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Riau Vegetables for Singapore Consumers:

A Collaborative Knowledge-Transfer
Project Across the Straits of Malacca


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Abstract

The paper analyses a recent collaborative knowledge transfer project between the Republic of Singapore and the Republic of Indonesia across the Straits of Malacca. The initiative was aimed at supplying the city state at the southern tip of the Malay Peninsula with green vegetables from Riau, Indonesia, and to provide technical assistance to Riau farmers on protected cultivation and post-harvest technologies. We reconstruct the bilateral evolution of the vegetable project in the context of the long-standing relationships between both countries vis-à-vis Singapore's reliance on food imports; identify the strategic partner organizations on both sides and their motivations to engage in this cross-country collaboration; present the project deliverables and outcomes; specify the type of knowledge transferred, technical assistance rendered and lessons learnt, and outline some of the challenges ahead for knowledge-intensive collaboration projects involving Singapore as emerging k-economy leader in the region and its resource-rich neighbor Indonesia. The paper is based on an unpublished technical cost-benefit analysis report entitled 'Strategic Marketing of Vegetables from Riau' commissioned by Singapore's Agri-Food & Veterinary Authority (AVA) in 2004 which was conducted by students from the Singapore Management University (SMU)¹ under the auspices of the authors. New value added is added by re-interpreting the project scope, contexts and outcomes from a cross-country knowledge-transfer perspective.

¹ Loh, Priscilla Cynthia; Xu Shujuan, Noelle; Yang Weiting, Joyce and Neo Aik Kee.

1. Brief Historical Reflections about Singapore – Riau Networks

The Straits of Malacca with the Riau islands at its south-eastern entrance constitute one of the world's most important sea passages, connecting the Indian Ocean with the China Sea and the Pacific (Andaya 1993; Somers Heidhues 2000; Evers and Gerke 2006). Some of these islands became centres of trade, religion and political power, like Lingga, Bintan and Singapore, but strangely enough the larger part of the island world of Riau from Bengkalis in the West to Natuna in the East remained until very recently relatively unaffected by the stream of world trade passing by (Trocki 1979, 1990; Song 1023; Wong 1960). Commercial activities were concentrated on limited areas, like the harbour town of Tanjung Pinang on Pulau Bintan or the city and harbour of Singapore on Singapore island. The islands for a long time remained mere batu lonjatan, stepping stones for intercontinental trade.

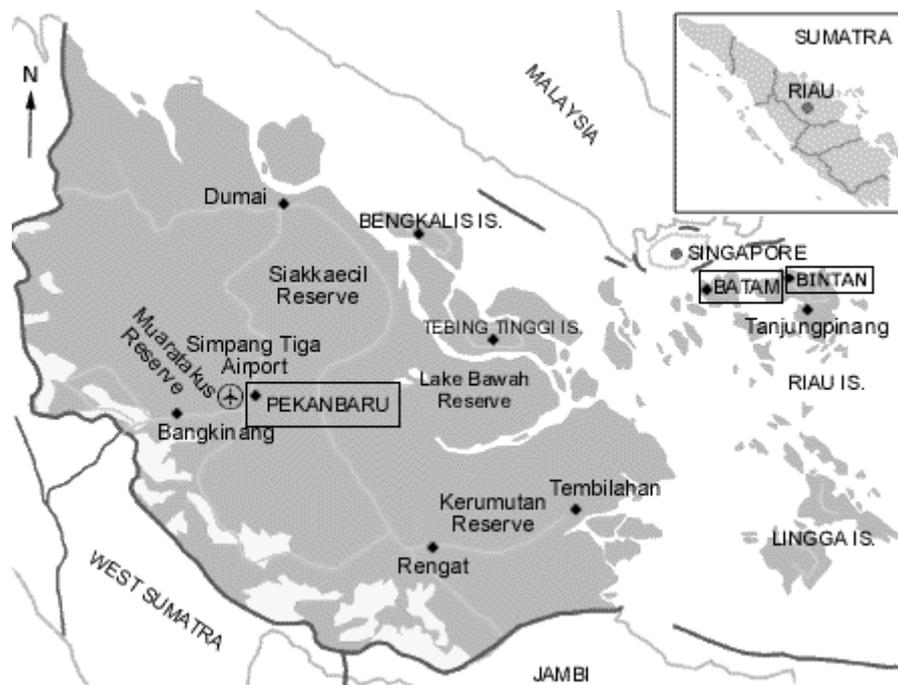


Figure 1: Map of Riau

Owing to its geographical position and historical contingencies, ties between Singapore and the Riau-Lingga Archipelago have been close (Trocki 1979). Colonial history from 1819 has changed the situation dramatically, when Sir Stamford Raffles acquired the island for the British East India Company. From then onward Riau disappeared from the Singaporean radar screen and the bulk of the migrant population looked East towards China, West towards India and North to the other Straits Settlement and to colonial Malaya. This “compass of perceptions” remained in place from 1815 to about 1980 but an undercurrent of commercial networks and migration was still maintained and connected Riau with Singapore. From a Riau perspective, however, Singapore always remained one of the “islands below the wind”, part of Nusantara, the Malay World. As late as the 1970s the Orang Laut, seafaring nomads, still landed on Singapore’s minor islands to trade fish and other sea products (The Encyclopedia of World History 2001). A duty free barter trade centre near the official wharfs of the Singapore Port Authority welcomed sailing vessels from Sumatra that discharged timber and loaded industrial goods. At that time Singapore’s prime minister Mr. Lee Kuan Yew was still occasionally referred to as “Raja Singapura” by Riau Malays (source: field notes by Hans Dieter Evers), who put him in line with the Sultans of Johore, Trengganu or Kelantan, while most Singaporeans turned their back on Riau. Students of the National University of Singapore could actually see the Riau islands from their Kent Ridge Campus, but showed little interest to explore them.

Until the “konfrontasi” stopped trade between Indonesia and Singapore and Malaysia from 1964 to 1966, North Sumatra and Riau supplied about 90% of all imported vegetables in Singapore and Malaysia. In 1967 trade resumed but only about 10% of all imported vegetables in Malaysia and Singapore came from Sumatra (Clauss 1982: 77). As the market was dominated by a group of eight exporters, the difference between farm-gate prices in Sumatra and consumer prices amounted to about 800% (Clauss 1982: 78, Ginting and Daroesman 1982). In 1980 a cooperative obtained an export licence and exported vegetables directly to the NTUC cooperative in Singapore, but volumes remained relatively small in comparison to imports from Malaysia’s Cameron highlands, Taiwan and other suppliers.

The situation changed again dramatically in 1990 with the development of SIJORI, the Singapore-Johore-Riau growth triangle, the heavy investments of Singapore companies in the Batam free trade zone (Kwan, Lim and Yeoh 2004), the opening of many hotels and resorts on Pulau Bintang and the frequent ferry services between the Riau islands and Singapore’s world trade centre and the Tanah Merah ferry terminal. Island Riau, Sumatran Riau and North Sumatra became important suppliers of vegetables and other agricultural products again for the ever increasing Singaporean population, which rose from less than two millions at independence in 1965 to 4.5 million in 2006. The rapid growth of the Singaporean middle class with increasing purchasing power added to the demand for imported food products (Chua 2005).

2. Vegetable Farming in Singapore and Demand for Leafy Vegetable Imports

Vegetable farming has a long history in Singapore (Song 1923; Poh Seng You & Chong-Yah Lim 1971). The climate is hot, humid, and rainy, with two distinct monsoon seasons – Northeastern monsoon from December to March, Southwestern monsoon from June to September, and inter- monsoon (frequent afternoon and early evening thunderstorms). Singapore’s distribution and sales channels are simple and direct, mainly geared towards local consumption. Local farmers are receptive to costly state-of-the-art technologies, such as expensive active chillers and storage refrigerators, to maintain the quality of their vegetables, and yet sustain price competitiveness. Farms are well maintained and organized. The so-called Good Agriculture Practice (GAP) farms are accredited by the Agri-Food and Veterinary Authority of Singapore (AVA) to produce safer and more hygienic vegetables which are in great demand in the local market.

Technology has a big impact on Singapore’s farming culture. One example is Oh Chin Huat, a hydroponics farm, where the vegetables are grown in soil-less conditions, utilizing the so-called Dynamic Root Floating (DFT) hydroponics technique in modular greenhouses. The opportunities for hydroponics seem endless but the high costs of production incurred in hydroponics farm make the vegetables very expensive as opposed to traditional methods.

As Singapore is small, lack of land is the main factor hindering local farmers from increasing vegetable production (Beatley et al. 2004). Cost of production is a genuine concern for local farmers seeking to remain price competitive. Singapore’s demand for leafy vegetables is equal to approximately one-third of its total vegetable consumption, hence the need for Singapore to look for a consistent supply of vegetables. The small country imports 90% of its food requirements and is constantly exploring new sources of food for local consumers.

3. The Local Supply Network of Singapore’s Leafy Vegetable Industry

Singapore’s leafy vegetable industry currently consists of local farms, wholesale markets, institutional buyers, wet markets, hotels, restaurants and cruise ships as well as foreign farms. A total of 72 local vegetable farms are operating in Agrotechnology Parks, occupying 133 hectares of land. More

than 80% of the local produce is derived from soil cultivation under protective netting, ensuring a constant production of high quality leafy vegetables, accounting for about \$15 million of produce mainly for the domestic market (Loh et al. 2004: 11). One of the established local farms involved in the soil cultivation of leafy vegetables under protected netting is Wong Kok Fah Farm. In operation for about 10 years, Wong Kok Fah Farm boasts a 2-hectare farmland and supplies 900 kilograms of Bayam, Caixin, Kailan, KangKong and XiaoBaiCai daily, packed and sold under the "Pasar" brand by NTUC FairPrice (Ramkishan 2003).

Wholesalers connect producers and consumers. The efficiency of their businesses depicts how much the vegetables eventually cost. High marketing and holding costs lead to lower prices for producers and higher prices charged to the consumer, and vice versa. Other potential issues include hygiene, environmental conservation and transport delays. In view of these constraints, large institutional buyers such as NTUC FairPrice source their supply directly from the farms straight into the supermarkets. This removes the intermediate costs and hence, FairPrice is able to manage the price and supply of vegetables.

However, wholesalers still provide the vital connection in selling to urban consumers. The system enables smaller scale purchasers like hotels, retail markets and restaurants to receive vegetables in a much easier mode, as well as a more financially inclined decision in terms of credit terms and cold chain for the vegetables as compared to dealing with the farm directly.

With the emergence of both national and international supermarket chains, which tend to be more aggressive in their marketing strategies, the number of stores has risen from 60 in 1987 to about 150 in 2003 and 182 in 2007 (source: company websites). Economic growth and generally higher incomes have enabled many working individuals to shop in establishments with greater selection and comfort. The number of working women has also continued to increase, preferring to shop in supermarkets for convenience, atmosphere and value for their money. These institutional buyers provide an advantage over retail markets, such as longer operating hours, cool, dry and hygienic environment, a larger variety of foods and products, as well as strategic location in their vicinity. Key players in this segment include French hypermarket Carrefour which is present in 31 countries and maintains two outlets in Singapore; Giant, a Malaysian based chain of supermarkets, locally owned by the Dairy Farm Group here in Singapore; Cold Storage, one of Singapore's most established supermarkets, and a leading standard in fresh food handling here in Singapore through its distribution centre; NTUC FairPrice, the National Trades Union Congress's first supermarket co-operative set up in the 1970s has the most outlets; Shop N Save, a discount supermarket; and Sheng Shiong, the 'heartland' supermarket, and a new player in the segment.

Wet markets represent an authentic component of Singapore's heartlands, where the majority of the residents purchase their fresh foods on a daily basis. However, with the emergence of the institutional buyers, these markets are seeing a lower share of the consumption pie, especially since the supermarkets provide a one-stop centre with a cool and hygienic environment that appeal to the ever-increasing working- class population. Nevertheless, the markets still appeal to a certain segment of the population and age groups as wetmarket customers maintain long-standing relationships with vendors, value the freshness and relatively low prices compared to supermarkets, can negotiate a little and live in close proximity.

Food service buyers such as hotels, restaurants and cruise liners require vegetables in the course of their operations, usually placing their orders with wholesalers, who provide the necessary arrangements for delivery to their place of business. Different from institutional buyers, these food service buyers do not need to order vegetables in bulk and risk financial resources in view of vegetables being highly perishable. Hence, with this operation model, it would prove more advantageous to source its vegetables from the wholesalers with credit benefits and cold storage spaces. This enhances the wholesalers' position in the leafy vegetables market.

As local production is not able to satisfy local demand on its own, Singapore is dependant on imports from foreign farms in Malaysia, Thailand and China which export vegetables to Singapore on a daily basis. Malaysia is the main exporter of leafy vegetables to Singapore with a volume of around 85,345 tons per year, constituting 70% of the total imports here annually (Loh et al. 2004: 22).

Institutional buyers tend to import directly from foreign farms. One example is NTUC FairPrice which imports vegetables from Pekanbaru, Riau Province, Indonesia, under the packaging brand "ValueFresh" as analysed further below.

4. Singapore's Main Import Countries for Vegetables

Singapore imports vegetables from 3 major countries in the Southeast Asian region: Malaysia, China and Indonesia (Herklots 1972; McConnell & Dillon 1997). About 16% of the total population in Malaysia is employed in the agriculture, forestry & fisheries sector. 17.61% of the total land is allocated to the cultivation of permanent crops. Malaysia provides the cheapest vegetables to Singapore and hence, dominates the imports of greens in comparison to other countries, e.g. Indonesia. Due to the close proximity between Malaysia and Singapore, demand by wholesalers and institutes in Singapore can be met quickly in a timely and safe manner via railway or road system. There is a certain preference with regard to vegetables from Cameron Highlands with its colder climate. As a consequence, Malaysia is a large volume provider to Singapore with an annual volume of 122,050 tons of leafy vegetables which constitutes 70% of the total supply in Singapore.

However, Malaysia's supply cannot be solely relied on because of several weaknesses. The occurrence of natural hazards such as flooding, landslides and forest fires, seasonal heavy rains in the East and the West coast region often cause floods and physical damage to crops and impede transportation of produce to Singapore. Furthermore, the wet conditions during the wet seasons make pest control difficult and ineffective (Chong et al. 1991). As a result, vegetable quantities produced during the rainy season are limited and the short supply leads to high market prices. As China and Indonesia are becoming more competitive, Malaysian exporters are under pressure. Relationship issues can also sporadically complicate things as demonstrated by Kuo (1990) some time ago in his case study on the Mandarin trade.

China with its abundant land resources, cheap labor pool of 1.3 billion people and hard-working farmers represent another foreign import partner of Singapore (Mello 2003). The seasonal climate makes it suitable to grow both warm and cool temperature vegetables. Chinese farmers are increasingly receptive to top quality factors of production to improve their produce. This would enhance the possibility of using technology to increase their crop yield and eventually their exports to Singapore (Shah & Strong 2000). Potential weaknesses include China's huge population size which may restrict the amount they can export. Farming techniques are old and hence the soil is depleted due to little crop rotation. Poor sanitation techniques and infrastructure limitations can have negative effects on Chinese crops. Modes of delivery from China to Singapore are limited to air or sea links with respective implications in terms of time, price and freshness.

5. The Riau Vegetable Project

The idea to import vegetables from Indonesia is an outcome of a 2001 Singapore-Indonesia Governmental Initiative when both governments decided to establish a vegetable project in Pekanbaru, Riau Province, Indonesia, aimed at exporting household vegetables such as Xiao Bai Cai, Bai Cai, Chinese Cabbage and Cai Xin to Singapore (Business Times 1/7/2004, 1/9/2004; Straits Times 2/6/2004). Pekanbaru was chosen as project site due to its central location within Riau's traditional harvesting grounds of leafy greens.

Land is abundant in Riau and very suitable for agricultural purposes (7.2% of the total land in Indonesia has been allocated for permanent crops). The climate is hot and humid, similar to Singapore, which accelerates the cultivation process. Labor is abundant, too, and can be employed easily with wages averaging S\$165 per month for an employee in the agriculture sector.

On 22 Oct 2001, the Governor of Riau Province, Saleh Djasit, and Chief Executive Officer of the Agri-Food and Veterinary Authority of Singapore (AVA), Dr Ngiam Tong Tau, signed a Memorandum of Understanding (MoU) for the vegetable project. A core element was the transfer of agriculture technology and cultivation techniques from Singapore authorities to the Indonesian counterparts aimed at creating a quality export standard from their own grounds. The Riau Province Agricultural Services, Dinas Pertanian Tanaman Pangan (DPTP) and Singapore's AVA were tasked to provide technical assistance to farmers in Riau with an emphasis on good agronomic practices, protected cultivation and post-harvest technologies so as to produce export quality leafy vegetables. The MoU also entailed the establishment of two demonstration farm areas totaling 1 hectare to enable the local farming community to emulate and expand their production of high quality leafy vegetables.

AVA's extension officers advised local farmers on seed selection, nutrient usage, and later pest control techniques (Wills et al. 1998; Carlile 1995; Hajek 2004). To process the harvested vegetables, a special facility in the form of an Agri-Processing Centre was built with a full 20-ton cold-storage facility for vegetables. A custom-built boat was also built and fitted with chiller facilities so as to ship vegetables in continuous cold chain from Indonesia to Singapore within 24 hours, ferrying 10 tons per trip (see pictures below). The Agri-Processing Centre in Pekan Baru boasts facilities such as the cold room for vegetable packing and reefer trucks with refrigeration, which contribute to the post-harvest treatment for leafy vegetables. Through the transfer of relevant farming know how, AVA hoped to improve the livelihood of the farmers in Riau whilst ensuring Singapore with a steady flow of vegetables. Another key aspect of the collaborative venture was the development of an efficient logistics network to further enhance the effectiveness of the Pekan Baru project.

BG George Yeo, Singapore's then Minister for Trade & Industry, said: "By itself, the Riau Vegetable project is not a big project but it opens up new areas of cooperation between Singapore and Riau mainland. To further such cooperation, Singapore opened a consular office and a trade office in Pekan Baru last year. Under the vegetable project, the Riau Province Agricultural Services ... works closely with Singapore's Agri-Food & Veterinary Authority (AVA) to provide technical assistance to Riau farmers on protected cultivation and post-harvest technologies. Through the transfer of AVA's expertise and technology, Riau farmers will be able to increase agricultural productivity using new farming techniques. Eventually, they will be able to supply high-quality vegetables for export to other countries besides Singapore. Singapore will also gain from having an additional source of food supply. This is in line with AVA's aim to provide more choice for consumers and to diversify food imports (http://www.edb.gov.sg/edb/sg/en_uk/index/news_room/news/2002/agri_business_co_operation.html). The ambitious target was to build up the quantity of commercially viable and high-quality leafy vegetables from Riau to about 160 tons a day in a gradual manner.

The project progressed rapidly. Within 7 months, production had been increased to 25 tons weekly and packing capacity was increased to 3.2 tons per 8-hour shift. By the third quarter of 2004, the new Agri-Processing Centre was completed where the vegetables were processed and packed into consumer packs in controlled environment packing rooms. The Centre uses the cold-chain transportation system to ensure that the vegetables arrive fresh in Singapore's supermarkets and retail markets. One of the main buyers in Singapore is FairPrice, a local supermarket chain owned by Singapore's National Trades Union Congress (NTUC), which has indicated its willingness to purchase 150 tons of vegetables per week from Pekan Baru. NTUC thus continues its earlier trade connection to Sumatran suppliers, that goes back to the 1970s.

With stringent measures developed by AVA, abundant land and labor force as well as the organized logistics infrastructure to transport the vegetables from Indonesia to Singapore, Indonesia seems to be a very promising and desirable vegetable trade partner. But just like Singapore's other trading partners, Indonesia is also facing various challenges such as the occurrence of natural hazards like severe droughts, occasional flooding, earthquakes, forest fires, haze etc. as well as political and infrastructural issues. Local transportation from the participating farms to the Agri-Processing Centre Pekan Baru poses a potential problem as delays in transport can damage the perishable vegetables. As much as Singaporean consumers know of Pekan Baru vegetables, they sometimes perceive the greens from Indonesia as inferior due to the suspected poor handling of vegetables from pre-harvest to marketplace.

6. Mission Findings by the SMU Strategic Vegetable Marketing Study Team

In 2004, a team of SMU students under the leadership of Dr Patrick Loh embarked on a study of Singapore's local vegetable market with respect to supplies from Pekan Baru, focusing on the advancement of the Agri-Processing Centre in Pekan Baru, an analysis of the industry and market observations as well as internal, financial and operational processes (Loh et al. 2004). A key question they intended to answer was to what extent the Pekan Baru project is able to cater to Singapore's large consumption of greens. The SMU team developed an economic model with respect to pricing and demand of Riau vegetables. They analysed the industry and market of fresh leafy vegetables, identified potential problems and developed a decision making tool for both Singaporean and Indonesian partners to further develop the collaboration venture.

Farmers in Kampung Pinang and Sei Simpang Dua were asked to assess the development of the Pekan Baru Initiative. Many were optimistic about the future as there are endless possibilities in improving the quality of their crops and exporting in larger quantities. However, some farmers were concerned that the prices that they charge are barely enough to break even. The average payment period of 15 days was raised as another issue as this has repercussions for production schedules, e.g. due to difficulties to finance the purchase of seeds and fertilizers in a timely manner. Pest control was highlighted as a challenge but due to the lack of funds, farmers felt that there is little they can do to manage pest control more effectively.

Other problems included quantity and quality control as well as logistical support in view of increasing outputs. Vegetable packaging at the Agri-Processing Centre itself was also brought up as the quality varies depending on the workers' job expertise and skills. Good vegetables were occasionally being disposed of locally whilst yellowed produce was packed and shipped to Singapore.

The team also interviewed supply chain stakeholders in Singapore, including AVA, farmers, importers as well as wholesalers and institutional players such as NTUC FairPrice, Cold Storage, Carrefour and Giant among others.

Rising land costs in Singapore make it increasingly difficult for local farmers to sustain their farming practices. Many have since moved into neighboring countries for cheaper arable land.

Having trade relations with many countries globally means that there is no issue of having a shortage of vegetables. To the contrary, wholesalers expressed concern that there might be a potential glut in the market.

Changing consumer trends represent another problem as highlighted by Singapore's Fruits and Vegetables Association (SFVA), which is made up of both fruits and vegetables importers and/or wholesalers. SFVA keeps tabs on industry trends, monitors the business environment, identifies potential challenges and communicates with AVA on various policies. Their concern in the supply chain is the social trend of young working people who are tending more towards supermarkets for the purchase of vegetables as the latter are more attractive in terms of operating hours and comfortable shopping environments.

When asked about the Pekan Baru project, Singapore's wholesalers and domestic farmers naturally were a little bit apprehensive about the government-to-government collaboration. Malaysia seemed the obvious choice when it comes to importing fresh greens because they are cheap and suppliers are easily within reach. Yet China provides more variety due to its climate, making Indonesia a least favoured source for vegetables in terms of quality, quantity and variety.

Institutional retailers generally had positive sentiments towards the vegetable project, but they also raised concerns over the packing and quality controls at the Agri-Processing Centre in Pekan Baru.

The detailed analysis of nine specimen vegetables, mainly Bayam, Caixin, Kailan, Xiao Bai Cai, Bai Cai, Chinese Cabbage, Leaf Mustard, Kang Kong and Lettuce by the SMU team suggests that the increased import of Xiao Bai Cai may hit a supply glut in Singapore, in turn lowering prices and profits for wholesalers and even exporters in Indonesia. To tackle this potential issue, the team recommended to look for alternative markets such as re-exporting to Hong Kong or Taiwan to ensure that the prices of vegetables in the Singapore market remain attractive for producers. With increased marketing and advertising and thus increased demand, their analysis suggests that the target markets would be able to absorb the excessive supply without causing a decrease in the price of vegetables.

Going forward, the team recommended to explore other viable investment locations for vegetable production in Indonesia given the rising farm costs and the lack of arable land in Singapore. With the young people tending towards supermarkets for groceries and daily food items, selling directly to institutional retailers may prove to be a winning advantage for Pekan Baru. As indicated above, Indonesia and China seem to be competitors for the position of the secondary exporter of fresh leafy greens to Singapore's local market after Malaysia. A systematic analysis of vegetable import data covering the period between Jan 2004 to Jun 2004 suggests that there is indeed a potential market of nearly 151 tons in Singapore and that the project is commercially viable.

To reach full production capacity, the team concluded that the Agri-Processing Centre and farmers in Pekan Baru should work more closely together to eradicate issues pertaining to maintaining quality produce, achieving quality control for packaging as well as resolve credit scheduling problems to increase production levels effectively. Certification under Singapore's quality vegetable production system, the GAP vegetable farm scheme, for farms in Pekan Baru was brought up as one way to provide added appeal to consumers. The Agri-Processing Centre which already has proper management systems (i.e. Good Manufacturing Practice (GMP) and Standard Sanitized Operating Procedures (SSOP) in place could be certified to ensure quality and food safety in vegetables processing and export.

7. Assessment of Knowledge Transfer Outcomes

As the project introduced various vegetables in Pekan Baru (which are common in Singapore but not in Riau), both Indonesian government officials and farmers had to be trained with regard to proper cultivation techniques, integrated pest management and disease control. AVA provided farmers with seeds and exposed them to an innovative cultivation technique, a system called "protected cultivation in nets" common in Singapore (Swarbrick & Mercado 1987). The function of nets is to break the rain and to avoid splashing effects which could expose the vegetables to bacteria, fungi from soil and diseases. The use of nets also makes it impossible for large insects such as the diamond shaped moth (a common pest) to fly in and to destroy the vegetables (e.g. by laying eggs), thereby reducing the dependency on fungicides and pesticides.



Protected Cultivation

**Good Farming
Practice Adopted**



Figures 2 and 3: Protected Cultivation and Good Farming Practice in Pekan Baru

Both government officials and farmers were invited to visit Singapore where they were exposed to local farming techniques, modern supermarkets etc. aimed at understanding the Singapore market and their prospective customers (Helmstaedter 2003; Von Krogh 2003). A significant element of the knowledge transfer between both countries was the establishment of the Agri-Processing centre in Pekan Baru. Its packing house plays a crucial role in preserving the cold chain and thereby the quality and freshness of the vegetables. The low temperature slows down the metabolism rate of the vegetables which remain fresh and attractive. Pekan Baru farmers were trained in relevant SOPs, to sort the vegetables, to pack them according to foreign specifications and to ship them properly.

Interviews with AVA's experts about the critical success factors of this bilateral knowledge transfer project suggest that "quality awareness of participating farmers in Riau and speedy logistics" were crucial for the successful project execution (which had a project budget of S\$ 3.2 million). A small boatyard in Bintan was tasked to build a 27 ton boat with simple cooler facilities (according to design ideas of AVA's Advisor Dr Patrick Loh) which greatly enhanced the sustainability of the project (see Figure and pictures below).

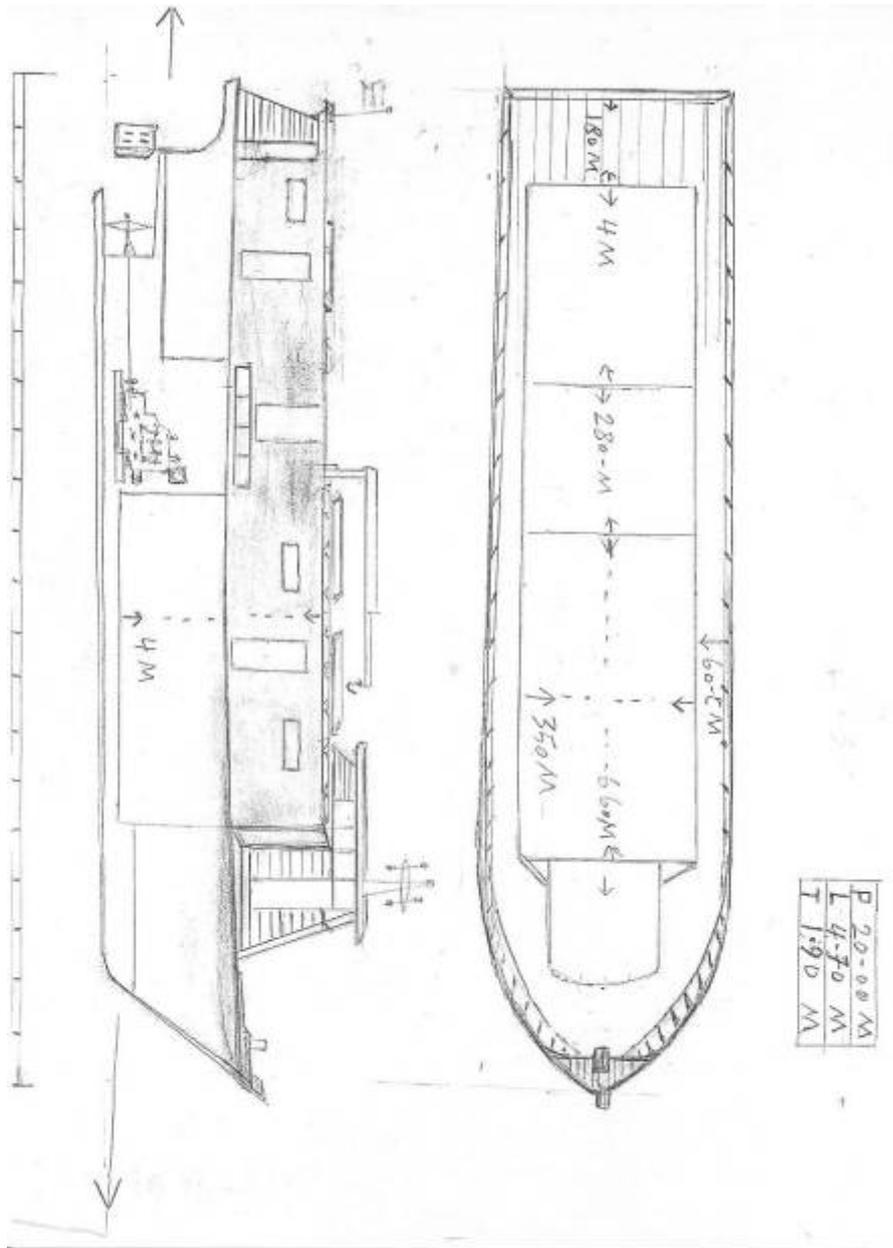


Figure 4: Boat Design by Dr Patrick Loh

Construction of Wooden Boat to Ship Fresh Produce from Riau to Singapore



Figures 5 and 6: Construction of Boat in Bintan Boatyard

Indonesia's government provided land (total cultivation size = 10 ha) and low interest loans to farmers in Pekanbaru to enable them to participate in the project.

AVA data suggest that the project has resulted in significant income increases for Riau farmers and is a good example for effective public-private-partnerships (Dixon et al. 2001). Emphasis was put on supporting small farmers rather than Riau's large commercial growers. The response in Singapore has been "positive" according to AVA which propagated the project amongst all big institutional buyers. In the end, FairPrice took on the challenge as it was the most interested party. Branded as "Value Fresh", the green vegetables from Pekanbaru are available at Fair Price outlets throughout Singapore. Currently

about 70 tons of vegetables are imported from Pekan Baru monthly. A second boat is in operation as supply is steadily increasing.

While both governments played a proactive role during the initial stage of the project, they subsequently reduced their visible involvement. The Riau Government authorized a local company ("Stargrower") to operate the project on a commercial basis. As far as Singapore is concerned, support is now provided as and when needed through AVA's commercial consulting arm Agri-Food Technology Pte. Ltd. (ATP). Another positive development is the fact that the project has been replicated in Bintan, Wacopek area.

8. Conclusion

Any knowledge transfer act entails effective sharing of ideas, knowledge, or experiences between 'those who are knowledgeable' and those who can use that knowledge (knowledge recipients) by means of mentoring, training, documentation and so forth (Helmstaedter 2003; Chay et al. 2007). Knowledge collaborators work together to achieve outcomes for 'shared stakeholders'. Both senders and recipients gain from this (e.g. in terms of time savings, revenues or other outcomes), achieving certain advantages which they would not have enjoyed if they had worked on their own. The beauty of collaboration lies in the fact that collaborators often create something completely new such as finding innovative ways of tackling supply bottlenecks and/or supplementing each others core competencies (Menkhoff et al. eds. 2005). In this sense we can categorise the Riau vegetable project as a good example of a bilateral knowledge transfer project. Besides mutual interests, pro-active knowledge leadership by both Governments and participating private sector organizations as well as a culture of learning, doing and sharing, the project deliverables can be attributed to the knowledge brokerage of participating AVA experts whose technical / regional know how and social capital were indispensable. As such the project showcases a knowledge-intensive development initiative which managed to avoid the so-called 'knowledge trap' (World Bank 1999; ADB 2005; Evers, Gerke and Menkhoff 2006). The latter can have serious implications for the sustainability of knowledge-intensive collaboration projects involving emerging knowledge-based economies and latecomers in knowledge governance.

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