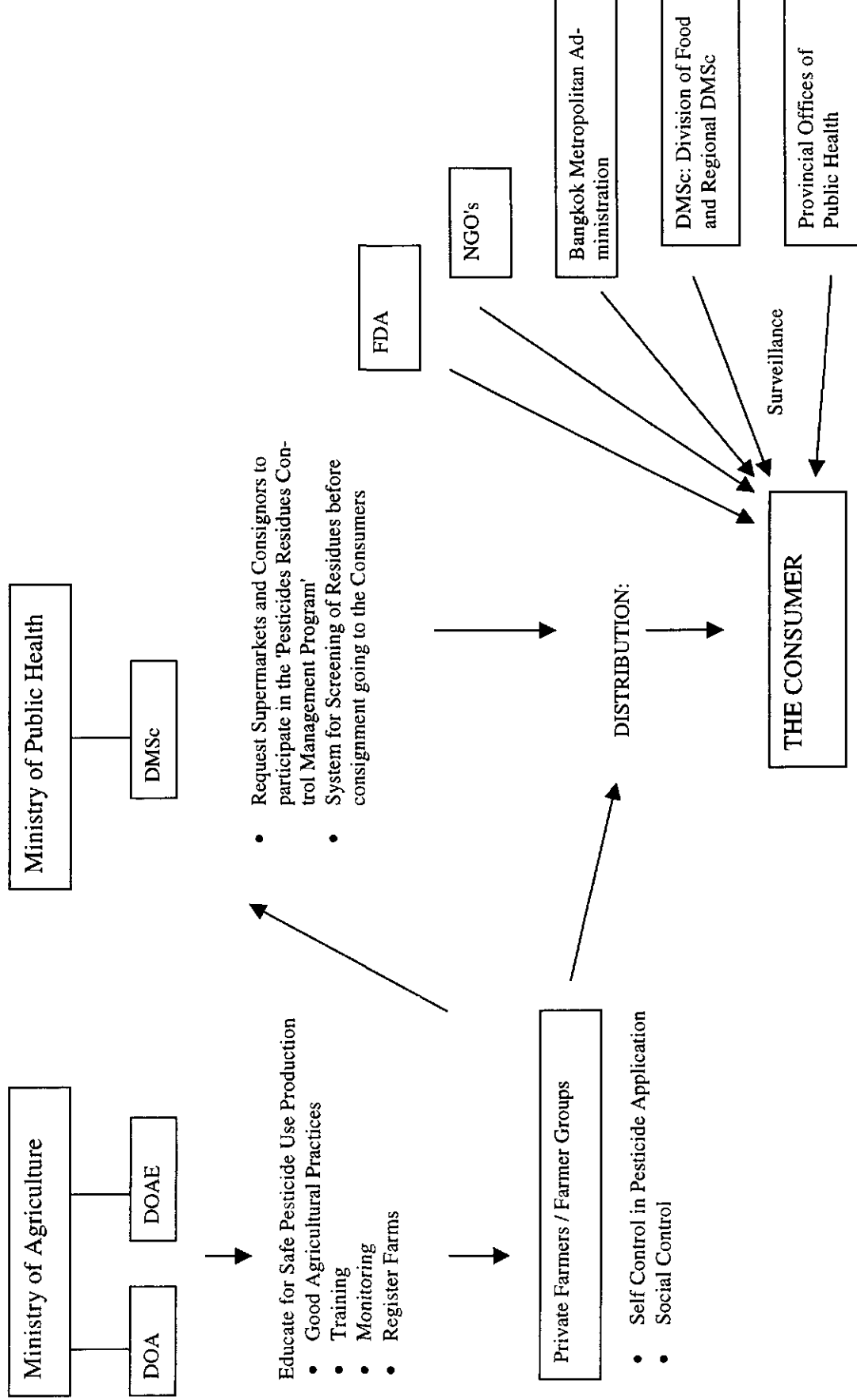


Figure 2.2 Current stakeholders for quality control certification and surveillance

3. Stakeholder perceptions and agri-supply chain development

The development of a sustainable Agri-Supply Chain requires commitment of the various stakeholders like growers, traders and supermarket. An important condition or pre-requisite for commitment is mutual understanding and benefit. In order to get understanding of the interests and potentials for mutual benefit, stakeholder perception analyses were composed. The results and conclusions from these analyses are described in the next sections.

The stakeholder perception analyses were composed starting from a conceptual model for farmers' behaviour. The model starts from natural or socio-economic circumstances, giving rise to uncomfortable feelings (perceptions of weaknesses or threats) in the mind of the grower/manager. Starting from those perceptions the grower/manager develops a strategic behaviour and a tactic behaviour. Within the strategic behaviour he sets priorities for structural adjustment of his business. Within the tactic behaviour he tries to cover or to compensate his weaknesses or threats via symptom combating. Figure 3.1 represents a stakeholder perception analysis for the management of World Fresh.

The stakeholder perception analysis in figure 3.1 intends to show that the management of World Fresh is worried about misuse of pesticides. This circumstance results in the feeling, that food safety is not guaranteed. This is a weakness of the system and a threat for the image of the TOPS supermarkets. To get rid of this weakness / threat, the management of World Fresh wants their growers to apply good agricultural practices. Consequently it is searching for a certification system, that prevents misuse of pesticides and consequently guarantees food safety. As long as certification is not operational the management has to manage (via tactic behaviour) with random checks on pesticide residues. Deliveries with pesticide residues above the maximum residue limits (MRL's) are disqualified.

Similar analysis were made for the other stakeholders and problems in the supply chain. A group of stakeholders potentially interested in certification are the advanced growers. Figure 3.2 shows their stakeholder perception model. Their product is mixed up with the product of less advanced growers. Since product attributes like taste and residues are mostly not visible, the advanced growers face an implicit quality degradation. They try to counteract this threat by developing a tactic behaviour consisting of building up a personal reputation. Ultimately they may start to supply their products under an own brand.

TOPS - WORLD FRESH

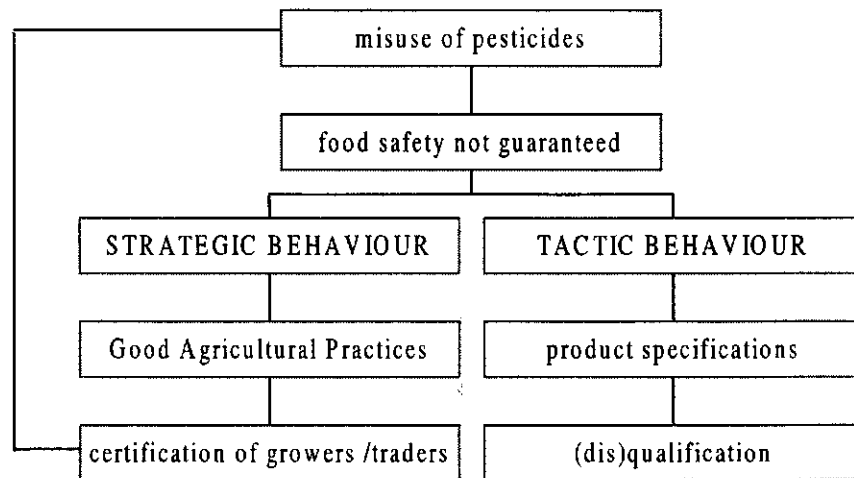


Figure 3.1 stakeholder perception model: tops-world fresh

ADVANCED GROWERS

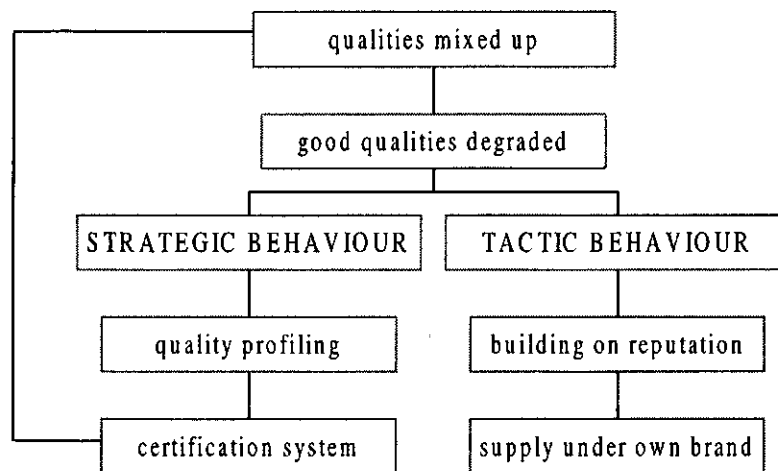


Figure 3.2 stakeholder perception model: advanced growers

The advanced growers are supporters of quality profiling and will applaud certification. The less advanced growers on the other hand will show resistance against certification.

Conclusion

Certification promises mutual benefits for distribution centres and advanced growers, i.e. good quality producers. The consequence of certification probably will be that less advanced growers drop out. This is no problem from the point of view of quality, but a fast or forced implementation might result in a decreased supply level. The consequences and eventual solutions of such an decrease should be considered in advance.

Another problem in the supply chain concerns the irregularity in supply. Consequently the buying department of the distribution centre has difficulties in meeting the service levels, eventually resulting in 'wild' purchases at wholesale markets at different levels in the supply chain. The matching tactic behaviour of the buying department is maintaining a broad basis of suppliers, resulting in reservations against a strong reduction in number of suppliers. The strategic solution for irregular supply is an improved planning of production, i.e. staggering over the various production seasons and production regions. This could be organised by the establishment of growers' associations under co-ordination of a chairman or supervisor (see figure 3.3).

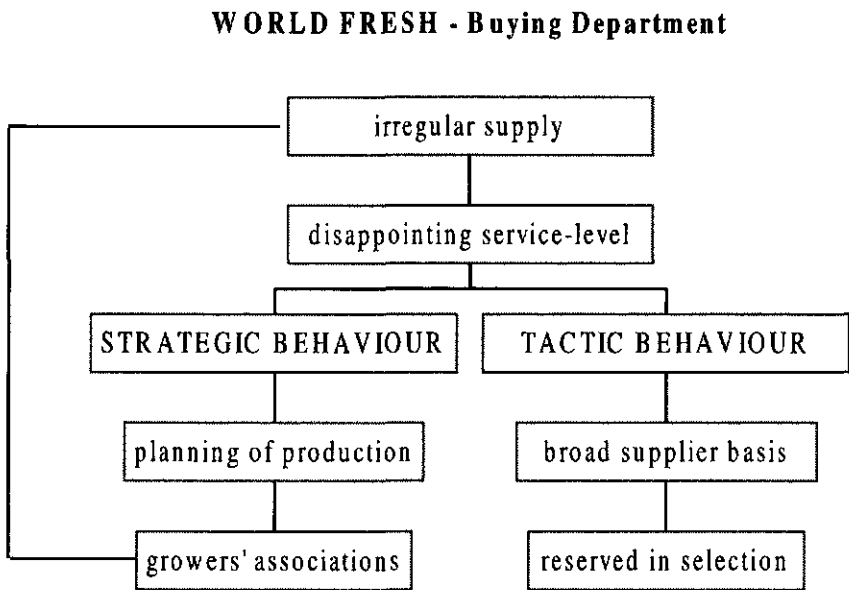


Figure 3.3 stakeholder perception model: world fresh – buying department

At the reverse of irregular supply are sharp price fluctuations for the vegetable growers. In periods of low prices the growers may run the risk of financing problems. In the short term (tactical behaviour) they are at the mercy of traders providing credit or inputs. The conditions for such services are mostly rather unattractive. In the long term (strategic behaviour) the establishment of a growers' association could be beneficial. In such an association the pain of unprofitable prices can be shared and a more regular supply can be organised (see figure 3.4).

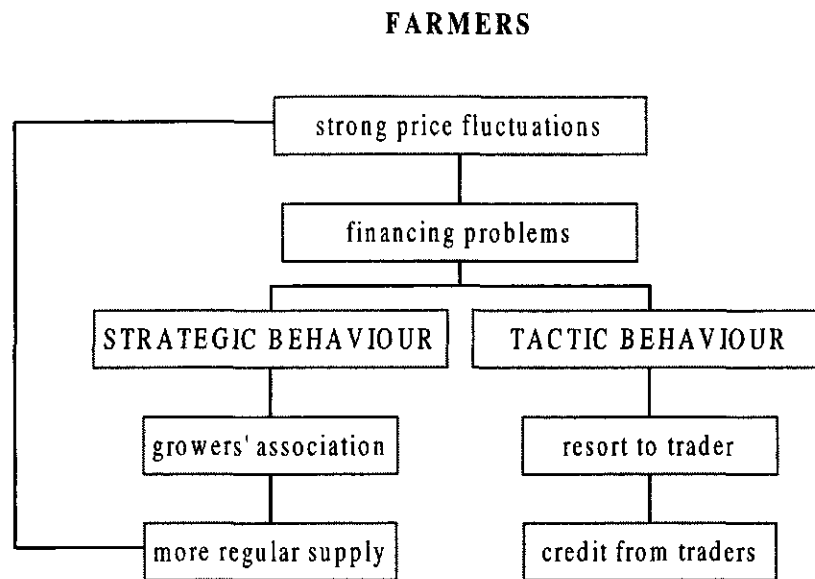


Figure 3.4 stakeholder perception model: farmer

Conclusion

Growers' associations promise mutual benefits for the distribution centres and the vegetable growers. Through an improved production planning the distribution centre may expect a more regular supply and the growers may expect smaller price fluctuations. The establishment of growers' associations needs an organisational effort, but the beneficial effects for the supply chain partners seem promising enough. Important conditions for the success of growers' associations are good technology, good management and honesty.

A third bottleneck in the supply chain, especially for the buying department, is deficiency in information about production costs for most vegetables. This deficiency makes it difficult to refute the production costs arguments of growers and traders. The short-term solution for this weakness in the negotiation position is application of a 'divide and rule' policy, resulting in tough price negotiations. This policy is not very productive in the long run, because it may disturb good relationships and undermine product quality. To escape from this downward spiral the distribution centre supports the value added chain policy (strategic behaviour). Monitoring and analysis of production costs are very useful to support the policy concerned (see figure 3.5).

Input suppliers do also have an interest in this field. They face competition in their markets and try to maintain or increase their market positions. As long as they have no relationships with growers they depend on ambitious statements and promotion activities (tactic behaviour). Participation in the supply chain project brings them in contact with potential new segments in their market. Demonstration plots and monitoring of input use, yield and quality provide them very useful information and promotion material to

strengthen their competitive position. The participating vegetable growers will also learn from the demonstration and monitoring.

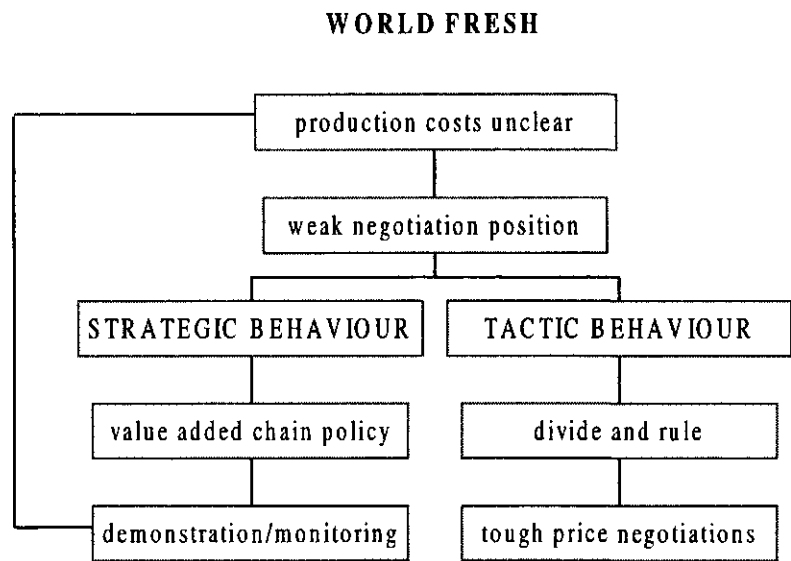


Figure 3.5 stakeholder perception model: word fresh

Conclusion

Monitoring and analysis promise mutual benefits for input suppliers, vegetable growers and distribution centres. The input supplier may gain a better competitive position in their market. The distribution centres get production costs information for their value added chain policy and the vegetable growers get improved inputs and management tools. As a whole the understanding between partners in the supply chain will improve.

In the next table the conclusions from the stakeholder perception analysis are summarised:

Strategy	Beneficial for	Reason, why
Certification	WF management Advanced growers	Food safety is guaranteed Good quality is profiled
Growers' associations	WF buying department Co-operative growers	More regularity in supply Smaller price fluctuations
Production system in- novation with cost monitoring	WF buying department Input Suppliers Participating growers	Production costs information Better competitive position Improved inputs and management

INPUT SUPPLIERS

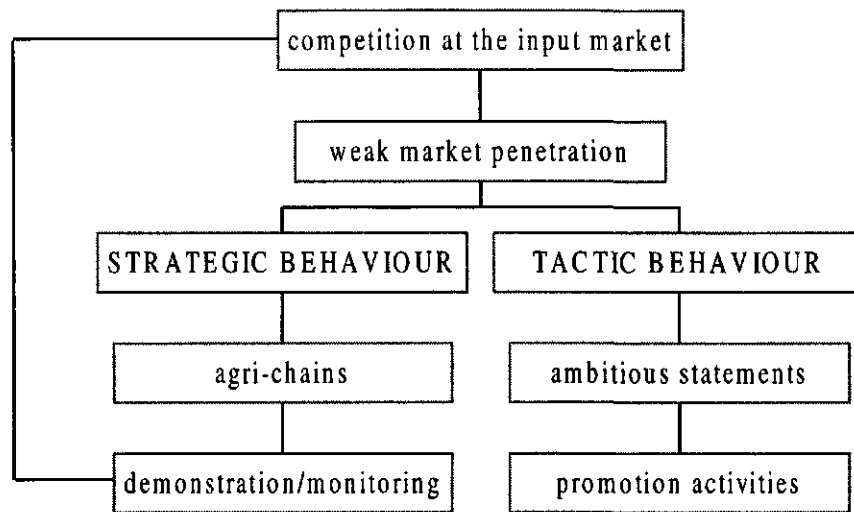


Figure 3.6 stakeholder perception model: input suppliers

4. Proposed activities for phase 2

Based upon our findings and the stakeholder perception analyses we have developed a number of proposed activities that focus around two major themes: the establishment of a quality and certification system and secondly the build up of a value chain analysis model. Each of the activities can be sub-divided into operational activities, tactical activities and strategic activities. While operational activities have an immediate impact in the short term, the tactical and strategic project activities will show a benefit in the medium and long term.

4.1 Structuring of quality and certification system

Operational activities: (short term)	Structuring of quality and certification system: (LEI/ surveillance and certification organisation) Production system innovation: (Pilots by Novartis: cabbage, carrot, sweet corn, mango)
Tactical activities: (medium term)	Development of growers' associations and contracting (Kasetsart – LEI)
Strategic activities: (long term)	Training Course Fresh Vegetables Supply Management (IAC/LEI)

Structuring of quality and certification system

In order to guarantee the safety of fresh products and gain consumer confidence it is essential to develop a kind of quality assurance scheme. The first efforts to establish such a quality monitoring system will focus on vegetables and fruits and it will be expanded to other products later. An independent company like for example SGS (Thailand) Limited will be strongly involved in the set up and implementation as an independent party. Apart from carrying out the physical inspection of the program, such a company can assist in the design and development of the inspection and testing criteria, specifications, and methodology encompassing the entire trade chain. Appendix 6 presents a proposal for the structuring of a certification system.

Production system innovation: (Pilots by Novartis: cabbage, carrot, sweet corn, mango)

We have identified farming preferred systems that provide the best option in the short and medium term to improve the agri-supply chain performance: conventional professional growers and intelligent pesticide management practitioners. Both systems can benefit from improved agro-inputs and farming practices. Improved seeds are characterized by: higher yields, uniformity of produce, improved quality, and disease resistance. Furthermore the

application of various varieties and growth regulators can contribute to the year-round availability of produce. Novartis (Seeds division and Crop Protection division) will set up demonstration projects for cabbage, carrots, sweet corn and mango within the existing supply chains of World Fresh Limited. Appendix 7 presents a concise description of the activities within the demonstration projects.

Development of growers' associations and contracting (Kasetsart – LEI)

During our mission it has become clear that currently input suppliers (both middlemen and agro-chemicals providers) play a crucial role in the farming practices and marketing of outputs. Their control over growers enables them to monitor and guarantee a safe use of agro-chemicals. However, we believe that the establishment of growers' associations can provide mutual benefits for vegetable growers and the World Fresh distribution centre. Through an improved production planning the distribution centre may expect a more regular supply and the growers may expect smaller price fluctuations and stability in sales. Additional research is necessary to determine the required conditions for success in the fields of management, technology, supervision, and contracting. (See appendix 8).

Training Course Fresh Vegetables Supply Management (IAC/LEI)

Integrated Chain Management is a new phenomena for the horticultural sector in Thailand. The phenomena includes subjects like high service levels, year-round supply, certification of production processes, product quality specifications, and checks on pesticide residues. Related subjects are setting up growers' associations, organisation of large horticultural enterprises, different types of certificates, crop performance monitoring, record keeping of pesticide and fertiliser use, human resource management, integrated pest management.

The objective of the proposed training course is to make the stakeholders in the vegetable supply chain familiar with the before-mentioned subjects. The stakeholders in this case include managers of vegetable farms, supervisors of growers' associations, suppliers of supermarket chains, policymakers from the government, certification agencies. Appendix 9 presents the proposal for a training course on fresh vegetable supply management.

4.2 Value chain analysis

Operational activities: (short term)	Surveys: standardised measurement units, input prices, model building, regional crop data collection (Kasetsart, LEI) Novartis pilots (cabbage, carrot, sweet corn, mango)
Tactical activities: (medium term)	Activity Based Costing System (Novartis, Kasetsart, LEI)
Strategic activities: (long term)	Identification of production / expertise centres Geographical Information System (GIS) Development of new regions and seasons Integrated Pest Management and Farmer Field School (FFS) planning

Two important components of the Value Chain Analysis program are the development of an activity based costing system and a geographical information system. In addition it would serve a long term interest if a marketing component could be included in the curriculum of the IPM courses and the FFS planning.

Activity Based Costing System (Novartis, Kasetsart, LEI)

World Fresh is strongly interested in having a system to approximate the costs of production and post-harvest handling up to the distribution centre. The projected result is an Activity Based Costing model as already exists for the links from distribution centre to supermarket. The objective of the project is working together/negotiating with growers and suppliers on basis of mutually accepted information, in order to build long term relationships. Working on basis of the ABC model may result in more regular prices. On the other hand suppliers with a speculative attitude may stop the existing relationship with World Fresh.

The establishment of an ABC system will cover more than one cropping season. In the short term surveys will be organised to get a good estimation of standardised measurement units, inputs prices, and to build up a computerised model. The pilot projects of Novartis will provide statistical inputs and serve as a control group. Appendix 10 describes the proposed project activities.

Geographical Information System (GIS)

The geographic distribution of vegetable production in Thailand is not readily accessible. For planning purposes of government, trade and industry a comprehensive geographic picture of vegetable production will be very useful. Examples of such purposes could be planning of training activities, selection of traders and growers, planning of surveys, etc. Up to now strategic considerations (like comparative advantages and seasonal complementarity) of production centres seem to play a minor role in the planning processes concerned.

The objective of the proposed GIS-system is to support the strategic decision-making of government, trade and industry on the future development of the vegetable sector (see appendix 11). For government agencies such decision-making may concern investments in infrastructure and human resources, or the geographic or regulatory facilitation of such investments. For individual private companies a GIS-system can support the selection and combination of main suppliers from regions with high yields, low disease and pest pressure and year-round supply. The final objective is vegetable production in regions which meet the ecological, economic and logistic conditions optimally.

Integrated Pest Management and Farmer Field School (FFS) planning

Currently IPM vegetable production in Thailand is in a pioneer phase. The marketing component (in terms of product specifications like uniformity, taste, colour, etc.) is lacking in the curriculum of the training-of-trainers (TOT) within the IPM program.

Nevertheless, IPM is an indispensable component of Good Agricultural Practices and can be considered as essential for the long-term improvement of horticultural production. Appendix 12 contains the first steps that have been taken to start the discussion on the integration of a marketing component into the curriculum of the TOT-program of IPM in Vegetables.

Literature

IFOAM, *Basic Standards of Organic Agriculture*. Tholey-Thely, West Germany, 1989.

Kieft, J., *Between plants and business. Farming styles in the Bangkok vegetable industry*. Agricultural University Wageningen, Department of Agronomy, Vegetable subdivision, 1994.

Pesticide Residues Control in Thailand. Pesticide Residues Analysis Section (Division of Food, Department of Medical Sciences), Bangkok, Thailand, 1999.

Appendix 1 Agenda of fieldwork in pre-phase 2

February 1999

Tuesday	16	Departure Dave Boselie AMS-BKK
Wednesday	17	Arrival Dave Boselie BKK
Thursday	18	15.00-17.00 ACC Meeting TOPS headquarters
Friday	19	9.00 Kasetsart University, 14.00 World Fresh
Saturday	20	
Sunday	21	Briefing Eric de Jonge / ATO
Monday	22	FAO, morning, Department of Agricultural Extension, afternoon, Dr. Lakchai and Mrs. Pacharee
Tuesday	23	10.00 World Education Asia, Mr. Marut
Wednesday	24	TOPS, Ms. Pennapa
Thursday	25	Preparation checklists and interviews for stakeholders
Friday	26	Novartis, seeds division and crop protection division
Saturday	27	Arrival Jan Buurma, briefing
Sunday	28	

March 1999

Monday	01	Stakeholder perception analyses
Tuesday	02	Planning fieldwork with Kasertsat and World Fresh
Wednesday	03	Discussion Dept. Toxic Subst (5793577-8) + Lakchai/Pacharee
Thursday	04	Fieldwork Organic Veggies (Pathumtani prov., Sam Lu Ka district)
Friday	05	Fieldwork Organic Veggies (Pathumtani prov.)
Saturday	06	Reporting Organic Veggies
Sunday	07	Reporting Organic Veggies
Monday	08	Fieldwork Sweet Corn (Ayuthaya, Mr. Suvit) 9.00 Headoffice TOPS,
Tuesday	09	DOAE: Horticultural promotion division, Mrs. Osara Afternoon: departure for Chiang Mai
Wednesday	10	Fieldwork Cabbage and Carrot (Chiang Mai, Chieng Dao), Mr. Chandee, Novartis
Thursday	11	Chiang Rai, Mae Suoi: 11.00 Field day IPM-TOT program (Mr. Marut), presentation on marketing component in IPM curriculum
Friday	12	Fieldwork Cabbage and Carrot (Chiang Mai): DOAE and other growers. San Pa Tong and San Pa Kwao
Saturday	13	Reporting Chiang Mai + visits (East West Seeds, afternoon)
Sunday	14	Reporting Chiang Mai + visits (return to Bangkok in the afternoon)
Monday	15	Preparing proposal and presentation Pre-phase 2 18.00-22.00 Discussion Chiel de Bruine
Tuesday	16	SGS, Dr. Kla, Lakchai (DOAE), 14.00 Kasetsart
Wednesday	17	14.00 WF-Rabobank (Hans Winkelmolen)
Thursday	18	18.30 SGS (Sangri La hotel)

Friday	19	9.30 Novartis, lunch + afternoon Kasetsart
Saturday	20	Arrival Prof. Zachariasse 12.15 U.+ Departure Jan Buurma
Sunday	21	Report writing
Monday	22	Mrs. Khotong – Ministry of Public health, 9.30 u. Meeting Zachariasse with Dean of Faculty Economics 9.00 u.
Tuesday	23	8.30 Visit to Dole, Hua Hin
Wednesday	24	8.00 Visit Guava farm, 14.00-17.00: Board Meeting
Thursday	25	10.00 TOPS: Chiel, Pennapa, Dave 14.30 Departure Dave to Hanoi
Friday	26	
Saturday	27	
Sunday	28	
Monday	29	
Tuesday	30	
Wednesday	31	Return Dave (Hanoi-BKK)

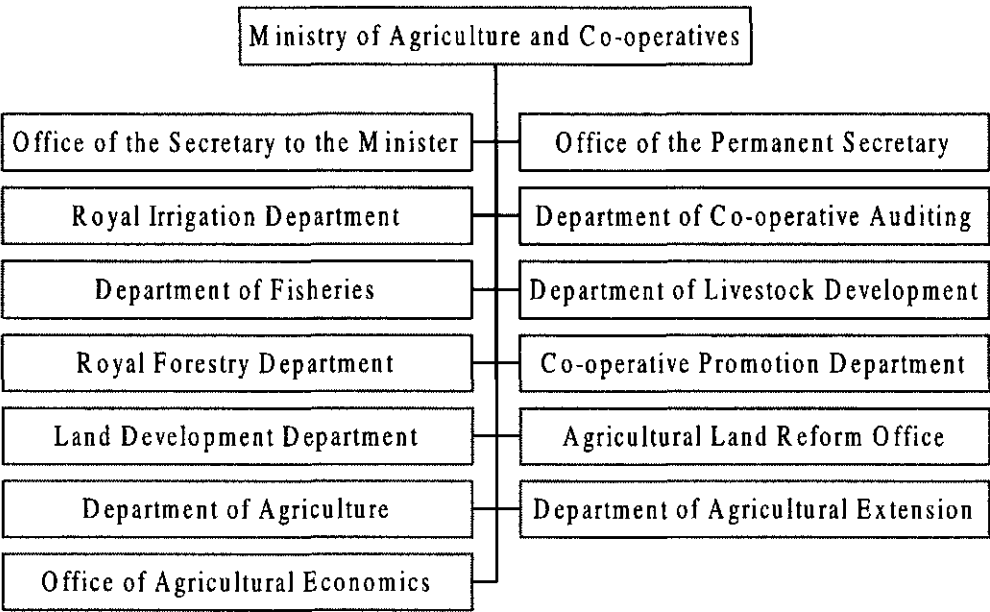
April 1999

Thursday	01	14.00 TOPS
Friday	02	8.00 Rayong (Mr. Attapol: mango), Novartis
Saturday	03	11.00 Prof.Saroj, Kasetsart University. Departure Dave (BKK-AMS)
Tuesday	13	Report writing

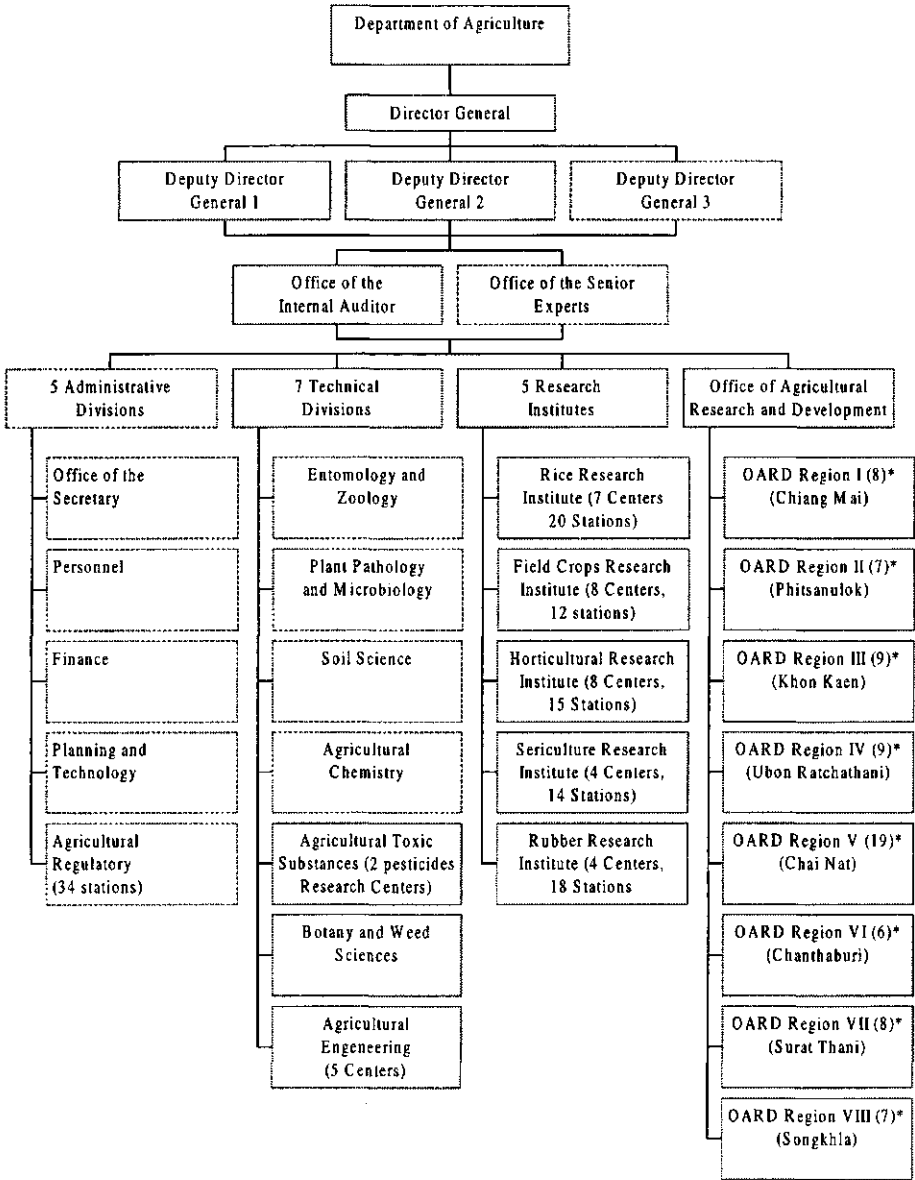
Appendix 2 List of people interviewed

Name	Organisation
1. Mrs. Pacharee Meanakanit	DOAE – Bio-control centre
2. Mr. Lakchai Meenakanit	DOAE – Plant protection division
3. Mrs. Jandee Thaweepiradeesathit	Chang Mai JPP Plant Co., LTD
4. Mr. Yutthana Wangsunton	Novartis – Vegetable seeds
5. Mr. Jaruek Sribuddhachart	Novartis – Crop Protection sector
6. Mr. Wichai Phamontri	Novartis – Vegetable / Flower seeds
7. Mr. Jose Valmayor	Novartis – Crop Protection sector
8. Mr. Marut Jatiket	World Education Asia
9. Mr. Randy Arnst	World Education Asia
10. Phitak Tanphibulwong	TOPS – Logistics and Distribution
11. Chiranun Poopat	TOPS – AVP
12. Dr. Kriangsak Suwanaradon	Novartis – Seeds
13. Mr. Frederik Vossenaar	Agricultural Counsellor, Netherlands Embassy
14. Mrs. Parichart Siwaraksa	UNDP
15. Mr. Sakda Bannaphoomi	Novartis – Crop protection
16. Mr. Kampol Treesahakiat	Novartis – Seeds
17. Dr. Kla Somtrakool	Department of Non-formal education, Ministry of Education
18. Mr. Chiel De Bruine	World Fresh Limited
19. Mr. Somchai Sakultheera	TOPS – Category director
20. Mr. Suwit Traichok	Thai Fresh LTD
21. Dr. Narin Somboonsarn	DOAE, Horticultural promotion
22. Mrs. Orasa Distapaen	Head of Vegetable division, DOAE, Horticultural promotion
23. Mrs. Omsap Viyakonvilas	DOAE: Planning Division
24. Mrs. Wanlapa Sithipitak	DOAE: Planning Division
25. Mr. Heng Kuang Tioh	East West Seed Company
26. Mr. Simon Jan de Hoop	East West Seed Company
27. Mrs. Orapin Thilawat	DOAE: Crop protection
28. Mr. Jules M.N. Odekerken	Rabobank International Thailand
29. Mrs. Khotong	Ministry of Public Health
30. Mr. Pitak Supanantakarn	SGS
31. Mr. Sophon Suriyaphong	SGS
32. Mr. Maroot Tuethong	SGS
33. Dr. Ammar Siamwalla	TDRI
34. Mr. Attapol	Sireethorn Ltd. Part.

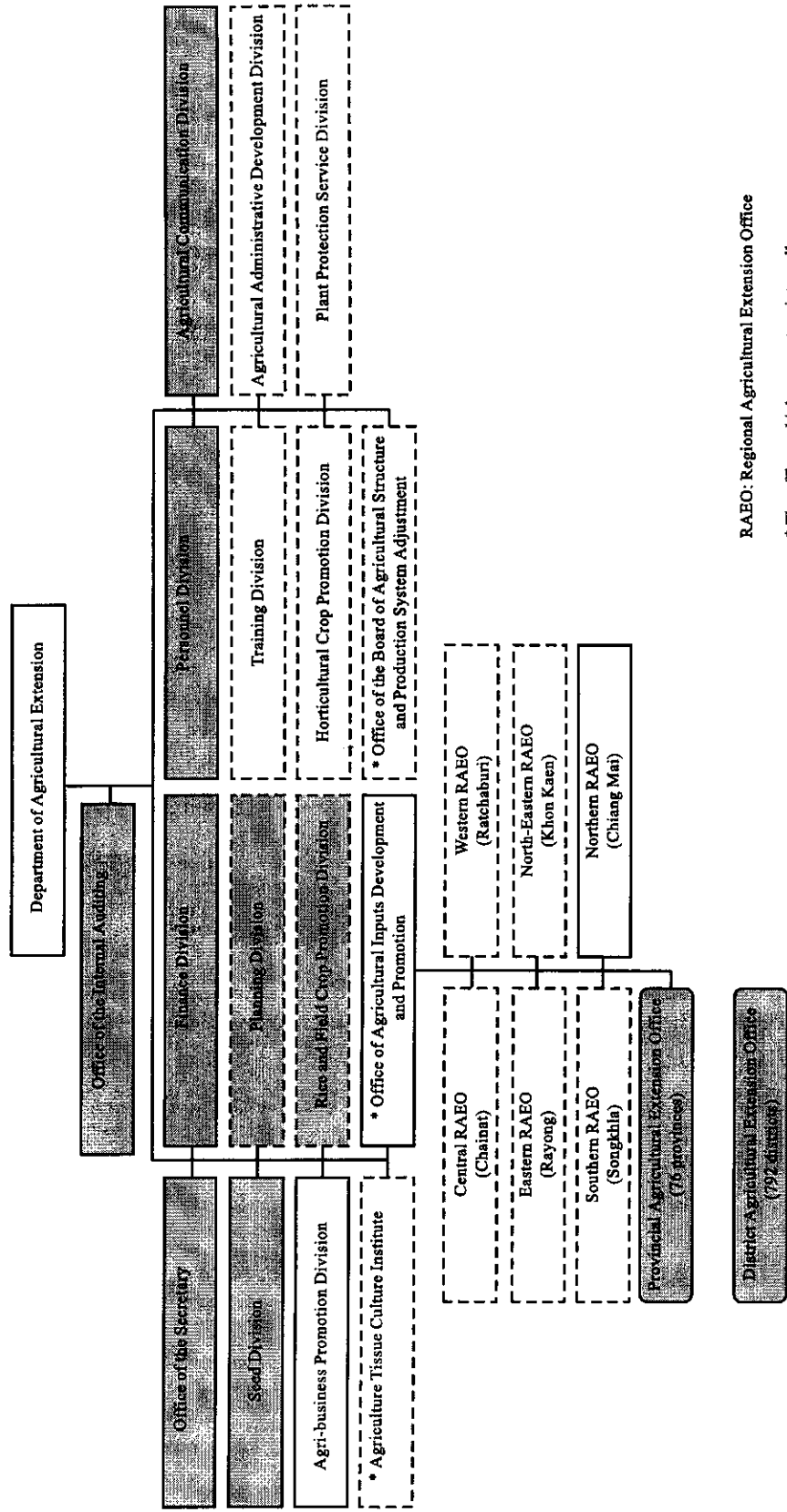
Appendix 3 Organisational chart of the ministry of agriculture and operatives



Appendix 4 Organisational chart of the Department of Agriculture



Appendix 5 Organisational chart of the Department of Agricultural Extension (DOAE)



Appendix 6 Proposal 'Quality Systems and Structuring of the certification system'

One of the major challenges of the agri-supply chain project is getting good quality, safe, clean and fresh products against competing prices. In this sense quality is not achieving excellence per se but moreover meeting customers' requirements. Quality inspection and quality assurance are essential components of quality management to reach this goal. The certification of the product process will confirm the standard and support consumers confidence.

Although there is a growing consumer and government concern about the quality and safety of fresh goods the efforts to establish a monitoring system for quality and safety have been limited and fragmented. The existence of multiple labels is confusing for the consumers. To improve this situation it would be necessary to stimulate co-operation between the various stakeholders involved (f.e. retailers, farmers/producers, transporters/packers, and government bodies like FDA, DOA, DOAE, BMA).

The project should contain the following steps:

1. Stakeholder workshop;
2. HACCP/Food Quality and Safety Systems Training;
3. Development of Codes of Practice;
4. Document Review - Codes of Practice;
5. Training - Documenting a Quality System;
6. Assembling the Quality manual and Codes of Practice;
7. Develop Training Manual for Uptake by Members;
8. Deliver training;
9. Internal Auditor Training;
10. Certification of the Produces.

Initially the project will be started as a pilot focussing on vegetable and fruit commodities and working with the existing preferred suppliers of World Fresh. When the approach proves to be successful it will be expanded to other fresh commodities.

Appendix 7 Proposal 'Production system innovation' (pilot project for cabbage, carrot, sweet corn and mango by Novartis)

Production System Innovation in Cabbage, Carrots and Sweet Corn

Mr. Wichai Phamontri of Novartis will implement this demonstration project.

Activity plan:

- selection of participating growers (five per crop);
- discussion of improved production system with participants;
- free seeds and new pesticides for participants;
- monthly visits and training to participating growers;
- monitoring of fertiliser and pesticide use with participants;
- parallel monitoring with one neighbour of each participant;
- yield and quality assessment participants and neighbours;
- activity based labour use/costs assessment with participants;
- nomination of participants for certification by DOAE.

Management plan:

- implementation in next rainy season (May-August 1999);
- budget = implementation and training free of charge by Novartis;
- participants to be selected from 'Chiangmai JJP' growers;
- post-harvest handling and forwarding by 'Chiangmai JJP';
- labour use/costs assessment supported by Kasetsart University;
- certification according to existing system of Dept. Agric. Extension;
- analysis and presentation of technical results by Novartis;
- analysis and presentation of economic results by Kasetsart;

Appendix 8 Proposal 'Development of growers' associations and contracting'

Currently input suppliers (both middlemen and agro-chemicals providers) play a crucial role in the farming practices and marketing of outputs in the Thai vegetable and fruit sectors. Their control over growers enables them to monitor and guarantee the (safe) applications of agro-chemicals. However, the establishment of growers' associations can provide mutual benefits for vegetable growers and the World Fresh distribution centre. Through an improved production planning the distribution center may expect a more regular supply and the growers may expect smaller price fluctuations and stability in sales.

Besides the existing formal farmers associations and agricultural co-operatives there is a broad range of informal initiatives for co-operation between growers in the fields of production and marketing. Often these group structures are village or family based. Professional growers within one family or one village join forces and exchange experiences and farming knowledge. These groups seem to meet all preconditions to develop into professional growers' associations and engage into long-term direct business relationships with retailers.

Additional research should cover issues like: the required conditions for success in the fields of management, technology, supervision, and contracting.

Appendix 9 Proposal for a training course on 'Fresh Vegetables Supply Management'

Knowledge demand

Integrated Chain Management is a new phenomena for the horticultural sector in Thailand. The phenomena includes subjects like high service levels, year-round supply, certification of production processes, product quality specifications, and checks on pesticide residues. Related subjects are setting up growers' associations, organisation of large horticultural enterprises, different types of certificates, crop performance monitoring, record keeping of pesticide and fertiliser use, human resource management, integrated pest management.

The objective of the proposed training course is to make the stakeholders in the vegetable supply chain familiar with the before-mentioned subjects. The stakeholders in this case include managers of vegetable farms, supervisors of growers' associations, suppliers of supermarket chains, policymakers from the government, certification agencies.

Knowledge supply

The International Agricultural Centre (IAC) in Wageningen, together with the Wageningen University and Research Centre, organises several training courses for agricultural managers, extension specialists and researchers from all over the world. Every year also a Vegetable Course is organised, with marketing as a major component. This marketing component is largely arranged by the Agricultural Economics Research Institute (LEI) in The Hague.

The Dutch horticultural industry developed much expertise in integrated chain management during the last decade. Various certification systems were established, the auction system came under pressure, growers' associations with tailor-made supply to supermarket chains came up, large scale enterprises with distinct business units arose, and staff management became more responsibility oriented.

Training proposal

The proposal is now let IAC and LEI organise a training course on Fresh Vegetables Supply Management in Thailand, e.g. at the campus of Kasetsart University in Bangkok. The training should deal with the subjects mentioned under knowledge demand and knowledge supply. The training period will last 4 – 6 weeks. Time schedule to be appointed by actors involved.

Participants could be invited from the various levels in the supply chain, like professional vegetable growers/companies, suppliers and buyers of supermarket chains, government officers (regional and national) dealing with certification issues, trainers from development projects (e.g. FAO/IPM-Vegetables), and university lecturers. A positive side

effect of the variance in participants will be network-building among the actors in the supply chain.

The main language during the training course will be English. Consequently the participants should have a good command (speaking and writing) of English.

Appendix 10 Proposal 'Activity Based Costing System'

Project plan

World Fresh is strongly interested in having a system to approximate the costs of production and post-harvest handling up to the distribution centre. The projected result is an Activity Based Costing model as already exists for the links from distribution centre to supermarket. The objective of the project is working together/negotiating with growers and suppliers on basis of mutually accepted information, in order to build long term relationships. Working on basis of the ABC model may result in more regular prices. On the other hand suppliers with a speculative attitude may stop the existing relationship with World Fresh

Activity plan:

- making a detailed break-down of all activities from land preparation to crop harvest;
- making a detailed break-down of all activities from crop harvest to distribution centre;
- collecting labour use data for the distinct production and post-harvest activities;
- collecting depreciation and maintenance data for the fixed assets involved;
- collecting material input, yield and post-harvest loss data for the major vegetables;
- collecting price data for the distinct kinds of labour, materials and investments;
- designing a data model for the Activity Based Costing model;
- developing a database to store the parameters resulting from data collection;
- developing an interactive tool to build cropping systems from basic activities;
- developing a calculation tool to show production costs for cropping systems.

Management plan

Data have to be collected in various regions, in various seasons and in various crops. Consequently completing the database and related tools is quite time consuming. Besides physical yield levels and input prices will change from year to year. Consequently the system will be made operational for the major vegetables only and for 1999/2000 yields and prices.

Time schedule: June 1999 – December 2000

Project leader: Novartis/Kasetsart University (?), with backstopping from LEI

Appendix 11 Proposal for Geographic Information System (GIS) on Vegetable Production in Thailand

Project plan

The geographic distribution of vegetable production in Thailand is not readily accessible. For planning purposes of government, trade and industry a comprehensive geographic picture of vegetable production will be very useful. Examples of such purposes could be planning of training activities, selection of traders and growers, planning of surveys, etc. Up to now strategic considerations (like comparative advantages and seasonal complementarity) of production centres seem to play a minor role in the planning processes concerned.

The objective of the proposed GIS-system is to support the strategic decision-making of government, trade and industry on the future development of the vegetable sector. For government agencies such decision-making may concern investments in infrastructure and human resources, or the geographic or regulatory facilitation of such investments. For individual private companies a GIS-system can support the selection and combination of main suppliers from regions with high yields, low disease and pest pressure and year-round supply. The final objective is vegetable production in regions which meet the ecological, economic and logistic conditions optimally.

The Department of Agricultural Extension collects detailed statistical data on areas and production of 50 vegetable crops all over the country. The data concerned are available in Bangkok for all 792 districts in Thailand. The Planning Division of DOAE already started a GIS-project using ARC/INFO. Geographic information like altitudes, irrigation, soil types, rainfall patterns, etc. and a digitised districts' map of Thailand are also already available. Up to now the GIS computer equipment and expertise was provided by a private company.

The existing GIS-project was mainly used to support individual farmers in crop selection. Starting from location specific information the appropriate vegetable crops were identified. The projected output of the proposed GIS-project is an operational system which produces strategic indicators for national and regional policymakers regarding existing production centres for various vegetable crops, distinction of agro-ecological zones for vegetables, regional differences in production levels and production seasons, potentially appropriate regions for vegetable production, and indigenous knowledge centres. This implies, that the project focuses at the information needs of both government policymakers and stakeholders from trade and industry.

The expected effect of the proposed project is well-informed decision-making regarding the further development of the vegetable sector in Thailand. This may finally lead to concerted actions of government, trade and industry in the direction of a more regular supply, a faster dissemination of new technologies in specific regions, a well-considered

planning of training activities in e.g. integrated pest management or certified vegetable production.

Activity Plan

First phase:

- drafting a proposal for the Thai/Dutch project team;
- making an inventory of the geographic information available;
- making an inventory of the policy questions to be answered;
- drafting a design for the Geographic Information System;
- approval of design and budget by the decision-makers involved.

Second phase:

- purchase of GIS computer equipment to be installed at DOAE;
- specification of the structure (data model) of the GIS-system;
- importing the statistical and geographic information into the system;
- specification of the output (maps) to be produced by the system;
- drafting a description/users manual for the GIS-system;
- approval of the GIS-system by the decision-makers involved.

Management Plan

Provisional partners in the proposed project are:

- Department of Agricultural Extension;
- Department of Agriculture;
- Office of Agricultural Economics;
- Agricultural Economics Research Institute (LEI).

The Department of Agricultural Extension will have the lead in the project. The Horticulture Crops Promotion Division and the Planning Division of this Department will play major roles, because they will probably have to keep the GIS-system operational in the future.

The Director General of the Department of Agricultural Extension decides upon the formal acceptance and implementation of the project proposed. This competence results from his responsibility for a good stewardship of the statistical data involved.

The implementation of the project will take about four months, i.e. one month for the first phase and three months for the second phase. Further details to be agreed upon during the first phase of the project.

Two visits from Dutch experts to the Department of Agricultural Extension are proposed. One during the first phase, for the data-analysis and design of the GIS-system. The other during the second phase, for technological support during the realisation of the system.

The communication during the project will be in English. Consequently the team members should have a good command (speaking and writing) of English.

Appendix 12 Proposal to integrate a marketing component into the curriculum of the TOT-program of IPM in vegetables

So far a proposal has not yet been formulated. However the following pages contain the content of a number of sheets that have been presented to representatives of the FAO-IPM program and the Department for non-formal education to start up the discussion and explore potential ways of co-operation:

IPM-VEGETABLES AND MARKETING

AGRI-SUPPLY CHAIN PROJECT

participants:

WORLD FRESH
LEI
KASETSART

INTRODUCTION

- CHALLENGES
 - producers
 - supermarket
 - MEETING POINTS
 - consumer confidence
 - regular supply + prices
 - CURRICULUM SUPPLEMENTS
 - certification + labelling
 - production planning + pricing
-

CHALLENGES FOR SUPPLY CHAIN

- PRODUCER
 - price incentive for IPM-production
 - SUPERMARKET
 - regular supply of qualified products
-
-

MEETING POINTS FOR PARTNERS

- CONSUMER CONFIDENCE
 - toxic free vegetables
 - guaranteed and identifiable
 - REGULAR SUPPLY + PRICES
 - consumer satisfaction
 - producer satisfaction
-

FFS-CURRICULUM SUPPLEMENTS

- CERTIFICATION + LABELING
 - technical records
 - on-farm inspection
 - residue analysis
 - product identification
 - PLANNING + PRICING
 - growers' associations
 - quality specifications
 - product development
 - input costs records
-

SUMMARY AND DISCUSSION

- AGRI-SUPPLY CHAIN
- 'TOXIC FREE' MARKET
- CERTIFICATION SYSTEM
- PRODUCTION PLANNING

=====

- SUPPORT FOR CERTIFICATION ?
 - COMMUNITY DEVELOPMENT ?
 - CURRICULUM SUPPLEMENTS ?
 - PRACTICAL CONSIDERATIONS ?
-