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Influence of Market Accessibility and Price Behavior on Smallholder Cropping Systems: A Case Study in SriLanka

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ABSTRACT

This study aimed to assess how markets affect smallholders' decision-making about their arecanut, pepper and banana smallholders cropping systems in Sri Lanka. An economic assessment of the markets available for different crops was made using data obtained from a market survey and village study. Study found that farmers selected different crops based on market accessibility. Majority of farmers reluctant to grow banana as small holdings in *Pannila*, whilst it was a popular choice on smallholdings in *Pallekiruwa*. Farmers faced high risk with perishables as their price variation was higher than that of storable crops. Study recommend to improve the market infrastructure for enabling farmers' income.

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Introduction

This study focussed on two markets located in the Wet and the Intermediate Zones of Sri Lanka. The Medagama rural market, in the Intermediate Zone, has much less infrastructure than the *Parakaduwa* market in the Wet Zone. because it is further from Colombo, with Parakaduwa ca. 68 km and Medagama ca. 285 km from the capital. Parakaduwa is situated on the main road between Colombo and Ratnapura and is well served in terms of roads and transport. In contrast, the quality of roads leading to Medagama is low, yet it is a thriving and active market serving a huge number of agricultural-based families in the region. Both commercial and subsistence crops are grown in the two agro-climatic zones. In the present study, banana (Musa spp.) and arecanut (Areca catechu) were selected as case studies to assess the effects of market factors on smallholder cropping decisions in Sri Lanka. Whilst agro-climatic and socio-economic factors have an important influence on what crops are grown where, it is clear that marketing factors have an overriding effect on the distribution of some crops in Sri Lanka. Agro-climatic conditions are suitable for banana cultivation in the Wet Zone, but the majority of banana is grown (as a mono crop, mixtures in homegardens and an intercrop with rubber) in the Intermediate Zone [1;2;3), because of ready access to a wellconnected marketing system in that region [1].

Among the homegarden crops, arecanut and pepper also provide a considerable income [4]. Although there is limited research on arecanut marketing systems in Sri Lanka, various authors have analysed marketing accessibility of arecanut in India [5;6;7;8].

Numerous authors in other Asian and African countries have observed that market accessibility directly influences the selection of cropping systems. Amongst socio-economic factors, market accessibility was has often been cited as an influential factor in crop selection on smallholdings around the World [9;10;11;12;13;14;15;16]. Moreover, good marketing structure, led to farmers obtaining their total gross agricultural cash income from their cultivations [17]. Clearly farmers seek to select cropping systems that provide returns that exceed production costs and may be particularly sensitive to costs of establishment, especially for perennial crops that may not yield for some time [18]. Whilst market accessibility is prominent in influencing section and management cropping systems, there has been limited research in terms of their effects on smallholder cropping systems in Sri Lanka.

In view of this dearth of information, the present study aimed to assess how markets affect smallholders' decisionmaking about their arecanut and banana smallholders cropping systems in Sri Lanka. The specific objectives were to gain a better understanding of: (i) how accessibility or availability of markets influence banana and arecanuts smallholder cropping decisions and (ii) the varieties of banana preferred by farmers and why in the villages of Wet and Intermediate agro-climatic zones of Sri Lanka.

Materials and methods

In this study, an economic assessment of the markets available for different crops was made using data obtained from a market survey. Medagama and Parakaduwa markets which used by farmers in Pallekiruwa and Pannila, respectively to sell their products and these were identified and selected as being most representative of local markets in the Intermediate and Wet Zones, respectively. These two rural markets known locally as "fairs" or "pollas" were situated in the Monaragala (Medagama rural market) and Kegalle (Parakaduwa) districts. Stratified random sampling was used to obtain a representative sample for the marketing survey. All participants in the marketing systems of the two selected markets were divided into groups, according to the different key players involved in transportation of products from the farm gate to the consumer. The total number of participants in Medagama market consisted of 170 producers

and 68 buyers of whom 8 were village collectors, 30 were intermediate collectors and the remaining 30 were distant wholesalers. To provide a reasonable sub-sample, 18% of producers and 50% of buyers selected from each of the three different categories were randomly chosen for the survey. Sampling methods used to select respondents in the Parakaduwa market differed from those of Medagama, because relatively few key players were involved in transportation of products from the farm gate to consumers in Parakaduwa. Intermediate and distant wholesalers were not involved in the marketing system of Parakaduwa apart from five village collectors (for banana) and three boutique owners (for rubber and homegarden crops). The number of producers compared with buyers was large and so a sub-sample of 18% of producers out of a total of 377 was selected together with 100% of buyers (the intermediate collectors and village boutique owners). Different percentages of the key players were selected because there were different numbers in each category and different variability within categories. Four different methods were used to collect data on marketing channels, price seasonality and marketing margins. These were semi-structured interviews, direct observations, case studies and data recording by selected households. One limitation of interviewing technique is that the actual amount of money received by each key player may not be reliably identified because people do not like to divulge this type of information. Therefore, this problem was overcome by the author accessing the market only through a key informant who was well known to traders and collectors.

Data on price variation were collected according to the three forms of price variations; price variation caused by quality of the products, time (daily, monthly and annually) and space. To understand how the price of banana and other products varied within a market day, case studies were undertaken and unit prices were recorded at three times during the day for individual sizes and *fingers* of banana. Data for the analysis of seasonal price variation for banana, arecanut and pepper were recorded by village collectors for the purpose of this study. In addition to temporal price variation in Medagama market. Farmer preference for different varieties of banana was assessed using the total number of banana clumps in each of the 24 households sampled in each village. While the farm sketches were drawn, the number of banana clumps was counted separately for each variety, and these data were used to assess farmer preference for each variety. Finally, to assess factors influencing marketing efficiency (such as insufficient space in the market and road barriers during transportation), semi-structured interviews and direct observation of the marketing system were undertaken during several visits at different times of the vear.

Results

Marketing channels

The availability of markets for different products is shown in terms of their respective marketing channels (Figs. 1 and 2). In *Medagama* market, the key players involved in the marketing of banana and arecanut can be divided into four categories (i) producers, (ii) village collectors, (iii) intermediate collectors and (iv) distant wholesalers. In addition, there were two types of intermediate collectors, one group that purchased goods and sold to distant wholesalers and another group who sent their products to the main market through distant wholesalers with a slip indicating the quantity and the trader to whom they should be delivered. The *Medagama* market, which used *Pallekiruwa* village, was well connected with respect to all four key market players (Fig. 1), whilst marketing channels in the *Parakaduwa* market, which used *Pannila* village, comprised only a few key players (Fig.2).

Farmers sold their products to various types of traders dependent on their circumstances and these could be divided into four groups; (i) farmers who had a large volume of products to sell, (ii) those who had a large volume but little labour to bring products to the market, (iii) those with few products to sell (e.g. 1-2 banana bunches and 50 arecanut per week) and (iv) those with easy access to the rural market. Taking the first group, they usually brought their products to the market by themselves rather than selling to village collectors. To transport goods, a tractor was hired at the cost of *ca*. SL Rs.600 (\$1= SL Rs. 154, October 2017) per tractor load. In Pallekiruwa, where a large amount of arecanut were grown, farmers in group (i) generally brought 10 000-15 000 arecanut on a given market day. If they sold products to the village collectors, it was not possible to make an additional profit even taking into account the opportunity costs of engaging in alternative paid labour. The second group of farmers was similar to the first in terms of the volume of production, but they preferred to sell products to village collectors. Although they could not make an additional profit like the first group, they sold to village collectors, because of a scarcity of family labour for transportation and because they preferred not to send such a volume of production with a person from outside the family. The third group of farmers preferred to sell their products to the village collectors because they had only a small amount to sell and after deducting transport costs, the extra revenue from taking their products to the market themselves would be too little. Finally, the fourth group of farmers usually went to the rural market whether their level of production was large or small, because they had their own transport facilities.

Market supplies and competition

A large volume of production is collected to the Medagama market within a single market day, for example ca. 21 000 arecanuts, 25 000 banana bunches and 1 000 kg pepper during the peak season. Banana from the Medagama market was transported to 10 distant areas of the country, ca. 20% went to the Colombo main market (Fig. 1a) whilst markets in the suburbs of Colombo such as Maharagama, Homagama, Kalutara, Bandaragama and Horana accounted for 15%, 13%, 7%, 9% and 9% of banana products, respectively. A smaller volume was distributed to the Eastern region of Sri Lanka to places like Akkaraipaththu (6%) and Kalmunai (3%) (Fig. 1a). Pepper from Medagama passed through the transit market in *Matara*, which is in the Southern region of Sri Lanka, and then to the Colombo main market, because the quantity of pepper sold on a single market day at the Medagama market was insufficient to transport to the Colombo main market (Fig. 1b).

A considerable amount of arecanut was traded in the *Medagama* market, sourced from a large number of villages (*ca.* 15 villages including *Pallekiruwa*) consisting *ca.* 21 000 and 8 500 (average nuts per market day) in the peak and offpeak seasons, respectively. Of the total production, 71% during the peak season and 59% during the off-peak season was taken to the North Central Province in Sri Lanka (Kantale) with a little transported down to the Eastern province (17% and 23% during the peak and the off-peak seasons, respectively), (Fig. 3b). Hanwella and Kaduwela,



Figure 1. Summary of various marketing key players for (a) banana, (b) pepper and (c) arecanut where numbers in the small boxes represent the total number of key players involved in each channel in *Medagama* which used

Pallekiruwa village. Emboldened numbers inside the large boxes represent the total number of players interviewed.





Pannila village. Emboldened numbers inside the large boxes represent the total number of players interviewed.



Figure 3. Percentages of total products (a) banana and (b) arecanut distributed to outside areas from the *Medagama* market within one market day.

which are Colombo suburbs accounted for a smaller amount (*ca.* 12% during the peak season and *ca.*18% during the off peak season) (Fig. 3b).

According to the amount of banana transported by tractor, *tavalam* (local transport method of goods using bullocks, see Plate 1a) and head loads, *ca.* 500 and 200 bunches of banana were brought to the *Medagama* market from *Pallekiruwa* during the peak and off-peak seasons, respectively, on an average market day. Varieties and these were ranked according to their availability in the village as follows; (i) *Embule*, (ii) *Anamalu*, (iii) *Rath kesel*, (iv) *Ash plantains*, (v) *Sini kesel* (only 2-3 bunches marketed per week) and (vi) *Kolikuttu* (only 1-2 bunches per week).

Producers determined the exact price by taking into account the competition for their products on a particular market day. When prices were good, many traders bargained on a competitive basis and producers could decide whether it was a good day for selling their products or not. Conversely, during periods of continuous rain, there was little demand for products and in the case of perishable crops, producers had to sell at a lower price even if it did not cover transportation costs. This was because if they kept the products for any length of time (even until the afternoon of the same day), then those that were not sold would have to be returned, often along difficult and inaccessible roads. Such decisions depended on the long-term experience of producers, and those less experienced were likely to be cheated by traders. Village collectors often procured products cheaply from inexperienced producers, fixing the price of banana according to the price behaviour of the market in the previous week. The price in the main markets such as Colombo were determined according to demand and supply on a given market day.

Analysis of the price variation

Several forms of price variations were found in the Medagama rural market, namely; (i) price variation influenced by the quality of the product and (ii) temporal price variation (short-term, daily and monthly).

Price variation influenced by the quality of the product

In general, village collectors, intermediate collectors and distant wholesalers purchased products using colour and size as indicators of quality. When traders purchased banana and arecanut, size was the main indicator used to determine price. For banana the variation in mean circumference, length and prices (per finger) are summarised in Table 1. Size was estimated using length and circumference of fingers of banana selected from the top, middle and bottom of the whole bunch. Banana fingers were classed as small, medium or large if their length and circumference measurements were ≤ 10 and ≤ 10.1 cm, 11-13 and 10.2-14.3 cm and ≥ 14.0 and

 \geq 14.4 cm, respectively. Whilst the size of fingers varied within the three categories, the mean price per Rath kesel banana finger varied from SL Rs. 7.00 for small to 12.00 for medium and 15.00 for large (Table 1). Village collectors, intermediate collectors and distant wholesalers also tended to consider the colour of some varieties of bananas (e.g. Rath kesel) when fixing prices for purchase. Based on visual appearance, three colour groups were identified. There were some price differences according to the colour, so the average price of dark red bananas was higher than medium and light red bananas. Similarly, when arecanut products were large in size and a dark orange in colour, they would command a high price compared with smaller greener nuts (data are not shown).

Table 1. Summary of the effect of size of '*Rath kesel*' fruit (a local variety of banana) on average market price (per finger) is paid by village and intermediate collectors in the market. Size was measured in terms of the length and circumference of individual fingers and data were presented in terms of mean length and circumference.

The first column shows size indicators set qualitatively by collectors as small, medium and large size.

Size	Mean length (cm)	Mean circumference (cm)	Price (SL Rs.) per finger
Small	≤10	≤10.1	7.00
Medium	11-13	10.2-14.3	12.00
Large	≥14	≥14.4	15.00

Temporal price variation

The price of products in the Medagama rural market varied (i) within a market day, (ii) between market days and (iii) seasonally. Price variation within a single day depended on the amount of products available in the market. Usually the Medagama market was opened on Wednesday evening when some producers started to bring their goods and distant traders started to arrive. If traders were able to purchase the products they required, then they would leave the market later on Wednesday evening. Producers who brought their products to the market on the Wednesday obtained a better price than those who arrived for trade the following day, when there were fewer traders but plenty of produce. Sini kesel, a local variety of banana, provides an example of the variation in price within a single day. A bunch of Sini kesel comprising 80 fingers varied from SL Rs. 350 on Wednesday evening, to SL Rs. 335 on Thursday morning and SL Rs. 320-315 on Thursday afternoon.



Figure 4. Seasonal variation in price of different types of banana varieties in *Medagama* market.

The price of different varieties of banana changed markedly, with prices peaking in the month of April followed by relatively little change over the period February to November (Fig. 4). There was no marked difference in the seasonality of prices for the different types of banana because all varieties began to yield at the same time. Therefore, all varieties of banana were found in the village throughout the year, but the number of bunches varied within the year; consequently only one variety was used to compare price with production. In terms of seasonal price variation, when the total supply to the market increased, the price decreased systematically, except months of January, December and April (festival seasons).

Infrastructural development and obstacles to marketing

In the Pallekiruwa area, farmers and village collectors brought products as *tavalam* to the market and as head loads to the roadside (Plate 1). The tractor has been used to transport goods since 1998 but before then all farmers used tavalam and head loads. After the tractor was introduced to the village, the three different methods of transport *i.e.* head load, tavalam and tractor were used by 50%, 25% and 25% of households, respectively. The reasons why the majority of people used head loads was that if they hired the *tavalam*, one person should walk with the *tavalam* to the market and pay transport costs as well. On the other hand, if they used a tractor, more money should be paid than the tavalam and the products were more likely to be damaged due to the poor quality of the road. Highly profitable banana varieties such as Rath kesel and Kolikuttu were brought as head loads whereas less profitable varieties such as Embule and Ash plantain were transported by tractor. Moreover, farmers preferred not to bring the small sized banana to the market on account of the low price obtained, poor transport facilities in the village and unreasonable transport costs. Transport costs differ with the form of transport. For example, it costs SL Rs. 10 per bunch of bananas, irrespective of size and SL Rs. 35 per 1 000 arecanut for transport by tractor, while the tavalam owner charged 6.50 and 35 for the same loads of banana and arecanut, respectively. Furthermore, losses during transport were greater with the tractor than the *tavalam* due to poor road conditions. However, farmers with more products used the tractor because it was not possible to carry large amounts



Plate 1. Methods of transporting products to the *Medagama* market (a) by *'tavalam'* (*i.e.* bullocks were used to transport products due to the poor quality of road) and owner of the *'tavalam'*, (b) and (c) head load by children and male farmers in *Pallekiruwa* village.

Other facilities in the market such as space and buildings (storage) were important with regard to marketing efficiency. The *Medagama* market consisted of one building including 20 small stalls, which were adequate for normal days. However, on rainy days, producers, intermediate collectors and distant wholesalers had trouble keeping their goods. Furthermore, there was no proper area for parking vehicles, although *ca.* 15 lorries were coming the market per day. According to the key players in the market, the tax collector charged SL Rs. 10 per bunch irrespective of size, 25 per each bundle of pepper and arecanut and 150 for each lorry, but there was no plan to extend the facilities.

Preference for different banana varieties

Most smallholders preferred to grow the banana varieties that commanded the highest returns. However, whilst the main preference was for the most profitable banana, practically the growth of some varieties was limited by environmental conditions in different villages. Firstly, when it consider the Pannila area, where Embune, Anamalu Embule and additionally a small amount of Kolikuttu clumps were grown, the price of banana differed from the Pallekiruwa area as a result of different marketing conditions and levels of production. In general, Anamalu and Embune fetched the highest prices while Sini kesel and Embule fetched the lowest prices of. Secondly, in Pallekiruwa area, Embune, Embule, Anamalu, Sini kesel, Rath kesel and Ash plantain were grown. Whilst the yield of Kolikuttu was low, this variety fetched a high price of because the volume of banana available in the market was low (data from market survey). In the Pannila area, Kolikuttu and Rath kesel were not grown widely, because farmers said that both varieties were highly susceptible to disease (Table 2).



Figure 5. The percentage of the total number of (a) farmers cultivating different banana varieties and (b) banana clumps (*i.e.* plants) grown in the villages of *Pannila* and *Pallekiruwa*.

Among the available banana types, the majority of farmers in *Pannila* (*i.e.* 85% of the 24 farmers surveyed) grew both *Embune* and *Anamalu* compared with 50%

growing *Embule*, due to the high price and low susceptibility to disease of the former. There was no much difference in the banana varieties grown in Pallekiruwa except for Kolikuttu and Ash plantain (Fig. 5a). Of the total banana clumps grown in Pannila (442) and Pallekiruwa (1 784), Embune accounted for ca. 44% and 30%, respectively (Fig. 5b).Table 3 summarises the priorities given for different varieties of banana grown in the Wet and Intermediate Zones. Of the total banana growers (259) in the Wet Zone, 33%, 22% 15%, 12% and 4% of farmers gave first priority for Anamalu, Kolikuttu, Embule, Embune and Sini kesel, respectively, whilst of the total (94) in the Intermediate Zone 14%, 17%, 23%, 30% and 9% of farmers gave first priority to the same varieties (Table 3).

Table 3. Priorities given for the different varieties of banana of the total households growing banana in the Wet and Intermediate Zones. Data were presented in terms of the percentage of households responded for each variety as their 1st 2nd and 3rd priorities

as then 1, 2 and 5 priorities.								
Banana variety	Wet Zone			Intermediate Zone				
	1^{st}	2^{nd}	3 rd	1 st	2^{nd}	3 rd		
Embune	12	0	3	30	0	0		
Anamalu	33	1	2	14	0	0		
Embule	15	2	3	23	3	0		
Kolikuttu	22	2	0	17	3	0		
Sini kesel	4	1	0	9	1	0		
Total banana growers	259			94				

Discussion

Where there was a large number of distant wholesalers market accessibility for the products was improved, whilst an increase in the amount of production resulted in an increase in the number of traders involved in the marketing procedure and vice versa as has been noted [16]. Marketing channels for pepper, arecanut and banana were well connected in Medagama but poor in Parakaduwa, due to differences in the number of key players, for example many more distant wholesalers and producers were involved in the Medagama market compared to Parakaduwa, where boutique owners and intermediate collectors predominated. The demand for banana and arecanut from distant regions such as Colombo and Kantale was high, due to the large urban and rural populations, whilst a greater amount of production supplied by ca. 15 surrounding areas in the Medagama market. The majority of smallholders in Pallekiruwa brought products direct to the Medagama market because labour for transportation was available and the volume of products was large. In addition, direct access to the market meant that villagers had a greater choice of buyers which served to enhance their profitability. In contrast, the majority of

Table 2. Reasons for farmers' preferences for different varieties of banana in Pannila and Pallekiruwa and where amount is based on a qualitative assessment.

Image: Participation of the second system Participation Participati		
Amount Preference Reason Amount Preference Reason Ash Low Low Price is low, susceptible to disease Low Low Price is low Embune Verv High Price is high, good market Verv High Price is high and low disease		
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Embune Very High Price is high, good market Very High Price is high and low disease	100	
	ses	
Anamalu High High Price is high, good market High Medium Price is medium and low		
<i>Embule</i> High Medium Although price is low, plants grow High Low Although price is low, plants	its	
well and less disease grow well and less disease	es	
Kolikuttu Very High Although price is high, growth is Very High Price is high but susceptible t	Price is high but susceptible to	
low poor suscentibility to disease low diseases	diseases	
Sini kesel Medium Low Although growth is good, poor Low Low Although growth is good, poor	oor	
market market		
Rath kesel Medium High Although, price is highest,	t,	
susceptible to diseases		

smallholders in Pannila sold banana to intermediate collectors because there was no choice of buyers at the Parakaduwa market, their level of production was low and little labour was available for transportation (16;19;20]. Infrastructural facilities are important in determining physical access to markets [21]. Although supply and demand was sufficient, road and transport from Pallekiruwa to the Medagama market was extremely poor due to the hilly terrain which was susceptible to severe erosion during monsoon rains. As other authors have found [22] low quality of the road resulted in high pre-marketing damage (Plate 1), contradicting preferences by farmers in the present study who encountered high rates of damage in tractor carried loads on bad roads. Farmers tended to select transport methods according to the value of the products, for example highly profitable banana varieties were packed with dried banana leaves, to reduce damage and increase profitability as has been noted elsewhere [23;24]. In addition, because of the poor road quality and hence high transport costs, a small number of farmers brought smaller-sized bananas to the market because of the low price they fetch. This would in part account for the decreased profits from bananas.

It is often assumed that as road networks linking markets and towns improve, the number and variety of traders visiting the market increases [25]. However, this was not the case for the Parakaduwa market where there were no distant wholesalers, despite the good connections with other markets, in particular the Colombo main market and suburbs where the demand for banana was highest. This is because traders could purchase a large amount of products at a cheap price due to a larger amount of production at Medagama market relative to Parakaduwa on a given market day [16]. The most important comment from both producers and traders was that whilst the production and the number of distant traders have increased since the opening of the Medagama market, there has been no expansion of space available in the market. Consequently, there is nowhere to store products during rainy days, and so most products are spoiled by mud and rain, resulting in a decrease in the profit of both producers and traders. The lack of space in the Medagama market is a result of the fact that a large number of traders visit it, but any decrease in traders would also be expected to be a disadvantage because would be likely to result in a decrease in the competition for products resulting in lower prices of products and hence lower income for farmers [26;27]. This is particularly important to the Medagama market since the majority of smallholders depend on the income obtained from sales of homegarden crops in Pallekiruwa.

Some farmers commented that if they had access to price information before the harvesting of perishable products, in particular banana (if not already overripe), they would be able to match the quantity of products brought to the market to price performance, and so limit losses and maximize profits. However, lack of access to appropriate market information was, as has been previously noted, a major limitation [13;17;22;28;29]. Whilst better access to market information could improve the situation of high-income farmers, lowincome smallholders are rarely in a position to change the pattern of marketing due to their need for regular income to pay for household goods as noted [30]. It is clear from the above, that the most important marketing factors determining access to markets in the two markets studied were the marketing channels and hence the actual supply and demand products, as has previously been noted [13;17;21;24;31;32], compared with infrastructural facilities including road, transport, market space and communication facilities.

As a result of greater demand for arecanut, banana and pepper from the distant areas, smallholders in Pallekiruwa brought more products to the Medagama market which in turn had a positive effect on the number of distant wholesalers involved in the marketing. However, such effects were evident in the Parakaduwa market. Despite the poor infrastructural facilities, high transport costs and lower prices paid by traders, farmers in Pallekiruwa appeared to be satisfied with the Medagama market, because they were usually guaranteed to sell as many products as they were able to bring to the market due to the high level of competition between traders. It was evident that, the majority of smallholders in Pallekiruwa cultivated banana as an intercrop with rubber [3], as a homegarden crop and a monocrop [3], because the accessibility of the market was much greater than in Pannila, where a smaller number of smallholders cultivated banana. In addition, farmers' preferences for the different varieties of banana varied between the two villages, again due to the accessibility of good markets and price differences. These findings are similar with observations made [;12;14;17;33]. The majority of farmers in both villages cultivated Embune and Anamalu because they fetched a good price at the market and were less susceptible to disease. However, all varieties of banana were cultivated in Pallekiruwa, because there was a demand for all varieties in the market, although prices varied for different varieties. A smaller number of farmers in Pannila grew Sini kesel, Ash plantain and Embule, because of the low preference for these varieties amongst intermediates due to their low price in the main market. Although there was not a marked preference for different varieties in Pallekiruwa, Embune, Anamalu and *Embule* were the most commonly grown varieties with few traders purchasing Ash plantain and Sini kesel. However, although prices and annual profits (EAV's) were the highest for Rath kesel and Kolikuttu, a smaller number of banana clumps were grown in Pallekiruwa due to their high susceptibility to disease (Table 2). Priorities given to the different varieties of banana differed at zone and village levels in the Wet Zone, whilst they were similar in the Intermediate Zone (Table 3), possibly because of the presence of good markets for banana in the Intermediate Zone relative to the Wet Zone [1]. Similar observations were made [15;3].

Price variation was greater for banana than pepper and arecanut and resulted in low profits for farmers. In accordance with the previous studies in Sri Lanka [1;3;22;35], the highest profit for banana was obtained during the three months of the festive seasons, when demand was highest. Perishability, poor quality control and the large volume of production collected on a given market day would all account for the high variation in prices of banana, as was evidence in previous studies [34]. As a result, wholesalers' (W/s) margins were highest for banana than other products such as arecanut and pepper [3;35]. Nevertheless, a larger number of smallholders in *Pallekiruwa* cultivated more bananas than smallholders in *Pannila*, due to the low cost of production [3;35] and the readily available market.

Arecanut prices were highest when production was lowest and *vice versa*, due to the fact that arecanut is entirely dependent on the demand from the local markets, in particular rural areas in Sri Lanka. Empirical studies suggest that farmers can obtain better prices by spreading the marketing of storable products [21;36], but whilst farmers have knowledge of storage methods and some farmers (with the highest amount of production) already practised it, these local methods were not sufficient due to limitations on time and labour availability [3;35]. The majority of farmers prefer to cultivate arecanut as a mixture in homegardens in Pallekiruwa due to the readily available market and the fact that alternative crops do not provide such a high income. As a result, in recent years arecanut cultivation has expanded markedly in Pallekiruwa, whilst in Pannila it was observed the ethnographic study that some farmers uprooted arecanut and replaced it with tea. Competitive local markets resulted in an increase in arecanut production in Pallekiruwa and the surrounding areas although there is no export market. Given the importance to smallholders of these local crops, due to the readily available market, some researchers [6:37] suggest that priority should be given to develop improved storage techniques and open export market for arecanut and banana in order to prevent market losses and exploitations.

Conclusions

The most important factors determining accessibility of markets were the efficiency of marketing channels and supply and demand for products. Infrastructural facilities in the market and road network serving villages and distant areas had an important influence on the number of distant wholesalers involved in marketing, and hence on farmers' returns. Farmers faced high risk with perishables as their price variation was higher than that of storable crops. Wellconnected marketing channels for banana was evident in the Intermediate Zone, but infrastructural facilities related to transport were poor, whilst the reverse was true in the Wet Zone. Farmers selected different crops based on market accessibility; because of poorly connected marketing channels, for example the majority of farmers did not grow banana as smallholdings in *Pannila*, whilst it was a popular choice on smallholdings in Pallekiruwa.

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