

PN-AISG-191

Production & Infrastructure Potentials & Constraints for
Fruit, Vegetable & Flower Exports

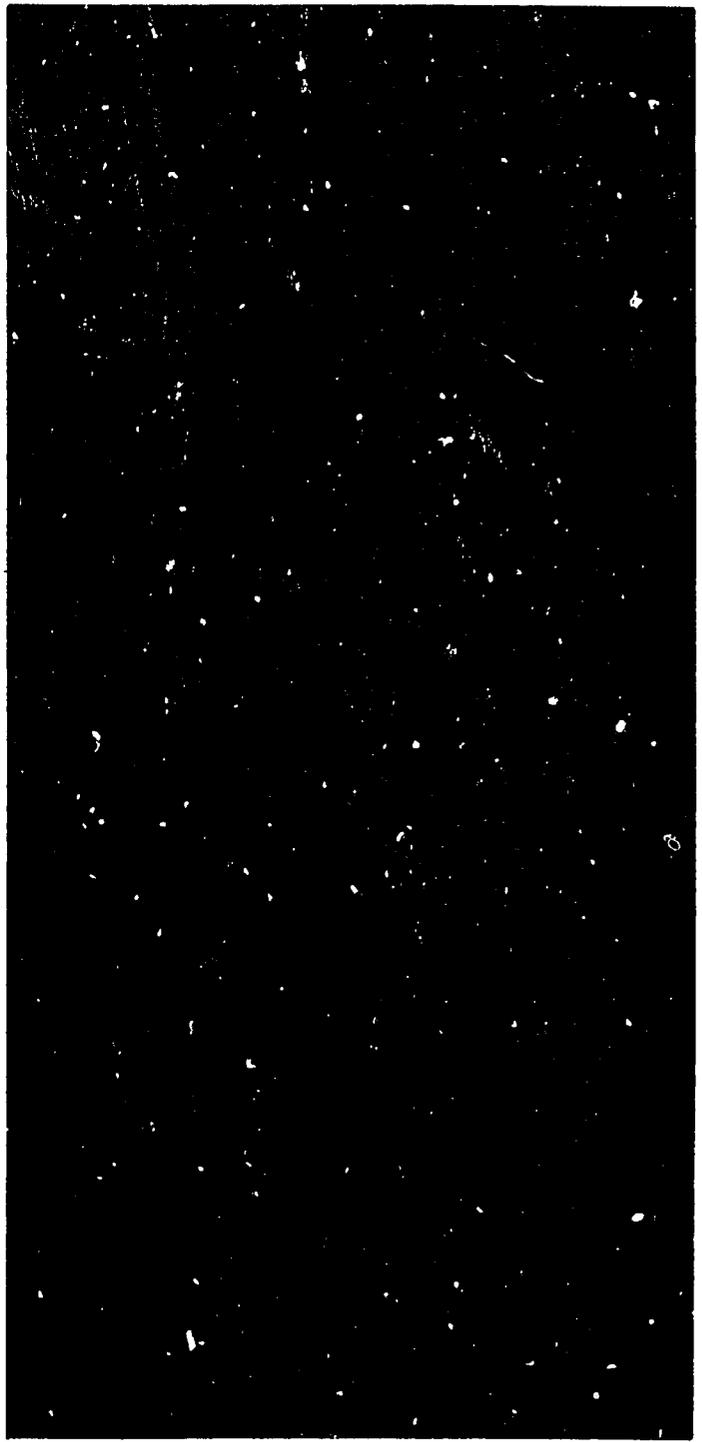
from the Mahaweli Region of Sri Lanka

Samuel R. Daines
J.R. Pawar



Research Group, Inc.
Development Group, Inc.
International Agribusiness and Irrigation

Submitted to
**Employment, Investment and
Enterprise Development Division
Mahaweli Authority of Sri Lanka**
and
Agency for International Development
Colombo, Sri Lanka



PA-ABG-191

15N 68388

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Fruit, Vegetable & Flower Exports
from the Mahaweli Region of Sri Lanka**

Final Survey Report for

Local Production Survey
Infrastructure Constraints Survey
Local Market Survey

Prepared by:
Samuel R. Daines
J.R. Pawar
SRD Research Group Inc.
880 East 1800 North
Logan, Utah 84321

for:
Market Development Unit
Employment, Investment and Enterprise Development Division
Mahaweli Authority of Sri Lanka

and:
Private Sector Office
U.S. Agency for International Development

October 10, 1988

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Executive Summary

The objective of the Sri Lanka Export Information Development project has been to analyze and evaluate export market opportunities for the Mahaweli region. The project involved a series of surveys aimed at assessing production potentials, local export infrastructure constraints, market opportunities and the competitive position of Sri Lanka in those markets *vis a vis* major competing suppliers. Figure 1 summarizes the overall ranking of market opportunities and competitive position which integrates the findings of all of the project final reports. The

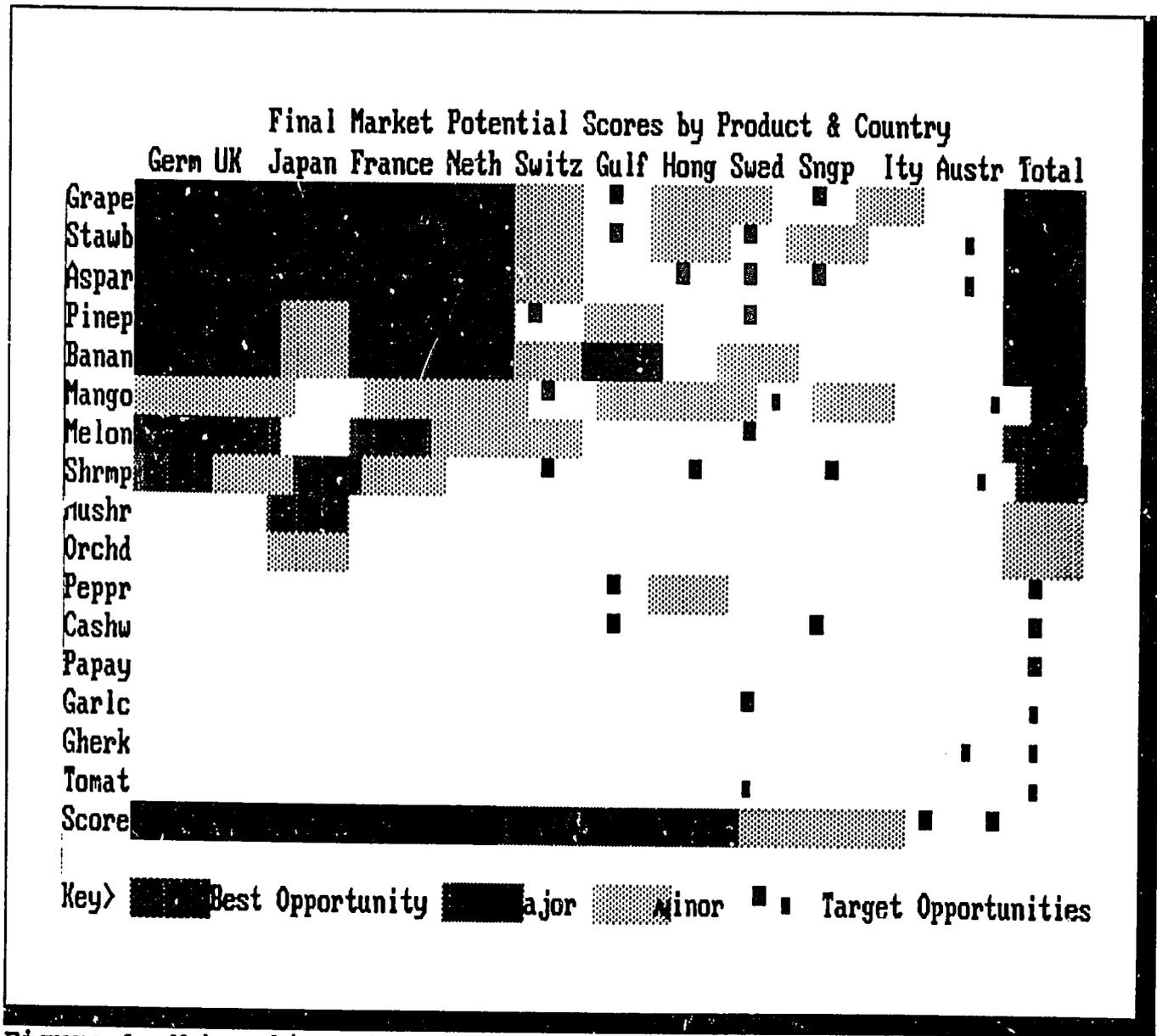


Figure 1: Mahaweli Market Opportunity Rankings

body of this report summarizes the findings of the production, infrastructure constraints, local market, and competitor cost surveys. When production possibilities, competitive position and market size are all integrated in Figure 1, eight "Best" and "Major" product opportunities emerge in the far right "Total" column of Figure 1. In rank order these are, Grapes, Strawberries, Asparagus, Pineapple, Bananas, Mangos, Melons and Shrimp.

A. Production and Post-Harvest Constraints.

Figure 2 summarizes study conclusions on production and post-harvest constraints which include physical constraints like climate, soils and irrigation, and also technological and training constraints such as varieties which have been proven in the markets and in similar climates and soils, and the relative difficulty of training Mahaweli farmers in production and post harvest technology.

Figure 2 displays a Total Constraints row at the bottom of the figure indicating the SRD team's overall assessment of the seriousness of the constraint and the relative difficulty of overcoming the constraint in the physical and socio-organizational environment of the Mahaweli. The last column in indicates the SRD team's overall assessment of production and post-harvest constraints by crop.

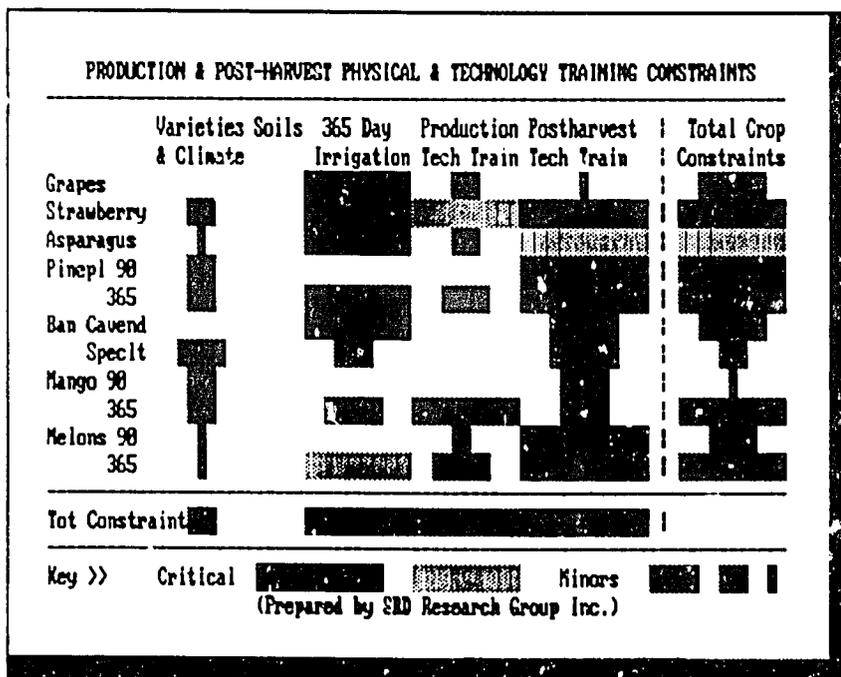


Figure 2: Production and Post-harvest Training Constraints

Soils of acceptable texture (sandy loam), depth (60-100 cm) and drainage (both internal and external) are abundant in the Mahaweli and represent no constraint at all to the development of the selected export products.

1. Post-Harvest Technology

The difficulty in training Mahaweli farmers and local firms in post-harvest handling, cooling and packing is the single most difficult constraint. The degree of difficulty varies widely by crop.

a. **Strawberry Post-Harvest Handling Constraints.** The introduction of difficult post-harvest technology is most critical in the case of Strawberries where shelf life is only 8-12 days maximum and where a few

minutes delay in cooling or slight mishandling of the fruit make a big difference to the viability of the business. This is particularly difficult since the technology must be similar to that used in high field heat circumstances like California desert strawberry production and not like Japanese cooler technology. Post harvest handling is also made more difficult by rain during the harvest which is similar to the Dutch and English post harvest situation. All of this adds up to a very difficult but superable constraint.

b. Asparagus Handling & the Move to Sea Freight. The case of asparagus is somewhat complicated.

With good treatment asparagus will last two weeks, with the very best post-harvest technology 22-24 days may be achieved. Good technology is not extremely difficult to achieve but forces the use of airfreight with its attendant high costs and reduced profitability. If 22-24 day shelf life technology can be achieved, refrigerated seafreight can be used and the profitability of the asparagus business substantially improved.

c. Melon Post-Harvest & the Necessity of Sea Freight Melons are in a somewhat similar but much more critical situation as asparagus with reference to post-harvest technology. Even the melons with the best market prices (yellow honeydew and cantaloupe) will not pay for airfreight and their shelf life with good but not superb post harvest handling will not allow for sea shipment. Thus it is critical to the melon export business that state of the art post-harvest technology be used in melons.

d. Smooth Cayenne Pineapple and the "Green-Maturity" Problem. Post harvest handling is an important but less difficult constraint in the case of pineapples due to the necessity of introducing the Smooth Cayenne variety which tends

to ripen "green" in climatic conditions like the Mahaweli. Pre-cooling procedures in the Mahaweli will actually have to be better than in Hawaii and highland Central American cases to allow the fruit to obtain more external color in the field and still arrive at the market in equally good condition. While this improved technology is critical, it is also rather simple and easy to train. For example, improving precooling and handling of pineapple above the current Central American level is not nearly as difficult as training to reach current Central American technology for strawberry handling.

e. Minor Post-Harvest Constraints in Bananas, Mangoes and Grapes. Post-harvest handling technology is much less difficult to train and master in the cases of bananas, mangoes and grapes. This is due both to the relative robustness of the products (3-10 weeks of shelf life) and the relative simplicity and robustness of the post harvest handling technologies utilized. This does not in anyway imply that these products may be handled acceptably without training and the introduction of new technology to Sri Lanka, that would need to be done in all cases. These crops are only rated as minimal post-harvest constraints in comparison to the other crops.

f. Post-Harvest Training vs. Post Harvest Technology R&D. The conclusion or our analysis with reference to constraints in post-harvest technology are that where the constraint is critical it is not because of a lack of appropriate existing post harvest technology, the constraint is a training constraint of transferring that technology to Mahaweli farmers and firms. Training in post-harvest technology is only effectively done on-the-job in packing facilities with adequate cooling equip-

ment. There is little point in undertaking technology training independently of actual project development. The added costs associated with post harvest technology training mean that the first packing plants which pioneer the application of the technology to the Mahaweli will bear an abnormally high training cost which may warrant public or external financial support. Small farmer crop specific production cooperatives have proved to be an excellent mechanism for channeling this kind of training support where small farmers are concerned.

2. Year Round Irrigation Water Availability Constraint.

The second most important production constraint is the availability of year round irrigation water in the Mahaweli region. This constraint is a critical one for all varieties and production schedule options for grapes, strawberries and asparagus and Cavendish variety bananas. We have called this constraint the "365 day irrigation" constraint because for these products not only does year-round water need to be available, its daily availability needs to be under the control of the producer, the standard rotational periods are not satisfactory supply arrangements for these crops. Irrigation availability on a daily basis year round is a *sine qua non* for large investment in any of these products, and an informed investor would not proceed even to expend significant sums on site specific feasibility analysis until the solution to this constraint was clearly possible.

The difficulty of obtaining year round, daily available irrigation water from in the Mahaweli region arises from two companion problems. The first is that the Mahaweli irrigation systems were designed and are currently being managed to provide seasonal irrigation principally on paddy rotation schedules. This would permit

certain of our selected short season export crops to survive during one or two crop cycles each year such as gherkins, tomatoes and melons and allow for approximately a 90 day marketing season. Some permanent crops are drought resistant and could likely survive from year to year and produce some short season exportable fruit with minimal irrigation support from shallow wells when Mahaweli irrigation was not available. These crops include some specialty bananas, mangoes, cashews and even under some circumstances, pineapple. Seasonal irrigation would however substantially reduce the profitability and commercial viability of these products. The profitability and viability problems arise from the fact that a 90 day marketing season leaves the very heavy physical and managerial infrastructure required for these enterprises idle during three fourths of the year, and prevents the product from being in the market for a long enough time to permit effective market channel management.

Two possible solutions might be examined to solve this important problem. The first might be to allow small farmer cooperatives to exercise their basic rights in "dead storage" as a kind of backup insurance to keep their permanent crops alive during the non-paddy season. Even under drought situations this use is consistent with the Mahaweli policy which is to give the settlers the final rights to the last drop of water (dead storage) in the reservoirs to keep their families, animals and permanent crops alive. A small scale settler cooperative, pooling their inherent dead storage rights could thus assure a year round supply of water available on a daily basis with a simple pump and PVC pipe into a reservoir. This is the pattern on which the grape grower cooperatives are functioning securely in the drought prone areas of Southern Maharashtra India. By using

drip irrigation application systems these small farmers assure that they can keep their small grape gardens alive on a minimum of water. Grape production is commercially feasible on 1/4 hectare plots. The amount of water required to keep a grape garden functioning on drip irrigation is minimal, and the option exists in severe drought to defoliate the vineyard, force dormancy and save the plants on almost no water. Mangoes and specialty bananas, and to a lesser extent asparagus and pineapple might survive under such a regime, but cavendish bananas, strawberries and year round melons could not.

The second option would be to develop groundwater through shallow dug-wells or deep tube wells. During most of the year the water table in many Mahaweli areas appears to be high enough that shallow "dugwells" could be a practical method of obtaining farmer controlled daily reliable supplies of water. If drip or even sprinkler application is used, these limited supplies could be effectively stretched to support significant areas of export crops. The difficulty arises because the possibility in all areas, and certainty in many, that these wells will go dry during critical periods of the year. The SRD team did not examine the hydrological feasibility of deep tube wells and the existence or non-existence of deep aquifers in the region.

3. Production Technology Training Constraints.

The technology for export production of the crops chosen under soils and climatic conditions similar to the Mahaweli exists in many countries. None of the priority products selected need be the subject of the development or even modification of existing production technologies. This is a major positive factor in moving these activities rapidly

from the "research" to the "development" phase in the Mahaweli region. This should not be read to imply that there is no production technology constraint, but simply to mean that it lies in production technology training and not in production technology research and development.

Training for production technology in fresh fruit and vegetable export crops takes place most effectively on-the-job during the course of project development. It is both needlessly costly and relatively ineffective to undertaken training in artificial educational or even demonstration sites or facilities. The most effective mode for providing this training is with "field-men" employed as agronomists representing the packing cooperative or company.

The substantial added costs of training which will be borne by the pioneering cooperative or firm may justify substantial public or external financial subsidy. With a significant training subsidy the success of the technology is secured not just for the pioneering cooperative or firm but also for all those coops that follow.

a. Grape Production Technology.

Grape technology under arid tropical conditions has been effectively developed and proven in Maharashtra and Tamil Nadu in India. The training difficulty of applying that technology in the Mahaweli is minor compared with other critical and major constraints.

b. Strawberry Technology

For more than a decade, the production of strawberries in hot arid areas using "day-neutral" varieties as annual crops has been a commercial reality. In fact this technology now dominates strawberry production over cool-climate three year type technology. This technology involves production of starts in cool climate nurseries and the transplanting of these starts to hot arid areas for a single season of production. This technology is

by far the most complex and difficult of all the crops selected, and is the only crop case where a production technology constraint is given a "major" rating in Figure 2. Small areas of land would be required in a hill area for reproduction of starts.

c. Asparagus. Commercial Asparagus technology for the arid tropics is very recent. Commercial hill area production in the tropics began in Malaysia about 1983-4 in the Kinabalu area by Thean Soo Tee and others. In the hot and arid tropics commercial production began perhaps even earlier in Thailand and more recently in Guatemala. It is the only crop selected which is relatively new to the Mahaweli, but which has already been successfully applied there. For this reason it is rated as having only a very minor production technology and training constraint.

d. Pineapple. Pineapple production technology with Smooth Cayenne is essentially the same as with Mauritius and there is considerable experience with pineapple production in Sri Lanka. The only interesting issue for pineapple is the effect of the rainy season on obtaining year round high quality production and that hardly qualifies as an important constraint.

e. Bananas. Banana production technology is widespread in Sri Lanka. Those few but important technical changes in production technology which will be necessary to implement large scale commercial cavendish or small scale specialty production do not represent an important technology or training constraint. Any business which can meet the very substantial organizational and infrastructure requirements of mounting a major banana operation will find it relatively easy to train in the technology.

f. Mango. Mango production technology as it exists is largely acceptable for short season "natural" production. The difficulty comes when "forcing" technology is required for year round production. This technology was developed initially in the Philippines and involves chemical forcing. Though the technology is new to Sri Lanka, its introduction and training requirements are not extensive. For this reason, year round mango production technology is rated as an important "minor" constraint.

g. Melons may be effectively grown on a short season basis for exports with little modification of existing Sri Lankan technology and it is not impossible to do so on residual moisture in heavier soils without irrigation. Year round melon production, however, will require some technological modification and training but not such as to make it a major or critical constraint.

4. Varietal Availability and Climatic Constraints.

As Figure 2 indicates, the SRD team conclusions on varietal availability and climatic constraints vary somewhat in seriousness between the selected crops, but in no case are they important constraints.

a. Grapes The necessary core of high market potential grape varieties have been successfully tested and commercially proven in arid tropical conditions in Maharashtra and Tamil Nadu India. These varieties include the major market variety Thompson Seedless and others. Retesting these varieties before commercial level application would be to waste precious commercial level development time and needlessly postpone market entry.

b. Strawberries. Day-neutral varieties appropriate for tropical

and arid production areas include Chandler, Douglas, Pajaro, Selva, Tangi and Cardinal. Of these, the best market variety is Chandler. Since these varieties would be forced in an annual production mode there is little long term risk. Commercial production should commence with Chandler reproduction with some smaller test quantities of all others. At the end of the first commercial year the conclusion should be in and further reproduction could be directed away from Chandler in the unlikely event that another variety is more successful.

c. Asparagus. The Upali group field tests in System B have proven the viability of at least one temperate region variety (a Dutch variety). UC 800 as well as the full range of earlier commercial varieties (Martha & Mary Washington, UC 72 and others) are doing very well commercially in the tropics at low altitudes and at similar latitude positions to the Mahaweli. There appears to be little reason for more experimentation. Commercial development could safely reproduce both the Dutch variety already doing well in System B and UC 800, though the success with UC800 in similar climates is sufficient to make commercial level plantings an acceptable business risk in the Mahaweli.

d. Pineapple. Smooth Cayenne is the indicated variety. There is little chance that others or some new varieties would make sense in the Mahaweli. The difficulty here lies in harvest and post harvest handling not in varietal development.

e. Banana. Bananas are the only case where varietal selection and development appear to be important constraints. This relates not to the difficulty with Cavendish as a commercial variety, or questions about its success in the Mahaweli environment. Cavendish commer-

cially thrives under arid tropical conditions like the Mahaweli (see the success in the Aguan Valley in Honduras). The varietal selection and possible development in bananas is limited to specialty varieties. Kolikuttu and Ambul both exhibit the high fruit flavor, firm texture, small size and good overall appearance and transportability which should make them good specialty varieties. The concern is that these varieties are not as genetically homogeneous enough or stable as one would like. "Off" flavors and textures occur with enough frequency to cause marketing problems. Since there are many sub-varieties inside these strains it is likely that investment in selection would be wise. It may even be that varietal stock from FHIA in Honduras might be obtained and prove profitable. Specialty bananas are the only case where an investment in varietal selection and development appears warranted.

f. Mangos. Existing mango varieties with favorable market acceptance and secure production capability in the Mahaweli are readily available. Alphonse and Hadyn are perhaps the most important options but there are many others as well.

g. Melons. Melon varieties appropriate for export marketing from the Mahaweli are readily available. The most important ones are Yellow Honeydew, Cantaloupe and Green Honeydew. Seeds can be purchased from any large U.S. supplier.

5. Soils Constraints

The soils requirements of the selected crops vary little if irrigation water is available. Under rainfed conditions some of these crops will do better on somewhat heavier than those which are optimal if irrigation is available.

Sandy loam soils with good internal and external drainage and

reasonable depth (60-100 cm) are ideal for all of the crops selected. These soils are what Mahaweli soils maps generally classify as class II and III soils. Acceptable soils of these classes are sufficiently abundant in the Mahaweli region to represent no constraint on production.

A. Export Infrastructure Constraints.

Figure 3 presents the SRD team conclusions on the relative importance of export infrastructure constraints. Five principal constraints were identified and studied. The bottom row in Figure 3 indicates the overall rating given to each constraint.

1. Cooling & Packing

The most critical infrastructure constraint is the total absence of field cooling infrastructure in the Mahaweli region. Without such facilities no exports of the selected crops can take place (with the exception of Cavendish bananas which do not need field cooling).

2. Refrigerated Trucking.

The other constraint rated "critical" is the non-existence of refrigerated trucking either in the Mahaweli or elsewhere in Sri Lanka. A handful of frozen trucks exist in Sri Lanka for ice cream and seafood, and a few small flower trucks were located. However, there are no 40ft refrigerated trucks of the type needed for fresh produce transport from the Mahaweli to Colombo. This constraint is not relevant to Cavendish bananas and less important for grapes but is a critical or major constraint for all other crops.

3. On-Farm Irrigation Infrastructure.

The lack of on-farm irrigation infrastructure was rated as a major constraint on the production of most of the selected crops. This is critical for Cavendish bananas where drip irrigation costing approximately US\$2,000/Ha. would be needed. Grapes, strawberries, asparagus and year round melons all require precision on-farm irrigation infrastructure involving drip, sprinkle or micro-leveled surface application. For these crops the availability of on-farm irrigation infrastructure was rated as a major constraint. On-farm irrigation infrastructure is only a minor constraint for pineapple, year round mangos, and it represents almost no obstacle in the cases of short season production of melons, mangoes and specialty bananas. In fact in the case of specialty bananas it may be that rainfed product will have the smaller size, firmer texture and higher flavor preferred in the market than irrigated fruit.

4. Fresh Produce Trade Financial Infrastructure.

This constraint does not refer to the lack of agricultural production or investment credit lines in Sri Lanka. There appears to be substantial agricultural credit available to private firms and farmers. The financial constraint referred to here has to do with the difficulty in accessing traditional agricultural credit from traditional agricultural lending institutions for high value perishable export enterprises. From the point of view of finance, the fresh produce export trade differs from agricultural finance in almost all important aspects. Most agricultural finance is short term input financing using land as collateral. The dominant inputs usually included in agricultural production finance usually include fertilizers, seeds and sometimes labor. Long term agricultural finance is usually for land, machinery and buildings, all of which are normally secured by land and chattel mortgages. Fresh produce export trade finance must be essentially different inputs, on different terms and be secured by highly perishable assets. Agricultural financing institutions are normally unable to make the radical adjustment required to enter the perishable produce trade even when they have substantial funds available in traditional agricultural credit lines.

The inputs which dominate in the fresh produce trade pattern of costs are cardboard and transport. The costs of these inputs are so high per hectare (for asparagus as high as US\$30,000/Ha. per year) that traditional bank guarantees based on land, equipment or building liens and mortgages are insufficient. The only asset with

enough value to be a sufficient bankable security is the perishable produce itself, and traditional banking institutions are almost always unable to accept this as security. The result is that where the fresh produce trade flourishes, a new kind of financial infrastructure gradually evolves to serve its needs with new mechanisms for credit and security. Unfortunately, those pioneers who enter the trade before this financial infrastructure has evolved will likely find obtaining sufficient credit on acceptable terms a major constraint.

The difficulty caused by the lack of fresh produce trade financial infrastructure varies widely by product. It is a critical constraint for Cavendish bananas, and a major constraint on the development of grapes, strawberries and asparagus. This is due to the financial intensity of these crops. A break-bulk Cavendish operation requires about US\$ 30,000,000 in finance to get off the ground. Strawberries, grapes and asparagus may require up to \$30,000 per hectare in finance each year.

In addition to being unwilling to accept perishable produce as

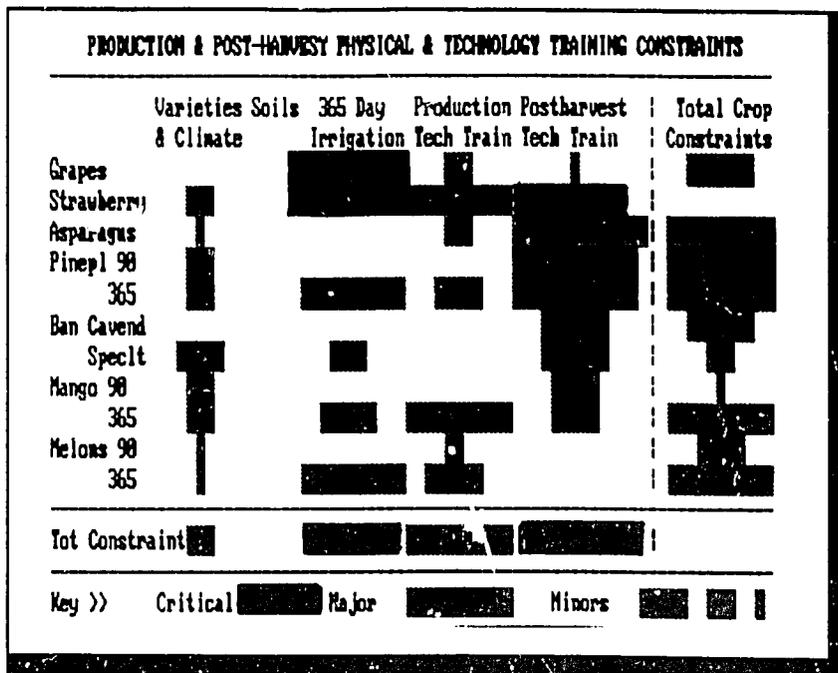


Figure 3: Infrastructure Constraints

the basic security for large loans, the other difficulty most traditional agricultural banks have with fruit and vegetable export finance is the high market risks involved. When adequate financial infrastructure has evolved, the normal financial mechanism is a product lien secondarily secured by the proceeds from the export marketing contract. The bank can collect from the primary debtor (the producer/packer) or it may elect to be paid first by the importer/-wholesaler as proceeds are remitted.

This kind of financial infrastructure evolves slowly because the bank is really putting its trust in businesses and markets outside Sri Lanka and it takes time for banks to become sufficiently familiar with these markets and the companies that operate in them to lay out hard cash. In the U.S. an intricate set of legal and institutional procedures evolved from 1930-1950 to regulate consignment trade in perishables (PACA law) and to provide the necessary environment for financial security which banks have come to rely on.

Until this kind of financial environment evolves in Sri Lanka, only the richest and deepest pocketed firms will be able to enter the trade. Small farmer grower cooperatives which are otherwise ideal organizational mechanisms for these crops will be barred entrance to the trade simply because they cannot provide the kind of guarantees traditional banks will require. Some kind of public or international risk-guarantee or other credit security mechanism will likely be required before these financially intensive products can get going in any but the largest firms hands.

For crops such as melons and pineapple this constraint is only of minor importance. For those crops such as specialty bananas and mangoes which are not financially intensive it is not a con-

straint at all.

e. Air & Sea Transport Infrastructure Constraints. Air and sea transport availability and port facilities are critical links in the international marketing chain for perishables. The SRD team assessment is that these facilities present only a minor constraint on the development of the selected major crops.

Sea port facilities are acceptable for reefer container handling and there is adequate current traffic to major market destinations.

Current traffic would not be sufficient to handle major expansions but that is to be expected. Container vessel traffic is normally a function of cargo demand and it would be unusual to find the capacity to have wildly outrun its market. As additional capacity is needed there will be a capacity expansion response, but the time lags can be painful to specific enterprises.

Colombo Container Terminal

Berth	300 meter	
	12 meter depth	
Marshalling Yard	8.6 Ha.	
Reefer Slots	72 doubles	
Reefer Cap.	144 20ft.	
Containers Handled	1981	58,806
	1982	103,244
	1983	142,811
	1984	181,484
	1985	215,876
CWC Container Vessels	DWT	TEU's
"Siri"	3,831	175
"Seedevi"	3,831	175
"Srimani"	9,700	410
"Srimathi"	9,700	410
"Muditha"	3,000	101
"Mahapola"	11,372	346
"Athula"	10,600	573

Table I Sea Port Facilities

The current limited refrigerated storage at the port is not an important problem since the product will be arriving in refrigerated containers and can be held that way until storage is available or until loading takes place.

There are however three cases where export transportation availability does rank as a major or important minor constraint.

Break-bulk Cavendish exports by definition depend on the availability of break-bulk reefer transport. Such traffic is not now available from Sri Lanka, and could not be expected to become available except in a whole vessel charter arrangement in connection with the banana operation. Break-bulk reefer charter vessels are readily available on the open market on a rental basis computed per cubic foot per month. Three such vessels would be needed on a full time basis to support a commercial scale Cavendish operation.

The other two cases where transport is an important, if minor, constraint are the cases of strawberries and asparagus where the problem is obtaining air cargo space at the preferential commodity rate. Though this problem can be important to a single enterprise at a given point in time, it is not likely to be a persistent or major constraint for the industry as a whole.

Fresh fruits and vegetables such as strawberries and asparagus have a special commodity rate to the Middle East of \$.085-.095/Kg. and \$1.05-1.25 to Europe. No special commodity rate is yet available to Japan. Air Lanka which handles about 50% of the export air-freight, and indeed the other carriers, prefer to carry higher paying cargo if possible. This means that when approached about making reserved cargo space for perishables the airlines are reluctant to make any commitments ahead of time at the special commodity rates. To someone studying the feasibility of a new perishable export product which depends on air freight, a conversation with the air cargo schedulers can be most disconcerting. This situation exists on an ongoing basis even in locations such as Santiago Chile and Mexico City where large volumes of fresh produce is exported. Excess air cargo capacity is very expensive to the carrier and since passenger traffic drives most of the capacity, the only way to expand is to add cargo planes on a scheduled basis or charter.

Charters and added cargo planes do not appear in response to single enterprise need and obtaining air cargo space is an ongoing battle in the long term as cargo supply and demand work themselves out. The push and shove for air cargo space is simply another one of the very difficult management tasks associated with the perishable export trade.

In order to evaluate the importance of the air cargo traffic

constraint we examined the quantity of scheduled cargo traffic into the selected markets. Because of the necessity of moving strawberries and asparagus in air cargo containers like the standard Lower Deck Container, only wide-body aircraft can be practically used.

The conclusion of our analysis is that while additional capacity would ease the management burden and risks involved, there is sufficient current traffic to reduce this constraint to a minor position. One of the reasons for this is that strawberry and asparagus profitabilities are such that even if space could only be obtained at double the commodity rate, that would not reduce profit below very attractive levels. This implies that while obtaining air cargo space at preferential commodity rates will likely continue to be a push and shove battle in the long run, the worst that would likely happen on a recurrent basis would be to have to pay higher, but still profitable, air freight rates in order to get space.

flights to Europe markets Colombo is in a better position than any Central American competitor. The number of flights to Japan suggests that the largest constraint on cargo space is likely to be in that direction.

Airport facilities for refrigerated cargo are limited but since all cargo would be sent to the airport in refrigerated containers, there is no refrigeration risk. The container can simply wait until the plane is ready to load and only then discharge its pallets. Since both strawberries and asparagus transport well when palletized, loading can move rapidly avoiding prolonged exposure to heat on the pad.

C. Comparative Advantages of Sri Lanka

The analysis of export potentials must begin with an assessment of underlying and long run comparative and competitive advantages and disadvantages which Sri Lanka may be able to count on for at least a decade or two. Export industries are high cost and high risk activities and last a long time. A country should try to assess its long run competitive position with considerable care to assure that the products it selects and the markets it concentrates on are ones which have some underlying advantage against many if not most potential competitors. There are of course some countries who share or even better Sri Lanka on any one of these factors, but few competitors have a superior overall position.

Sri Lanka appears to have three major long run competitive advantages against many of its existing and potential competitors in the following areas:

1. Seasonal Flexibility

Sri Lanka's tropical geographic position provides it with year round growing temperatures which

With fifteen wide body Katunayake Airport	
Weekly Wide Body Flights	
Germany	4
Paris	4
Amsterdam	4
London	3
Zurich	2
Rome	1
Europe Markets	13
Tokyo	2
Hong Kong	2
Singapore	5
Asia Markets	8
Middle East	21

Table II: Air Cargo Capacity

allows it to produce many crops on a year round basis. Recent technology for many temperate crops such as asparagus, grapes and berries are opening vast export opportunities to tropical production sites. The single monsoon pattern in the Mahaweli area provides another seasonal advantage when combined with irrigation. This advantage is a prolonged dry period with low air humidity which is important for low cost production of most fruits and vegetables. Tropical temperatures combined with high humidity create an optimal growing environment for pests and diseases and also creates harvest problems for most fruits and vegetables. The long dry season in the Mahaweli is therefore a significant comparative advantage against many tropical competitors and even against Sri Lankan competitive sites on the West side of the Island. Off-season market windows in Japanese and European markets present a large opportunity to tropical producing countries.

2. Labor Cost Advantage.

Sri Lankan farm labor costs are very low when compared to almost all major competitors. Labor costs are roughly 4-5% of competitors in the U.S., Western Europe and Japan; 30% of Central and South American competitors, and less than 50% of most Asian competitors.

This advantage is only marked where labor represents the dominant cost in a particular product's cost structure. A reasonable measure of this type of labor intensity is the number of person hours or days required to produce one ton of product. Such a measure was used in the selection of products to assure that labor intensity was given an important weight in the criteria for product selection.

3. Transport Cost and Geographical Position Advantage.

Western Europe and the Pacific Rim centered on Japan are the world's two chief importing regions for high value fresh fruits and vegetables. Sri Lanka has a unique position (except for India) in being positioned roughly equidistant from these two regions. That puts Sri Lanka in a very advantageous position to develop an export industry geographically diversified between these two major market regions. Most other exporters will have to focus on one or the other of these regions without the option of maintaining seasonal marketing options in both directions.

D. Survey Methodological Approach

The methodological approach deployed in study to meet the requirements of the objectives is discussed below in brief.

1. Product Selection

A preliminary list of approximately sixty different agricultural products having potential for export market was prepared in consultation with the EIED and AID personnel. Subsequently, the seven-factor ranking methodology was applied to all of the candidate products to make final selection of the products for the detailed study. The factors considered for the purpose were; (i) labour cost advantage, (ii) transport cost advantage, (iii) feasible product shelf life, (iv) tariff and sanitary restrictions, (v) seasonal advantage, (vi) total value demand, and (vii) import supply demand.

The data for this effort were drawn from the existing sources in Sri Lanka complemented by the sizable data base in the SRD computerized files. The effort of applying the seven-factor ranking methodology enabled us identify in all nineteen products belonging to the categories of fruits, vege-

tables, flowers and other products for the detailed study. The products selected for study are indicated in Table III.

Fruits	Vegetables
Flowers	Other products
Banana	Asparagus
Carnations	Shrimps/
Cashewnut	Capsicum/
Orchids	Mushrooms
Strawberry	Green pepper
Grapes	Garlic
Mangoes	Ginger
Melons	Gherkins
Papaya	Tomatoes
Pineapple	

Table III: Selected Products

Among the products identified for the detailed study, shrimps/prawns and handicraft products are not directly dependent on irrigated farming. However, their inclusion in the action program would certainly make use of surplus resources (including labour) and contribute to the economy of the community in the area.

It also facilitated understanding of farmer level constraints in adoption of new production practices. The farmer level production cost surveys involved interviews of the respondents with the help of the questionnaires specially designed for the purpose. The respondents were selected randomly without following any specific sophisticated sampling technique.

2. Domestic Market Study

The domestic market study included the aspects such as estimation of marketing costs and margins, understanding of marketing channels and dimensions of

internal demand and working out estimates of exportable surpluses of target commodities. This study was based on review of existing studies and domestic market surveys. The enquiries made with the samples of primary producers, transport agencies, commission agents/wholesalers, retailers and consumers were quite useful to meet these requirements.

Export Market Infrastructure Study

The export market infrastructure study aimed at gathering of information on costs and practices of post-harvest handling, cooling, packaging, processing and transport availability of physical facilities. Additionally, it also helped understanding of tariffs and sanitary regulations. Most of the information was gathered through books, reports, bulletins and pamphlets relative to various aspects. The visits to port, airport and cold storage units were useful to know existing export market infrastructure.

Analytical Framework

The data obtained through production cost study have been analyzed to obtain the estimates of per acre resource use structure, production cost, output, gross return and net return in respect of all the products. In case of the plantation/long duration crops, the total cost of establishing the garden has been apportioned over the entire productive life of such gardens. The procedure followed for evaluation and allocation of costs of individual cost items is explained in brief in Appendix I. The shares of individual cost items in the total cost have been indicated by way of percentages. Though the data on cost of marketing incurred by the producer was on per unit volume basis, the same were computed on per unit area basis to estimate total cost figure for the producer. The marketing costs and

marketing margins have been estimated on per unit volume basis.

ness activities, marketing system and price incentives. Though the analysis of interactions among these factors is not intended, it is felt necessary to study in brief the farm and household economy of the farming community in the Mahaweli Irrigation Project area based

5. FARM LEVEL ECONOMY IN THE MAHAWELI

The Mahaweli Irrigation Project could be considered as a great adventure contemplated by the Government of Sri Lanka during recent years in collaboration with the international funding agencies such as World Bank and USAID. The project involved sufficiently large investment in construction of series of dams, excavation of canals and creation of infrastructure needed for efficient use of irrigation water, supply of inputs, marketing of output, processing, storage, etc. The various components included in the project are extremely useful to provide most of the services conducive for speedy development of irrigated agriculture. The administrative machinery created for execution of the project programs seems to be ideal and adequate. In spite of all these plus points the project has not been able to yield desired results because of certain missing links. Moreover, the farmers in the project area have remained backward in taking advantage of irrigation water and other infrastructure to increase farm productivity, and thereby realize higher income and improve living conditions.

There could be various reasons for such a type of situation in the project area. In the presence of irrigation water and infrastructure and under the given set of agro-climatic conditions, the only possible reasons for such a state of affair is to be found in the factors withholding farmers from making profitable use of various resources including irrigation water. Moreover, such factors are closely associated with socio-economic conditions of the farmers, nature of their farm bus-

on the farm level information. The chapter, therefore, discusses the salient features of the average farm family in the area.

1. The Average Farm Family

The composition of the average farm family is indicated in Table 2.1. The family of 6 persons is composed of 22.83 per

Table 2.1: Average Size of Farm Family and its Composition in the Mahaweli Area

(Persons)				
Particulars	Men	Women	Children	Total
Family members	1.37 (22.84)	1.53 (25.50)	3.10 (51.66)	6.00 (100.00)
Literates	1.12 (18.67)	0.83 (13.83)	1.22 (20.33)	3.17 (52.83)
Illiterates	0.25 (4.17)	0.70 (11.67)	1.88 (31.33)	2.83 (47.17)
Earners	1.12 (18.67)	1.13 (19.67)	0.53 (8.83)	2.83 (47.17)
Dependents	0.25 (4.17)	0.35 (5.83)	2.57 (42.83)	3.17 (52.83)

(Figures in the parentheses indicate percentages to the total family members.)

cent men, 25.50 per cent women and 51.66 per cent children. Almost 53 per cent of the family members have got education at different levels. Of the total family members, 47.17 per cent are engaged in various pursuits of work; whereas the remaining are dependents. Though the average family seems to be quite adequate in size, the dependency ratio is high because of more number of children.

2. Structure of the Average Farm

In general, the farm holdings are small in size in the area because majority of the farms are new settlers who have been allotted with a fixed area as per government policy. As could be seen from Table 2.2, the size of the average farm holding is 3.16 acres of which almost 10.50 per cent land is not available for cultivation partly because of fallow land and partly due to land occupied by buildings. The land area under cultivation is 2.83 acres or 89.50 per cent of the total area of which 2.13 acres receives canal irrigation. The gross cropped area is 3.83 acres and the intensity of cropping works out to 135.34 per cent.

The variability in the size of farm holdings is very low and the per capita land availability comes to 0.47 acres.

Table 2.2:Particulars of Average Farm Holding

Particulars	Area (acres)	Percentage to total
Total land area	3.16	100.00
Fallow land	0.08	2.53
Area under buildings and garden	0.25	7.91
Area under cultivation	2.83	89.56
(i)Irrigated	2.13	67.41
(a)Seasonal	1.13	35.76
(b)Two seasonal	1.00	31.65
(ii)Unirrigated	0.70	22.15
Double cropped area	1.00	31.65
Gross cropped area	3.83	
Cropping intensity (percentage)	135.34	

Farm Capital Assets

The per farm value of capital assets presented in Table 2.3 does not include the value of land. The capital base is worth

Table 2.3:Per Farm and Per Acre Value of Capital Assets

Capital asset	Per farm value(\$)	Per acre Value(\$)	Percentage share
Buildings	186.56	65.91	30.68
Implements	105.72	37.37	17.38
Machinery	153.67	54.30	25.27
Livestock	162.16	57.30	26.67
Total	608.11	214.88	100.00

of \$608.11 per farm or \$214.88 per cultivated acre. The proportion shares of buildings, implements, machinery and livestock are of the order of 30.68, 17.38, 25.27 and 26.67 per cent of the total value of capital assets, respectively. Most of the farm implements are of traditional type;whereas the farm machineries such as two wheeler tractors, sprayers, dusters, etc., are owned only by a few farm families in the area. It would be more appropriate to say that the capital base of the farms is too inadequate to meet the requirements of the products proposed for introduction in the area. Even for the present type of crop production activity, the capital base will fall short of if it is intended

either to increase the farm productivity by way of using additional input quantities or to adopt new technologies. Besides, the existing level of livestock production activity does not provide sufficient employment and income earning opportunity to the families.

3. Cropping Pattern Of the Average Farm

The cropping pattern of the average farm is shown in Table 2.4 which indicates relatively higher preference for the

Table 2.4: Cropping Pattern of the Average Farm

Crop	Area under the crop (acres)	Percentage share in the gross cropped area
Paddy	2.00	52.22
Cowpea	0.30	7.83
Sesamum	0.24	6.27
Chillies	0.63	16.45
Vegetables	0.20	5.22
Fruit crops	0.10	2.61
Other crops	0.36	9.40
Gross cropped area	3.83	100.00

subsistence crops in land allocative decisions of the farmers in the area. Paddy and cowpea together share a little over 60 per cent of the gross cropped area. The area shares of chillies and sesamum are 16.45 and 6.27 per cent respectively. Fruits and vegetables together occupy nearly 9 Per cent of the gross cropped area. For most of the crops, farmers use seeds of their own and the yield potentials of these seeds are quite low. Paddy crop is grown both in Yala and Maha seasons. In effect, paddy is the major crop in the area and crop breeders have succeeded in evolving high yielding varieties. The Department of Agriculture and the agricultural extension officials in the project have been trying to spread adoption of high yielding seed varieties by the farmers. Yet the speed of adoption process is very slow. The overall effect of this phenomenon is observed in low productivity of most of the crops in the project area. There is some degree of awareness about new seed varieties among the farmers. However, the adoption process is delayed to a considerable extent because of certain financial and other constraints.

4. Income and Expenditure Pattern of the Farm Families

The details of annual income and expenditure are given in Tables 2.5 and 2.6 respectively, on per farm family basis.

Table 2.5: Annual Income of the Average Farm Family

Source	Annual income (\$)	Proportion of total income (percentage)
Crop production		
(i) Used for home consumption	577.40	43.64
(ii) Sold in market	324.79	24.55
Livestock production		
(i) Milk and milk products	50.46	3.82
(ii) Sale of animals	76.09	5.75
(iii) Organic manure	27.95	2.11
Wage earnings	165.13	12.48
Business and service	101.24	7.65
Total	1323.06	100.00

The income of the average farm family comes to \$ 1323.06 per annum. The contribution made by crop and livestock production activities to total family income is of the order of 68.19 and 11.68 per cent respectively. Almost 63 per cent of the total output of crop production activity is consumed at home and the remaining is sold in the market to earn cash income. The wage earnings and income from business and service together share a little over one-fifth of the total income. The income derived from wages, business and service thus supplements the farm income for maintenance of the family. That way the livestock production activity seems to have limited scope in influencing family income; though there exists tremendous potential to improve livestock production activity through adoption of cross breeding program and strengthening animal health care facilities. In general, it seems that the only way to increase existing income level of the families is to effect changes in their crop and livestock production activities. The figures given in Table 2.6 reveal that the annual expenditure of the average family was of the order of \$ 1453.75. Of the total expenditure, the shares of consumption expenditure and production expenditure come to 57.77 and 24.32 per cent respectively, whereas the remaining expenditure is on account of loan repayment and other purposes such as marriage, funeral, etc. So far as consumption expenditure is concerned, 65.50 per cent of it is on food items and 18.40 per cent on family clothing. The expenditure on health and education comes to 5.05 per cent of the total consumption expenditure. The other expenditure items

such as fuel and electricity, religious ceremonies and other necessities of life account for 5.15 per cent of the total expenditure. The per capita consumption expenditure works out to \$ 139.97 per annum which is quite low from the view point of minimum requirements. On inquiry it was revealed that the per capita consumption of milk, fruits, vegetables and other nutritious diet is not adequate to keep body in healthy condition.

Table 2.6: Annual Expenditure of the Average Farm Family

Item	Annual expenditure (\$)	Proportion in the total expenditure (percentage)
Consumption expenses		
(i) Food	549.97	37.83
(ii) Clothing	154.37	10.62
(iii) Housing	18.15	1.25
(iv) Fuel and electricity	23.58	1.62
(v) Other necessities	30.66	2.11
(vi) Health	19.02	1.61
(vii) Education	23.35	1.31
(viii) Religious ceremonies	20.71	1.42
Production expenses		
(i) Crop production	353.56	24.32
(ii) Livestock production	67.38	4.63
Loan repayment	113.37	7.12
Other expenditure	89.63	6.16
Total	1453.75	100.00

The expenditures on crop and livestock production activities indicate only cash expenses on various forms of inputs. The other items of imputed costs are not included in the production expenses shown in the table. From the foregoing discussion it could be concluded that the economic position of the farm families is not sound due to the fact that the existing production activities are not able to provide additional employment and increased income to the families. The family budget is almost in deficit. Therefore with the continuum of the present production practices, it may not be appropriate to expect the families to divert a part of their savings either for purchasing additional quantities of inputs or undertaking new investments through owned funds for strengthening capital base and thereby improving economic condi-

tion. The effective solution to overcome this situation is to devise and implement new policy programs which would facilitate farm families diversify their production activity and derive due shares in total output for their efforts to be able to improve living conditions and become active partners to make the irrigation project a major contributing factor to the national economy. The overall impact of these policy programs should result into acquisition of additional resources, reallocation of available resources, adoption of new technologies, gainful employment to idle labour force, investment in productive capital assets, improvements in resource productivities, provision for post-harvest facilities and efficient marketing of output.

2. DOMESTIC MARKET IN SRI LANKA

Efficient marketing of farm products plays an important role in determining the extent of rewards to primary producers for putting in their productive resources as well as managerial abilities in the production activity. In effect, the marketing of agricultural output is a complex phenomenon which is associated with different types of inefficiencies and imperfections at various levels because of involvement of quite a large number of marketing functions and marketing intermediaries on one hand and diversified and dispersed nature of production processes on the other hand. Since a well organized and efficient marketing system usually pays extra dividends to primary producers as well as final consumers, efforts are needed to resort to various measures aiming at removal of all the inefficiencies and imperfections to a maximum possible extent. An understanding of existing marketing system is, however, essential to attempt evolution and execution of appropriate measures. The present chapter is devoted to discuss in brief the domestic market and export

trade infrastructure in Sri Lanka with a view to throw light on the nature of marketing system available for the products of agricultural origin. Most of the discussion is centered around Colombo city market because it happens to be the biggest single market in the country for all the products presently selected for the detailed analysis. The other markets are also significant; but they are relatively small in comparison with the Colombo market.

1 Nature of Domestic Market

As mentioned earlier, the Colombo city market could be considered as the major domestic market for almost all the products selected for the present study. The other city markets at Kandy, Anuradhapura, Jaffna, Ratnapura, etc. , also put forth sizable demand for a variety of fruits, vegetables and other products produced in the country. Yet it is assumed that the potential demand in these markets will not be significantly higher than the existing demand in the immediate future. So far as the Colombo city is concerned, the main market for fruits and vegetables is situated just adjacent to the railway station and it is not far off from the dockyard. Besides main market, there are some small markets in other parts of the city of which a few are in fact sub-markets of the main market. A brief description of the Colombo market is given below.

Physical Facilities:- The main market is located in old structures which are quite big in size. However, the market seems to be congested because the entire space falls short of to meet requirements of the trade handled at the market. There is no sufficient open space to facilitate parking of trucks and other vehicles when loading and unloading as well

as purchasing activities are in operation. The cold storage facilities are totally absent and the dealers in the trade are required to store the produce on their own mostly in open condition. So far as sanitary arrangements are concerned, it seems that no sufficient attention has been given to this aspect as yet. There is no place where the primary producers and village level traders bringing products to the market can stay over night or take rest. The facilities for tea, meals and drinking water are inadequate and unhygienic. Besides, the space allotted to the individual wholesalers and retailers is not enough to meet requirement of the trade handled by them. The situation at the sub-markets was not different than that at the main market.

Commodity-Mix and Market Supply:-

The market provides a place for selling and buying of a variety of fruits, vegetables and some other products of animal origin throughout the year. The monthly supplies of different fruits and vegetables, however, vary greatly depending upon seasonality in their production. Among the fruits, banana, papaya, mangoes, pineapple, jack fruit, oranges, passion fruit, guava, melons, etc., are important ones. As far as vegetables are concerned, the list is quite big. The enquiries with the dealers revealed that the quantities of different vegetables supplied to the market were lesser than the demand. The general consumers present a wide range of tastes for the vegetables. This situation could be exploited adequately for the benefit of the primary producers by way of encouraging them to diversify and intensify their production activities.

The office of the market control organization is manned with a meager staff. Besides, the practice of maintaining records of arrivals and prices of all the products on daily basis is not

followed in this office. As a result, it was difficult to know the magnitudes of arrivals and prices of the individual products. In the absence of such information, an attempt was made to work out estimates of annual supplies of some of the important fruits and vegetables in the market based on the information obtained from the sample of wholesalers and retailers. The rough estimates of the quantities of important fruits and vegetables supplied to the market on yearly basis are indicated in Table 3.1. Among the various products, banana ranks first with regard to total supply in the market. The estimates of product supplies need to be refined by way of introducing the practice of maintaining daily records of market arrivals and prices of the products. These statistics will be of great use to plan for certain improvements in the existing marketing facilities. Unfortunately, it was not possible to obtain information relating to the quantities of different products coming from various parts of the country; though it is useful for planning purpose.

Marketing Functions and Intermediaries:-

The marketing of agricultural products, particularly the perishable products like fruits and vegetables, involves a series of marketing functions such as exchange (buying and selling), physical (storage, transportation, packaging, loading and unloading, and processing), and facilitating (standardization, financing, risk bearing, market intelligence, etc.).

To perform these functions, a large number of intermediaries are involved in the entire process of marketing. So far as the marketing system in Sri Lanka is concerned, the chain of intermediaries begins with the village level produce collecting agents to wholesalers/commission agents and leads

to retailers. The supporting services are performed by transport agents, labourers, packaging material suppliers, and the personnel working in the market and bank offices.

Table 3.1: Estimates of Annual Supplies of the Important Fruits and vegetables in the Colombo Market
(Metric tonnes)

Product	Quantity supplied	Product	Quantity supplied
Banana	2500	Papaya	150
Mangoes	185	Pineapple	320
Oranges	75	Guava	35
Passion fruit	12	Jack fruit	45
Melons	325	Bread fruit	30
Okra	50	Gourd (all)	175
Beans (all)	60	Tomatoes	190
Garlic	15	Onions	675
Potatoes	450	Green chillies	125
Cauliflower	35	Cabbage	65
Lime	45	Drumstick	15
Brinjal	55	Ginger	25
Cucumber	80	Radish	5

Most of the produce is transported from producing area to the market by trucks. Railway transport is availed wherever such facility exists. For most of the products, the packaging material used is either gunny bags or baskets. Wooden boxes are rarely used for packaging. There exists a high level competition among the transporters at places where the producing area is closer to the main market and the transport cost is relatively cheap. For distant producing areas, however, the transport charges increase progressively with the distance. The transport cost is around \$ 0.25 per bag of 30 kgs for first 30 miles, \$ 0.30 for another 30 miles, \$ 0.45 for next 30 miles and so on. On the average, the loading and unloading charges are \$ 0.10 per bag or basket of 30 kgs.

The approximate numbers of wholesalers and retailers working in the main market are given in Table 3.2. Some of the retailers as well as wholesalers handle a group of fruits and vegetables. Also in some cases the same person works as a wholesaler and retailer as well. Besides, though the number of retailers is fairly large, some sort of mutual understanding works at the price deciding level. Unfortunately, the aspect of market intelligence has been totally overlooked. The primary producers get information on market condition mostly through village level traders and other fellow producers marketing the produce earlier. The cooperative bank located in the market premises provides banking facilities to the traders. The performance of the bank is quite efficient. The control on marketing activities is exercised by a small organization having a few personnel. Moreover, the major task of this organization is to collect market fees. In effect, this organization needs to be strengthened and made viable for effective control over price settlement activities,

supervising operation of norms for standardization and grading of products, and improving marketing conditions.

Table 3.2: Approximate Numbers of Wholesalers and Retailers in the Colombo City Main Market

Product	Number of wholesalers	Number of Retailers
Banana	15	60
Papaya	10	45
Mangoes	8	32
Melons	12	30
Pineapple	12	25
Ginger	6	15
Garlic	10	35
Cucumber	8	20
Tomatoes	10	30
Potatoes	15	50
Onions	15	55
Lime	6	25
Vegetables	35	125

At present, grading of products is done by the retailers for their own benefit. The products are, however, not graded before the same are sold to the retailers. From the sanitary point of view, the neglect of cleanliness is the most disquieting feature in the market premises.

Market Demand for the Products:- From the enquiries with the wholesalers and retailers in the main market, it was understood that the demand for almost all the fruits and vegetables is sufficiently high in the market. Some times there prevails a situation of market gluts in case of the products whose supply is seasonal. So far as the products selected for the detailed analysis are concerned, it would be more appropriate to say that the majority of vegetables and a few fruits possess high potential demand. Moreover, the products such as cashewnut, superior quality mangoes, strawberry, asparagus, mushrooms, carnations and orchids might possess limited potential demand at the beginning. Yet because of developing industrial complex at the outskirts of Colombo and expanding tourism, it is believed that the internal demand for these products too will rise in future. Besides, the population belonging to high and middle income strata has been well exposed to the western style of living. This group of population is expected to demand additional quantities of high price products because of demonstration effect. The domestic market could, therefore, be believed to absorb additional quantities of these products to some extent.

The other urban areas in the country will also be able to absorb additional quantities of these products. However, the expected increase in demand will not be significant in the near future. Additionally, it is rather futile to expect the rural areas demand sizable quantities of quality products under the existing income generation and income distribution patterns. The increased potential demand for the high quality and high price

products will, therefore, be from the domestic urban areas and the international markets only.

2. Efficiency of Domestic Market

The extent to which a marketing system performs various functions efficiently depends on the availability and quality of physical infrastructural facilities, the entrepreneurial and managerial manpower, the financial institutions, the communications network, and the type of marketing channels established by the intermediaries to attain distributional efficiency. Besides, the degree of involvement of complexities in marketing structure, product characteristics, level of efficiency in management of various activities, and type of control over marketing system together determine the pricing efficiency of the marketing system. The foregoing discussion revealed that the existing domestic marketing system has got several deficiencies in these regards as a result of which there existed distributional as well as pricing inefficiencies. To throw additional light on these aspects, a more detailed analysis relative to distributional efficiency and pricing efficiency could be attempted by way of studying existing marketing channels, marketing margins, and price spread in respect of some the products sold in the market.

Marketing Channels:- The production of fruits and vegetables is carried out by a large number of small producers scattered over different regions in the rural areas; whereas the demand for the same is in urban areas located at distant places. The gap between the primary producers and ultimate consumers is filled in by some marketing channels of which the following four seem to be prominent ones. The marketing channels are depicted in Appendix III for all the competing Countries.

1. The producer sells produce to private trader at village level who, in turn, sells to wholesaler or exporter or canneries.

2. The producer sells produce directly to wholesaler or exporter or canneries.

3. The producer sells produce directly to consumers either in the village itself or in nearby big villages and towns.

4. The producer sells produce to the Export Production Village (EPV) companies initiated by the Ministry of Trade and Shipping and assisted by the Sri Lanka Export Development Board (EDB). This channel eliminates the middlemen and the EPV companies sell the produce directly to exporter. In the first two channels, the retailers buy produce from wholesalers or canneries, as the case may be, and sell to final consumers. The EPV company is, in effect, a form of cooperative organization of producers and it could be believed that this type of organization will prove to be an effective instrument in promotion of export trade in agricultural products.

Marketing Margins and Price Spread:- Table 3.3 presents information on price paid by consumers and proportions of marketing costs, traders' commission and profit, and net price received by primary producers in the consumer's price in respect of some of the products. It could be revealed that the proportions of marketing margins in the consumer's price were quite high in the marketing of fruits and vegetables as well. The primary producers got about 40 to 67 per cent of the consumer's price after incurring costs on account of transport, packaging and loading. The balance of 33 to 60 per cent of the consumer's price went for marketing functions and services. The commission and profits of

Table 3.3: Prices Paid by Consumers and Proportions of Marketing Costs, Marketing Margins and Net Prices Received by Producers in the Consumers' Prices in respect of Fruits and Vegetables

Product	Unit	Consumer Prices \$	Percentage Shares in Consumer Prices			
			Commission	Marketing Cost Intermediary	Producer	Net Price Producer
Banana	Bunch *	5.71	22.85	11.43	9.14	56.58
Papaya	Kg	0.23	28.57	7.14	7.14	57.15
Mangoes	Box *	14.68	27.78	11.11	5.56	55.55
Pineapple	Kg @	0.33	20.00	12.50	7.50	60.00
Melons	Piece	0.26	15.62	12.56	9.38	62.44
Capsicum	Kg	0.39	25.00	4.17	4.17	66.66
Garlic	Kg	1.15	22.86	8.57	5.71	62.86
Ginger	Kg	1.96	31.67	5.00	5.00	58.33
Tomatoes	Kg	0.65	31.00	11.00	6.00	52.00
Okra	Kg	0.23	34.57	7.14	7.14	51.15
Brinjal	Kg	0.20	33.34	8.33	8.33	50.00
Lime	Dozen	0.33	50.00	5.00	5.00	40.00

* One bunch has 300 bananas and one box contains 250 mangoes.
@ Superior grade.

percent of the consumer's price showing thereby the tendency of the traders and other intermediaries to make exorbitant profits in the trade. It seems that the existing marketing system for fruits and vegetables is characterized by several imperfections and inefficiencies at various levels. To make the marketing system more effective, there is a need to adopt suitable measures to improve distributional and pricing efficiencies of the existing marketing system. Imposition of certain regulations on the actions of intermediaries, fixation of norms for transport rates and encouragements to new traders to enter in the business to effect competition in the market may be considered as some of the measures in this direction.

The

marketing system for flowers is different than that for fruits and vegetables. The common flowers used for garlands and bouquets are marketed through a marketing system having the whole chain of village level traders, wholesalers and retailers to fill in the gap between primary producers and consumers. From the enquiry with a couple of retailers, it was understood that the profit margins and losses in handling remain quite high and the shares of producers are reduced to that extent. Usually the supplies of flowers and prices remain fluctuating. The retailers, however, try to take advantage of this phenomenon for their benefit. In case of the cut flowers, however, the producers are well organized and conscious about their shares in consumer's price. The producers' cooperative organization in Colombo has been doing excellent job in marketing of cut flowers and seedlings of orchids and enthurium efficiently. The

activities of this organization are multiple they have helped the producers in many ways. From the very beginning, the organization has been doing the

work of technology transfer and market penetration by way of organizing seminars and exhibitions. The production and marketing of carnations has been handled successfully by a private firm. The firm is operating the production system with high level technology and capital intensity. Perhaps it may go difficult for an individual producer to take such a type of highly capital intensive activity. Yet others can make a headway by taking up the activity even on small scale since the production system and underlying technology are scale neutral.

The domestic demand for mushrooms is mainly from the hotel industry as is the case with the cut flowers. The hotel industry is having slack business these days. As a result, the domestic demand for mushrooms and cut flowers is low. This phenomenon is, however, a temporary one. Besides, the changing food habit of high income class people could be exploited for creating additional demand for these products in the near future.

3. Infrastructure for Export Trade

Sri Lanka has been in the export trade for quite a long time. The export quantities of tea, rubber, coconut (including coconut products), coffee and cashewnut have always remained high in the international markets. During recent days, the country has been making a big dent in exporting prawns/shrimps to various markets. Owing to its long standing position in the export trade, the country has been making efforts to create necessary infrastructure (both physical as well as organizational) for promotion of export trade.

Physical Infrastructure:- There are two major modes of exporting products to inter-

national markets. The first mode is sea transport and the second is air transport. Because of its friendly relations with all the countries, Sri Lanka is having regular ships and air flights to connect majority of the international markets. Most of the export trade is handled at the ship yard and airport at Colombo city. Both at the ship yard as well as airport, there are facilities for storage and proper handling of consignments. The cold storage facilities at both the places make it convenient to store perishable products at appropriate temperatures until the products are dispatched to their final destinations. The exporters have been trying to use suitable packages for individual products keeping in view specific requirements of transport and maintenance of product quality. The existing storage and product handling facilities at the ship yard and airport, however, may fall short of with further expansion in export trade. Another important facility required for export of perishable farm products is the quick transport from producing area to port through cold container carriers. Unfortunately, such facility does not exist today. Besides, there are no cold storage facilities in the producing area where producers can store their produce safely until transport is made available.

Organizational Infrastructure:- The country has made conscious efforts to establish different organizations and evolve rules and regulations for expanding export trade. The following organizations serve export trade activities in many respects.

Export Organizational Infrastructure

1. Export Development Board (EDB)
2. Trade and Shipping Information Board (TSIS)
3. Trade Commissioners of Sri Lanka resident abroad (TC)
4. Industrial Development Board
5. Sri Lanka Business Development Centre (SLBDC)
6. Foreign Investment Advisory Committee (FIAC)
7. Local Investment Advisory Committee (LIAC)
8. Ministry of Industries and Scientific Affairs (MISA)
9. Ministry of Textile Industries (MTI)
10. Ministry of Fisheries (MF)
11. Ministry of Rural Industrial Development (MRID)
12. Ministry of Finance and Planning (MFP)
13. Urban Development Authority (UDA)
14. Ceylon Electricity Board (CEB)
15. Central Bank (CB)
16. National Development Bank (NDB)
17. Capital Development & Investment Co.Ltd.(CDIC)
18. Development Finance Corporation of Ceylon (DFCC)
19. Bank of Ceylon (BC)
20. People's Bank (PB)
21. Sri Lanka Export Credit Insurance Corporation (SLECIC)
22. Ceylon Institute of Scientific
& Industrial Research (CISIR)
23. National Engineering
& Research Development Centre (NERDC)
24. National Institute of Business Management (NIBM)
25. National Apprenticeship Board (NAB)
26. National Packaging Centre (NPC)
27. Ceylon Freight Bureau (CFB)
28. Sri Lanka Exporters' Union (SLEU)
29. Orchids Growers' Cooperative Association (OGCA)
30. Bureau of Ceylon Standards (BCS)

The above institutions perform different types of advisory, financing and export promotion functions. All these functions encompass a variety of activities conducive for expanding export trade at a greater speed. The information given in Table 3.4 is useful to understand the different types of services and incentives extended by various institutions.

The provisions made for giving financial assistance, tax exemptions and other promotional incentives are helpful to an export oriented project at different stages of its development and they result into expansion of export trade. Table 3.5 provides some evidence in this respect by way of giving information on exported quantity and value of some of the commodities.

Table 3.4: Export Trade Functions and Institutions

Functions	Institutions
I. Advisory and supporting functions	
1. Product identification	EDB, TSIS
2. Market & supply base surveys	EDB, TSIS, TC
3. Feasibility studies	EDB, IDB, SLBDC
4. Project approval	FIAC, LIAC, MISA MTI, MF, MIRD, MFP
5. Location approval & Power supply	UDA, CEB
6. Production processes & installation	IDB, CISIR, NERDC
7. Training	NIBM, NAB
8. Packaging development	IP, NPC
II. Financing functions	
1. Medium & long term financing on concessionary terms	CB, EDB, NDB CDIC, DFCC
2. Small & medium scale industrial loans	NDB & commercial banks
3. Working capital on concessionary terms	CB & commercial banks
4. Domestic letters of credit	BC, PB
5. Guarantee against defaults	SLECIC
6. Equity participation	EDB, NDB, CDIC, DFCC
III. Export promotion incentives	
1. Marketing assistance	EDB
2. Promotional freight rates	CFB
3. Exchange release	ECD
4. Discounting exchange bills	CB & Commercial banks
5. Export development & Investment support scheme	EDB
6. Tax incentives	MFP, EDB
7. Assistance to expand exports	EDB
8. Assistance to small scale export oriented manufacturers & processors	EDB
9. Assistance to pioneering projects	EDB
10. Bridging loans	EDB
11. Assistance to financially ailing projects	EDB
12. Presidential export awards	EDB
13. Export Production Villages scheme	EDB

Table 3.5: Some Indicators of Expanding Export Trade

Product	Export quantity (tons)		Value (\$)	
	1983	1986	1983	1986
Cut Flowers & Buds	57.77	220.38	265591	976527
Fresh vegetables	1757.61	1671.22	1177514	1942373
Cashewnut	899.43	1034.11	2731230	6380714
Pineapple	171.06	242.56	113587	139968
Other fruits	292.52	344.83	191771	260663
Prawns/shrimps				
(a) Live	107.77	18.65	537589	158218
(b) Frozen	1719.59	1252.74	9679585	10904710
Frozen vegetables	NA	92.03	NA	66798

During the period from 1983 to 1986, the exported quantities of all the products excepting prawns/shrimps increased significantly. The value of exported products also indicated increasing trend during the period. In addition to the export trade promoting activities performed by various institutions mentioned earlier, there are well established export activities handled by special boards for tea, coffee, rubber, coconut, etc. The standard specifications prescribed by the Council of the Bureau of Ceylon Standards for different products are mostly in accordance with the requirements of the importing countries. In conclusion, it may be said that the additional programs for export expansion will be benefitted greatly by the existing organizational infrastructure. Besides governmental and cooperative institutions, a large number of private exporters are in the export trade for quite a long time. They have established contacts with the traders in importing markets. Also they have made arrangements to receive information relative to market conditions regularly. The association of exporters has been functioning effectively in promotion of export trade. From the discussion with a group of members of the association, it was revealed that this association will extend all the possible cooperation to EIED in its proposed endeavour.

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