

Marketing of Indigenous Fruits in Zimbabwe

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ABSTRACT

Poverty, food insecurity and unsustainable use of natural resources are being blamed for the setback of African development. Research on the domestication of indigenous fruits, conducted by the International Centre for Research in Agroforestry (ICRAF) is among the several attempts to improve the livelihood strategies of the poor communities to attain food security, improve nutrition, increase cash income while conserving the environment. However, the research initiative is being limited by lack of baseline information on the existing production-to-consumption system.

This study aims at describing the market structure, conduct and performance of *Uapaca kirkiana* and *Strychnos cocculoides* indigenous fruits, including the institutions guiding the management of the trees and use of the fruits. Also, intends to evaluate the demand of the fruits by assessing consumer's attitudes, preferences and willingness to pay, and finally suggest on improvements.

The study was conducted in Murehwa and Gokwe production and marketing sites, Mbare central market, City Botanical gardens and Westgate shopping centre. Data was collected by a review and analysis of secondary information, Rapid Market Appraisal, formal surveys and conjoint experiment, and analysed using descriptive statistics and advanced multivariate methods.

Findings suggest that there is a substantial amount of trading and consumption of the fruits in both rural and urban areas of Zimbabwe. The marketing system is characterised by lack of production, as all fruits for selling and consumption are collected from the natural forests. There are numerous collectors and retailers but few wholesalers causing less competition at their level. There is no sophisticated product differentiation, however elementary presale activities at the retail level reflect consumer preferences. There is a lack of price formation mechanism. Major means of price formation include information from neighbours, knowledge of previous seasons and total cost incurred by the traders. One of the main obstacles to improving the marketing system is missing institutions defining property rights of IFTs and the fruits. The fruits are still treated as a public good, although increased usage has caused shortages and rivalry. Despite the constraints, consumers love the fruits and they are willing to pay, and hence traders generate some cash. In order to increase market sales, traders may

supply high quality fruits in Harare markets, areas of high preferences. Furthermore, the government may set up reliable institutions among other recommendations, in order to encourage private action.

Keywords: Marketing analysis, consumer behaviour, institutional economics

ZUSAMMENFASSUNG

Armut, unsichere Nahrungsversorgung und wachsende Umweltprobleme sind Hauptprobleme des Entwicklungsprozess afrikanischer Länder. Als einen Beitrag zur Lösung dieser Probleme bemüht sich das International Centre for Research in Agroforestry (ICRAF) um die Erhaltung und züchterische Weiterentwicklung heimischer Baumfrüchte. Ziel dieses Vorhabens ist es, den traditionellen Konsum der in den Wäldern vorkommenden Wildformen durch eine bäuerliche Produktion für den Markt auf nachhaltige Basis zu stellen. Damit soll gleichzeitig ein Beitrag zur Ernährungssicherheit, zur qualitativen Verbesserung der Ernährung und zur Einkommenserzielung in einer arbeitsteiligen Wirtschaft geleistet werden. Die Forschungsarbeit wird durch den mangelhaften Informationsstand bezüglich der Produktion und dem Konsum der Früchte erschwert.

Diese Studie beschreibt und analysiert sowohl die Struktur des Marktes für die Früchte von *Uapaca kirkiana* und *Strychnos cocculoides* als auch das Verhalten und die Leistungsfähigkeit der Marktakteure (structure-conduct-performance- oder "SCP"-Ansatz). Weiterhin werden die institutionellen Rahmenbedingungen der Frucht- und Baumnutzung untersucht. Die Nachfrage nach den Früchten wird mit Hilfe von Einstellungsmessungen und Zahlungsbereitschaftsanalysen auf Konsumentenebene analysiert. Aus den Analysen werden Empfehlungen zur Verbesserung des Vermarktungssystems abgeleitet.

Die Studie wurde in drei Gebieten in Simbabwe durchgeführt. Murehwa und Gokwe wurden als Produktions- und ländliche Vermarktungsorte berücksichtigt während die Hauptstadt Harare den Ort mehrerer zentraler Märkte darstellt. Im Rahmen der Datenerfassung wurde zum einen auf Sekundärliteratur zurückgegriffen, und zum anderen eine Marktübersichtsstudie ("Rapid Market Appraisal") durchgeführt. Dabei wurde neben formellen Befragungen auch ein Conjoint Experiment vorgenommen. Die Daten wurden mit deskriptiven und weiterführenden multivariaten Verfahren ausgewertet.

Die Ergebnisse der Studie zeigen, dass die Früchte in ländlichen und auch städtischen Gebieten Simbawwes in beträchtlichem Umfang verzehrt und auch gehandelt werden. Das Vermarktungssystem ist durch einen Mangel an Produktion gekennzeichnet, da alle Früchte für den Konsum und Verkauf von Gemeinschaftsland gesammelt werden. Die Ebene des Sammelns und der Einzelhändler ist durch viele Akteure und hohen Wettbewerb

gekennzeichnet, während auf der Ebene der Großhändler nur einzelne Akteure tätig sind. Die Früchte werden mit geringer vorheriger Produktdifferenzierung vermarktet. Einfache Sortierung vor dem Verkauf gibt die Konsumentenpräferenzen wieder. Der Preisbildungsprozess ist ausserordentlich intransparent, da Einzel- und Großhändler die Verpackungsgröße variieren und den Preis pro Gebinde konstant halten, was letztendlich vom Verbraucher schlecht zu beobachten und zu vergleichen ist. Das Vermarktungssystem der Früchte wird durch die nur ungenügend definierten Eigentumsrechte an den Bäumen und Früchten kompliziert. Die Früchte werden als Allmende-Gut wahrgenommen, obwohl die intensive Nutzung zu Knappheit und Rivalität geführt hat. Die Früchte geniessen eine hohe Verbraucherpräferenz und Konsumenten äusserten hohe Zahlungsbereitschaft.

Zur Verbesserung des bestehenden Vermarktungssystems wird empfohlen, dass die Märkte in Harare in noch stärkerem Maß mit Früchten guter Qualität beliefert werden, da die dort befragten Konsumenten eine hohe Präferenz für die Früchte zeigten. Weiterhin sollten die institutionellen Rahmenbedingungen gestärkt und eindeutige Eigentumsrechte an den Bäumen bzw. den Früchten definiert werden.

Schlagwörter: Marktanalyse, Verbraucherverhalten, Institutionökonomie

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LIST OF ACRONYMS AND ABBREVIATIONS

AGRITEX	Agricultural Extension Services, Zimbabwe
ARDA	Agriculture and Rural Development Authority, Zimbabwe
BMZ	Bundesministerium Für Wirtschaftliche Zusammenarbeit (Federal Ministry of Economic Co-operation in Germany)
CIFOR	Centre for International Forestry Research
ENDA	Environment and Development Agency, Zimbabwe
FAO	Food and Agricultural Organisation of the United Nations
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
ICRAF	International Centre for Research in Agroforestry
IFs	Indigenous Fruits
IFT	Indigenous Fruit Tree
IFTs	Indigenous Fruit Trees
IRMA	Indigenous Resource Management, Zimbabwe
NGOs	Non-Government Organisations
NRB	Natural Resource Board, Zimbabwe
RMA	Rural Market Appraisal
SCP	Structure-Conduct-Performance
SPSS	Statistical Program for Social Sciences
US\$	United States dollar
VIDCOs	Village Development Committees
WADCOs	Ward Development Committees
WWF	World Wildlife Fund

1 INTRODUCTION

1.1 PROBLEM ANALYSIS

Efforts to enhance African development are seriously hampered by poverty, which goes hand in hand with household food insecurity and environmental degradation. Eradicating poverty, attaining food security¹ and at the same time conserving the environment are seen as contradictory objectives to achieve. This is because the majority of the rural poor destroy their environment in order to earn a living. Study cases in sub-Sahara African countries such as Ghana; show that poor communities, especially women harvest more non-timber natural forest products than rich people (FALCONER, 1990, AGYEMANG, 1994). Generally, poor peasants and the landless extract natural resources more than the rich people because doing business using natural non-timber products requires less capital investment (NEUMANN & HIRSCH 2000, p. 36). In addition to that, poor people live in marginal lands, far from economic growth points, such that during off-cropping season they have no other sources of income generating activities than harvesting and selling natural forestry product. An example is given by CAVENDISH, (1997) in Zimbabwe where he found out that environmental resources are more of a source of livelihood strategy for the poor than the well doers.

The continuous and extensive collection of the forest products has resulted into over-exploitation of the natural resources in question. The exploitation cannot easily be reduced because of the fast growing population in relation to the declining agricultural productivity (MCCALLA, 1999, p. 97). In such a case, forests and farm trees remain to be a major source of food supply and cash generation for the poorest households in rural Africa (FALCONER & ARNOLD 1991, p. 1). However, over the past decade, the rate of deforestation has been alarming at nearly 4 million hectares per annum for agricultural production, fuel and grazing (WORLD BANK 1996). That means the quantities of products, which are being harvested by the rural people are declining and hence the poor community's livelihood strategy is likely to be affected. However, in order to increase food supply and at the same time realise environmental conservation in sub-Saharan Africa, international organisations and researchers

¹ Defined as agricultural production plus factors affecting household food supply such as deforestation, variability in food reserves, availability of forestry products and a shift from subsistence production to marketing economy (FALCONER & ARNOLD 1991, p. 1).

have suggested a number of options. They include increasing productivity to rise household incomes and develop institutional framework that will limit desertification.

In Southern Africa, governments, Non-Government Organisations (NGOs) and international organisations working on rural development, have initiated a battle against poverty aiming at providing food security and prevent environmental degradation. In 1990, ICRAF established research on domestication² and conservation of indigenous fruit trees (IFTs) in order to increase fruit yields, initiate wider cultivation by farmers, increase consumption and improve marketing activities of the fruits and their products. On the long run, these activities are expected to contribute in eradicating poverty through enhanced food security, improved nutrition and increased cash income of the rural poor households (MAGHEMBE, 1999).

The idea of domesticating indigenous fruits of the Miombo Woodlands of Southern Africa started at ICRAF-Malawi, Makoka research station. The encouraging results of tree growth parameters and fruit production, of more than 20 indigenous fruit tree species (MAGHEMBE, 1995, p. 45) facilitated ICRAF to develop a framework on how to domesticate the fruit trees. In 1994, ICRAF, governments and NGOs in Southern Africa agreed on a regional project to work on the species, co-ordinated by ICRAF and funded by BMZ. So far, among the developments of the BMZ/ICRAF funded Project on Domestication of indigenous fruits include the selection of priority species, collection of germplasm, establishment of provenance trials, improvement of nursery facilities and establishment of on-farm evaluation trials. The next step is to disseminate improved propagation materials to farmers for wider cultivation.

But the problem is, there is no adequate information on the existing production-to-consumption-system to appease the ongoing research. This study defines production-to-consumption-system as a complete set of actors, materials, activities and institutions involved, from harvesting/collecting *U. kirkiana* and *S. cocculoides* indigenous fruits, through trading processes in the different markets to consumption. In short, it includes the flow of the fruits from the forests through various participants to the consumers. The whole process is associated with changing of ownership rights of the fruits during selling and buying, transportation and storage, added value and different costs including transaction costs and

² In this context, domestication is to identify and improve agroforestry trees according to farmer and market demand (SIMONS, 1997, p. 4).

benefits among the actors concerned (BELCHER, 1998, p. 59). In addition, the process involves different forms of interaction to facilitate exchange of market information, labour and capital investments.

Apart from gaining knowledge, information on the prevailing production-to-consumption-system will facilitate the expansion of indigenous fruits (IFs) marketing activities. Therefore, there is a need to assess the trading system in order to provide information to help in the design of a suitable marketing mix that can increase demand of the fruits. Apart from information on the traders and their decision-making environment, prior knowledge on consumer behaviour with respect to indigenous fruits is necessary. This includes the evaluation of consumer needs and desires, consisting of consumer attitudes, preferences and their willingness to pay. Knowledge on consumer behaviour will offer ways to increase demand at the same time give feedback to the on-going breeding and agronomic researches aiming at increasing fruits supply and uses.

An understanding on the trading system and consumer behaviour is not the only information needed for expansion of marketing activities. Normally institutional arrangements such as government regulations, policies, customary laws and use/r rights influence the type of trading activities and associated consumption pattern. So, it is necessary to identify the institutional framework and investigate how it might affect the marketing system and consumption of the fruits.

So far there have been no attempts in the region to study the production and marketing of the fruits. Therefore, to generate such information, two studies have been conducted; the first one on the economics of production carried out by Mithöfer (2002) and the second on the economics of marketing by the author of this report. The studies are a collaborative work between the University of Hannover and ICRAF. Data were collected in Zimbabwe, a case study area for Southern Africa. Two indigenous fruit species including *Uapaca kirkiana* and *Strychnos cocculoides* are examined in the economics of the marketing system. Farmers selected these species in the priority setting exercise done by ICRAF in 1998.

1.2 DESCRIPTION OF THE IFTs UNDER STUDY

1.2.1 *Uapaca kirkiana* Muell Arg. (Euphorbiaceae)

Uapaca kirkiana is a fruit tree species, indigenous to the miombo ecological zone of Southern Africa and Madagascar (HANS, 1981). The tree is small to medium size of up to 5-12 meters high and 5-25 centimetres in diameter. The stem bears short and thick branches with simple alternating leaves arranged in clusters. The male and female flowers are yellow in colour and globose in shape, but born by different trees.



Uapaca kirkiana tree



Uapaca kirkiana fruits

The fruits are set between January and February and mature in August and November (MWAMBA, 1995, p. 28). Mature fruits are brown or yellow, and measure on average 3.3 cm in diameter, round, with tough skins. The pulps are yellow, sweet with a pear-like taste and contain between three and four seeds.

Apart from the fruits, *Uapaca kirkiana* trees provide a number of other products and services including fodder, fuel, timber, medicines, shade and processed products such as dyes and alcoholic drinks. In addition, the poor communities, both in rural and urban areas sell the fruits to generate supplementary cash income. However, despite the uses, farmers do not grow

the trees because the seeds are hard to germinate, the trees take long to produce fruits, and there are no varied marketing opportunities (MAGHEMBE et. al., 1998).

The second indigenous fruit species under this study is *Strychnos cocculoides*.

1.2.2 *Strychnos cocculoides* Bak. (Loganiaceae)

Strychnos cocculoides is a small tree ranging from 2 to 8 meters high. The stem is creamy brown, thick and ridged with a compact roundish crown consisting of dense spiny branches (ICRAF, 2002). The fruits are globose in shape, dark green when young and yellow to orange when ripe. They range from 1.6 to 7 centimetres in diameter, smooth, with a wooden shell and taste like oranges. Moreover, the fleshy pulp houses numerous hard-coated seeds.



Strychnos cocculoides tree



Strychnos cocculoides fruits

The tree grows in woodlands and lowland forests at an altitude range between 400 and 2000 meters, rainfall 600 and 1200 millimetres, and temperature 14 and 25°C (FAO, 1983). Cultivation of *S. cocculoides* trees by farmers is not a common practise as per reasons of *U. kirkiana* growing explained above. However, the trees germinate and found uncut in farmers' fields and forests, due to annual fires, which soften the seed coats and cause the seeds to germinate. Recent research developments show that the seeds can be treated, seedlings raised

in the nursery and planted in the fields (ICRAF, 2002), with a survival rate of 3% to 9% on-farm (MKONDA, 2002).

The *S. cocculoides* trees provide a number of products such as leaves, roots, barks, wood and fruits. Ripe fruits are available between April and July, and are eaten fresh or used to prepare a sweet-sour non-alcoholic drink and porridge at farm level. In addition, the fruits are used to make dyes, which have insecticide qualities to protect painted articles from insects attack (HINES & ECKMAN 1993). Furthermore, the fruits are widely sold in both rural and urban markets.

1.3 RESEARCH OBJECTIVES

The major goal of this study is to generate baseline information on the existing marketing system of the two indigenous fruits including trading, buying and institutions used in the management of the trees and use of the fruits. Apart from generating information, the marketing study also aims to examine whether there are possibilities of expanding the marketing opportunities of the fruits. These overall objectives are accomplished through answering the following questions:

- What is the prevailing type of market system of *U. kirkiana* and *S. cocculoides* indigenous fruits, their opportunities and constraints?
- Are there off-farm processing activities for the fruits?
- Which factors facilitate or limit the consumption and purchase of the fruits?
- Which are the consumer preferences and willingness to pay for the fruits?

In order to achieve the goal of this study, the following tasks will be performed. Firstly, there is need to know the prevailing marketing system of the fruits. Here the primary activity will be to evaluate the major parameters of the market structure, including participants, their numbers along the chain, existence of barriers to entry and the extent of product differentiation. Also to examine how the participants conduct the marketing activities such as price formation as well as costs incurred and profits obtained at each marketing level.

The second task will be to evaluate the demand of the fruits by assessing consumers' willingness to pay and estimate factors that influence consumption and purchase behaviours.

Since government policies and regulations influence marketing systems, the third activity will be to describe the existing policy framework including natural resource use and management policies and determine the existence of institutions consisting of type of property rights regimes in order to predict their effect on the marketing system. And the last assignment will be to suggest on how to improve the system based on the research findings.

1.4 ORGANIZATION OF THE THESIS

Chapter 2 explains the theoretical framework, which will be used to analyse the marketing system and serves as a basic theoretical concept to evaluate attitudes and behaviour. The Structure-Conduct-Performance concept is being used to structure the marketing analysis. Within the framework, conduct and performance are being assessed using economic theories such as pricing theory, competition policy and prevailing institutions. Since the marketing system of *U. kirkiana* and *S. cocculoides* indigenous fruits' includes traders and consumers, the theory of consumer behaviour is also discussed. The aim is to understand attitudes, preferences and willingness to pay and buy the fruits.

Chapter 3 presents the methodology used to collect data to acquire the above-mentioned information. The chapter elaborates on the sampling procedures, techniques of questionnaire administration used to traders, policy makers and consumers, and sample sizes. The chapter also presents a framework of data processing and statistical analyses used. Special emphasis is given to factor analysis used to reduce variables and logistic regression to determine consumers' characteristics associated with consumption and purchasing behaviours. Conjoint analysis is used to analyse and conclude on important and preferred characteristics and levels of the fruits and finally cluster analysis to segment the consumers of the fruits considering their preference structure and socio-economic traits.

The first part of chapter 4 describes and analyses the prevailing marketing chain of indigenous fruits in Zimbabwe. It gives an overview of the utilisation and existing marketing of the fruits including market organisational structure, conduct and performance. The existing institutional arrangements including property rights and transaction costs as well as the effects on the marketing process are explained. The chapter also characterises the consumers of indigenous fruits, identifies factors relevant to consumption, purchase behaviour, consumer attitudes,

preferences and willingness to pay and buy. Chapter 5 is giving the summary of findings, draws conclusions and gives recommendations.

2 THEORETICAL FRAMEWORK

2.1 MARKET STRUCTURE, CONDUCT AND PERFORMANCE CONCEPT

An assessment of the prevailing marketing system of *U. kirkiana* and *S. cocculoides* fruits will only be achieved by examining the main parameters which determine the market functioning. The parameters consist of the type of participants, their numbers, size distribution, barriers to entry and the extent of product differentiation. More than those, an evaluation of price formation and mode of payment as well as estimation of costs incurred, prices, incentives and returns to investment are required (BAINS & QUALLS, 1987). Therefore, in order to structure the empirical information on this marketing analysis, SCP framework is applied (FARRIS, 1997).

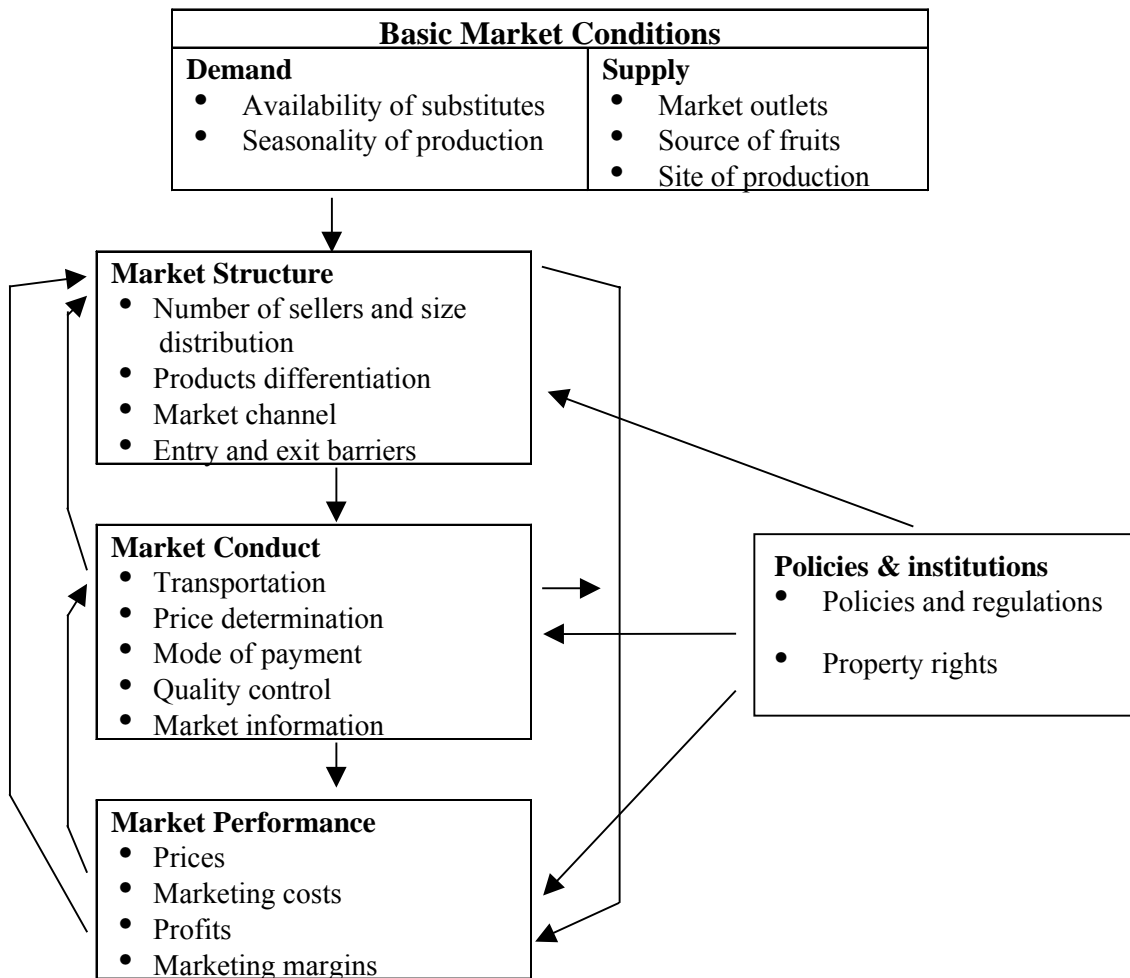
The SCP framework follows the industrial organisation theory, which deals with market structure, its conduct and the implication of the behaviour on economic performance. Under the basic market conditions such as demand and supply characteristics, SCP framework tries to combine the predominant parameters of market structure, conduct and performance in order to explain the operation of a market. Therefore, in this study of marketing of *U. kirkiana* and *S. cocculoides* fruits, an attempt is done to describe the market structure including the organisational characteristics such as the degree of seller and buyer concentration, the extent of product differentiation and entry barriers. This will lead to the information about factors influencing the nature of market competition and pricing.

Within the SCP framework, the market conduct and performance will be appraised combining price theory and competition policy with structural elements. An evaluation of the behavioural characteristics of the marketing actors such as decision making towards conducting presale practices, price determination, mode of payment, decisions to advertisements and cost for each marketing activity will guide in the understanding of the market conduct (FERGUSON & FERGUSON, 1994, p. 15). While, an analysis of the relationship between prices, marketing costs and profits earned will conclude on the market performance. An examination of the existing prices and cost structures will also help in understanding the extent of the relative difficulties or easiness for established firms to leave the industry or new potential ones to enter. Since product differentiation affects prices and price forming mechanism, observations of the extent of product differentiation will be done. The

information will assist in explaining the different prices found in the market, buyers' preferences and perceptions.

Traditionally, market structure was assumed to play a leading role in determining the pattern of behaviour of the actors involved in the marketing process. That is market performance is influenced by the conduct which is set by the market structural characteristics. But, further market analyses suggest that, on the long run, external factors to the industry can modify the direction, such that the market structure might interact with conduct to determine performance (e.g. FARRIS, 1997, p. 139, DAVIES et. al., 1988, p. 5, WALDMAN & JENSEN, 1998, p. 7). However, all the three components (Market structure, conduct and performance) of the SCP concept are prone to government policies. Therefore, when interpreting the results of Structure-Conduct-Performance analysis, government policies are worth considering. This study will attempt to describe policies and regulations within which the marketing system operates in order to understand their influences. Apart from government policies, performance or conduct can influence the market structure. For example mergers among firms reduce the number of firms and affect size distribution (FERGUSON & FERGUSON, 1994, p. 15).

Structure-Conduct-Performance framework has commonly been used in the investigation of agricultural and natural resource markets in industrial and rural setting since the late 1960's. Examples are studies of the market power and vertical linkages in fish industry in Malaysia ISHAK, (1988) and the economics of production and marketing in small-scale fisheries in the Philippines POMEROY, (1989). The framework has also been used to assess market systems of non-traditional forest products in Asia (CARANDANG, 1994) and potential of wild fruits in Malawi (KAARIA, 1998). Therefore, the study on the marketing system of *U. kirkiana* and *S. cocculoides* indigenous fruits will describe some of the structural characteristics, assess the conduct and conclude on the performance. Specific parameters investigated under this study are shown in Fig. 2.1.



Adopted from WALDMAN & JENSEN, (1998, p.7), DAVIES, et. al., (1988. p.5).

Figure 2.1 Parameters of Structure-Conduct-Performance framework analysed in the *U. kirkiana* and *S. cocculoides* IFs' marketing study

Institutional economic concepts, mainly property rights and transaction costs will be analysed to complement the traditional elements of SCP framework. The prevailing institutions governing the IFs management and use will be described. Predictions on how they might influence the existing marketing system, and whether they might affect the expansion of the activities will be made. Identification of resource administration regimes and the current use rights is important because in any production and commodity exchange system, there are rules guiding the exchange and enforcement of property rights, allowed forms of co-operation and

competition. Usually, in systems where property rights are not well defined operational difficulties emerge because of the expulsion³ and rivalry⁴ principles characterising goods.

Literature review reveals five types of resource administration regimes commonly used in resource management. These are state, common, private, public and open access. In state owned resource, the good is governed by the state. Individuals and groups may be allowed to use the resource but only through special permits (BROMLEY & CERNEA, 1989, p. 11). Examples properties under state property regimes are national parks, game reserves and national forests. In this case, the permits ease the issuing of the use rights to individuals and hence limit problems which might have been experienced.

Marketing operations are also difficult in common property ownership type such as communal pasture grounds and fishing sites. In this case, both exclusion and rivalry principles apply. Usually, the resource belongs to a group of individuals originating from a common interest, cultural norms, tribes, kin systems or extended families. But, while other individuals are totally excluded from using the resource, there is competition for the good within the group itself due to rising demand. The competition facilitates lack of incentive to sustainable management. The unstable resource reserves end up in difficulties in smooth marketing operations.

Similar to common property rule is a privately owned good. Both private and common property access regimes are controlled by groups of individuals who have the common right, involvement and also exclude non-owners (BROMLEY & CERNEA, 1989, p. 15). However, the difference is, in privately ownership regime, there are fewer members included in the resource ownership and use rights than in the common rule. However, since the number of people accessing the good in the private property is limited, the arrangement prevents overuse.

Open access occurs when there is no definition of property rights. As a result, there are no actors, which can claim the benefits from the resource (BROMLEY & CERNEA, 1989, p. 19, LARSON & BROMLEY, 1990, p. 239). In this case, individuals who first practised control over the resource are the ones owning the resource. However, due to increased demand of the product, competition increases. This status cause allocative inefficiency, misuse and

³ People who own the good exclude others

⁴ Price of the good is greater than zero, and all persons compete for it

exploitation of the good in question. The other property rights ownership regime is that of a pure public good in which there is neither exclusion nor rivalry principles in effect. Examples of such goods include clean air and defence, in which individuals are free to use any amount of the resource. Therefore, there is need to examine the property rights associated with indigenous fruit trees and fruits and find ways of preventing problems that might emerge. This is due to the fact that indigenous fruits are products from the natural forests, and in less developed countries natural resources' property rights are either not well defined or biased on the interests of the former colonial rulers.

In most cases, if the marketing mechanisms are undeveloped, then there is a provision for transaction costs. These are costs involved in running an economic activity from collection, processing to transfer of goods, services and property rights allied with the exchanged goods (JAFFE, 1995 p. 27). Transaction costs are associated with lack of transparency and preferences, and they are classified into information, negotiation and monitoring or enforcement costs (HOBBS, 1997 p. 1083). Therefore, this study on the marketing system of *U. kirkiana* and *S. cocculoides* indigenous fruits will try to examine the existence and importance of such costs. It will evaluate cost embedded in searching for market information, acquiring prices for the fruits, opportunity cost of time for carrying out the business and costs of ensuring payment arrangement. During the marketing process traders might also incur other monitoring costs such as proper handling of products (GOETZ, 1995, p. 383, JAFFE, 1995, p. 28, HOBBS, 1997 p.1083). All these aspects will be addressed in order to understand the type of uncertainties and costs involved in the business of the two indigenous fruits.

Transaction costs can be very high to traders' time, causing barriers to the exchange process. Sometimes, transaction costs influence traders' choices of market outlets and even quantities to supply to the markets. But despite the importance of transaction costs, they have rarely been examined in detail in food marketing systems. Generally, the systems have considered transport, storage, distribution and handling costs (HUBBARD, 1997 p. 240, JAFFE, 1995 p. 29, HOBBS, 1997) and in some cases merged the transaction costs with overhead expenditures. According to HOBBS, (1997 p. 1084), their omission can be explained by the fact that, in practise, transaction costs are difficult to separate from production and marketing costs. Hence, it is necessary to understand the nature and effects imposed by transaction costs in the marketing systems. The identification of the type of transaction costs involved in the marketing system of indigenous fruits will guide in giving recommendations to reduce such

costs to increase actors' benefits. So far, studies indicate that in an attempt to lower transaction costs, traders in the developing countries have developed contract arrangements to reduce the costs and consequently try to stabilise market supplies, prices and producer income (HOLTZMAN, 1986 p. 34).

In summary, in order to assess the marketing system of indigenous fruits, characteristics of the marketing activities will be examined. The SCP framework will be used to combine the parameters of the system. The market structure will be described, and using economic theories such as pricing and competition policies will assess the conduct and performance. In addition, concepts of institutional economics consisting of property rights and transaction costs will be examined. These will eventually be incorporated in the SCP framework in order to understand the marketing system of *U. kirkiana* and *S. cocculoides* indigenous fruits and suggest ways for improvement.

2.2 THEORY OF CONSUMER BEHAVIOUR

Consumers are the end users of the production-to-consumption system. They consist of complex individuals depending on a number of psychological and sociological characteristics and needs (SCHIFFMAN & KANUK, 2000, p. 5). Therefore, based on the complicated nature of consumers, it is important to understand how the fruits and their products can be transferred to them and the effectiveness of the transfer process. The information will also assist ICRAF's program on domestication of indigenous fruit trees aiming at producing fruit trees with traits pre-confirmed by consumers' willingness to buy, instead of developing fruit trees with traits of their choice, and then convince consumers to use them. In other words, the domestication research program must determine the needs and wants of the consumers before hand, which will guide in the efforts to deliver the desired fruits to the consumers. Otherwise, if consumers are not interested with the fruits, there will be no need of increasing production because demand will be low and hence the program on domestication of indigenous fruit trees will be a failure.

From this point of view, evaluating consumer attitudes, preferences and assessing their willingness to pay are the crucial information needed to decide whether and how the overall objectives of ICRAF's efforts to improve nutrition, food security and household cash income may be realised. But, in order to identify attitudes, preferences and willingness to buy the

fruits, it is necessary to analyse the theory of consumer behaviour. The theory will facilitate in an understanding of behaviour shown by consumers in the process of purchasing the fruits. Also it will help in answering questions such as which type of fruits consumers buy, why they buy, when, where, how much and how often they buy them. Consumer behavioural theory suggests that in the decision to purchase a product consumers go through seven steps, need recognition, search for alternatives, evaluate available alternatives, buy and use the product, evaluate the experience, provide feedback and end the purchase process (WELLS & PRENSKY, 1996, PENSON, et. al., 1999). But, HOWARD & SHETH, (1969) summarised the seven steps into four elements comprising of inputs, perceptual constructs, learning models and outputs (Fig. 2.2).

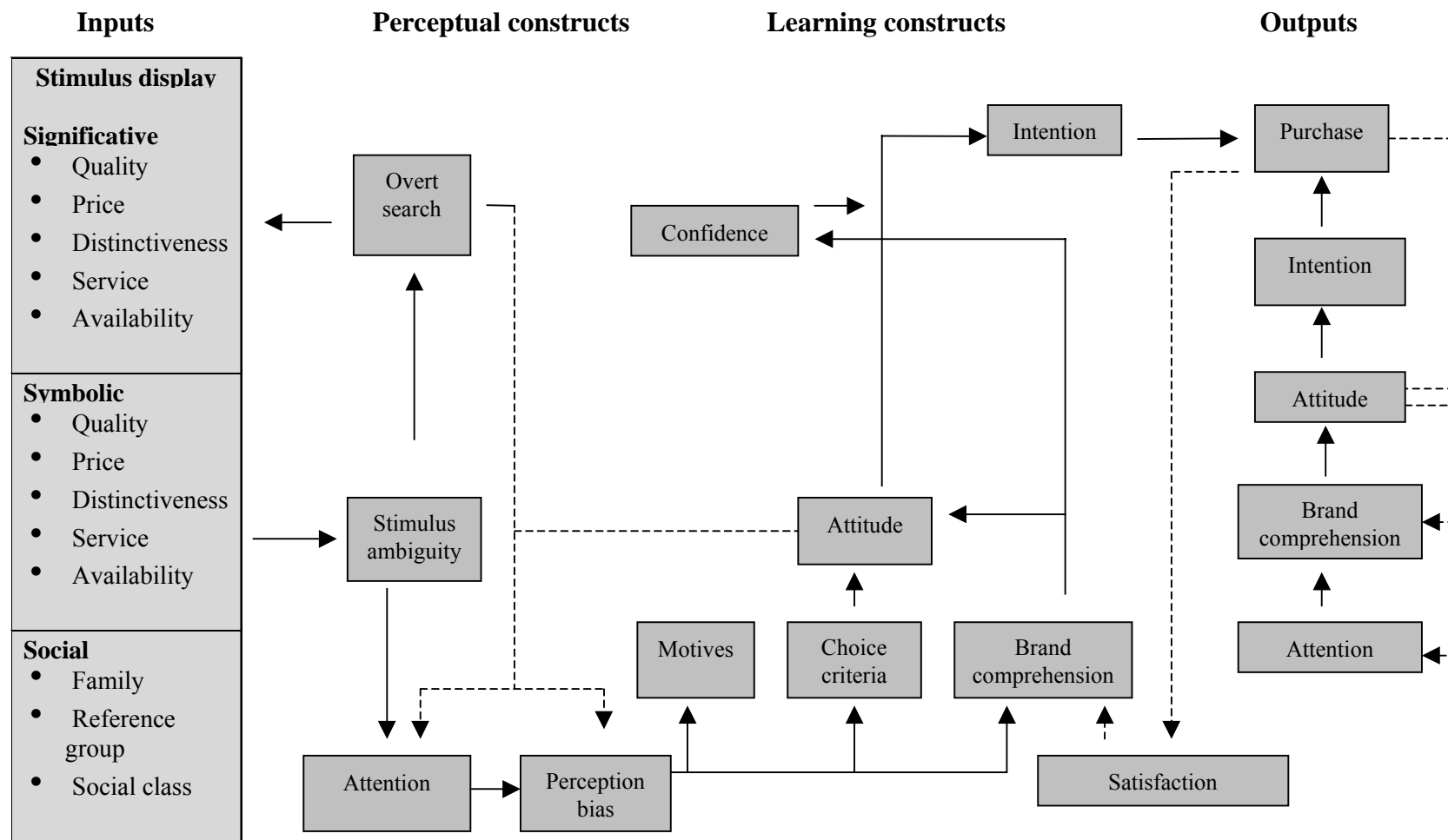


Figure 2.2 A model of consumer behaviour

Source: RICE, 1993, p. 305, adopted from HOWARD & SHETH 1969

Note: Dotted lines portray feedback

Inputs comprise of the source of information about the product to a consumer. They are differentiated into significant, which shows information on the physical attributes of the product and symbolic data obtained from oral expressions and visible elements of an advertising message. Significant and symbolic information come from a set of the marketing mix comprising of the product itself including its package, size, guarantee, its price, promotion and the place it is sold. However, social input is attained from the socio-cultural environment surrounding the consumer including influences from experienced consumers within the family, friends, neighbours, social class (income, education and occupation), culture and sub-cultural memberships (e.g.. CHRIS, 1993, p. 305, SCHIFFMAN & KANUK, 2000, p. 200).

In this study of the marketing of *U. kirkiana* and *S. cocculoides* IFs, elements of input as mentioned above, and how they influence preferences, consumption and purchase behaviours will be assessed. For example, the effects of disposable income on preferences and willingness to pay and buy for the fruits in question will be closely examined. This is because disposable income is one among important economic factors influencing demand. Consumer theory suggests that people with high disposable income have high ability to pay for a product compared to those with low disposable income (e.g. PENSON, et. al., 1999). Therefore, knowledge in the relationship between disposable income and consumption and purchase behaviours of indigenous fruits will facilitate in designing suitable marketing strategies to target respective income groups of consumers.

Apart from disposable income, other sociological aspects such as age, race, education, family size, marital status and gender will be considered to understand attitudes, preferences and learn the influence of these factors in consumer decision to purchase indigenous fruits. Theory proposes that individuals belonging to similar age, race, education, family size, marital status and gender behave alike and different from their colleagues because they share the same background characteristics, roles and hence needs (WELLS & PRENSKY, 1996).

According to HOWARD & SHETH, (1969), upon receiving the input information about a product, the consumer's decision process to purchase moves to perceptual constructs stage consisting of four elements, stimuli ambiguous, overt search, attention and perception bias. A stimulus ambiguous is a level at which a consumer receives a vague message and therefore

forced to search for more information. However, in this task of searching for information a consumer might be subjected to a perception bias.

The perceptual model sequentially influences the third stage, which is the learning devices directly related to the product in question. These affect the satisfaction of the consumer's perceived needs (motivation) which later direct the criteria for choice of the product. Brand comprehension succeeds criteria for choice, which also influences the attitudes towards the product. Hence, in this study, attitudes and perceptions will also be examined. According to consumer theory, attitudes are individual's internal expressions of inner feelings and opinions that show agreement or not to a given product or service. They are outcomes of psychological processes therefore can only be said or observed from what people do (e.g. SCHIFFMAN & KANUK, 2000, p. 200).

Since attitudes are a function of important beliefs, which are mental or verbal statements, that reflect a person particular knowledge and assessment of a product, they can be experienced and changed over time. That is why consumers evaluate alternative products and services based on prior knowledge of the attributes and the benefits offered by the product in the past. So far, despite an indication that demand of indigenous fruits in Southern Africa is affected by the negative attitude towards forest collected products (BRIGHAM, et. al., 1996), there has been no efforts to identify other attitudes leading to preferences of the fruits by consumers. Attitudes towards indigenous fruits' consumption are an important mediator in developing effective marketing decisions such as advertisement or price change. Experiences show that market performance can be improved through manipulating the factors behind negative attitudes towards products (ENGEL & BLACKWELL, 1982). Therefore this study on the marketing system of *U. kirkiana* and *S. cocculoides* fruits will explore attitudes and suggest alternative strategies to improve the negative ones in order to increase demand.

Based on Fig. 2.2, the attitudes held and the evaluations carried out will determine the level of confidence leading to buy the product, and in the process attitudes and confidence lead to intention to purchase the product. After purchase, a consumer tries to give feedback on whether or not the need has been satisfied. The fourth stage of the decision process is output which is a sequence of events including attention, brand comprehension, attitudes, intention and finally purchase.

Finally, to predict future demand, marketers will also be interested to know if consumers buy the fruits as snacks or buy them for major meals. Hence, knowledge on the usage situation of the fruits will be inquired. Information such as the objectives of consuming the fruits, frequencies of purchase and quantities bought will be inquired.

In brief, to assure implementation of a successful marketing strategy for the marketing of *U. kirkiana* and *S. cocculoides* indigenous fruits, knowledge on consumer needs is a prerequisite. This information will be acquired by analysing the theory of consumer behaviour. Apart from needs, consumer behavioural analysis will facilitate an understanding of consumer attitudes, factors affecting preferences and willingness to pay for the fruits. So far there has been no study in Africa, which tried to examine consumer behaviour with respect to *U. kirkiana* and *S. cocculoides* indigenous fruits. But, the information is crucial in determining the future of research on conservation and domestication of the fruit trees.

The analysis of the production-to-consumption system was made feasible through data collection conducted during the 1999/2000 and 2000/2001 fruit ripening seasons. Informal and formal tools have been applied to generate information for simple descriptive and more sophisticated multivariate analyses.

3 METHODOLOGICAL APPROACH

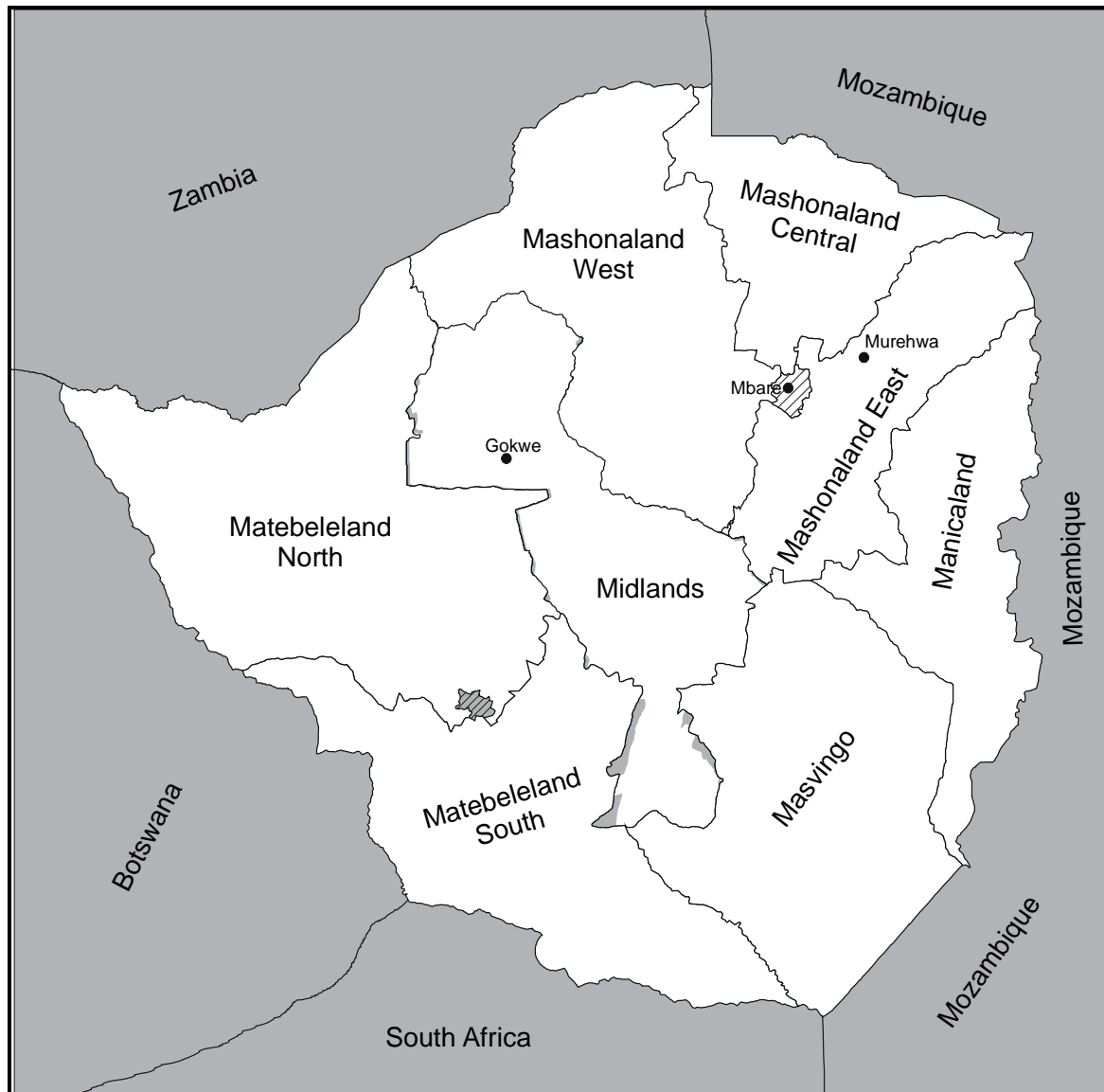
A stepwise data collection procedure was followed. To start with there was need to compile the existing information on the marketing of indigenous fruits in Zimbabwe to help in refining and getting a clearer picture of the research problem and suggest hypotheses leading to carrying out the detailed market study. Therefore, a review of literature and analysis of secondary data were conducted. Apart from gaining some preliminary knowledge on the marketing activities and constraints, the exercise gave ideas on the potential sites for the study, which were considered during site selection.

3.1 SITE SELECTION

In order to collect reliable and sufficient data on the trading activities and consumer behaviour, specific sites were selected. First of all, an exploratory survey of the potential areas of production and marketing activities of *U. kirkiana* and *S. cocculoides* fruits including Masvingo, Marondera, Murehwa, Gokwe and Harare districts was carried out. Since secondary information revealed that the marketing activities are carried out in both rural and urban markets, two rural district markets and one urban, central market were selected. These are Murehwa and Gokwe growth point markets in the rural districts of Murehwa and Gokwe respectively, and the third one is Mbare central market in Harare urban district (Fig. 4.1). In addition, sites were selected using the expertise of ICRAF and DRSS staff located in Zimbabwe.

Apart from the rural and urban locations of the markets, other major distinguishing attributes of the three sites and markets are, Murehwa unlike Gokwe is a prominent site for production and marketing of *U. kirkiana* fruits. Specific sites involved in the study in Murehwa are villages of Ward⁵ 16, Murehwa growth point and Diza roadside markets. Subsequently, the study on the marketing system of *U. kirkiana* and *S. cocculoides* indigenous fruits is a complement of the study on production economics of the same fruits conducted by Mithöfer (forthcoming) which was being conducted at the same time. Therefore, the other reason for selecting Murehwa site was to get a continuity of events from production on-farm to marketing off-farm.

⁵ An administrative unit below a district



● = Study markets

Figure 4.1 The map of Zimbabwe showing study markets

Nevertheless, because in Murehwa *S. cocculoides* fruits are rare, Njelele ward in Gokwe district was selected to study the marketing of *S. cocculoides* fruits. Markets involved in Gokwe are Gokwe growth point and Bomba roadside markets. Harare urban district was also selected because it hosts the central market known as Mbare, which deals with selling all types of indigenous fruits in the country and also it is a major destination of *U. kirkiana* fruits from Murehwa site.

In order to study consumer characteristics, their attitudes, preferences and willingness to pay and buy the fruits, sites for consumer survey were selected based on stratified sampling procedure on grounds of disposable income. The selection procedure was expected to give an insight of the relationship (if any) between the existing income levels and willingness to pay for indigenous fruits. Therefore, in Harare urban district, three strata namely Mbare central market, City Botanical gardens and Westgate shopping centre were chosen assuming to represent low, medium and high income classes respectively. In Murehwa and Gokwe rural districts, Murehwa and Gokwe growth point markets were selected. In addition to income, it was also presumed that individuals within each of these strata share other characteristics such as geographical location, which affect the consumption of indigenous fruits at a similar rate.

After the site selection, an immediate task was to acquire the information about *U. kirkiana* and *S. cocculoides* indigenous fruits' marketing systems. Since there was not much information from literature and secondary data, Rapid Market Appraisal (RMA) techniques were applied.

3.2 RAPID MARKET APPRAISAL AND FORMAL SURVEYS

Rapid Market Appraisal (RMA) is a procedure for analysing commodity markets using a combination of informal techniques such as individual and group informal interviews, direct observations and participatory rural appraisal tools (SIMMONS, et. al., 1994, p. 13). The framework is best suited to research studies in which either little research has been done before, poorly conducted or needs an update (HOLTZMAN, et. al.,1993). Its strength includes its practicability on identifying and sharpening research problems and ranking them according to importance. It can also detects emerging issues, themes and opportunities facing marketing systems. So far, the framework has been widely used to analyse market systems. Examples are the analysis of fallow production systems, fuelwood and charcoal markets in Asia (PADOCH, 1988; FAO, 1991; & FAO, 1993).

In the study of the marketing system of *U. kirkiana* and *S. cocculoides* indigenous fruits, RMA techniques applied include direct observations and informal discussions with stakeholders including traders, policy makers and consumers. The results obtained from RMA assisted in a more systematic investigation of the marketing system of the two fruits. In addition, RMA gave some ideas on the future opportunities and constraints facing the IFs

marketing system, including the institutional arrangements guiding the use of the fruits. However, due to methodological deficits and the need for detailed marketing, policy and consumer analyses, data collected by RMA was not sufficient. Therefore, formal surveys were performed in order to gather primary data for in-depth economic analysis. Hence, trader, policy leaders and consumer formal questionnaires were designed based on the RMA findings and interviews held.

It is obvious that probability sampling allows a random selection of elements, each with non-zero chance of being selected for the sample and hence produces good representation of the population. However, due to the descriptive nature of this study, purposive sampling was used to select traders and policy makers for the formal discussions. For the consumer formal interviews, questionnaires were administered to anyone found in the identified strata (as explained in subchapter 3.1) provided the consumer is willing to provide information.

3.3 CONJOINT EXPERIMENT

Since the goal of this study is to improve the marketing activities, there is need to evaluate the consumer side of the production-to-consumption system in details. This is because consumers are the most important elements of the system. If consumers are not interested in indigenous fruits, there is no need to increase production. In this case, apart from the consumer informal and formal surveys, a conjoint experiment was conducted to find out the type of fruits preferred by consumers, which will serve as a guide in explaining consumers' willingness to pay and buy the fruits.

3.4 A FRAMEWORK OF DATA ANALYSIS

The data collected from all the techniques explained in subchapters 3.2 and 3.3 are subjected to simple descriptive statistics and advanced multivariate analyses.

3.4.1 Descriptive Statistics

In order to describe the extent of the prevailing marketing activities for *U. kirkiana* and *S. cocculoides* indigenous fruits, the different elements of structural characteristics are analysed using simple descriptive statistics. Thus traders and their characteristics, prices, costs and profits are calculated. Based on the information gathered from policy makers, the existing institutions are also summarised.

3.4.2 Analysis of Consumer Behavior and Willingness to Pay

The analysis of marketing activities is entirely conducted by descriptive statistics. But due to the complicated nature of the information to be extracted from consumers, a variety of advanced multivariate procedures including factor, logistic regression, conjoint and cluster analyses need be applied. These will facilitate the identification of characteristics of consumers against non-consumers and buyers against non-buyers, find the type of fruits preferred by consumers and finally segment the consumers for the purpose of easy design of the marketing strategies focusing at the right target groups.

3.4.2.1 Factor analysis

During the survey of the marketing systems of *Uapaca kirkiana* and *Strychnos cocculoides* indigenous fruits, many questions were asked in order to measure consumer attitudes, opinion and beliefs. Therefore, the first step is to reduce the number of variables and develop factors to represent the related variables. This task can be conducted by factor analysis, a technique used to analyse interrelationships among large numbers of variables and explain them in terms of their common factors. It summarises information contained from a number of originally recorded variables into compound variables called factors, consisting of few variables having similar meaning. The technique comprises of a number of steps; however, the major ones include the computation of the correlation matrix, assessment of the factor values, extraction

and rotation of the factors (HAIR, et. al., 1998). The factors will further be incorporated in the identification of consumer attributes associated with consumption and purchase behaviours of the fruits. Despite the limitations associated with this technique, factor analysis has been used in a number of research studies to develop consumer profiles towards attitudes and preferences on products to forecast consumer behaviour (CHURCHILL, 1999 p. 858).

3.4.2.2 Logistic regression

In order to improve demand, a marketing strategy should be formulated. So, there is need to identify the socio-economic characteristics associated with consumption and purchase behaviours. But, in the study of the marketing systems of *U. kirkiana* and *S. cocculoides* fruits, the dependent variables for consumption and purchase behaviours are dichotomous holding the values of 1 for “yes, I do consume or purchase” and 0 for “no, I don’t consume or purchase”. Therefore, in this case, logistic regression is appropriate. Logistic regression has been used in a number of preference, household related and tree planting studies both in Europe, America and Africa. Examples of such studies include the assessment of tree planting behaviour in Kenya (DEWEES, 1991), economics of non-timber products and several marketing researches in India and Europe.

3.4.2.3 Conjoint analysis

After knowing the characteristics of consumers, buyers and their counterparts, it is necessary to identify the type of fruits they prefer for the purpose of recommendations on product development and market improvement. In such case, a conjoint analysis is applied. Conjoint analysis is a multivariate technique designed to measure the way consumers attain preference for a particular product or service. The analysis was selected assuming that like any other product, indigenous fruits purchasing environment is a subject of choice among a set of fruit multi-attributes, therefore conjoint analysis will measure the way consumers attain preferences of *U. kirkiana* fruits based on the concept of utility. The analysis will decompose the consumer preference structure (dependent variable) by using the associated attributes at different levels of the product as given by the respondents (HAIR, et. al., 1998). Finally it will identify the preferred combination of attributes and levels, specific features of the combination that influence the preference and the relative importance of each attribute for each respondent. Therefore, using data collected during the conjoint study, part worth

coefficients, which indicate the influence of each attribute level on the respondent's preference, will be estimated.

Conjoint analysis has been introduced in consumer research in 1975 (WIERENGA & VAN RAAIJ, 1988). So far it has been used in a number of cases to identify products' features most desirable to consumers. Besides it has been used to evaluate new product opportunities and concepts based on preferences. Different users of conjoint analysis also use the method to measure the acceptability of new products in order to target product development to the desired beneficiaries (JANSEEN, et. al., 1991). The analysis has been widely applied in the world including Germany (v. ALVENSLEBEN & SCHRADER, 1998), Australia (JOHNSON, et. al., 1991), Ireland (MURPHY, et. al., 1998), United States and United Kingdom (LOADER, 1990) and in Colombia (JANSEEN, et. al., 1991).

3.4.2.4 Cluster analysis

Preferences differ because consumers have different characteristics and hence needs and desires. In such case, aiming at improving sales by targeting the whole market is not practical. Therefore, it is necessary to group the consumers into distinct divisions with different preference structures and characteristics/behaviours, which might require different products or marketing mixes. In this study about marketing of the two IFs, the individual's utilities or part worths estimated in the conjoint analysis are clustered by the use of cluster analysis and socio-economic characteristics of each group summarised (MASSART & KAUFMAN, 1983, CHURCHILL, 1991, GREEN & KREIGER, 1991) using cross tabulation.

There are two types of cluster analyses commonly used, hierarchical and non-hierarchical or K-Means clustering methods. Hierarchical clustering method involves the construction of hierarchical structures consisting of separate groups and makes use of both quantitative and qualitative variables to form the divisions. In this case, clusters can be formed by the application of different approaches including agglomerative, divisive, single, average, complete linkage and wards or centroid methods. Although the method is popular, its major problem is, it cannot handle large data sets (HAIR, et. al., 1998).

Non-hierarchical clustering uses only quantitative data and measures similarities between variables by use of Euclidean distance. In this method, prior specification of the number of clusters and cluster centres (cluster seeds) is a pre-requisite. Following the selection of the

cluster centres, sequential, parallel threshold or optimisation methods can be used to arrive at the final clusters. However, selection of the cluster seeds for K-means clustering is a difficult task, but the method is a bit faster and consumes less computer time. In addition to that, K-means clustering analysis accommodates large data sets and the output is more reliable because the method encounters the effects of different distance measurement techniques and outliers (CHURCHILL, 1999, HAIR, et. al., 1998).

In this study, cluster analysis is used to group buyers of *U. kirkiana* fruits for future targeting specific consumers for appropriate marketing mix. Both hierarchical and non- hierarchical clustering methods are used. The first one is used to establish the number of clusters and the latter to give the final groups including cluster membership. Finally, each group is described by means of socio-demographic variables allied to it.

4 EMPIRICAL ANALYSES

Indigenous fruits of Zimbabwe are native to southern Africa region and usually grow naturally in the wild. Like in other countries in the region, the major source of these fruits in Zimbabwe is the Miombo Woodlands, which covers about 5% of the total land area of the country (EC-FAO 1998). Miombo Woodland is an extensive vegetation type covering central and southern Africa. It covers Mozambique, Angola, Zimbabwe, Zambia, Tanzania, Malawi and Democratic Republic of Congo (MILLINGTON, et. al., 1986).

Uapaca kirkiana and *S. cocculoides* are among the 50 indigenous fruit tree species growing naturally in the regional woodlands providing a wide range of products to the rural communities of Malawi (MAGHEMBE & SEYANI 1992), Tanzania (KARACHI, et. al., 1991), Zambia (KWESIGA & CHISUMPA, 1992) and Zimbabwe (ENDA, 1991). The products consist of fruits for consumption and selling, traditional medicines, fence materials, poles, timber, fuel, fodder, manure and wood for carving. However, the extent of consumption and marketing are not known. Therefore, to get a clearer understanding of the two aspects, marketing and consumer analyses including trading mechanism, consumption patterns, beliefs and attitudes, preferences and willingness to pay for *U. kirkiana* and *S. cocculoides* indigenous fruits, are dealt with at length, as explained in the coming subchapters 4.1 and 4.2.

4.1 MARKETING ANALYSIS

Marketing analysis is conducted to know the process under which individuals exchange the fruits. In this study it includes the description of the potential sellers comprising of producers, retailers and wholesalers, how they design the products, set prices, promote them, store and finally deliver to the consumers. In addition, the analysis considers the constraints faced by the actors, incentives realised and institutional arrangements under which the exchange system operates. Therefore, to acquire this information, a stepwise data collection procedure (literature review, secondary data analysis, RMA and formal surveys) is applied in order to fill the SCP concept.

4.1.1 Data Collection for the Marketing Analysis

4.1.1.1 Secondary data and RMA

To gain a preliminary understanding of the marketing system, a review of literature and analysis of secondary data relevant to marketing of indigenous fruits was conducted. The activity was conducted to compile existing knowledge on the marketing system, which could lead in refining the research problem, and suggest hypotheses directing to carry out the detailed market study. Therefore, available studies from the university departmental libraries of Agricultural Economics, Social Sciences and Institute of Environmental Studies (EIS) were searched. Also, information from the Ministry of Agriculture offices of Extension (AGRITEX) and Department of Research and Specialist Services (DRSS), Forestry Commission and National Bureau of Statistics were reviewed. Other data from the international organisations specifically Centre for International Forestry Research (CIFOR), Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)-Indigenous Resource Management Project (IRMA) and World Wildlife Fund (WWF) were analysed. The review of secondary literature provided an opportunity to learn about the general organisation and performance of the existing marketing systems of mainly exotic fruits and vegetables, but very little information on IFs was acquired. However the information on IFs marketing gave some light on how to formulate primary hypotheses on the research question.

The review of literature and analysis of secondary information were followed by RMA, which included individuals and group informal discussions with the stakeholders of indigenous fruit trees research and development. These were representatives of ICRAF, researchers of the University of Zimbabwe, officials of the Ministry of Agriculture and Forestry Commission. Others are administrators from CIFOR and GTZ Project. The discussions enriched the researcher knowledge and understanding on the status of indigenous fruits and products marketing and processing. However, the information collected was not sufficient to give a clearer picture of the structural organisation and performance of the marketing system of the fruits.

Consequently, RMA was extended to traders of indigenous fruits. Informal discussions with producers found at their homes, retailers and wholesalers on the markets were held. Since the fruits were not yet on the markets, the discussions were conducted with traders of exotic fruits

and vegetables, but claimed that they usually sell indigenous fruits when they are in season. For the purpose of consistency and uniformity (HOLTZMAN, et. al., 1995, p. 54), the informal interviews were carried out using guideline questions listed in Appendix 4.1. The questions inquired on the type of participants involved in each market stage, type of products on sale, processing activities, entry and exist barriers to the markets of indigenous fruits. Also information on presale practices (sorting, packing and grading), price determination, mode of payment, market outlets, selling and buying prices and other costs incurred were inquired. And finally, constraints and incentives faced by different market participants were asked. For example to get an idea of the existence presale activities before taking the fruits to the market, traders were inquired:

Do traders conduct any presale activities before taking their fruits to the market? If yes which ones?

So, at the end of the RMA exercise, a substantial amount of data was collected. Despite gaining preliminary understanding of the system, research problem and hypotheses were refined. However, the data obtained from secondary data sources and RMA could not be used in detailed marketing investigation including testing of the identified hypotheses. This is because the data was highly susceptible to biases, which could lead to difficulties in judging the quality of the results. Hence, traders' formal surveys were designed and conducted to collect primary data to supplement the gathered information, acquire bases for generalisation about the wider population and test the hypotheses. The information collected from rapid market appraisal therefore aided in setting up the questionnaires for formal interviews.

4.1.1.2 Traders formal survey

Although the objective of conducting traders' formal survey is to collect primary data, the fact that the marketing study is descriptive in nature, (that means it aims at gathering information to describe the marketing situation, problems and opportunities), induces the traders' survey to remain exploratory. Therefore, probability sampling was not possible because of three major reasons. First, there was no prior information on the actors involved and where to find them. Second, the business is still pre-mature and hence only few traders (compared to the exotic fruits) scattered within the major production and marketing areas are involved. Third, there are strong customary laws at village level, which hamper trade of indigenous fruits

(explained in details in subchapter 4.1.7.2). So, in this situation, purposive non-probability sampling was an option (BACKSTROM & CAS'ER 1981).

In this sampling plan, people who were seen selling and transporting *U. kirkiana* and *S. cocculoides* indigenous fruits were believed to be the representatives of the population of interest. These were deliberately targeted for interviews because it was assumed that they could offer some perspective on the research question, through providing information on what they were doing. The sampling technique could be classified as some sort of population census because initially all traders present at the market were aimed at being interviewed. But few traders rejected to be interviewed on either fear that they might be reported to the traditional leaders, being spied by the government to take over the business or were too busy for interviews. Therefore, selection of the 180 traders was not only based on respondents' availability at the markets and involvement in the marketing activities, but also their willingness to answer the questions.

In the formal interviews, detailed questions were asked in order to identify and quantify the different marketing activities at each stage. Questions administered to traders inquired on the sources of fruits, labour requirements for collection and presale activities, quantities collected, the practised presale activities such as sorting and packing, quantities sold and the markets to which the fruits were sold. For example, in order to understand the extent of presale activities as a means to product differentiation, some categories were included in the open question asked in the informal interview regarding the same problem. This was done in order to quantify the traders and identify common practises. Therefore, traders were asked:

“Do you conduct any presale activity for your fruits before taking them to the market? Yes? No? If yes, which ones? Wash? Sorting? Grading? Packing? Why do you conduct them? If No, why?”

Other information asked was the type of transport to the market, prices, their determination and mode of payment, preferred customers, benefits, constraints and suggestions for improvement of the indigenous fruits' markets. Lastly in order to understand the bio-data of the traders, demographic characteristics such as age, marital status, education and tribe were also queried (Appendices 4.2 – 4.4). Since demographic questions are regarded as sensitive data to the society, in this study they were placed at the end of the questionnaires to avoid

unnecessary tension at the beginning of the interviews. Also, considering the limited knowledge on the existing marketing system of the two fruits, most of the questions in the traders' and policy makers' (Appendix 4.5) questionnaires were open-ended to allow flexibility of responses.

All traders' survey questionnaires were pre-tested to remove ambiguities, irrelevance, awkwardness, long and difficult questions. Results of pre-testing were used to determine the logical sequence of the questions, restructure the questionnaires wherever necessary and verify time management. Pre-testing also revealed respondents' general understanding, perceptions, attitudes and opinion on the subject of IFs marketing. The pre-testing activity was conducted at the 3 selected sites for traders' surveys. A sample of 5 respondents for producers, retailers and wholesalers were interviewed for pre-testing purposes.

In order to gather administrative information, market infrastructure, problems and future plans, a formal questionnaire (Appendix 4.6) was administered to district administration officers of Murehwa, Harare and Gokwe. For example, in order to know the type of market equipment such as storage facilities in use, the following question was addressed to the administrators:

“Which type of equipment and numbers are available in the market?”

Future plans for the markets were also revealed through the following question:

“Are there any plans to improve the market and its services for the next 5 years? If yes, which ones and how?”

In addition to formal surveys, direct observations on the business transactions at all marketing channels were conducted. And to complement the survey information, prices were monitored weekly to fill the knowledge gap on price trends.

The different data collection stages provided a substantial amount of information on the prevailing activities of the marketing system, including constraints and incentives associated with the system. Furthermore some highlights on the institutional arrangements under which the system operates were revealed. Therefore, in the following subchapter, theory is merged with the actual situation on the ground in order to describe the market structural characteristics like product attributes, marketing channels and entry barriers. Also economic

theory is applied to assess the market conduct including the market power, competition, transparency and preferences. In addition, performance indicators such as prices, costs, profits and market margins are dealt with. Taking into consideration the importance of each of these components of SCP concept and facilitate easy understanding of the flow of events, structural characteristics are discussed in a separate subchapter but conduct and performance merged together.

4.1.2 Analysis of Market Structure

In the analysis of market structure, this study is trying to describe the environment in which the marketing activities occur. According to figure 2.1, the structural elements considered in this study are number of sellers and buyers and their distribution (market concentration), product differentiation, entry and exit barriers and marketing channels. The narration of these factors is important because they have an influence on the nature of competition and pricing behaviour of the markets. Also the knowledge of the market structure of indigenous fruits can be used in classifying the markets into either perfect or imperfect competition. Perfect competition is an economic market model characterised by a large number of both sellers and buyers, each seller supplying a small portion of the market and hence unable to influence prices and end up being price takers. All sellers offer a homogenous product that means product differentiation and preferences are non-existence, and everybody have full knowledge of market information such as prices, product quality and consumer demand (e.g.. PENSON, et. al., 1999). A deviation from any of these characteristics forces the market in question into an imperfect competition situation. Therefore, the following subchapters are summarising the features of *U. kirkiana* and *S. cocculoides* indigenous fruits market structure as per information gathered using all the tools applied in data collection discussed earlier. The subchapters also conclude on the market structure basing on the deviations from characteristics of perfect competition.

4.1.2.1 Market structural information from secondary sources

Information gathered from secondary data and informal discussions, suggests that marketing is the second largest use of *U. kirkiana* and *S. cocculoides* indigenous fruits, after consumption. Although selling of these fruits is not a traditional practice in Zimbabwe, during the ripening season, the fruits are widely sold in both rural and urban markets. High rate of

unemployment associated with economic hardship in the country force people to sell the fruits to generate additional income to supplement other sources of cash. In some cases marketing indigenous fruits has made some people to live as indigenous fruit traders.

Therefore, the two indigenous fruits under this study together with other indigenous fruits such as *Lannea edulis*, *Ziziphus mauritiana*, *Azanza garkeana*, *Adansonia digitata*, *Tamarindus indica* and *Berchemia discolor* have found their way to the rural and urban markets. However, like the source of indigenous fruits for consumption, almost all fruits for selling are harvested from the natural forests and only few from producers' conserved trees on their crop fields. Despite the tree ability to grow in harsh environmental conditions without inputs, it is not a tradition of producers in the region to plant indigenous fruit trees to increase yields and hence market supply. Out of 54 producers interviewed during this study of marketing *U. kirkiana* and *S. cocculoides* fruits, only five have attempted to plant⁶ one or two trees of *U. kirkiana*, *S. cocculoides* or *A. garkeana* indigenous fruits. Different studies have revealed the reasons attributing to this behaviour. Among them is lack of marketing opportunities for the fruits (MAGHEMBE, et. al., 1998). This suggests that expanding marketing activities may act as an incentive for producers to invest in planting the fruit trees to increase market supply.

Also, some preliminary observations in Zimbabwe have indicated that the marketing system of indigenous fruits is still informal dominated by women and children who generate income for farm inputs and other household needs (GUMBO, et. al., 1989). Therefore, there is a danger that when formal marketing activities are introduced, government interventions and access to the business by the high capital investors will increase efficiency, which will drive away the low capital traders including poor women and children. Furthermore, recent developments in the marketing institutions of Harare city council include the relaxation of certain vending by-laws to allow retrenched employees and spouses to sell produce to make ends meet (THE SUNDAY MAIL, 1994). This act has facilitated the increase in number of vendors in the city. Although the change of this institutional arrangement might be seen as weakening the formal fruits marketing system, all the same, it has strengthened the informal sector favouring the current indigenous fruits' trade.

⁶ For more information on planting, see Mithöfer report on the production economics

However, considering the overall objective of this research, that is to generate baseline information to be used in the expansion of marketing opportunities, the information reported above on the existing marketing system of indigenous fruits is not sufficient. But it may serve as a background information that has to be refined and filled with detailed information by informal and formal surveys. Major characteristics of the market structure including key players, market concentration, product differentiation, processing activities, entry and exit barriers, and marketing channels are missing. In addition, institutions regarding the user right of the fruit trees and fruits are not explained. Therefore, the following section is trying to describe the market structure using information generated from the detailed formal surveys. But before trying to explain the parameters of the market structure, there is need to conclude on the choice of the markets under study.

4.1.2.2 Selected markets

The outcome of discussions held with the District Executive officers and staff members suggest that the choice of the markets under study was successful. Apart from the differences in the extent of production and marketing activities, a number of other contrasts and similarities in administration, capacities, benefits and problems exist between the three markets. The diversity ensured the capturing of information in different market set-ups and also helped in explaining some of the results obtained afterwards.

Starting from Mbare market, it is the central market for Zimbabwe, located in Mbare suburbs in Harare Urban District in Mashonaland West Province. The market serves the whole country with an average of 10,000 customers per day. On an average day, the market consists of 1200 producers coming from all over the country, 700 retailers and 155 wholesalers (NDINGINDWAYO, 1999). The marketing activities are guided by the Government of People Market Act of 1983 which gives a provision of any citizen to apply from the district council, for a non-transferable stand, in which the trader will be responsible for the cleanliness and hygiene. With respect to indigenous fruits, the market sells all types of indigenous fruits including *U. kirkiana*, *S. cocculoides*, *Z. mauritiana*, *Syzigium sp*, *Azanza garkeana*, *Adansonia digitata* and *Berchemia discolor*. Producers, retailers and wholesalers pay Z\$ 33 per day, Z\$ 495 and Z\$ 550 per month respectively to sell their produce in this market.

In contrast, Murehwa is a rural market located in Murehwa growth point in ward 30, in Murehwa Rural District, Mashonaland East Province. The market serves 130,801 people, living in 21,936 households from Nheweyembwa (wards 1, 2, 3, 4, 5, 10), Mukarakate (wards 17, 18, 19, 20, 21), Chamachinda (wards 11, 14, 15) and Zihute (wards 8,9,16, 30). The latter contributes to the majority of customers of the market. In addition, the market serves passengers travelling on Harare – Mutoko and Harare – UMP roads. In this market, retailers and producers pay Z\$ 25 per month while wholesalers pay Z\$ 100 per month to occupy a cubicle to sell produce. According to the MUREHWA DISTRICT CHIEF EXECUTIVE OFFICER, (1999), the differences in these prices are due to the fact that the wholesaler cubicles are new compared to the rest. Common IFs on sale at Murehwa are *U. kirkiana* and *Berchemia discolor*.

Gokwe market is also a rural market situated at Gokwe growth point, Gokwe South District in Midland Province, and serves a total of 251,321 people from 27 wards. On an average day, the market consists of 50 producers, 89 retailers and 22 wholesalers. The potential indigenous fruit on the market are *S. cocculoides*, *U. kirkiana* and *Berchemia discolor*. Producers coming to sell in this market pay Z\$ 20 per day, while retailers and wholesalers pay Z\$ 104 per month.

Despite the differences, there are also similarities. The three markets are all administered by District Chief Executive Officers of their respective districts. Marketing committees, accountants and security guards assist the officers. The accountants collect market fees and the security guards receive problems as they arise from traders and ensure security in the market environment. All the markets under study operate daily including weekends and public holidays and sell crops and non-crop commodities ranging from green vegetables, legumes, tubers, exotic and indigenous fruits. Non-crops are farm equipment, livestock and products, clothes and electrical products. Traders pay market fees, which are used as a source of district council revenues and therefore spent for salaries of the district council workers and upgrading different district structures including building more market cubicles. But still, the markets have serious problems such as lack of adequate infrastructure like electricity and storage facilities. These similarities and differences show that the study markets were well chosen and hence will give a wider picture of the activities of the IFs marketing system in the country. Consequently, the following subchapter discusses the participants of the marketing system.

4.1.2.3 Participants of the marketing system

As mentioned in subchapter 4.1.2, the number of sellers and their distribution (market concentration) is an important element in explaining the market structure. However, there was no secondary information regarding the aspect. Information gathered from informal and detailed formal surveys suggests that the marketing system of *U. kirkiana* and *S. cocculoides* indigenous fruits in Zimbabwe is still in its infancy stage compared to exotic fruits. Moreover, it consists of numerous sellers and buyers. For *U. kirkiana* fruits, producers/collectors, wholesalers, retailers, vendors and consumers dominate the system. The participants are similar to *S. cocculoides* fruits marketing, but during the period of this study (1999/2000 ripening season), the by-law restricting marketing of the fruits in Gokwe was so strong that the enumerators could not find anyone who could be classified as a wholesaler.

However, there are no clear cuts on activities carried out by different actors in the marketing system of the indigenous fruits (Fig. 4.2), as some retailers and vendors may also collect the fruits for selling. However, results reported in this study are based on producers/collectors as people who collect the fruits from the communal forests and sell to wholesalers, while retailers are those who buy from the wholesalers and sell in small quantities to consumers. Wholesalers are people, who buy from the producers/collectors, transport the fruits to Harare and sell to retailers and vendors or sometimes to consumers. While retailers are formal traders with permanent cubicles in the central or growth point/district markets in which they pay monthly fees, vendors are informal who sell their fruits along the highways, roadsides, on streets and around the market locations, where they don't pay tax. In some cases, village agents are assigned by wholesalers to collect *U. kirkiana* fruits from the producers/collectors and pile them at certain collection points for the lorries to transfer the fruits to the central market.

The demographic characteristics of the traders show that most of them belong to the working force (the retiring age in Zimbabwe is 65 years) of the country which is between 18 to 65 years old (Table 4.1). Considering the occurrences of different age groups across the trading stages including production/collection, retailing and wholesaling, results show that there are at least 15% children in retailer section. But children do not exist in wholesaling and production sections. This might be caused by the amount of labour and capital investments especially transport and transaction costs incurred in the two marketing stages. The same reasons can assist in explaining why people above 65 years are not involved in the wholesaling activities.

Table 4.1 Demographic characteristics (% respondents) of *U. kirkiana* and *S. cocculoides* IFs traders

Characteristic	Producer (n = 54)	Retailer (n = 117)	Wholesaler (n = 9)
Age			
• Children (1-17 years)	-	15	-
• Worker (18-64 years)	94	84	100
• Retired (> 64 years)	6	1	-
Marital status			
• Single*	30	33	11
• Married	70	67	89
Formal education			
• 0 years	17	3	-
• 1-13 years	83	95	100
• > 13 years	0	1	-
Sex			
• Male	32	21	79
• Female	68	79	22
Family size			
• ≤3 people	9	19	-
• 4 - 6 people	24	44	22
• > 6 people	67	37	78

Source: Traders' formal survey, 1999/2000

Percentages, which don't sum to 100 are due to rounding up errors

*Includes unmarried, divorced, separated and widowed

The marketing system of the two indigenous fruits consists of people representing the typical Zimbabwe population in which the literacy level is 85% (ZP, 1999). Large percentages of traders have spent one to 13 years in formal school, possibly because of the high numbers of young traders below the retirement age in the sample. The two factors namely young age and medium education might facilitate the possibility for future expansion of the marketing activities because young and educated people can more easily risk trying marketing innovations to increase marketing opportunities than the non-educated competitors.

The marketing system is also characterised by a large percentage of females in production and retailing sections, but many males in wholesaling level. This might be caused by the fact that

the IFs marketing activities are still in their early stages and hence less returns are generated for more men to take large part. However, literature suggests that this situation might be attributed by the fact that women have high incentive towards the trade because their husbands allow them to control the money that is obtained from wild fruit sales (GUMBO, et. al., 1990). This fact is also supported by studies from South central Africa, where it is reported that women are only allowed by their husbands to control the money from wild fruit sales even if sold exotic fruits too (PACKHAM, 1993). Other examples from the production and marketing of shea nuts in Uganda, palm processing in Brazil (CLAY, 1997) and rattan weaving in Sarawak, East Malaysia (BROSIUS, 1995) have given three reasons explaining high women involvement in the sectors. The causes are either the activity is high labour intensive, rewards low returns to labour or it is possible to conduct the work near home to avoid labour conflicts with domestic chores. However, for the case of *U. kirkiana* and *S. cocculoides* indigenous fruits' marketing, further research needs to be done.

To provide an insight into the degree of the market power among the actors, market concentration is calculated (FERGUSON & FERGUSON, 1994, p. 39). According to literature, calculating partial concentration indices such as Herfindahl-Hirschman, Gini and concentration ratio (FARRIS, 1997, p. 147) could determine market concentration. Nevertheless, taking account of the available data being full of gaps and uncertainties, the market concentration of *U. kirkiana* indigenous fruits' interviewed traders is determined by concentration ratios (market share ratio). Economic theory suggests that increasing concentration is likely associated with increasing market power and decreasing competitiveness (POMERY & TRINIDAD, 1995, p. 222).

The procedure of estimating market share ratios is considering the estimated volumes of fruits handled by each seller, as a percentage of total fruits handled by all traders interviewed in the study at each market level including producers, wholesalers and retailers. Market concentration as a measure of market structure has been widely used. For example POMERY, (1989) and SCHEID & SUTINEN, (1981) successfully used this technique in the study of fish markets in Philippines and Costa Rica respectively.

The concentration ratios⁷ of participants in the marketing system of *U. kirkiana* suggest that the wholesale section has the least number of actors causing high concentration of market

⁷ Judgement scale according to German Monopolies Commission

sales and hence the greater the possibility of non-competitive behaviour. In this section, the largest trader supplied approximately 17% of the total volume supplied by wholesalers and the largest three traders gave 39% (Table 4.2) of the volume. These results suggest that in the 1999/2000 season, wholesalers had the market power, which could enable them determine the price for the fruits. But, this was not the case; wholesalers had the lowest profit (Table 4.10) possibly due to the high factor prices during that particular season. On the other hand they could not raise fruit selling prices to cover their costs in fear that retailers and vendors would opt to buy the fruits from producer.

Table 4.2 *Uapaca kirkiana* traders' market shares

Number of sellers	% individual shares	% Sellers	% Cumulative shares
Wholesalers (n = 9)			
1	16.78	11.11	16.78
3	11.11	33.33	39.00
6	11.11	66.67	72.33
Producers (n = 54)			
1	12.92	1.85	12.92
3	6.33	5.56	28.52
6	2.62	11.11	38.39
Retailers (n = 117)			
1	3.30	0.85	3.30
3	2.70	1.71	8.47
6	0.95	37.61	12.71

Source: Traders' formal survey, 1999/2000

The wholesaling situation was different from producer and retailer sections. At the producer stage, the largest producer supplied around 13% of the total fruits' volume delivered by all producers at the market while the largest three producers gave 29%. Retailer section contains the largest number of participants and hence low concentrated, a circumstance causing greater competition (FERGUSON & FERGUSON, 1994). In this case, the largest retailer sold around 3% of the retail volume and the largest three sold less than 10%.

Product differentiation is also an important element in explaining the market structure. The following subchapter therefore is giving the results of the type of products found on the

market. In addition, it discusses the different strategies used by various actors in the marketing activities to differentiate products to increase sales and raise profits.

4.1.2.4 Product differentiation and strategies

The only products of the indigenous fruits on the market are fresh fruits. During the 1999/2000 ripening season, no processed products for both *U. kirkiana* and *S. cocculoides* fruits were observed in the market. For all the two fruit types, natural differentiation into sizes and colours are prevalent in the markets. The fruits can be grouped into three sizes, comprising of small, medium and big. Common fruit colours for *U. kirkiana* are yellow (MWAMBA, 1995, p. 28 named them cream coloured fruits) and brown, while for *S. cocculoides* fruits greenish and yellow colours. Furthermore, due to lack of facilities, the markets also contain fresh and non-fresh fruits. According to consumers' informal discussions and personal observations, their fresh stem attachments can easily identify fresh *U. kirkiana* fruits and usually round shaped while the non-fresh are normally rough/shrunk with dry attachments. The dry stem attachments is the major criterion to identify non-fresh *S. cocculoides* fruits on the market, since they don't significantly shrink due to their hard shells.

At the producer and wholesaler levels, presale activities such as washing, grading and packing do not exist. After acquiring the fruits, producers and wholesalers sell them straight without any preparations for selling. This is because they believe that the fruits are already clean from the trees and hence don't need additional washing. This trend is similar to traders of *S. cocculoides*. But, about 90% of *U. kirkiana* fruit retailers invest their time and resources to further modify the naturally differentiated fruits. They conduct simple activities mainly separating the rotten fruits from fresh ones and wash them. In rare cases they sort the fruits according to sizes. Furthermore, they divide them into selling units ranging from 300g to 500g depending on the market and utensil used, and finally packed. The rest of retailers do not conduct the activities because in addition to the belief that the fruits are clean (4% retailers) they think that the practise of washing and packing in bags will enhance perishability (3% retailers) of the fruits (Table 4.3).

Results also show that, presale activities are not conducted to direct the price formation process, because only 8% of interviewed retailers, reported that they conducted the activities to facilitate charging higher prices. However, the practises are conducted to facilitate hygiene

environment for the fruits, and also traders use the activities as a preference strategy, as more consumers are attracted to clean, graded, packed fruits. But, apart from the indication that, the simple presale activities performed by the retailers do not influence pricing mechanism, they can be used as a directive to further improvement of the product differentiation process.

Table 4.3 Behaviour of conducting presale activities (% retailers) for *U. kirkiana* IFs

Site	Practise presale activities	Reasons for presale activities				Reasons for no presale operation	
		Attract customer	Hygiene	Raise price	All three reasons	Rot quickly	Clean already
Mbare (n = 48)	88	48	40	2	-	-	4
Gokwe (n = 35)	97	30	43	3	29	3	-
Murehwa (n = 34)	85	43	30	18	3	3	-
Average	90	40	38	8	16	3	4

Source: Traders' formal survey, 1999/2000

Figures in brackets are respondent number

The percentages don't add to 100 because the table shows the % of traders who mentioned the reason. The difference is the percentage of people who don't conduct the activity or indicated the reason

Questions asked: Do you conduct any presale activity for your fruits before taking them to the market? If yes, why conduct the activities? If No, why don't you perform the activities?

Furthermore, the findings suggest that the importance of the reasons differed across the sites. Attracting customers was the major driving force for Mbare retailers to conduct presale activities. This might be explained by the presence of competition between the indigenous fruits themselves and also from exotic fruits sold on the adjacent tables. The exotic fruits are widely sold in both formal and informal markets, but regardless of the market, they are well graded, sorted and packed. For Gokwe market, there are very few exotic fruits on the market. Due to the agro-ecological characteristics of this zone, there are few farmer initiatives to grow exotic fruits other than mango. Importing the fruits from other parts of the country is sometimes limited due to the remoteness of the area and poor road infrastructure. In such a situation, the marketing activities of indigenous fruits face less challenge due to the lack of competition. Therefore, retailers in Gokwe conduct the practises mainly aiming at creating hygiene environment for the fruits. However, apart from impressing customers, retailers in

Murehwa are performing the activities to raise prices. This is because the area produces much *U. kirkiana* fruits, therefore the market prices are low compared to other sites of the study.

The common unit of measurement for producers is a 20-litre bucket (11kg), but for the wholesalers the different sizes of *U. kirkiana* fruits are sold in tins with volumes ranging from five, 10 to 20 litres. However, detailed examination of the marketing activities, have found that the volume of the 20 litre tins varies among wholesalers. Some press the bases of the tins inwards to reduce the volume and hence the amount of fruits to be filled in the tins. At the retailing levels, the fruits are either packed in plastic bags or in plates, bowls, or cups weighing on average 300g at Gokwe, 400g at Mbare and 500g at Murehwa. However, between the markets and trading levels the quantities vary because of the various measurements used. Sometimes retailers sell the fruits in small tins ranging from 1.5, 2.5 and 5 litres. Selling of individual fruits by retailers is also common in Gokwe. Since *S. cocculoides* fruits are big, they are sold individually in all markets and divisions.

In brief these results indicate that the marketing system of indigenous fruits is still in its low developed stage compared to exotic fruits, where products are well differentiated into various qualities. For the indigenous fruits, there is no sophisticated product differentiation across traders of the same level, such that even traders cannot charge different prices. All of them sell fresh fruits consisting of mixed natural colours and sizes. But compared to production and wholesaling sections, there is an attempt towards differentiation at the retailing level in which, retailers wash, grade and pack *U. kirkiana* fruits. The major aims of these activities are to increase preference and improve hygiene standards. These are important activities and need be checked with the consumers to find out if they realise and appreciate them. Still in retailing division there are no differences between retailers, all pack in the same type of packing materials and varied quantities.

4.1.2.5 Marketing channels

Information on the existing marketing channels and outlets of *U. kirkiana* and *S. cocculoides* indigenous fruits is important in describing the market structure as outlined in subchapter 2.1. This knowledge will facilitate an understanding of the flow of the fruits from the origin (producer) to the final destination (consumer). Since there was no information regarding this

aspect gathered from secondary sources, the information reported here is entirely based on the informal and formal interviews.

Starting from the marketing chain of the *U. kirkiana* indigenous fruits, the producers/collectors at Murehwa villages are the first link of the marketing chain. They collect the fruits from the communal forests or from their own fields and sell to wholesalers, retailers and vendors. All wholesalers come from Mbare central market, but for the latter two types of traders they also come from Murehwa growth point market and other parts of Harare city. Informal discussions have also revealed that in other seasons wholesalers used to come from other parts of the country such as Kadoma and Bulawayo. However, due to the restrictions on the trade imposed by the traditional leaders, either this was not the case in the 1999/2000 or they were coming late at night.

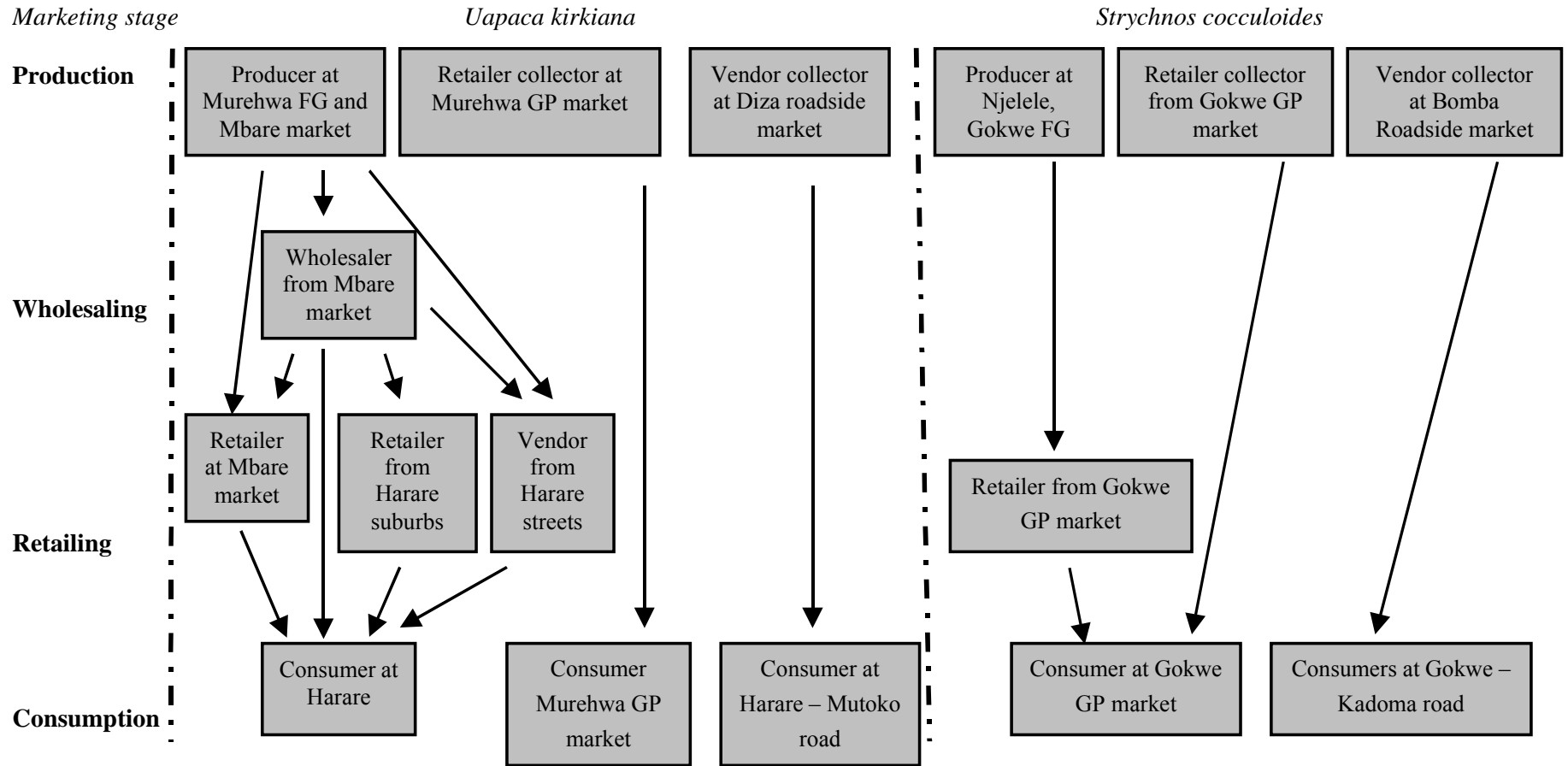
Retailers and vendors at Mbare buy the fruits from producers, wholesalers or sometimes travel to Murehwa and collect the fruits for selling. Upon acquiring the fruits, they divide them into small quantities and sell to consumers at the market. But retailers at Murehwa growth point market collect the fruits from the nearby forests and sell directly to consumers at the market. Like the retailers found in Murehwa growth point market, vendors in Murehwa also collect the fruits themselves and sell to consumers along Harare-Mutoko road.

Wholesalers buy fruits from producers in Murehwa villages and transport to Mbare. They also buy fruits from producers who bring the fruits to Mbare and sell to retailers and vendors coming from Mbare market, Harare suburbs and Harare streets. This study has also found cases of wholesalers selling fruits in small tins (5 litres) direct to consumers at Mbare.

However, for *S. cocculoides* fruits, producers at Njelele villages collect and sell the fruits to retailers coming from Gokwe town. The retailers later sell the fruits to consumers at Gokwe growth point markets. Some retailers and vendors from Gokwe town and Bomba roadside market travel to the rural areas and collect the fruits and sell straight to consumers at Gokwe. Although the participants' functions overlap, the most common flow of *U. kirkiana* fruits is from producers to wholesalers, retailers and finally consumers, while for *S. cocculoides* fruits is from producers to retailers and ultimately consumers.

Market outlets for *U. kirkiana* and *S. cocculoides* indigenous fruits are limited to village, roadside, district and central markets. *Uapaca kirkiana* fruits from Murehwa production site

reach the final consumers through Diza roadside, Murehwa growth point and Mbare and street markets (Fig. 4.2), while *S. cocculoides* fruits from Gokwe villages reach consumers through Bomba roadside and Gokwe Growth point and street markets.



Source: Formal and informal surveys, 1999/2000

FG = Farm-gate, GP = Growth Point

Figure 4.2 Typical marketing channels of *U. kirkiana* and *S. cocculoides* indigenous fruits

4.1.3 Market Conduct and Performance

In order to fill the SCP concept, an attempt is made to assess the pattern of behaviour, the mechanism which traders follow and the decisions they take in the process of marketing the two fruits. Therefore, features discussed in market conduct and performance include transportation of the fruits, price determination, prices, marketing costs and profits. Finally, in order to find out price differences between market levels, marketing margins are also discussed. In this study, conduct and performance aspects are discussed together because of high interaction of the two aspects. For example, price formation is an element in market conduct but highly linked to profits in market performance.

4.1.3.1 Price determination

Pricing is an important aspect of market conduct. Consumers compare price they have paid for a product with the utility obtained from the good, while traders can relate prices to the total profits generated by the business (PANIGYRAKIS, 1997, p. 295). Therefore, the following section is seeking to assess the pricing strategies of the marketing system of *U. kirkiana* and *S. cocculoides* fruits to get an idea of how prices of the fruits are set and affiliate the results in the marketing mix to expand marketing activities of the indigenous fruits. Generally, there are three basic types of pricing strategies; these are depending on total cost incurred, demand and competition.

However, information gathered in this study shows that there is no definite or formal mechanism of setting prices. The major methods used by traders to determine prices include knowledge and memories of the previous marketing season, total costs, information from neighbours and other traders coming from the market, daily market prices and discounts on high quantities bought. Results displayed in Table 4.4 reveal that (35%) producers assign prices from information obtained from neighbours who have recently visited the market. This indicates that they have no say on the price, just take market prices as brought by their neighbours. Furthermore, 18% producers reported that they determine prices from the knowledge of the previous season while 13% from total costs. Other producers mentioned the size of the fruits, daily market prices and quantities bought by the customer as ways leading to the prices they charge.

Table 4.4 Price determination (% respondents) by *U. kirkiana* and *S. cocculoides* IFs traders

Trader/site	Price determination				Know prices of other areas	
	Previous season	Total cost	Neighbour	Others *	Yes	No
Producer						
Mbare (n = 19)	16	16	21	47	68	32
Gokwe (n = 13)	8	8	46	38	-	100
Murehwa (n = 22)	29	14	38	19	90	10
Average	18	13	35	35	79	47
Retailer						
Mbare (n = 48)	17	75	-	8	48	52
Gokwe (n = 35)	6	57	37	-	-	100
Murehwa (n = 34)	21	44	27	8	79	21
Average	15	59	32	8	64	58
Wholesaler						
Mbare (n = 9)	11	67	11	11	67	33

Source: Traders' formal survey, 1999/2000

*Size of the fruits, daily market price, quantity bought

Questions asked: How do you determine the price of fruits you do sell?

Do you know the price of these fruits in other parts of the country?

However retailers and wholesalers claimed that they mainly determine prices according to total marketing costs including price of the fruits and transport to the market which can lead to retailers and wholesalers having more power of allocating prices than producers. Despite the market power, findings of this study suggest that wholesalers were not able to make much profit under the unexpected rise of the marketing costs. This might be due to the inability of wholesalers to raise prices, as their customers will opt to buy straight from the producers.

Retailers and wholesalers, also regard prices set by other traders, a condition indicating strong oligopolistic interdependencies between them. However in some days, prices depend on the fruit availability on the market. That means if few fruits are available at the market, prices go up while an increase in supply causes the prices to fall. At the retailer level, in Murehwa and Gokwe, neighbours information ranks second as a source of price information, but in Harare,

there is no retailer who reported to acquire price information from neighbours. This might be due to the scattered nature of settlements in Harare City.

Availability of marketing information such as prices and consumer demand are key determinants of market performance as it can increase competition and equity. Moreover, information availability varies across markets of indigenous fruits. In Gokwe, both retailers and producers are unaware of the prices of similar fruits sold in other areas of the country. This might be a result of the remoteness and poor communication of Gokwe site, which causes high transaction costs of price information before transporting the fruits to the markets. On the contrary, the proximity to markets in other towns is an advantage to Murehwa traders as they become aware of prices on different and nearby markets.

The common method of payment in the markets of *U. kirkiana* and *S. cocculoides* fruits is cash⁸. Findings of this study show that *U. kirkiana* fruits were sold on credit. At least 6 out of 54 producers and 19 out of 117 retailers, but only one wholesaler sold their fruits on credit without any terms attached like interest or higher prices. On the other hand there was no evidence of contractual arrangements between buyers and sellers. Only one producer sold fruits to a permanent customer because he is a relative, otherwise other traders sell fruits to anyone.

4.1.3.2 Price differentiation

According to secondary information, indigenous fruits' price in Zimbabwe varies according to the type of the fruits. For example, at peak harvesting periods of 1998, a 5 litre tin of *U. kirkiana* was sold at US\$ 0.30 while *S. cocculoides* costed US\$ 0.06-0.15 per fruit (RUKUNI, et. al., 1998). This trend is still supported by the results of this study. There are various prices charged for *U. kirkiana* and *S. cocculoides* indigenous fruits per market and type of trader. Prices are higher in urban markets followed by semi urban/growth point markets and then rural areas. In the case of *Uapaca kirkiana* fruits producer and retailer prices are lower (Z\$

⁸ A situation different from *Ziziphus mauritiana* indigenous fruits in the Zambezi valley (among the remotest area of Zimbabwe), where barter trade is common at the producer level. That is producers are given food and household items in exchange for the fruits (FUNKHOUSER & LYNAM, 1999, KADZERE, et. al., 1998), and some sell on credit.

3.17 and 9.90) in Murehwa growth point market than in Mbare urban market (Z\$ 5.07 and 11.17) (Table 4.5).

Table 4.5 Average selling price/kg of *U. kirkiana* and *S. cocculoides* IFs

Trader/site	<i>U. kirkiana</i>	<i>S. cocculoides</i>
Producer		
• Mbare (n = 19)	5.07	-
• Gokwe (n = 13)	3.23	0.07
• Murehwa (n = 22)	3.17	-
Retailer		
• Mbare (n = 48)	11.17	-
• Gokwe (n = 35)	10.24	0.16
• Murehwa (n = 34)	9.90	-
Wholesaler		
• Mbare (n = 9)	5.24	-

Source: Traders' formal survey, 1999/2000

- = No such level/trader in the marketing system

Relatively high prices at Mbare may be caused by additional factor costs including fuel and transportation and low availability of the fruits. Although traders incur transport costs to come to Mbare, the higher prices at Mbare might create an incentive for producers and retailers in Murehwa and Gokwe rural areas to transport their fruits and sell them in Mbare central and Gokwe town markets. In addition, if the producer prices continue to be low, there will be less incentive for farmers to cultivate indigenous fruit trees. This is because they will not recover their labour and capital investment by planting the fruit trees to increase market fruit supply.

However, the regional price differences for *U. kirkiana* fruits might be caused by the lack of transparency due to different prices for the various utensils (cups, bowls, plates, tins and buckets) used to measure the fruits. The use of different measurements imposes difficulties in comparing the prices, supply and demand with exotic fruits sold in standardised quantities and marketed in the same markets with IFs. Within the same market, one finds higher prices in the retailing section than in production sector, but the prices within the same level looks similar. However, closer examination has revealed that prices of *U. kirkiana* in all the markets, especially in retailer, followed by wholesaler sections are not equal because traders adjust quantities of the fruits filled in the different containers. In the case of tins, wholesalers press

the bases of the tins inwards to reduce the volume. Sometimes paper or grass materials are filled before the fruits are put in the tins. These activities are not conducted openly to the customers. Trading system of *S. cocculoides* fruits in Gokwe portrays the same trend. In this case, the fruits are sold at Z\$ 0.07/kg by the producers in Njelele villages, while retailers sell at more than double the producer price (Z\$ 0.16) in Gokwe growth point market (Table 4.5).

In the process of transferring the produce from the producer to the consumer a number of marketing costs are involved. Therefore, the proceeding subchapter is discussing the different costs involved in order to demonstrate traders, better ways of reducing them to raise profits and incorporate the costs in the calculations of marketing margins.

4.1.3.3 Labour costs for travelling and collecting the fruits

All *U. kirkiana* and *S. cocculoides* indigenous fruit producers/collectors incur costs in a form of time to travel and labour to collect the fruits. A summary of labour costs for travelling and collecting the *U. kirkiana* fruits is shown in Table 4.6, but detailed calculations are shown in Appendix 4.7. In general to collect one bag (33kg) of *U. kirkiana* in Murehwa costs 11% more money than in Gokwe. This might be caused by the shorter distance (0.39 km/trip) and hence time (0.23 minutes) of travel in Gokwe as compared to Murehwa (0.88 km per trip) in which people spend on average 0.72 minutes. In addition low opportunity cost of labour in Gokwe at Z\$ 34.94 per a farm working day compared to that of Murehwa Z\$ 40.00 (AGRITEX, 2000) contributes to these results.

Furthermore, due to high traders' scramble for *U. kirkiana* fruits in Murehwa, producers/collectors spend on average 31.38 hours in a season of eight weeks to travel in search of the fruits while Gokwe producers/collectors 12.25 hours. These findings might justify ICRAF plan to plant these trees on farm so that collectors can save time to travel looking for the fruits in the forests. However, the situation is different with collection of *S. cocculoides*. Traders incur Z\$ 4.31 per bucket of 72 fruits (Table 4.7), (Appendix 4.8), and spend up to 78 hours travelling in search of the fruits in a season of 12 weeks.

Table 4.6 Cost of labour to travel and collect *U. kirkiana* IFs

Parameter	Mbare	Murehwa	Gokwe	Source
Average travelling time to collect the fruits				
Distance (km) travelled/trip (AD)	0.88	0.88	0.39	Survey data
Time (min.) of travel/trip (ATM)	0.72	0.72	0.23	Survey data
Rate of travel/trip (ART)	1.22	1.22	1.53	Survey data
Total trips (ATT)	29.23	29.23	20.53	Survey data
Total travel time (hrs) per season(ATTS)	31.38	31.38	12.25	ART*AD*ATT
Average collection time for a 20lts bucket				
Quantity (litres) of fruits collected per season (TQ)	2371.72	2371.72	688.88	ATT*ATQT
Quantity (litres) collected per trip (ATQT)	81.14	81.14	33.56	Survey data
Time (min.) to collect 20lts of the fruits (T20L)	0.94	0.94	0.59	Survey data
Time per (min.) season (TS)	76.28	76.28	19.64	ATQT*T20L
Labour time (min.) to travel and collect one bucket (LB)	0.91	0.91	0.92	Total labour/ Quantity fruits
Other measurements				
Number of buckets in a bag (BKT)	3	3	3	Survey data
Weight (kg) of a 20lt bucket (WB)	11	11	11	Survey data
Weight (kg) of a bag (WBG)	33	33	33	BKT*WB
Wage rate				
Wage rate/day, Harare (8 hrs), Murehwa and Gokwe (6 hrs)	40	40	34.94	AGRITEX 2000
Industrial wage rate/hour (HWR)	5	6.67	5.82	Wage rate /No. of hrs/ day
Labour costs (Z\$)				
Total labour costs (Z\$)/bucket (BLC)	4.55	6.05	5.38	LB*HWR
Total labour costs (Z\$)/bag	13.65	18.14	16.15	BLC*BKT

Source: Traders' formal survey, 1999/2000

Questions asked: What is the travelling time, distance, number of trips per season, quantity collected per trip and time spent to collect one bucket of *U. kirkiana*?

Total travel time per season = Rate of travel*Distance*Number of trips, Total collection time = Quantity of fruits collected*Collection time/unit, Total labour = Sum of the two (adopted from CAMPBELL, et. al., 1997)

Table 4.7 Travelling and collection costs for *S. cocculoides* IFs

Parameter	Gokwe	Source of information
Distance travelled/trip (AD)	0.98	Survey data
Time (min.) of travel/trip (ATM)	0.33	Survey data
Rate of travel/trip (ART)	2.96	Average rate travel
Total trips (ATT)	26.91	Survey data
Total travel time (hrs)/season (ATTS)	78.06	ART*AD*ATT
Average collection time for a 20lts bucket		
Quantity of fruits collected per season (TQ)	3305.89	ATT*ATQT
Total average quantity collected/trip (ATQT)	122.85	Survey data
Total average time (min.) to collect 20lts fruits (T20L)	0.37	Survey data
Total collection time/season (TS)	45.45	ATQT*T20L
Total labour time (min.) to travel and collect a bucket (LB)	0.74	Total labour/TQ
Other measurements		
Number of fruits in a bucket (BKT)	72	Survey data
Weight (kg) of a 20lt bucket of fruits (WB)	14.12	MKONDA, et. al., 1999
Wage rate		
Wage rate per 6 hours of farm work	34.94	AGRITEX 2000
Wage rate/hour in Gokwe cotton growing (HWR)	5.82	Wage rate / No. of hrs/day
Labour costs (Z\$)		
Total labour cost/bucket (BLC)	4.31	LB*HWR

Source: Traders' formal survey, 1999/2000

Total travel time per season = Rate of travel*Distance*Number of trips, Total collection time = Quantity of fruits collected*Collection time/unit, Total labour = Sum of the two (adopted from CAMPBELL, et. al., 1997)

Questions asked: What is the travelling time, distance, number of trips per season, quantity collected per trip and time spent to collect one bucket of *S. cocculoides*

After collecting the fruits, traders who sell their fruits along the roadsides, districts and Mbare markets are faced by the cost of transporting the fruits plus themselves to the market. Therefore, the following subchapter explains the findings of the transportation sector of the indigenous fruits.

4.1.3.4 Transportation

Means of transport have significant effects on pricing and the conditions under which the products arrive at the destination point, and these in turn affect customer satisfaction (KOTLER & ARMSTRONG, 1999, p. 375). Therefore, this study has examined the transportation sector in details. Findings from secondary sources found out that the major means of transporting indigenous fruits to the markets include ox-carts, bicycles and occasionally buses (KADZERE, et. al., 1998). In remote parts of the country, walking is a predominant form of transporting the fruits. However, this information does not explain the full transportation process including costs and associated problems in order to be able to assess incentives and constraints faced by the traders.

Informal and formal surveys revealed that after the collection, collectors walk from the collection points, with the fruits on their heads to their homes. Collectors selling on-farm wait for wholesalers to come to the houses, while those selling at district/growth point, roadside and Mbare markets use scotch-carts, bicycles, buses and sometimes pick-up trucks. In most cases, the type of transport depends on the distance to the market and the quantities of the fruits dealt with. In some cases, traders either employ one of the transport means, combine two or more. Transportation might be the cause of fruit losses of up to Z\$ 18.40/33kg bag of *U. kirkiana* fresh fruits for producers interviewed in Harare as compared to their counterparts in Gokwe (Z\$ 6.40/bag and Murehwa Z\$ 9.41/bag) (Table 4.9). A descriptive analysis of transportation sector shows that generally at one stage or another, 48% traders transport their fruits using their feet (Table 4.8). However, most retailers from Murehwa to Mbare and Njelele villages to Gokwe town combine feet and buses or scotch carts.

Table 4.8 Means of transporting (% respondents) *U. kirkiana* and *S. cocculoides* IFs to the markets

Market level	Type of transport			
	Feet	Scotch cart	Bus	Truck
Producer				
Mbare (n = 19)	79	-	16	5
Murehwa (n = 22)	43	14	29	14
Gokwe (n = 13)	8	23	39	31
Retailer				
Mbare (n = 48)*	31	13	56	-
Murehwa (n = 34)	64	9	27	-
Gokwe (n = 35)	64	18	18	-
Wholesaler				
Mbare (n = 9)	-	-	-	100
Average	48	15	31	38

Source: Traders' formal survey, 1999/2000

* Percentages adding more than 100 are due to rounding up errors

Questions asked: Which transport do you use to the selling point?

Do you experience any transport problems? If yes, which problems?

The cost of transporting *U. kirkiana* fruits from the villages to growth point and road side markets by scotch cart is 40% and bus 50% more in Gokwe than Murehwa production sites. This can be explained by the fact that Gokwe is remote and has poor road infrastructure, which has caused the operation of very few buses compared to Murehwa. Still, buses are not designed to transport fresh produce but passengers. Therefore, bus owners are not able to satisfy the needs of traders like packing the fruit bags separately from the hard luggage. This lack of flexibility of the bus workers ends up in the highest fruit losses of more than Z\$ 75/bag in Gokwe and Murehwa (Table 4.9). The high fruit losses might be caused by the piling up of the bags containing the fruits together with other luggage in the bus carrier section, which enhances the smashing of the fruits. Sometimes the buses refuse to carry traders and hence retailers and producers are forced to spend more than three days on bus stops to wait for alternative transport. As the fruits are highly perishable, quite significant amounts rot before reaching the market.

Wholesalers hire lorries or pick-up trucks to transport the fruits from the production sites to Mbare market. During the course of the study, 1999/2000 season, the prices were highly hit by inflation, which made the wholesalers pay up to Z\$ 37.50 per bag on average. Since the selling price at this level is relatively low, wholesalers acquired low relative margins compared to retailers and producers (Table 4.10).

Apart from transport fares, traders who take the fruits to Mbare market face transaction costs of organising transport and bargaining for the transport fares and ensure proper handling of the fruits during loading and unloading from the vehicles. Traders also experience a number of other transport problems. Major ones include unreliable and expensive transport (22% respondents), and for traders using their heads, heavy weight of the fruits is a concern (14% respondents). In addition to these, high spoilage is also reported as a constraint in the transportation process.

Table 4.9 Marketing costs (Z\$/33kg bag) of *U. kirkiana* IFs

Trader	Transportation		Fruit acquisition		Presale activity	Market fees	Bus fare	Fruit losses	Total cost
	Scotch cart	Bus/lorry charge	Collect	Buy					
Producer									
Mbare (n = 19)	5.00	9.21	13.61	0.00	0.00	3.3	7.59	18.40	57.11
Gokwe (n = 13)	7.00	15.00	16.15	0.00	0.00	3.3	0.00	6.40	47.85
Murehwa (n = 22)	5.00	10.00	18.14	0.00	0.00	5.0	0.00	9.41	47.55
Retailer									
Mbare (n = 48)	5.00	7.48	0.00	171	11.25	4.71	0.00	47.92	235.55
Gokwe (n = 35)	9.00	0.00	16.15	0	13.10	0.17	0.00	77.72	116.14
Murehwa (n = 34)	5.00	0.00	18.14	0	15.00	0.17	0.00	75.14	113.45
Wholesaler									
Mbare (n = 8)	10.00	37.50	0.00	79.83	0.00	2.29	0.00	27.67	157.29

Source: Traders' formal survey, 1999/2000

Market fees = Market fees per day/average no of bags per day

Presale activity = Time spent *wage rate

Transportation = Cost of transporting a bag by all means

Questions asked: Which expenses do you incur from buying to selling the fruits?

Transportation: How much do you normally pay to transport 20lts bucket per a given transport type?

Fruit acquisition: Where do you get the fruits you sell?

Fruit losses: Do you encounter any fruit losses during transportation? If yes how much is lost per bucket?

4.1.3.5 Market fees

Traders, regardless of fruit type handled pay market fees (except vendors) of varied amounts. Producer rates range from Z\$ 3.3 to 5.00/bag while for retailers from Z\$ 0.17 to 4.17/bag. However, wholesalers in Mbare pay Z\$ 2.29/bag. The various levels of market fees charged and the rate of turnover per market determine the differences in the costs of market fees/bag displayed in Table 4.9. The differences in the cost of presale activities for *U. kirkiana* fruits are mainly caused by the various prices of packing materials per market. In addition, traders also incur transaction costs of time during the marketing period. Upon reaching the market, fruits sold to retailers are modified by using different presale activities as discussed in subchapter 4.1.2.4.

To get an indication of the market performance, profit at each market stage is calculated. Marketing expenses included in the analysis are opportunity cost of labour for travelling and collecting the fruits, time spent in presale activities and the amount of money used to buy the fruits for selling and plastic bags for packing. Other costs are transportation consisting of traders' bus fares, fruits transport, loading and unloading expenses and losses caused by handling, transportation, storage and consumer tasting. In addition, marketing time and fees are also accounted for. Marketing margins are also studied to measure the share of selling price between different marketing stages. The results of marketing margins together with that of the market concentration ratios and profits have been used to judge on the performance of the prevailing marketing system.

4.1.3.6 Marketing margins

Results on Table 10, suggest that the different marketing costs found along the chain are affecting the margins. This study has expressed marketing margins in two terms, absolute and relative marketing margins. The former is the difference between the indigenous fruits' price paid by consumers and that obtained by its producers. While the latter shows the relative terms of the level of the prices of the fruits in percentages.

Since Mbare market charge high prices, producers who sell *U. kirkiana* fruits at Mbare receive 45% share of the price paid by the consumer as compared to their counterparts in Murehwa and Gokwe, 32% (Table 4.10).

Table 4.10 Marketing margins (Z\$/kg) for selling *U. kirkiana* IFs

Parameter	Murehwa growth point market		Gokwe growth point market		Mbare central market		
	Producer	Retailer	Producer	Retailer	Producer	Wholesaler	Retailer
Price/revenue/kg	3.17	9.90	3.23	10.24	5.07	5.24	11.17
Total cost/kg	1.44	3.44	1.45	3.52	1.73	4.77	7.14
Profit	1.73	6.46	1.78	6.72	3.34	0.47	4.03
Absolute MM*	6.73		7.01		6.10	0.17	5.93
Relative MM (%)**	32.02		31.54		45.39	1.52	53.09

Source: Traders' formal survey, 1999/2000

MM = Marketing Margins

*Producer Absolute Marketing Margins (PAMM) = Retailer price – Producer price

Retailer Absolute Marketing Margins (RAMM) = Retailer price – Wholesaler price

Wholesaler Absolute Marketing Margins (WAMM) = Wholesaler price – Producer price

** Producer share of price (PSP) = Producer price/Retailer price*100

Wholesaler Relative Marketing Margins (WRM) = Wholesaler price – Producer price/ Retailer price*100

Retailer Relative Marketing Margins (RRM) = Retailer price – Wholesaler price/ Retailer price*100

As mentioned earlier, despite the wholesalers being fully aware of the market supply and having the market power (subchapters 4.1.2.3), they are getting the lowest share of the price. For the period under study, wholesalers have been facing high transportation costs, which within the season increased by 100% due to inflation. Therefore, some were opting to sell some of the fruits in small quantities straight to consumers in order to recover some of their costs. This option is not included in the profits shown in the table above. However, the common assumption underlying most non-timber forest products' trade that producers are exploited by wholesalers and middlemen (NEUMANN & HIRCH, 2000, p. 66) is not supported by the findings of the study on marketing system of *U. kirkiana* and *S. cocculoides* fruits. May be this is because the intermediary traders/wholesalers in this study are not the focal outlet for the producers. Producers can still sell fruits direct to retailers and vendors.

4.1.4 Other Problems Encountered in the Marketing of IFs

Besides transportation problems as reported above, traders face several other constraints associated with the business of the two indigenous fruits. In general perishability of *U. kirkiana* fruits is a major setback for all the traders including producers (50% responses), retailers (63% responses) and wholesalers (75% responses) selling in Mbare market (Table 4.11). The problem is so severe to the extent of forcing the Harare district council to designate Tsiga, an area within Mbare suburbs, to serve as a seasonal market for *U. kirkiana* fruits. Separating the fruits market from the rest of the produce aims at avoiding the rotten fruits and their smell to spoil the environment of the main Mbare market. Mbare traders also recognise the perishability problem through transporting the fruits from the production sites, where they incur a lot of losses in the process of loading, packing the bags in the lorries, handling during travelling and unloading from the trucks at the destination market.

Apart from spoilage of the fruits, intensive consumers' tasting of the fruits ranks second at all trading levels. Tasting problem is more serious in the wholesale section (75% responses), followed by retailers (63% responses) and finally producers (50% responses). This is because wholesalers spread their fruits on the ground and hence makes them more vulnerable to tasting. In the case of retailer level, tasting takes place to the fruits which are not packed in plastic bags. But at the producer section, tasting occurs when the fruits are piled in buckets and not in bags. Consumers taste the fruits to make sure that they are buying the sweet fruit types. But the problem is, there is no agreed quantity for tasting. Therefore, some consumers take an advantage and taste as many as they wish to the extent of causing financial losses to the traders.

Table 4.11 Problems faced by traders (% responses) of *U. kirkiana* and *S. cocculoides* indigenous fruits

Trader/Problem	Mbare	Murehwa	Gokwe
Producer	n = 18	n = 20	n = 7
• Perishability of <i>U. kirkiana</i> fruits	50	5	14
• Consumer tasting	17	20	0
• Low sales at peak	17	0	0
• Traditional law against selling IFs	0	65	57
• Seasonal business	0	0	29
• Others*	16	10	0
Total	100	100	100
Retailers	n = 52	n = 33	n = 43
• Perishability of <i>U. kirkiana</i> fruits	63	24	16
• Consumer tasting	17	21	19
• Few customers for <i>S. cocculoides</i>	4	0	0
• Low sales at peak	8	12	2.3
• Heavy to carry fruit on heads	4	0	0
• Traditional law against selling IFs	4	15	28
• Low price	0	15	2.3
• Poor infrastructure	0	0	30
• Others**	0	13	2.3
Total	100	100	99.9
Wholesalers	n = 8		
• Perishability of <i>U. kirkiana</i> fruits	75	-	-
• Consumer tasting	12.5	-	-
• Poor infrastructure	12.5	-	-
Total	100	-	-

Source: Traders' formal survey, 1999/2000

* -Some buyers don't pay debts

-At nights there are plenty of thieves around Mbare market

-Fruits are heavy to carry on heads

** Retailers collecting the fruits themselves sell at low prices

-At night there are plenty of thieves around Mbare market

-Poor market infrastructure e.g. storage facilities, marketing sheds

n = Total number of responses

At the producer level in Mbare, a problem which carries a similar weight as tasting is low sales in December because it is a peak period (17% responses). Low sales during peak periods is also the third problem for retailers in Mbare market. This problem is caused by the fact that, during the peak period all the fruits in the forests mature at the same time. Due to high competition they are also harvested at a ago, a situation causing supply to exceed demand. Low willingness to pay might also be facilitated by consumers acquiring the fruits from their relatives from the rural areas as gifts or just go and harvest them during weekend visits. For the fruits which manage to reach the market, lack of storage facilities and processing opportunities to increase the fruits' shelf lives and extend the marketable season, cause massive losses.

Lack of marketing infrastructure including sheds in Tsiga market and storage facilities are reported at an equal level with the tasting problem at the wholesaler section. Since wholesalers are dealing with huge quantities of fruits, they spread them on an open ground, which makes the fruits vulnerable. The sunshine facilitates quick rotting, and the dust creates non-hygienic conditions.

In the case of Murehwa, producers' major problem is the traditional laws (65% responses) imposed by the chiefs (dealt at length in subchapter 4.1.7.2), limiting the collection of the fruits for selling. This problem is followed by too much tasting and short periods of the business. However, retailers at Murehwa reported perishability as a major concern succeeded by tasting. The traditional law against selling the fruits is also reported by retailers who go to the rural areas to collect the fruits by themselves.

Like the Murehwa production site, Gokwe producers also reported the negative influence of traditional chiefs in collecting *U. kirkiana* and *S. cocculoides* fruits for selling as their first problem. The second problem is the shorter duration of the business caused by traders harvest all the fruits at one time and since there are no storage facilities, the fruits are sold for only two months. Tasting of *U. kirkiana* fruits rank third, generally the reasons for tasting are the same as those explained in the previous paragraphs.

In summary, marketing *U. kirkiana* and *S. cocculoides* indigenous fruits is associated with a number of problems. However, the major ones are perishability of *U. kirkiana* fruits, consumer tasting, traditional laws prohibiting marketing of the fruits and lack of marketing infrastructure. In addition, a number of other problems as displayed in Table 4.11 influence

the marketing processes and lower the marketing efficiency. Therefore, any efforts towards improving the marketing system should consider these constraints.

4.1.5 Uses of the Money from IFs Sales

Nevertheless, to argue on the ICRAF's objectives of improving marketing activities in order to generate some cash income for poor communities, traders were asked for the advantages of selling the two fruit types. Findings suggest that traders get both financial and social benefits from selling IFs. On average producers of *U. kirkiana* make between Z\$ 1.73/kg in Murehwa, Z\$ 1.78 in Gokwe and Z\$ 3.34/kg in Mbare (Table 4.10). Most producers (65%) use the generated cash income to purchase basic household needs such as clothes and food items. Apart from food and clothes, retailers and wholesalers living in towns and cities spend the money for paying house rent and transport fares. Considering the fact that the marketing period of the fruits coincides with school openings, 16%, 37% and 25% producers, retailers and wholesalers respectively spend some money to buy school stationery and pay fees (Table 4.12).

Whereas the fruits ripe during preparation for crop growing, 32% producers, 24% retailers and 13% wholesalers used the money to buy farm inputs. These results support ICRAF hypothesis that if the marketing opportunities for the fruits have increased, the poor communities will be able to generate cash to subsidise their household income.

Furthermore, 19% producers and 8% retailers most of them found in Mbare market utilise the indigenous fruit trading period to satisfy their social desires. These consist of building relationships and entertaining themselves through meeting old friends and making new ones, while 12% retailers think that they help to distribute the fruits all over the country.

Table 4.12 Uses of money (% respondents) obtained from selling *U. kirkiana* and *S. cocculoides* IFs

Trader	Basic needs*	Farm inputs	School fees	Build relationships	Source of employment	Supply IFs all over
Producer						
Mbare (n = 19)	58	37	17	32	-	-
Gokwe (n = 13)	68	-	15	-	-	-
Murehwa (n = 22)	68	26	16	5	5	-
Average	65	32	16	19	5	-
Retailer						
Mbare (n = 48)	67	9	16	3	56	16
Gokwe (n = 35)	42	8	50	-	27	8
Murehwa (n = 34)	81	56	44	13	56	-
Average	63	24	37	8	46	12
Wholesaler						
Mbare (n = 9)	50	13	25	-	-	-

Source: Traders' formal survey, 1999/2000

Total percentages are not equal to 100 because of double counting

*Clothes, rent, food and transport fare

Questions asked: Which are the benefits obtained from selling IFs?

4.1.6 Summary of Market Structure, Conduct and Performance

In summary, the market structural elements found in the different levels of the marketing system of the *U. kirkiana* and *S. cocculoides* indigenous fruits in Zimbabwe are presented in Table 4.13. The features as found by this study suggest that the marketing system of the fruits are operating on the imperfect competitive zone because some of their characteristics deviate from the model of perfect competition. For example, although there are many independent producers and retailers, there are few wholesalers in the marketing of *U. kirkiana* fruits which causes less competition in the section.

In addition, there are no complex product differentiation processes, but traders sell a mixture of genetically differentiated fruits, into colours and sizes. However, some elementary grading and packing is conducted in the retailer section. Hence, the natural differences and the presale activities at the retailer level introduce consumer preferences. Another important

characteristic associated with the market is lack of transparency such that producers are acting without information on market prices and consumer needs. Producer and retailer knowledge of prices in Murehwa and Mbare rely on neighbours and visits to the market (section 4.1.3.1). Moreover, retailers have no information on consumer fruits' quality needs and demand.

Also, there is no price formation mechanism, which facilitates the existing traders' cheating behaviour. That is, while all the prices are seen similar at different market levels, retailers and wholesalers adjust prices by varying quantities of the fruits in the different measurement utensils and volume of the commonly used tins.

Table 4.13 Market structural attributes of *U. kirkiana* and *S. cocculoides* IFs

Marketing level	Market concentration	Product differentiation
Production	<ul style="list-style-type: none"> • Largest producer supplied only 13% of the total volume of all producers • Three largest producers supplied 29% of total volume supplied by all producers 	<ul style="list-style-type: none"> • No attempts to differentiation, only natural differences into colours and sizes exist
Retailing	<ul style="list-style-type: none"> • Largest retailer sold only 3% of the total volume sold by all retailers • Three largest retailers sold 8% of total volume sold by all retailers 	<ul style="list-style-type: none"> • Simple forms of grading and packing
Wholesaling	<ul style="list-style-type: none"> • Largest wholesaler gave 17% of the total volume of all wholesalers • Three largest wholesalers gave 39% of total volume sold by all wholesalers 	<ul style="list-style-type: none"> • No attempts to differentiation, only natural differences into colours and sizes

Source: Traders' formal survey, 1999/2000

4.1.7 Property Rights, Natural Resource Use and Management Policies

The influence of institutional arrangements on marketing systems has recently been recognised by a number of researchers (HOLTZMAN, 1986). Therefore, in this study of marketing of *U. kirkiana* and *S. cocculoides* fruits, laws and by-laws are important aspects that will enlarge the view of the traditional SCP approach with respect to the socio-economic

framework. Socio-economic characteristics form the behaviour of the actors which influences the marketing activities and hence they are worth be incorporated in the study of the marketing system in order to assess initial ICRAF objectives of improving production, consumption and marketing of the fruits.

The fact that rural communities of Zimbabwe have/have not an access to indigenous fruits and trees located in the communal forests near their villages, fields and homestead may influence the preference towards the development of the fruits' markets. Therefore, the succeeding section is trying to examine property right regimes, natural resource use and management policies of the trees and the fruits and assess whether they influence the current market structure, conduct and performance. Also, the section shows how the institutions might affect the commercialisation process.

Therefore, in order to describe the policy set-up, detailed literature review and analysis of secondary data were conducted. Besides that, officials of the Forest Commission were consulted for further discussions. Furthermore, a detailed questionnaire was designed and administered to 52 leaders at village and ward levels. All sites, which participated in the studies of production and marketing of indigenous fruits including Murehwa, Gokwe and Takawira resettlement area (a second site for the production economics study), were involved. Questions inquired on whether there existed government regulations, traditional taboos or village by-laws with respect to the management and use of the naturally grown indigenous fruit trees, fruits collection and selling. Likewise, how are the management and use rules implemented and enforced to the community. Since ICRAF is working towards increasing cultivation of the trees and commercialisation of the fruits, policy leaders were asked about their views on planting the fruit trees, existing marketing activities of IFs and promotion of the fruits' marketing.

Results show that the policy set-up consists of written formal and traditional informal institutions. Formal rules are the inherited natural resource policies and management regimes initiated by the colonial powers, which were entirely interested in timber production. For these formal colonial rules, the use and user rights of non-timber forest products such as indigenous fruits are not specified. On the other hand, the traditional sector that is mainly the chiefs has imposed informal rules, which insist on home consumption as the only use for the indigenous fruits.

4.1.7.1 Natural resource use and management

Natural resource management studies show that governments in Southern Africa intervene in the marketing process of forestry products specifically fuelwood and timber through the imposition of supply licenses, traffic points, check points and control regimes (DEWEES, 1994). In so doing, they limit the supply of the products assuming that commercial harvesting of forestry products leads to exploitation of natural resources. But, the countries have no policies and regulations specifying the management and use of other natural resource products such as indigenous fruits. However, with the recent growing knowledge on the importance of non-timber products to the rural communities, efforts are underway to incorporate management and use rules for non-timber forest products in the government forest policies.

4.1.7.2 Land and tree tenure systems

With respect to forests and woodlands management, Zimbabwe has five tenurial systems⁹ (NHIRA & FORTMANN, 1991, p.4), which consider the overlapping nature of ownership and use rights of the trees and products found in the forests. These are state land and tree tenure, resettlement areas and tree tenure, tree planted by groups and institutes, commercial farms and communal land and tree tenure.

State land and tree tenure

State land and tree tenure includes forest reserves and national parks of Zimbabwe. In this system, land, trees and forest products are managed and controlled by government through the Forestry Commission. National parks are managed and controlled by the Department of National Parks and Wildlife Management, and the local communities are excluded from free use of the products. However, the Forestry Commission holds various contracts with the surrounding societies. But the increased use of the forestry products by the people surrounding the forests results into the local communities applying illegal means such as poaching and forest fires to acquire the products (FORTMANN, 1991, p. 4).

⁹ A system of ownership and management of land and trees involving people and social institutions (NHIRA & FORTMANN 1991, p. 4)

Resettlement land areas and trees tenure

Land and trees found in resettlement areas such as Takawira is another tenure system. This is considered the most insecure tenurial system compared to the rest. In this system, the government guided by the Legal Authority and Rural Land Act issues contracts to farmers to reside, cultivate and graze their livestock. However the permits regarding the duration of stay are highly uncertain. The government has broad powers of terminating the contracts with few rights to compensate investments made by individuals during the time of stay in the contracts. Like the indigenous woodlands in the communal areas, the government controls the indigenous trees through the district council. The major implementers of the tenurial laws are the Natural Resource Board (NRB) working under the district council. Farmers are prohibited from accessing the fruits and other products from the forests of the resettlement areas.

Trees planted by groups and institutes

Quite a different tenure concerns trees planted by groups and organisations such as women, VIDCOs, churches, spirit media, farmers, clinics and schools. Individual farmers can also plant trees in their home gardens and crop fields. The management and use of these trees are exclusively left to the members and individuals involved. In this tenure system, tree access is sometimes protected through existing cultural and religious norms.

Commercial farms and trees tenure

The other tenure is trees on commercial farms. Under this tenure, owners of the farms are in full control of the land and forest. However, they have to notify the Forest Commission if they want to cut an indigenous tree, but the permission might as well be denied if the species in question is under protection.

Communal land and tree tenure

Secondary sources reveal that communal tenure system is the largest system (43% of woodlands) in Zimbabwe. The areas is highly populated, with the lowest agricultural potential and inhabiting around 75% of the country's population (EC-FAO, 1998). The low agricultural

productivity and high population pressure explain why its dwellers compete for indigenous fruits as a source of an additional income.

The communal land and tree tenure system is the most interesting tenure for this study on the marketing of *U. kirkiana* and *S. cocculoides* indigenous fruits. This is because as explained in subchapter 4.1.2.1, the major source of the two fruits is the communal forests. Also two of the sites for this study, Murehwa and Gokwe production areas are located in this system. Therefore, detailed examination of the tenure system has been conducted in order to get a deeper understanding of the effective institutions governing the marketing of indigenous fruits.

Findings suggest that, previously, this system was managed by traditional laws and regulations led by chiefs and elders. Inheritable land rights were allocated to individual families, households or groups. However, after the communal land Act of 1982, all land under this system was put under the control of the president, but administered by the Ministry of Local government, Rural and Urban Development through the district councils (RUKUNI, 1994). At the grass root levels major implementers of the land tenure laws are Village Development Committees (VIDCOs) and Ward Development Committees (WADCOs).

In this tenure system tree ownership and use/r rights depend entirely on the value of the tree. Therefore, two types of tree tenure are found. In the first case, district councils, traditional authorities and local institutes control specific tree types such as timber trees. The second tree tenure is indigenous trees in individually owned crop land, owned by the owner of the farm or district council depending on the tree commercial value. However, in some parts of Zimbabwe, indigenous fruit trees in communal land are treated as both open access goods where no one is excluded from using the fruits (GUMBO, et. al., 1989). For example, in Kanyati communal area, Kariba and Tsholotscho districts the fruit trees are regarded as “planted by god” therefore, no one is excluded from using the fruits (NHIRA AND FORTMANN, 1991). In these places, there is a danger of market failure because the rural communities incur cost to manage the indigenous fruit trees, but since harvesting is allowed to anyone, traders from cities and towns who can access good prices of the fruits benefit more.

In conclusion, secondary literature shows that rules governing the ownership and use rights of indigenous fruits in the communal land and tree tenure system are not apparent. In the communal forests and individual farms indigenous trees' ownership and user rights depend on

the value of the trees. In all the cases, the district council and its authorities own all indigenous trees with commercial value, especially timber. Indigenous fruit trees ownership and user rights were not a concern of the mentioned authorities because at the onset of these rules, the fruits and trees had no commercial value and hence were treated as a public good. However if trees are planted in private crop fields or commercial farms, the people own the trees.

From this point of view, all tenurial niches discussed so far don't put clear on the issue of indigenous fruits as a commodity from communal forests, which has gained commercial value. Apart from inheriting the current systems as mentioned before, the other reason might be due to the fact that the marketing of indigenous fruits has started to intensify in the recent years due to increased economic hardships. Furthermore the administrative, legal and local government bodies such as VIDCOs and WADCOs have completely failed to manage indigenous fruits use in communal areas. This is because of the extensive population growth and increased usage of forest products, which raised the competition for the fruits.

Therefore, after finding out that the rules regarding indigenous fruits are not obvious, this study attempted to know how leaders in the production sites and government level deal with this new emerging aspect of marketing of IFs. Are there any regulations or by-laws helping to guide the efficient management and use of this resource? If yes, which are the laws, enforcement criteria and problems associated with the implementation of the laws.

Results of the 52 interviews administered to policy makers and traditional leaders show that most leaders are aware of the regulations guiding indigenous fruit tree management and fruits handling, harvesting and marketing. The Natural Resource board, foreseeing tree management and conservation, might deliver the knowledge on management of indigenous trees. Furthermore, there is full knowledge (100% respondents in Murehwa and Gokwe, and 82% respondents in Takawira) on the limit to marketing IFs (Table 4.14). These are not remarkable news because communal areas are the major sources of the *U. kirkiana* and *S. cocculoides* for selling, and hence show little promise for the two fruits' commercialisation programme. However, for Takawira, the 18% leaders who are not aware of the rules are possibly coming from different cultural backgrounds, from the rest of the leaders living in resettlement area.

Table 4.14 Are there any regulations with respect to the following?

Item	Murehwa (n = 18)		Gokwe (n = 12)		Takawira (n = 22)	
	Yes	No	Yes	No	Yes	No
Planting	17	83	27	73	5	95
Fruit	100	-	92	8	86	14
Marketing	100	-	100	-	82	18
Collection	83	17	83	17	91	9
Tree	100	-	100	-	100	-

Source: Policy assessment survey, 2000

Questions asked: Are there any regulations with respect to the following? Planting indigenous fruit tree? Indigenous fruits management?, Marketing?, Collection of the fruits?, Indigenous fruit trees management?.

Yes = There are regulations, No = There are no regulations

Most leaders are not informed of any laws directing IFT planting. This is because they consider indigenous fruits can never be planted, since the seeds are hard to germinate. Therefore, until now it is only god who gives them free for people to use the fruits.

Information on the existence of regulations guiding IFTs and fruits was not enough to summarise on the institutional set-up controlling the use and management of the fruits. Therefore, further queries were conducted to know the detailed contents of the regulations and the reasons behind the inclusion of each. Results show that policy makers across all the sites know that cutting and selling indigenous fruits are prohibited (Table 4.15). Reasons for not cutting the trees are to provide fruits (33% respondents), prevent soil erosion (27% respondents) and conserve the fruits for future generation (23% respondents). Others according to the order of importance are to supply firewood, prevent lightening, attract rains, provide shade, fresh air, food for wild animals, avoid extinction of the trees, protect wind, keep shelter for praying to the spirit media, get leaves for manure and harvest pollen for bees.

Table 4.15 Regulations (% respondents) in place for IFTs and fruits

Regulation	Murehwa (n = 18)	Gokwe (n = 12)	Takawira (n = 22)	Average
Tree management				
• Don't cut IFTs	100	100	100	100
• Don't set fire on IFTs	6	-	81	44
• Don't burn grasses under IFTs	6	-	9	8
• Don't climb IFTs	-	-	5	3
Fruit management				
• Don't shake IFs from the trees	78	22	-	54
• Don't throw stones to the IFs	33	28	-	31
• Don't comment negatively to IFs*	11	42	-	27
• Don't harvest green IFs	33	67	82	61
Fruit collection				
• Don't pick IFs with both hands	6	-	-	6
• Collect the ones on the ground only	61	25	5	30
• Collect enough to eat at that time	6	33	-	20
• Don't collect the green IFs even if fallen on the ground	11	67	95	58
Marketing				
• Don't sell IFs	100	100	100	100
Planting				
• Forefathers and leaders encourage planting IFTs	17	25	5	16

Source: Policy assessment survey, 2000

*e.g. taste, smell, size, etc

Percentages don't add to 100 because of double counting

Questions: If there are regulations, which ones with respect to each of the following: IFTs management? IFs management? Collection? Marketing? Planting?

With respect to IFs management, 61% policy leaders reported that there are regulations that do not allow people to collect green fruits either through shaking the trees or even the ones which have fallen on the ground by their own. This regulation prevents people from shaking the flowers and premature fruits, a practise, which decreases fruit yields. To insist on not shaking the trees, people are also encouraged to collect fruits, which have fallen on the ground only. According to the leaders, marketing of the fruits is prohibited because wild animals used

to consume the fruits will go hungry and hence attack crop fields (29% respondents) (Table 4.16).

Table 4.16 Reasons (% respondents) of not selling indigenous fruits

Reasons	Response counts	Percentage
Our forefathers didn't sell	3	11
IFs are gifts from god, should be free	7	25
Large quantity harvest will finish the fruits	4	14
Huge harvest will cause hunger to wild animals	8	29
If sell no rain	2	7
Others*	4	14
Total	28	100

Source: Policy assessment survey, 2000

*They will dry up, loose taste, followed by evil spirit, your cattle will be eaten by lion

Question: Why do people not allowed to sell IFs?

This reason is followed by the claim that the fruit trees are naturally growing in the wild, nobody has invested any production cost, therefore they have to continue being a free commodity (25% respondents). But, this argument forgets that these fruits are area specific, and hence people living in non-miombo zone depend on markets to acquire them. In that case, consumers are supposed to pay for the marketing costs incurred by traders. Some leaders are also concerned about the conservation and management of the trees to avoid climate change and environmental degradation. If harvested in large quantities, the trees will be destroyed and will affect rainfall reliability.

Religious beliefs and traditional norms are among the reasons for not selling indigenous fruits. People believe that if they sell indigenous fruits the trees will dry up, lose taste, the evil spirit will punish the person selling, and if the trader has cattle, lions will attack them. Other people argue that they follow their forefathers' behaviour of not selling the fruits. Taboos and beliefs have also been reported in communal areas of Zimbabwe other than Murehwa and Gokwe. They include community sanctions in case of cutting indigenous fruit trees, and the governance of daily activities towards the use and management of the trees. For example, in Chivu, Zvishavane, *Strychnos potatorum* and *Lonchocarpus capassa* fruit trees are not cut for firewood (MAZAMBANI, 1991). Also *Ficus sp.*, *Parinari curatellifolia*, *Rhus sp.*, *Chirindesis*

sp. and *Sclerocarya birrea* fruit trees are protected for religious reasons. In the Mid-Zambezi valley, most people are still respecting the spirit media prohibiting the cutting of *Ficus sonderi*, *Adansonia digitata*, *Tamarindus indica* and *Azanza garkeana* fruit trees. However the traditional controls are now diminishing due to non-believing immigrants from nearby countries and the influence of some churches. Instead VIDCOs and WADCOs are supposed to promote sustainable use of the trees and products.

Based on restrictions on the marketing of indigenous fruits, respondents were asked their views about the current trade of IFs and measures to improve or remove the restraints associated with the practise to ensure that the villagers surrounding the forests benefit. Table 4.17 shows that more than 50% leaders in Murehwa support the current trade.

Table 4.17 Leaders' views (% respondents) on easing the regulations against marketing of IFs

View	Murehwa (n = 18)		Gokwe (n = 12)		Takawira (n = 22)	
	Good	Not good	Good	Not good	Good	Not good
Selling IFs harvested from the forests?	56	44	33	67	46	54
Farmer plant own trees, can they sell?	94	6	75	25	91	9
Ease regulations limiting marketing of IFs through:						
• establishing co-operatives	11	89	25	75	50	50
• issuing licences to traders	6	94	14	86	36	64
• traders planting their own fruit trees	100	0	92	8	96	4

Source: Policy assessment survey, 2000

Question: In the efforts of promoting/developing the marketing of IFs what are your views in easing the regulations, which limit the collection, and marketing of indigenous fruits through: Establishing co-operative groups/bodies which will collect and sell?. Issuing licenses to individuals and groups which will collect and sell and revenue being earned by villages/district councils? Support farmers to plant indigenous fruit trees in order to sell the fruits?

This might be due to the intensive marketing activities going on now, in which traders benefit from the business. But for Gokwe, more than 65% oppose the trade, possibly because the chief is so strict and they are the implementers of the by-law. With respect to planting the trees and later selling the fruits, more than 90% leaders in Murehwa and Takawira like the

idea. However, in Gokwe there is a sign of disbelief (25% respondents) that farmers can grow indigenous fruit trees. Furthermore, they think that it will be hard to prove that one is selling fruits from his/her farm or harvested them from the communal forests.

In general, people in communal areas comprising Murehwa and Gokwe are reluctant to ease the regulations that limit the marketing of the fruits as compared to Takawira resettlement area. They still believe that if licences are issued or marketing co-operatives established, there will be environmental destruction. Therefore, for organisations interested to encourage farmers to plant the trees for commercial purposes, clear rules and regulations have to be set forward to avoid conflicts.

In order to understand the role of different administrative bodies in the IFTs and IFs management and use, this study inquired for actors responsible for the implementation of the laws and by-laws in place. Findings suggest that in the past, people caught selling IFs were fined. The amount of fines ranged from a chicken to several goats depending on the number of crimes (including others not related to selling IFs) one has committed within the year. However, in recent days, no one has been subjected to that kind of punishment because ideally, the government structures such as VIDCOs and WADCOs are supposed to deal with those people. However, the weak administrative and implementation capacities of the government bodies have caused confusion of who is really accountable in enforcing the regulations. Findings of this study show that in Murehwa communal area the major body answerable for regulations is the VIDCOs as informed by 72% respondents (Table 4.18) while in Gokwe are the chiefs (83 percent respondents). Nevertheless, in Takawira resettlement area village chairmen and women are the most responsible.

There are some claims from people and village leaders that if people sold IFs or picked other peoples fruits, they might be taken to the police and chiefs for punishment. But some leaders reported that in reality, there has been no mechanism of such kind. For example, this study found out that producers in Murehwa harvest and transport the fruits to the markets openly during the day, while it is not easy to do so in Gokwe. As a result some producers in Gokwe take the risk of harvesting and transporting the fruits at night, which increases transaction costs. In addition, for the season under study, in Gokwe, it was not possible to classify individuals who are wholesalers because no one wanted to admit buying and selling the fruits

in large quantities because he/she could be answerable to the chief. These problems end up in inadequate market supply in urban centres.

Table 4.18 Implementation (% respondents) of regulations guiding management and use of IFTs and fruits

Responsible body	Murehwa (n = 18)	Gokwe (n = 12)	Takawira (n = 22)	Average
Ward Councillor	6	-	9	8
Village chairman/woman	33	-	55	44
Natural Resource Board	22	17	41	27
Conservation Committee	6	-	41	24
VIDCO	72	8	14	31
Parents	11	17	-	14
Police	6	8	-	7
Chief	61	83	-	72
AGRITEX	6	-	32	19
Forest Commission	6	8	-	7

Source: Policy assessment survey, 2000

Percentage totals per site don't add up to 100 because of double counting

Question: Who is responsible for enforcing/implementing the regulations?

4.1.7.3 Summary of institutions controlling management of IFTs and use of fruits

In conclusion, there are government regulations regarding the ownership and user rights of natural resources and produce as a whole, but more emphasis is on timber production and management. So far, there is no transparency on the property rights regarding the use and ownership of indigenous fruit trees and fruits. This is because the resource has until recently been treated as a public good. That means there was no competition and hence consumption by anybody was not considered to reduce the amount of fruits in the forests. Also, there was no exclusion of anyone regardless of his/her background. Like reported by chief NJELELE (2000),

“..... even travellers were allowed to harvest and eat the fruits as many as they could and continue with their journeys. In addition, wild animals were also allowed to take their share as wished.....”

The increase in population in Zimbabwe estimated at 11 million people and growth rate of 2.4 (CSO, 1998), coupled with declining income and increasing economic hardships are rising the use of the fruits. These facts have caused poor people to compete for the fruits to subsidise their household incomes. Since there is no exclusion of individuals to use the fruits, the high competition has changed the status of the resource from being a public good to an open access. This situation make people scrambling for the fruits for survival, at the same time, there are no clear institutions on the afterwards of IFs change of status from being a public good to open commodity with an increased rivalry. This state causes confusion between traditional leaders, the surrounding communities and traders. As a result traditional leaders, the grass root of the problem, impose traditional laws and regulations to restrict the selling of indigenous fruits. In so doing, the amount of fruits that producers are willing to supply is endangered.

The unclear rules regarding the ownership and user rights of indigenous fruits in the communal areas suggests that there might occur some difficulties in the commercialisation. Therefore, on the short run, the process of promoting marketing activities should emphasise on strengthening policies on increasing access of the fruits through certificates. But on the long run, planting the trees on individually owned farms and groups will be a sustainable source of fruit supply for the market.

To conclude on the marketing analysis, it is necessary to summarise the characteristics, which impose inefficiencies to the indigenous fruits' marketing system. Since there is no mention of these aspects in any of the secondary sources consulted, the reported results are fully based on the information gathered in the study of marketing system of the two fruits.

4.1.8 Sources of Market Inefficiencies

Starting from the producer level, findings of this study show that, the institutional arrangements at the production sites, mainly traditional taboos and by-laws against collection of IFs for selling cause great disabilities. This situation might seriously affect collectors who belong to the traditional ruling class or clan in which cheating the chief is a great offence. However, for other collectors, so long as one can walk and collect the fruits, he/she can survive in the business. But, searching for transport, bargaining and high fares might limit producers to take the fruits to Harare markets. Therefore, despite low farm-gate prices

received from wholesalers, they might continue selling on-farm. Apart from transportation costs, the other cause of ineffectiveness to retailers buying fruits from the villages are transaction costs associated with transporting the fruits. These include non-flexibility of bus carriage conditions, which are obligated to carry passengers but not fruits, a condition, increasing handling costs and high fruit losses. This might be the reason why most retailers prefer to buy the fruits from the wholesale section in Mbare market. Transport searching, bargaining and high transport fares pose problems in the wholesaler section of the two indigenous fruits too. Wholesalers need to hire trucks to be able to transport the large quantities of fruits to Harare.

Despite the prevailing problems and unsuitable institutional arrangement, which hamper market supply, the major focus of this study remains the same. That is to analyse the marketing system from production to consumption in order to find ways of increasing marketing opportunities. In fact, right now, the subject has become more interesting because it will find out whether it is feasible to talk of improving production and marketing activities in the current constraints hampering fruit collection for the market. Therefore, the following subchapter analyses the consumer as per information gathered by informal and formal surveys.

4.2 CONSUMER ANALYSIS

Secondary information on consumption of indigenous fruits was not available. Therefore, consumer analysis had to be conducted to assess the extent of consumption of the fruits, and the possibilities of improving the condition. In order to accomplish these objectives, consumer behaviour theory is analysed. Despite the intensity of consumption, the analysis of consumer behaviour will facilitate an understanding on consumers' attitudes, preferences and willingness to pay for the fruits, which can serve as an indicator for demand. The information will also be incorporated in the design of appropriate marketing mix and provide feedback to ICRAF's research, with a long-term objective of domesticating the fruits to improve nutrition and raise cash income to poor families. Therefore, sites were selected as discussed in subchapter 3.1, and detailed consumer analysis conducted.

The data collection process followed a stepwise procedure similar to the one applied in the marketing analysis. Since there was no secondary data on consumption of the two fruits,

consumer informal survey was first conducted to get an insight of the consumer side of the production-to-consumption system. Based on the results, formal questionnaire has been designed in order to assess consumer characteristics and behaviour.

4.2.1 Data Collection for Consumer Analysis

4.2.1.1 Consumer informal survey

Consumer informal survey was a crucial activity since there was no information about the type of questions to ask consumers in the formal survey, which could lead to its failure. Therefore, the informal interviews were conducted in the five sites selected for consumer survey to identify important aspects of consumer behaviour. To allow in-depth and open discussions between consumers, group discussions among individuals of similar sex and age were encouraged. Group conversations were possible in Murehwa and Gokwe because the survey was conducted during off-growing season, so most people were not very much occupied with farm activities. Groups were also formed in City Botanical gardens since they are recreational areas. In these two cases, the informal consumer interviews were conducted in groups of 2 to 16 people. In busy centres like Westgate shopping centre and Mbare market, consumers were interviewed individually. Apart from listing and show of hands, consumers were given an opportunity to rank the type of fruits they preferred in a matrix using stones.

Similar to traders' informal interviews, guideline questions listed in Appendix 4.9 were used. First of all in order to get an idea of consumption of the fruits, it was necessary to know the sources of the fruits for consumption, eating and buying habits including the period when the habits started. Changes of the inclination over the years, frequency and quantities of purchase and consumption were also important. For example to know the different sources where consumers acquired the fruits for consumption, consumers were asked the following simple open question:

*“Where do you get *U. kirkiana* and *S. cocculoides* indigenous fruits you do consume?”*

Similarly, in order to predict future demand, it was interesting to know the frequency of purchase, quantity purchased and objectives of consuming the fruits. Therefore to assess the objectives of consuming, consumers were inquired if they buy the fruits as snacks or buy them for major meals. An example of such a question is:

“Which are the objectives of consuming U. kirkiana and S. cocculoides IFs when they are in season?”

In addition to these questions, it was necessary to learn on the attitudes and preferences of the indigenous fruits by asking questions on attributes and levels considered when consume or buy indigenous fruits and also preferred indigenous fruits. Other factors affecting consumer behaviour were also inquired. They include substitutes of the two indigenous fruits, type of indigenous fruits processed products on the market, prices and opinion on the improvement of marketing of indigenous fruits. The results of this survey helped in getting an insight of some of the important aspects of consumer behaviour and also aided in the design of the detailed consumer formal questionnaire.

4.2.1.2 Consumer formal survey

To assess consumer behaviour, an elaborate consumer formal survey questionnaire consisting of three types of questions as shown in Appendix 4.10 was designed. The first part of the questionnaire was designed to get a general understanding on the consumption and purchase of *U. kirkiana* and *S. cocculoides* indigenous fruits as compared to the commonly consumed exotic fruits such as mangoes, oranges and apples. Most questions in this section were a detailed version of the informal discussions carried out before. Consequently, questions were asked about sources of the indigenous fruits consumed and mode of acquisition, frequency of consumption, quantities and preferences to both exotic and indigenous fruits. For example the different markets where consumers acquire the fruits for consumption is still an important aspect to be considered. The open question asked in the informal interview was further closed in order to quantify the different responses. This was done to guide in concluding the major source of the fruits. Hence in the formal consumer survey, consumers were asked the following closed question:

“Where do you get U. kirkiana and S. cocculoides indigenous fruits you do consume? Local markets?, Supermarkets?, Gifts?, Forests?, Crop fields?, Others? If others, please specify?”

Likewise, after getting some ideas on the aims of consuming IFs, the question aiming at estimating demand of the fruits as asked in the informal discussion was also closed and asked:

“Why do you consume U. kirkiana and S. cocculoides IFs?” As snack? Acquire vitamins? Satisfy hunger? Other people are consuming? Follow ancestral behaviour? Others?, If others, please specify?

The second part of the questionnaire contained questions designed to measure attitudes towards indigenous fruits' consumption and marketing. The major assumption behind learning attitudes associated with these two fruits is: attitudes are outcomes of psychological processes, which can change by being subjected to positive experiences and ideas from other individuals or mass media. Therefore, by identifying the negative attitudes, ways can be designed to rectify them to increase demand. So, likert scales to measure beliefs, feelings, opinions and actions towards trade and consumption of the indigenous fruits were designed and administered to consumers. Likert scales were selected because they are easy to construct, analyse the results and they are simple to address to the respondents because consumers are asked to indicate their degree of agreement with the statements.

In order to understand the different attitudes with regards to the consumption and marketing of the fruits, a number of statements including opinions on purchase prices, sizes and preferred colours were asked to all consumers including buyers and non-buyers. An example of a question that aimed at assessing the attitude towards colour read as follows:

“Do you agree with the following statement? Regardless of other factors (e.g. taste), I would buy brownish U. kirkiana fruits as against yellow. Strongly agree? Agree? Partly agree /disagree? Don't agree? Strongly disagree? No answer?”

Also, in order to assess whether consumers appreciate the initiated presale activities conducted by some of the traders, questions about the need for presale activities and existing selling practises were included. In the informal discussions some consumers indicated their support in the marketing of indigenous fruits because the business raises government revenues. Therefore, it was worth it quantifying the responses in order to assess the extent of the opinion. In addition data on suggestions to improve the marketing activities as per informal discussions such as expansion of the market facilities, health and nutritional contribution and the need to plant indigenous fruit trees was summarised. An example of a likert scale to measure the attitude on the current marketing of IFs harvested from the forests is:

“Do you agree with the following opinion? S. cocculoides /U. kirkiana fruits harvested from the forests shouldn't be sold? Strongly agree? Agree? Partly agree /disagree? Don't agree? Strongly disagree? No answer?”

In order to characterise the consumers, a third part was planned to compile information on the socio-economic characteristics including marital status, family composition, income, education, age and sex. This section consisted of open and closed type of questions. Subsequently, preliminary informal discussions revealed that most Zimbabweans consume indigenous fruits, therefore the 541 respondents were selected according to whoever was available in the stratum and liked to provide information.

The informal and formal interviews generated a considerable amount of information to explain the consumers and the existing situation on the consumption of indigenous fruits. Therefore, the succeeding subchapter tries to describe the consumption side of the marketing system of the two indigenous fruits by applying the theory underlying consumer behaviour. So, the general extent of consumption, beliefs and attitudes towards the consumption and purchase and consumers' characteristics associated with consumption, non-consumption, buying and non-buying behaviours for the two indigenous fruits are identified. Furthermore, preferences to the fruits' natural characteristics such as size and colour and the way the fruits are presented on the market (e.g. packed or unpacked) are summarised. In addition, the need to improve the situation in which the fruits are sold is discussed. Furthermore, consumer attitudes on prices and their likelihood to pay the estimated prices are presented.

4.2.2 Descriptive Analysis of the Consumption Behaviour

Knowledge on the extent of consumption is an important feedback for the research on domestication of the fruits. Without the end user, the increased production will have no destination and hence efforts towards domestication will not have a meaning. This subchapter is therefore compiling knowledge collected from both informal and formal discussions in order to explain the existing status and get an overview of consumption activities. So, information on proportions of people consuming the fruits, frequency of consumption and purchase, quantities consumed and bought, the form in which the fruits are consumed, trends of consumption over the years and preference of the indigenous fruits to exotic fruits are discussed.

4.2.2.1 General consumption

Results of the detailed consumer formal surveys of 2000 ripening season found out that 94% (Table 4.19) of people in the study sites consume *U. kirkiana* fruits and at least all people who consume IFs consume the fruits. Furthermore, out of the *U. kirkiana* consumers 56% eat *S. cocculoides* fruits.

Table 4.19 Consumption of *U. kirkiana* and *S. cocculoides* IFs (% respondents)

Site	Consume				Food relief in famine			
	<i>U. kirkiana</i>		<i>S. cocculoides</i>		<i>U. kirkiana</i>		<i>S. cocculoides</i>	
	Yes	No	Yes	No	Yes	No	Yes	No
Murehwa (n = 106)	100	-	46	54	85	15	84	16
Gokwe (n = 111)	95	5	49	51	95	5	96	4
Mbare (n = 105)	99	1	60	40	86	14	88	12
West gate (n = 115)	88	12	80	20	91	9	96	4
B. gardens (n = 104)	90	10	44	56	93	7	95	5
Average	94	7	56	44	90	10	91.8	8.2

Source: Consumers' formal survey, 2000

Note: Figures in brackets are number of respondents

Percentages, which don't add to 100, are due to rounding up errors

Questions asked: Do you consume *U. kirkiana* fruits?. Do you consume *S. cocculoides* fruits?. Do you think IFs provide food relief during periods of famine?

Many consumers of *U. kirkiana* fruits are located in Murehwa (100% respondents) and Mbare (99% respondents), possibly because of the availability of the fruits through production and markets respectively. Furthermore, there are many (12%) non-consumers of *U. kirkiana* fruits in Westgate shopping centre as is in the other sites. This situation can be explained by the location of many non-Zimbabweans, shopping in this site as compared to other markets under study. In the case of *S. cocculoides* IFs, numerous consumers are found in Westgate and Mbare sites instead of Gokwe, which is the production site. This result might not reflect a permanent scene, it may as well be caused by the availability of the people on that day. In order to conclude on this trend, further research on this aspect is recommended.

Due to the widespread belief that IFs provide security especially during periods of famine (FAO, 1983, CAMPBELL, 1987, MAGHEMBE, et. al., 1998, SAKA & MSOTHI 1994), this study

attempted to examine the notion with consumers. Results show that, up to 90% of consumers of both *U. kirkiana* and *S. cocculoides* fruits think that the fruits rescue food situation during drought years and periods of famine (Table 4.19). Quantities of *U. kirkiana* fruits consumed between rural and urban areas differ. For example, during the ripening season on average, consumers in Harare consume 35 fruits for 15 times a month as compared to 63 fruits for 19 times in Gokwe (Table 4.20).

Table 4.20 Average quantities and frequencies of consumption per month for *U. kirkiana* and *S. cocculoides* IFs

Site	<i>U. kirkiana</i>		<i>S. cocculoides</i>	
	Average quantity	Average frequency	Average quantity	Average frequency
Harare	34.65	15.21	11.00	5.60
Gokwe	63.18	19.45	21.18	2.90

Source: Consumers' formal survey, 2000

Questions asked: When *U. kirkiana* and *S. cocculoides* fruits were in season (1999 season), how frequently in a week did you consume?

When *U. kirkiana* and *S. cocculoides* fruits were in season (1999 season), how many in a week did you consume?

The trend of *U. kirkiana* consumption is the same to the *S. cocculoides* fruits. Consumers in Gokwe consume twice as much *S. cocculoides* fruits a month as compared to Harare. The differences might be caused by the fact that in rural areas, the fruits' availability is high and since the fruits ripe during off peak season, most people consume them as food supplement. In addition there are few exotic fruits in rural areas as compared to urban areas. The wide consumption of exotic fruits such as mangoes and oranges in Harare than in Gokwe might also help to explain the existing difference on the consumption of the two fruits. Apart from presence of exotic fruits, in Harare there are many people belonging to multicultural backgrounds who don't eat the fruits. Findings of this study also indicate that *U. kirkiana* fruits are frequently consumed and in high quantities compared to *S. cocculoides* fruits. However, the differences in consumption among the two fruits might not be a fundamental observation, because it might be caused by seasonal yield differences which could not be proved by this study since it is beyond its objectives.

4.2.2.2 Trends in consumption

To get an insight of the habit of consuming these fruits, consumers were asked about the period when they started consuming IFs. Results of the informal discussions show that consumption of indigenous fruits in Zimbabwe started from time immemorial. However, compared to the past the consumption is increasing. In general, frequent hunger outbreaks and war towards independence increased the consumption for the past two decades. Furthermore, 59% consumers think that there is a change in the intensity of consuming *U. kirkiana* and *S. cocculoides* indigenous fruits in the country. This is because of the growing marketing activities (91% respondents) which made the fruits available throughout the country during the season (Table 4.21).

However, other consumers think that consumption of indigenous fruits has declined because of extensive use of exotic fruits (43% respondents). In addition, 32% respondents informed that deforestation caused by clearing land for settlements, increasing demand for forest products such as firewood and building materials and expansion of crop production decreased the fruit trees. Finally frequent droughts also affected fruit yields and hence decreased consumption.

Despite the wider consumption, 7% of people living in the study sites do not consume the fruits. The majority of these people are originated from United Kingdom, Portugal, Malawi, Zimbabwe (mainly whites) and South Africa. Their major reason was they don't know the fruits (60% respondents) while 20% don't like the taste of the fruits. In fact, 15% fear even to taste the fruits because they are not sold in supermarkets and hence they might be poisonous. The remaining reported that, because the fruits are not available where they stay, they are not used to them. Moreover, with the growing population coupled with a decline in disposable income, potential for increased consumption is high.

Table 4.21 Trend towards consumption of *U. kirkiana* and *S. cocculoides* IFs

Trend	Percentage
High consumption because	
• Frequent hunger outbreaks	9
• Sold in markets	91
Total	100
Low consumption because	
• Wide use of exotic fruits	43
• Young people do not prefer the fruits	7
• Deforestation	32
• Market prices are high	9
• Lack of awareness of the fruits to young generation	7
• Drought reduces yields	2
Total	100

Source: Consumers' informal survey, 1999

Questions asked: Why nowadays there is high consumption of *U. kirkiana* and *S. cocculoides* fruits? Why nowadays there is low consumption of *U. kirkiana* and *S. cocculoides* fruits?

4.2.2.3 Attitudes and preferences to consumption of IFs

In order to improve the demand of IFs, information on preferences and attitudes associated with the fruits is analysed. The information is crucial keeping in mind the existence of exotic fruits, which might compete with IFs. However results suggest that the consumption of the fruits as explained above might not only be caused by food security reasons but also knowledge of the nutritional value of the fruits. Nutritional studies of indigenous fruits show that the fruits contain substantial amounts of vitamins, proteins, oils, energy, fibres and minerals (Table 4.22). For example 100g fresh weight of *U. kirkiana* fruits contain 16.8 mg vitamin C, 1.8% crude protein and 1,456 kJ energy (SAKA, 1994, p. 51). The fruits have calcium and iron contents of 33 and 431µg/g respectively (ibid.). The fact that the fruits are highly consumed and at the same time have reasonable amounts of vitamins support earlier reports that they significantly contribute to the nutrition of poor people including their children and pregnant women (FALCONER, 1990). This is because most poor people in Zimbabwe live in marginal land areas where few varieties of exotic fruits grow. In addition, the poor people cannot afford exotic fruits from the markets.

Table 4.22 Nutritional information of some commonly consumed IFs in Zimbabwe

IFs Fruit	Vitamin C (mg/100g fresh wt.)	Crude protein (%)	Energy value (kJ/100g)	Fibre (%)	Minerals (µg/g)	
					Calcium	Iron
<i>Uapaca kirkiana</i>	16.8	1.8	1,456	8.4	33	431
<i>Parinari curatellifolia</i>	10.4	3.0	1,517	5.5	129	103
<i>Strychnos spinosa</i>	19.9	5.4	1,923	17.6	149	136
<i>Azanza garkeana</i>	20.5	15.1	810	45.3	95	84
<i>Flacourtia indica</i>	10.2	4.2	1,290	5.7	354	734
<i>Syzygium guineese</i>	11.9	10.1	1,096	30.3	227	758
<i>Ziziphus mauritiana</i>	13.6	4.1	1,588	3.4	135	-
<i>Adansonia digitata</i>	179.1	3.1	1,480	8.3	1,156	58

Source: SAKA, 1994, p. 51-53

- Not determined

In this study of marketing of *U. kirkiana* and *S. cocculoides* fruits, consumers reported that they prefer to consume the fruits because they have vitamins. This attribute ranks second after consuming the fruits as snacks (Table 4.23). Provision of vitamins is an important characteristic that can be used in the promotion activities to increase demand of the fruits. Apart from snacks and vitamins, the fruits are also consumed out of habit. Therefore, there is very little support from the consumer surveys that the fruits are consumed to satisfy hunger.

The latter reason (consuming the fruits as a habit) complies with the theory of consumer behaviour. Usually, some consumers rely on other people in their decision towards purchase and utilising a product. Normally people from the same subculture including nationality, religion and geographical region (KOTLER & ARMSTRONG, 1999, p. 136) can serve as a point of comparison of a consumer in forming attitudes and behaviour towards a product. In this case, this factor can be used by marketers of *U. kirkiana* and *S. cocculoides* fruits to design a product promotion strategy targeting different subcultural groups in order to capture many consumers who would use the group in their decision to buy the fruits.

Table 4.23 Reasons (% consumers) of consuming *U. kirkiana* and *S. cocculoides* IFs

Reason	Murehwa (n=106)	Gokwe (n=111)	Mbare (n=105)	W/gate (n=115)	B/garden (n=104)	Average Total
<i>U. kirkiana</i>						
Snacks	68	87	69	79	74	75
Vitamins	10	8	17	12	8	11
Hunger	6	4	6	4	7	5
Others consume	4	-	2	1	8	3
Follow parents/ancestors	11	1	7	5	4	6
Total	99	100	101	101	101	100
<i>S. cocculoides</i>						
Snacks	61	70	66	72	78	69
Vitamins	13	16	17	12	11	14
Hunger	6	13	5	3	2	6
Others consume	9	-	3	2	7	4
Follow ancestors	11	1	9	10	2	7
Total	100	100	100	99	100	100

Source: Consumers' formal survey, 2000

Total percentages not equal to 100 are due to rounding up errors

Questions asked: Why do you consume *U. kirkiana* and *S. cocculoides* fruits? 1. Snack 2. Acquire vitamins 3. Hunger 4. Others, specify?

4.2.2.4 Consumers' attitudes on the fruits

Information about general consumption of the fruits is not enough to accomplish the efforts of increasing marketing activities. Knowledge on the existing attitudes with regards to the fruits is important, because it can be used to satisfy consumer needs. For traders, modifying consumer negative attitudes towards the fruits can help them increase their sales. Therefore, this subchapter is trying to discuss the results of attitude queries including buyers and subsistence consumers during the study.

Generally from informal discussions, consumers are pleased with the extent of consumption of the fruits because the fruits have vitamins and minerals for health. They encouraged the current trading of the fruits not only to increase consumption but also because they think that the business is a good source of government revenues. However, in order to improve the

consumption and trading activities, they recommended planting the fruit trees to increase fruit yields. Also, in order to enhance wider consumption, they suggest establishing promotion activities and improving distribution of the fruits to many markets in the country. Therefore, this study is testing these beliefs and attitude statements of consumers including buyers of the two fruits to quantify the extent of the agreements with the opinions.

Descriptive analysis reveals that up to 40% consumers of both *U. kirkiana* (Table 24) and *S. cocculoides* fruits (Table 25) encourage the existing trade of indigenous fruits. Their major reasons are the trade creates employment, facilitates easy access of the fruits in cities and many people like to eat the fruits. Also 53% and 44% of *U. kirkiana* and *S. cocculoides* fruits consumers respectively support the idea that the fruit trees should be planted to increase fruit supply. In addition to increase supply, they also like the opinion because the new trees will replace the old ones, enhance producer ownership of the trees, expand the country's forest resources and prevent extinction of the tree species for the benefit of future generations. The consumer support towards planting the trees is not only in line with ICRAF's objectives to enhance more consumption and selling, but also backs up the efforts of other international organisations and NGOs to increase poor household income possibilities and at the same time, it is improving the environmental degradation.

Table 4.24 Consumer attitudes (% respondents) on marketing of *U. kirkiana* IFs

Opinion/attitude	Strongly agree	Agree	Partly agree partly disagree	Don't agree	Strongly disagree	No answer
Traders should continue selling <i>U. kirkiana</i> fruits	41	33	2	13	10	1
To continue selling <i>U. kirkiana</i> will increase government revenue	6	20	6	40	13	15
To improve the marketing of <i>U. kirkiana</i> fruits, advertisement is important	21	39	4	21	14	1
To improve the marketing of <i>U. kirkiana</i> fruits, they should be sold in all markets (small and big)	27	45	4	14	9	1
<i>U. kirkiana</i> fruits from the forests shouldn't be sold because they are given by god	20	7	8	38	26	1
<i>U. kirkiana</i> fruits trees should be planted to increase fruit supply	53	31	2	9	4	1
Children and pregnant women should be encouraged to consume <i>U. kirkiana</i> fruits because they are rich in vitamins	44	35	4	3	1	13
Exotic fruits have more vitamins than indigenous fruits	5	9	6	30	38	12

Source: Consumers' formal survey, 2000

n = 510

In addition, most consumers compromise with the idea that in order to improve the marketing of *U. kirkiana* and *S. cocculoides* fruits, advertisement is important and the fruits should be sold in all markets. This will allow access to the fruits by all consumers and introduce competition with exotic fruits. They also strongly believe that children and pregnant women should be encouraged to consume IFs because they are rich in vitamins.

Table 4.25 Consumer attitudes (% respondents) on marketing *S. cocculoides* IFs

Opinion/attitude	Strongly agree	Agree	Partly agree partly disagree	Don't agree	Strongly disagree	No answer
Traders should continue selling <i>S. cocculoides</i> fruits	40	37	3	10	4	6
To continue selling <i>S. cocculoides</i> fruits will increase government revenue	6	21	7	34	9	23
To improve the marketing <i>S. cocculoides</i> fruits, advertisement is important	29	41	3	21	5	1
To improve the marketing of <i>S. cocculoides</i> fruits, they should be sold in all markets (small and big)	27	48	5	15	5	-
<i>S. cocculoides</i> fruits from the forests shouldn't be sold because they are given by god	12	11	6	35	36	-
<i>S. cocculoides</i> fruits trees should be planted to increase fruit supply	44	38	1	12	5	-
Children and pregnant women should be encouraged to consume <i>S. cocculoides</i> fruits because they are rich in vitamins	45	36	3	4	-	12
Exotic fruits have more vitamins than indigenous fruits	6	6	7	30	38	13

Source: Consumers' formal survey, 2000

n = 284

Yet, consumers don't agree with the notion that continuing selling the fruits will increase government revenues. This is due to the fact that the current trade is still informal without co-ordination and regulations controlling the business. As a result no taxes are imposed to all the traders. Nevertheless, majority (38%) of consumers of both *U. kirkiana* and *S. cocculoides* fruits strongly disagree with the feeling that exotic fruits have more vitamins than indigenous fruits. The reasons are nobody has a scientific proof to support the statement. More than that, the indigenous fruits are wildly growing without chemicals and hence naturally healthier than

exotic fruits. Also, consumers reported that IFs have high nutritional value because their forefather survived by eating only the IFs before the introduction of exotic fruits in Zimbabwe. Besides, 38% and 35% consumers of *U. kirkiana* and *S. cocculoides* fruits respectively don't agree with the opinion that the fruits are harvested from the natural forests and hence they shouldn't be sold.

Despite the general consumer attitudes, this subchapter is streamlining further down to the buyer. The attitudes of buyers are of special interest to this study keeping in mind its objective of improving the marketing activities.

4.2.2.5 Buyers' attitudes and willingness to pay

Based on findings of this study, out of the 94% consumers of *U. kirkiana* reported in subchapter 4.2.2.1, 50% buy the fruits (Table 4.26). There are higher purchasing activities in urban areas than rural sites. The trend shows that there are more buying activities in Mbare, Westgate and City Botanical gardens as compared to Murehwa and Gokwe. Possibly the urban people have higher incomes than the rural people do. According to Mithöfer (2002), most rural people in Murehwa and Takawira depend on remittances from relatives in urban areas to supplement their budgets for basic needs. However, the fact that there are more buyers in the urban areas might suggest that rural people might increase their fruit sales by taking the fruits to the urban markets.

Furthermore, Murehwa rural site has the lowest purchasing activities for both the fruits, which might be due to high availability of *U. kirkiana* fruits in the area. But for *S. cocculoides*, the fruits available in the area are too few to be taken to the market, while Gokwe site is unable to supply fruits as far as Murehwa markets.

In the case of *S. cocculoides* fruits, only 30% out of its consumers buy, suggesting small market of the fruits. Most consumers get the fruits from relatives from the villages who visit them during the season and some consumers travel to the rural areas and collect themselves from the forests or their fields.

Table 4.26 Buyers (% respondents) of *U. kirkiana* and *S. cocculoides* IFs

Site	<i>U. kirkiana</i>		<i>S. cocculoides</i>	
	Buy	Other sources	Buy	Other sources
Murehwa (n=106)	20	80	3	97
Gokwe (n=111)	39	61	33	67
Mbare (n=105)	70	30	46	54
West gate (n=115)	62	38	47	53
B. gardens (n=104)	60	40	22	78
Average	50	50	30	70

Source: Consumers' formal survey, 2000

n = 255

Note: Figures in brackets are number of respondents

Questions asked: Where do you get the fruits you do consume? Markets? Gifts? Forests? Fields? Others?

There is a difference on quantities of *U. kirkiana* fruits bought between rural and urban areas. Consumers in Harare buy almost twice as much fruits as compared to Murehwa and Gokwe rural areas. During the ripening season, on average, buyers in Harare purchase 8 times, amounting to 52 fruits per month as compared to 23 and 38 fruits in Murehwa and Gokwe respectively (Table 4.27).

Table 4.27 Average frequencies and quantities purchased/month of *U. kirkiana* and *S. cocculoides* IFs

Site	<i>U. kirkiana</i>		<i>S. cocculoides</i>	
	Average quantity	Average frequency	Average quantity	Average frequency
Murehwa	22.52	2.38	3.33	0.23
Harare	52.37	7.59	13.00	1.61
Gokwe	38.27	5.81	17.61	4.58

Source: Consumers' formal survey, 2000

Questions asked: When *U. kirkiana* and *S. cocculoides* were in season (1999 season), how frequently in a week did you buy the fruits?

When *U. kirkiana* and *S. cocculoides* were in season (1999 season), how much/quantity a week did you buy the fruits?

However, the buying behaviour of *S. cocculoides* is a bit different from *U. kirkiana* fruits. Buyers in Gokwe buy more frequently at higher quantities than in Harare and Murehwa. This might be due to the low availability of the fruits in Gokwe town compared to the rural areas, which leaves the market as the best source of the fruits. In general these results suggest that urban markets are more potential than the rural ones. Efforts to improve cash incomes of the rural poor might consider supplying more fruits in the urban markets.

With respect to opinions and beliefs, descriptive results show that buyers of the two fruits displayed the same trend (Tables 4.28 and 4.29). In the case of *U. kirkiana* fruits, 53% buyers strongly agree with the opinion that marketing should continue, the fruits should be advertised (43% respondents) and sold in all formal and informal markets (56% respondents). They also support that farmers should plant the fruit trees (50% respondents) to increase supply for both consumption and selling. However, buyers like consumers disagree with the view that to continue with selling the fruits increases government revenues (43% respondents) and that exotic fruits have more vitamins than IFs (39%).

Also for *S. cocculoides* fruits, 55% buyers strongly agree that traders should continue selling the fruits. Measures recommended to improve the marketing activities including advertisements (48% respondents), planting the fruit trees (46% respondents) to increase supply and sell in all markets in the country (58% respondents). However, like buyers of *U. kirkiana*, they don't agree that selling the fruits will increase government revenues, and also exotic fruits have more nutrients than IFs. The reasons are the same as of their colleague consumers.

Table 4.28 Buyers' attitudes (% respondents) on marketing of *U. kirkiana* IFs

Opinion/attitude	Strongly agree	Agree	Partly agree/ disagree	Don't agree	Strongly disagree	No answer
Traders should continue selling <i>U. kirkiana</i> fruits	53	36	2	5	3	1
To continue selling <i>U. kirkiana</i> will increase government revenue	7	24	8	43	11	7
To improve the marketing of <i>U. kirkiana</i> fruits, advertisement is important	28	43	2	20	6	1
To improve the marketing of <i>U. kirkiana</i> fruits, they should be sold in all markets (informal & formal)	31	56	2	8	2	1
<i>U. kirkiana</i> fruits from the forests shouldn't be sold because they are given by god	8	7	4	45	35	1
<i>U. kirkiana</i> fruits trees should be planted to increase fruit supply	50	36	1	9	3	1
Children and pregnant women should be encouraged to consume <i>U. kirkiana</i> fruits because they are rich in vitamins	37	42	5	3	1	12
Exotic fruits have more vitamins than indigenous fruits	6	10	7	28	39	10

Source: Consumers' formal survey, 2000

n = 255

Table 4.29 Buyer attitudes (% respondents) on marketing of *S. cocculoides* IFs

Opinion/attitude	Strongly agree	Agree	Partly agree/ disagree	Don't agree	Strongly disagree	No answer
Traders should continue selling <i>S. cocculoides</i> fruits	55	36	3	5	1	-
To continue selling <i>S. cocculoides</i> will increase government revenue	10	25	13	33	13	6
To improve the marketing of <i>S. cocculoides</i> fruits, advertisement is important	37	48	1	13	1	-
To improve the marketing of <i>S. cocculoides</i> fruits, they should be sold in all markets (small and big)	29	58	3	10	-	-
<i>S. cocculoides</i> fruits from the forests shouldn't be sold because they are given by god	6	8	1	39	46	-
<i>S. cocculoides</i> fruits trees should be planted to increase fruit supply	43	46	-	5	5	1
Children and pregnant women should be encouraged to consume <i>S. cocculoides</i> fruits because they are rich in vitamins	33	44	8	5	1	9
Exotic fruits have more vitamins than indigenous fruits	7	5	9	25	44	10

Source: Consumers' formal survey, 2000

n = 91

In order to know the preferences with respect to the two fruits, consumers were asked to rank their willingness to buy five different species of indigenous fruits currently on the market. Findings on Table 4.30 show that all buyers of indigenous fruits prefer to buy *U. kirkiana* first followed by *Z. mauritiana* fruits. However the proportions of people preferring the fruits differ. For buyers of *U. kirkiana* fruits, if granted with enough money to buy the five species of indigenous fruits including *U. kirkiana*, *S. cocculoides*, *A. garkeana*, *Z. mauritiana* and *A. digitata*, 72% would like to buy *U. kirkiana* first. The second choice is *Z. mauritiana* (36% consumers) and third *A. garkeana*. Like the buyers of *U. kirkiana*, buyers of *S. cocculoides*

fruits would like to buy the same choices of first and second types of fruits but the third one is *S. cocculoides*.

Table 4.30 Willingness (% respondents) to buy indigenous fruits

Indigenous fruit	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Overall Rank
<i>U. kirkiana</i> buyers						
<i>U. kirkiana</i>	72	14	9	4	1	1
<i>S. cocculoides</i>	5	14	16	14	47	5
<i>A. garkeana</i>	4	23	35	32	7	3
<i>Z. mauritiana</i>	19	36	17	17	15	2
<i>A. digitata</i>	1	13	33	25	33	4
<i>S. cocculoides</i> buyers						
<i>U. kirkiana</i>	68	15	11	6	-	1
<i>S. cocculoides</i>	8	24	26	22	18	3
<i>A. garkeana</i>	4	23	34	28	12	4
<i>Z. mauritiana</i>	20	25	11	22	21	2
<i>A. digitata</i>	-	13	19	22	48	5

Source: Consumers' formal survey, 2000

Percentages adding more than 100 are due to two fruit ranked in one position

- *A. digitata* fruit is highly unpopular in the site for *Strychnos cocculoides*

Question asked: If you have enough money for buying only 4 types of indigenous fruits out of *U. kirkiana*, *S. cocculoides*, *A. garkeana*, *Z. mauritiana* and *A. digitata*, which ones are you likely to buy 1st to 4th?

Furthermore, comparing preferences of indigenous and exotic fruits, buyers informed that if they are given a sufficient amount of money to buy fruits from a basket of oranges, mangoes, apples, and the five indigenous fruits' species, 43% buyers would buy apples first. The second choice is oranges (29% buyers) and third mangoes (28% buyers). After the exotic fruits, the indigenous fruits follow in the same order as described above. That is the forth rank is *U. kirkiana* followed by *Z. mauritiana*, *A. garkeana*, *A. digitata* and finally *S. cocculoides* (Table 31).

Table 4.31 *Uapaca kirkiana* buyers' (% respondents) preferences

Fruit	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6	Rank 7	Rank 8	Overall rank
Orange	30	29	16	8	5	5	5	2	2
Apple	43	25	13	7	4	2	2	3	1
Mango	11	19	27	14	11	5	7	5	3
<i>U. kirkiana</i>	10	15	22	29	9	8	6	3	4
<i>S. cocculoides</i>	1	3	3	9	14	8	15	40	8
<i>A. garkeana</i>	1	1	4	9	27	32	20	9	5.5
<i>Z. mauritiana</i>	3	6	11	15	21	15	14	13	5.5
<i>A. digitata</i>	1	1	4	8	10	24	30	27	7

Source: Consumer formal survey, 2000

Percentages adding more than 100 are due to two fruit ranked in one position

Percentages adding less than 100 are due to some respondents not ranking all fruits

Question asked: If you have enough money for buying only 7 types among the five species of indigenous fruits and apples, mangoes and oranges, which ones are you likely to buy 1st to 7th?

Table 4.32 *Strychnos cocculoides* buyers' (% respondents) preferences

Fruit	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6	Rank 7	Rank 8	Overall rank
Orange	29	28	12	13	7	6	2	2	2
Apple	37	27	18	9	5	1	2	1	1
Mango	11	13	28	17	13	7	9	4	3
<i>U. kirkiana</i>	15	16	14	27	8	8	10	1	4
<i>S. cocculoides</i>	2	7	6	12	21	10	15	25	5.5
<i>A. garkeana</i>	-	1	6	9	24	33	21	11	5.5
<i>Z. mauritiana</i>	6	7	9	6	12	17	22	19	7
<i>A. digitata</i>	0	1	7	7	11	18	20	37	8

Source: Consumers' formal survey, 2000

Percentages adding more than 100 are due to two fruit ranked in one position

Percentages adding less than 100 are due to some respondents not ranking all fruits

Question asked: If you have enough money for buying only 7 types among the five species of indigenous fruits and apples, mangoes and oranges, which ones are you likely to buy 1st to 7th?

This trend is similar across buyers of the two species under study and also across Murehwa, Gokwe and Harare districts. Therefore, these results suggest that there is high preference of exotic fruits as compared to indigenous fruits. However, in cases where exotic fruits are not available or unaffordable, *U. kirkiana* can serve as a substitute.

This study also wanted to know the knowledge of the consumer and perceptions with respect to existing prices, assuming that the information on prices consumers have and their willingness to pay shall provide important knowledge for marketing actions. Therefore, consumers were presented with a 500g packet of *U. kirkiana* and a single medium fruit of *S. cocculoides* as sold on the market, and they were asked to estimate different prices they consider them cheap, too cheap, expensive and too expensive for both peak and non-peak periods. Also they were asked to show their degree of willingness to pay and intentions to buy under the too cheap and expensive price situations. The assumption is, at too cheap and too expensive prices the probability of consumers to buy the fruits will be zero. At lower prices consumers might doubt the quality of the fruits and at higher prices, they might not be able to afford them. Since there is limited information on the quality of the indigenous fruits sold on the markets (as discussed in subchapter 4.1.2.4), the process of price judgements, was expected to facilitate consumers to make a trade-off between the price and the quality of the fruits (TATHAM, et. al, .1994). In this case, the cheap identified price was assumed to offer the maximum willingness to pay to the consumer.

Results of this activity are presented in Table 4.33. In general consumers have estimated the lowest to the highest prices for the 500g *U. kirkiana* and a medium fruit of *S. cocculoides*. Also they commented on their willingness to buy on too cheap and expensive prices. To get an idea of the consumer prices, average prices which, consumer consider too cheap, cheap, expensive and too expensive were calculated. In addition, to give the range of prices mentioned by the consumers, minimum and maximum prices are also displayed. Furthermore, the standard deviation, which showed the diversion of each of the mentioned price value from the mean of the price category, is shown. All these data expression criteria are meant to facilitate an easy understanding of the range of consumers' estimated prices and their willingness to pay.

Findings suggest that during the season, buyers of *U. kirkiana* fruits consider on average Z\$ 3.65 as too cheap price for a 500g packet. However, at the too cheap price, 52% buyers will

absolutely purchase the fruits while 17% will buy the fruits and 10% will probably buy. The notion that at too cheap price consumers will doubt the quality and hence the probability of purchase will be zero was not supported by these findings. Still at the expensive price of an average of Z\$ 11.47, 25% buyers of *U. kirkiana* fruits will definitely buy the fruits and 22% will possibly buy.

Table 4.33 Attitudes towards prices (Z\$) by buyers of *U. kirkiana* and *S. cocculoides* IFs

Character	500g packet of <i>U. kirkiana</i> fruits (n=255)				A medium size <i>S. cocculoides</i> fruit (n=91)			
	Average price	Lowest price	Highest price	Std ¹⁰ .	Average price	Lowest price	Highest price	Std.
Too cheap	3.65	1.50	7.00	1.61	1.52	0.50	2.50	0.84
Cheap	5.90	3.50	7.50	1.72	3.50	1.00	6.50	2.35
Expensive	11.47	7.50	27.50	5.30	6.63	2.50	12.50	3.97
Too expensive	15.64	9.50	25.00	4.24	9.75	4.00	16.50	5.06

Source: Consumers' formal survey, 2000

Questions: During this season, which prices (Z\$) do you consider cheap, expensive, too expensive and too cheap (that you doubt the quality of the fruits) for a packet of 500g *U. kirkiana*/medium size *S. cocculoides* fruits at peak and non-peak periods? How likely are you to buy the fruits at the expensive price you have mentioned? Too cheap price you have mentioned?

The trend is the same for *S. cocculoides* fruit buyers. At too cheap price, which is on average Z \$ 1.52 per fruit, 18% buyers will absolutely purchase the fruits, but at an expensive price only 10%, are willing to buy. These results conclude that intentions to buy at expensive prices are less than at cheap prices. But still there is an indication that the potential for the market expansion is high as buyers are willing to pay as much as two times the current market price of Z\$ 5.00 per packet.

Besides prices, informal interviews also revealed some important fruit characteristics that consumers prefer. Therefore, in this study an attempt was made to understand the importance of each of the mentioned characteristics including natural colour and size, packing, sorting and grading as offered by the markets. Knowledge of these characteristics is important to

¹⁰ The diversion of the price estimates around the average/mean value of that category

improve the current way of presenting the fruits on the market and finally increase demand. In an effort to compare price and size towards the preference of the fruits, findings indicate that 35% buyers of *U. kirkiana* (Table 4.34) agree that regardless of other factors such as taste they would buy big *U. kirkiana* fruits at lower prices. In the case of *S. cocculoides* fruits, 34% buyers (Table 4.35) complied with the same view. The major reason explained by consumers are that, big fruits have more flesh and if sold at low prices, they are assumed to be cheap. Most buyers for both the fruits don't agree that they would buy small *U. kirkiana* fruits with high price because they will be expensive while offer little flesh to consume. With regards to colour, brown colour is more important than yellow colour as confirmed by 34% buyers of *U. kirkiana* fruits who agree that they would buy brown fruits as against yellow ones. Also 40% buyers of *U. kirkiana* fruits would like to buy packed fruits for easy carrying, attractiveness and hygiene.

Table 4.34 Buyers' attitudes (% respondents) on fruit attributes of *U. kirkiana* IFs

Opinion/attitude	Strongly agree	Agree	Partly agree partly disagree	Don't agree	Strongly disagree	No answer
I would buy big sized <i>U. kirkiana</i> fruits with less price	24	35	6	24	10	1
I would buy smaller sized <i>U. kirkiana</i> fruits with high price	18	19	11	37	14	1
I would buy brownish <i>U. kirkiana</i> fruits as against yellowish	30	34	10	23	2	1
I would buy packed <i>U. kirkiana</i> fruits as against unpacked	22	40	3	28	6	1
I would buy sorted <i>U. kirkiana</i> fruits as against unsorted	19	44	5	26	5	1
I would buy graded <i>U. kirkiana</i> fruits as against ungraded	44	45	1	7	2	1

Source: Consumers' formal survey, 2000

n = 255

Question asked: Do you agree that you would buy big size *U. kirkiana* fruits against small with less price?

Brown against yellow? Packed against unpacked? Sorted against unsorted? Graded against ungraded?

But for the same reasons of preferences to brown colour of *U. kirkiana*, 33% buyers of *S. cocculoides* fruits would buy yellow compared to greenish fruits (Table 4.35). But, buyers of

S. cocculoides fruits don't agree with the idea of packing the fruits. This is because they think that if the fruits are not packed, it is easy to select the desired fruit qualities. The other reason for not preferring packing is, it doesn't allow negotiation of prices and usually packing raises price possibly because of the packing materials and cost of labour. However, buyers of all the fruits agree that they would buy sorted and graded fruits as against unsorted and ungraded fruits. Most of them are attracted by the uniformity of the sizes and they consider graded fruits to last longer.

Table 4.35 Buyer attitudes (% respondents) on marketing of *S. cocculoides* IFs

Opinion/attitude	Strongly agree	Agree	Partly agree partly disagree	Don't agree	Strongly disagree
I would buy big sized <i>S. cocculoides</i> fruits with less price	38	34	3	17	8
I would buy smaller sized <i>S. cocculoides</i> fruits with high price	21	14	8	34	23
I would buy yellowish <i>S. cocculoides</i> fruits as against green	31	33	4	25	7
I would buy packed <i>S. cocculoides</i> fruits as against unpacked	13	21	7	41	18
I would buy sorted <i>S. cocculoides</i> fruits as against unsorted	20	38	4	27	12
I would buy graded <i>S. cocculoides</i> fruits as against ungraded	42	46	-	11	1

Source: Consumers' formal survey, 2000

n = 255

Question asked: Do you agree that you would buy big size *U. kirkiana* fruits against small with less price?

Brown against yellow? Packed against unpacked? Sorted against unsorted? Graded against ungraded?

4.2.2.6 Summary of consumer attitudes and willingness to pay

In brief, consumers encourage the existing trade of IFs harvested from the forests because it creates employment to the increasing poor population in the country. However, they emphasise on planting activities to increase fruit yields for home consumption and marketing. In addition to increasing the market supply, the initiatives are supported to appropriately distribute the fruits to all informal and formal markets in the country and introduce promotion

activities. However, consumers don't approve the notion that the prevailing marketing activities contribute in the generation of government revenues, because the trade is still informal with no clear taxing mechanism in place. The assumption that exotic fruits have more vitamins than IFs is also not ideal to consumers because of lack of scientific evidence to support the claim.

With respect to attitudes and preference to buy the fruits, results show that buyers of IFs in Zimbabwe prefer *U. kirkiana* fruits first followed by *Z. mauritiana*. However the third choice for *U. kirkiana* buyers was *A. garkeana* while *S. cocculoides* for its buyers. These results are contrary to the country's farmers' desire of preferred species for domestication, in which the first wish was *S. cocculoides* (78% farmers), followed by (*U. kirkiana* 70% farmers) and third *Parinari curatellifolia* (MAGHEMBE, et. al., 1998). This might be caused by high diversity of backgrounds of people living in towns, interviewed in the consumer survey. People interviewed in consumer survey might originate from both miombo and non-miombo woodlands such as the Zambezi valley where the common fruit species is *Z. mauritiana* which is marketed all over the country different to *U. kirkiana*. Nevertheless, given a basket of exotic fruits mixed with IFs, *U. kirkiana* ranks fourth after the exotics.

Results of price attitude suggest that both buyers of *U. kirkiana* and *S. cocculoides* fruits are willing to pay a price, which was considered low relative to quality. Expensive prices were judged unaffordable. Price above the market price, up to Z\$ 11.00 for a packet of 500g *U. kirkiana* fruits is considered expensive but still can definitely be bought by 25% buyers, showing good prospects for market expansion. On the other hand, buyers of *S. cocculoides* are willing to pay Z\$ 3.50 on average for a medium size *S. cocculoides* fruit. However, any price from Z\$ 2.50 is considered expensive but can still be paid by 10% of the buyers.

4.2.3 Multivariate Analyses

As learnt from the objectives of this study, among the aims of conducting consumer analysis are to identify relevant characteristics associated with consumers and buyers, assess their attitudes, preferences and willingness to pay. In addition, to identify the type of fruit characteristics is considered important. The previous subchapter has given a descriptive analysis of the general consumption patterns, preferences and attitudes on prices, colours, sizes and appreciation on the current presale activities. Therefore, in the subsequent

subchapters, multivariate procedures including factor, logistic regression, conjoint and cluster analyses are being applied to get a deeper insight of consumer behaviour.

In the first attempt, factor analysis is applied to reduce the number of variables that were recorded to measure the attitudes and opinions relevant to consumption and purchase behaviour of the fruits, and develop factors to represent the related variables. This is due to the fact that several variables were recorded to measure attitudes, beliefs and opinion of consumers with respect to consumption and purchase behaviours of the two fruits. The task to reduce variables is crucial for easy data management. Since the results of factor analysis showed that there are significant common driving forces leading to consumption and purchase behaviours of *U. kirkiana* and *S. cocculoides* fruits, the next step was to find out which are these factors? A common approach towards solving this problem is to use logistic regression to predict the probability of consuming and buying depending on the strength of the influencing factors. Therefore, in the logistic regression, factors developed through factor analysis and socio-economic characteristics of consumers, buyers and their counterparts are included in the logistic regression to evaluate the attributes which are associated with the possibility of purchasing and consumption behaviours.

Furthermore, despite the description of the attributes of the fruits people prefer to buy, there was need to know what are the important characteristics and at which levels consumers wish to buy. This information is an indicator of the input people use in the purchase process. To answer these questions data from conjoint experiment of buyers of *U. kirkiana* fruits is subjected to conjoint analysis and individual part worths calculated each part worth showing the importance of the attribute and level. Finally, in order to check whether there are different groups of consumers, a cluster analysis is conducted. Buyers of *U. kirkiana* fruits are clustered into groups of similar utility levels of the important traits embodied in the fruits as identified by the conjoint analysis. The estimated clusters are latter defined by the use of socio-economic attributes associated to each.

4.2.3.1 Factor analysis

In this study of marketing system of *U. kirkiana* and *S. cocculoides* indigenous fruits, numerous questions were asked in order to capture as many consumer beliefs, attitudes and preferences with respect to the two fruits. At the end of the interviews, it was found that there

were many questions, which contained similar characteristics. Therefore, in order to get a clearer picture of the consumer behaviour and be able to manage the analysis, factor analysis is applied in order to reduce the number of variables by summarising similar attributes and separate them from other traits on the grounds of correlation analysis. The basic assumption of the factor analysis model is that it can explain a complex factor of variables by observing the correlation coefficient between variables.

Generally, factor analysis comprises of a number of steps (HAIR, et. al., 1998, SPSS, 1994, p. 50). These include the computation of correlation matrix, interpretation of factor values and extraction of the factors. However, the following section shows the procedure used to analyse factors of *U. kirkiana* and *S. cocculoides* IFs consumption and purchase attitudes.

After the computation of the correlation matrices of *U. kirkiana* and *S. cocculoides* fruit variables mentioned in Appendix 4.11, all variables with an absolute value correlation coefficient (r) between the variables themselves greater than 0.5 were selected. The coefficient 0.5 was chosen to ensure that the variables are correlated to each other. Variables with low correlation coefficients ($r < 0.5$) were left out assuming that they were not related to others. In order to extract the factors, principal component analysis¹¹ as explained by HAIR, et. al., 1998, p. 95 & SPSS, 1994, p. 50 was used. The method summarised the original variables' information in a minimum number of factors by considering the total variance.

A further step, which is extraction of unrotated factors, was carried out. The selection of the unrotated factors was based on a combination of two methods, the size of the value of total variance and a scree plot. In the first case, a factor that accounted for total variance or eigenvalue greater than one was significant and hence selected. For the scree plot, total variance associated with each factor was plotted against the factors. An indication of the maximum number of factors was obtained at a point where the curve suddenly broke from steep to gentle slope as shown in Figure 4.3.

¹¹ 1. Calculation of unrotated factor matrix
2. Extraction of unrotated factors
3. Rotation by VARIMAX procedure and assessment of factor loadings
4. Interpretation of the factor model

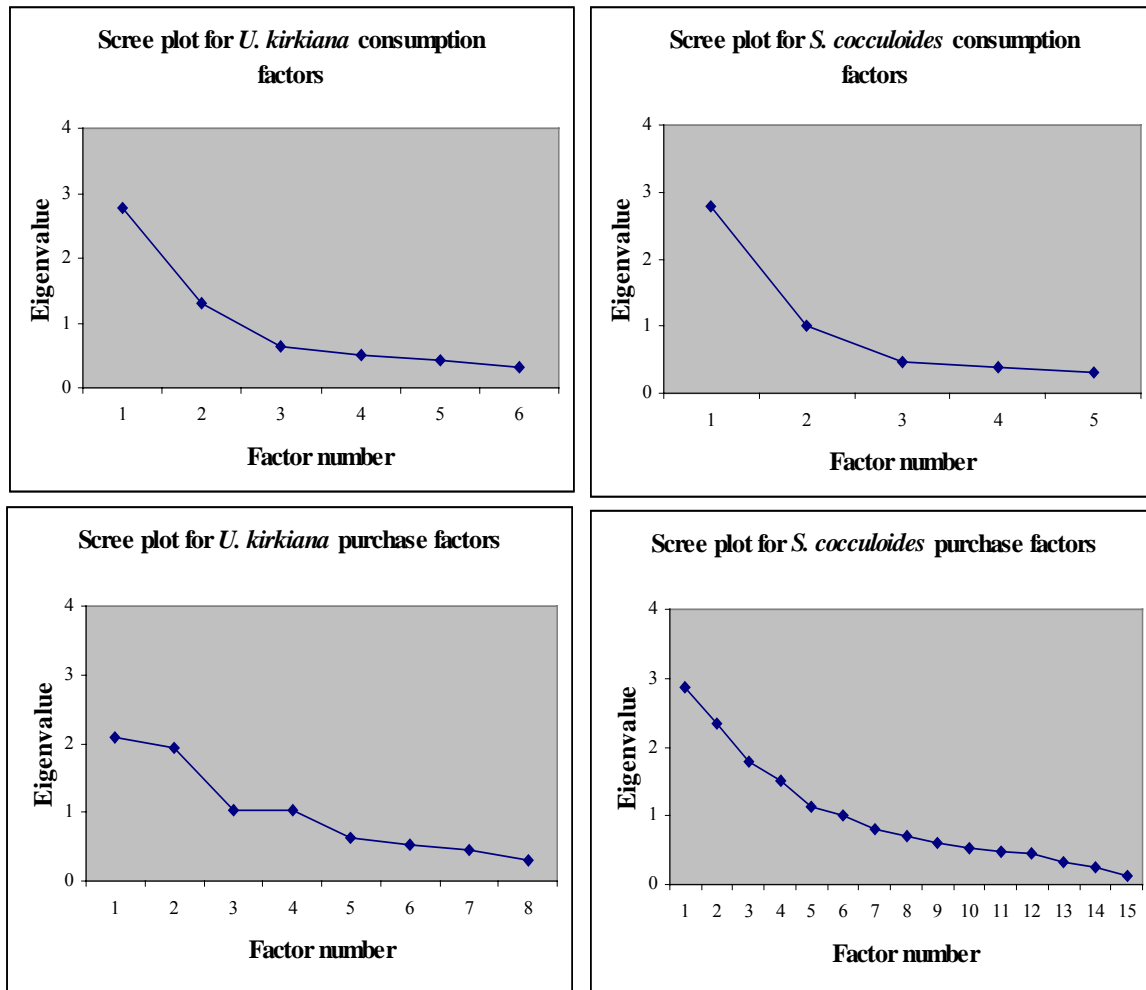


Figure 4.3 Scree plots for *U. kirkiana* and *S. cocculoides* consumption and purchase factors

In addition, variable communalities, which indicate the proportion of the total variance of each original variable shared with other variables in the analysis, were assessed. In this step, only those with values greater than 0.5 were favoured assuming that they had half or more of the variance accounted in the factor solution. Several factor solutions ranging from two to seven for consumption, non-consumption, buyers and non-buyers of *U. kirkiana* and *S. cocculoides* fruits were tried out in order to get the representative factors. However, the best solutions were attained at two factors for consumption of the two fruits, and four and six for purchase of *U. kirkiana* and *S. cocculoides* fruits respectively. Other factor solutions had a wide range of variables combining into economically and practically meaningless solutions.

After selecting the factors, the problem was, the variable loadings/values of unrotated factors were not clearly showing the similarity or differences between the factors and the variables, to

facilitate the judgement on which variables contributed strongly to the factors. Therefore, the factors were rotated using VARIMAX method to easy interpretation. VARIMAX rotation process twists the values to either close to (+ 1) indicating a positive association, (- 1) meaning a negative relationship or 0 that is lack of alliance (HAIR, et. al., 1998 p. 110).

After the rotation, factor loadings, which indicate correlation between the factor and the variable, were assessed to judge their representativeness in the factors. Since factor loadings have a higher standard error than correlation coefficients (GORSUCH, 1983); they need higher significant levels, hence, from the rotated matrix, variables with factor loadings greater than ± 0.5 were nominated to characterise the respective factors presuming that they practically contribute in the factors.

Finally the factors were interpreted and named depending on the combined meaning of the group of variables loaded under each factor or using variables with highest values. It is noted that consumption behaviour of both fruits has fewer attitude factors as compared to purchase behaviour. In addition, there are more attitudinal factors in purchasing *S. cocculoides* than *U. kirkiana* fruits. This trend might be caused by the fact that consumption of the fruits is a practise used by people. Therefore there are less comments made by consumers on the behaviour. However, marketing of these fruits is a new practise. When compared between the two fruits, selling of *S. cocculoides* is newer than *U. kirkiana*. This might cause all the concerns expressed by the buyers.

Uapaca kirkiana consumption factors

Uapaca kirkiana consumption factor 1 is among the two factors formed from attitudes expressed by consumers of the fruits. Results in appendix 4.12 show that factor 1 has four variables with significant loadings. Three variables including continue selling IFs, improve advertisements and sell IFs in all markets, have positive factor loadings, which means they are in the same direction. However, variable don't sell fruits from the forests have a negative factor loading. The signs of these variables indicate that as efforts towards selling more *U. kirkiana* fruits including encouraging traders to sell more and improve the marketing mix (promotion and distribution to all markets) increase, attitude against selling IFs from the forest decreases or vice versa. These results make sense in the way that since attitudes change with time, the negative notion might change after experiencing the high take-off of the

business and the benefits traders get. However, on the other hand, if the institutional set-up is not yet clearly defined, the increased activities might increase misunderstandings among traditional leaders and traders and hence the efforts towards increased selling of IFs will collapse. Therefore, since all the variables are presenting ideas on how to improve the trade of the fruits, they are all grouped together and named “*Uapaca* promote” (Table 4.36).

The second factor for consumption of *U. kirkiana* fruits has only two variables all with positive signs. The variable names are plant *U. kirkiana* fruits to increase supply and children and pregnant women have to be encouraged to eat the fruits because they are rich in vitamins. Since all the variables have a similar sign, these results suggest that as planting to increase fruit supply increases, the encouragement to children and pregnant women to consume *U. kirkiana* fruits also increases. This might be true in the sense that given enough fruit supply, efforts to encourage pregnant women to eat the fruits will be feasible. As compared to the current situation where the supply of the fruits is highly seasonal and even within the season, the fruit yields between the years are unreliable. Since the meaning of the two variables are different, a name for this factor was assigned using the variable with the highest loading, and hence the name “*Uapaca* children”.

Table 4.36 Names of factors extracted from attitudes of marketing and consumption of IFs

Factor number	Consumption		Purchase	
	<i>Uapaca kirkiana</i>	<i>Strychnos cocculoides</i>	<i>Uapaca kirkiana</i>	<i>Strychnos cocculoides</i>
1	<i>Uapaca</i> promote	<i>Strychnos</i> promote	<i>Uapaca</i> price	<i>Strychnos</i> price
2	<i>Uapaca</i> children	<i>Strychnos</i> vitamins	<i>Uapaca</i> sale	<i>Strychnos</i> promote
3			<i>Uapaca</i> planting	<i>Strychnos</i> revenues
4			<i>Uapaca</i> exotics	<i>Strychnos</i> colour
5				<i>Strychnos</i> quality
6				<i>Strychnos</i> planting

Source: Consumers’ formal survey, 2000

Strychnos cocculoides consumption factors

From the consumption of *S. cocculoides* fruits attitudes two factors have been developed. Like the *U. kirkiana* consumption, the first factor consists of four variables. The factor loadings for variables continue selling IFs, improve advertisements and sell IFs in all markets, have positive signs and hence change together. But, variable don't sell fruits from the forests has a negative factor loading. The signs suggest that an attempt towards enhancing more selling of *S. cocculoides* fruits comprising of improving the marketing mix, attitude against selling IFs from the forest decreases or vice versa. However, the policy implication for these results are as explained for *U. kirkiana* consumption factor 1. This factor is named as “*Strychnos* promote”. *Strychnos cocculoides* consumption factor 2 has only one positive variable concerning the vitamin contents of IFs. The fact that factor 2 has only one variable might not qualify being a factor. But since it has only one variable loaded to it might suggest that it has unique characteristics and hence it is worth being included in further analyses. Therefore, it is named as “*Strychnos* vitamins”.

Uapaca kirkiana purchase factors

For *U. kirkiana* purchase, four factors were selected. The first factor has three variables with significant loadings. While variables willingness to buy too cheap fruits and would buy big fruits at less price have positive signs, willingness to buy small fruits at high price has a negative sign. This means that as willingness to buy cheap fruits goes up, intention to buy expensive fruits goes down. The validity of this result will depend on the type of the fruit prices available in the market. If cheaper fruits with good quality are sold, buyers will hesitate to buy expensive fruits. So, as the variables contained in the factor explain the relationship between prices and willingness to pay, the factor is named as “*Uapaca* price”.

Uapaca kirkiana purchase factor 2 is similar to *U. kirkiana* consumption factor 1 with an exception of variable improve advertisements. This factor is interpreted as follows, as trading of *U. kirkiana* fruits and efforts to distribute the fruits into all markets increase, attitude against selling IFs from the forest decreases or vice versa. Hence, as the variables contained in the factor explain about increasing sales, the factor is named as “*Uapaca* sale”.

Uapaca kirkiana purchase factors 3 and 4 have single positive variables. Therefore, the factors are named after the variable meanings. In this case, *U. kirkiana* purchase factor 3 is called “*Uapaca* planting” because it encourages planting activities to increase fruit supply. Also, *U. kirkiana* purchase factor 4 is named as “*Uapaca* exotics” because the variable highly loaded into it says that exotic fruits have more vitamins than indigenous fruits.

Strychnos cocculoides purchase factors

With respect to *S. cocculoides* purchase, six factors were developed using attitude information provided by buyers of the fruits. The first factor consists of three variables with positive signs and one variable negative. Variables willingness to buy too cheap *S. cocculoides* fruits, big *S. cocculoides* fruits with less price and small *S. cocculoides* fruits with high price have positive signs so they vary together, while willingness to buy expensive fruits has a negative sign. This means that as willingness to buy too cheap and small fruits but high price goes up, intention to buy expensive fruits goes down. These results are mixed up and not consistent, because willing to buy small fruits with high prices means intention to buy expensive fruits. Purchasing expensive fruits can't go together with intention to buy cheap fruits. However, this factor indicates price concern and hence named as “*Strychnos* price”.

The second purchase factor for *S. cocculoides* fruits comprises three variables. Variables advertisement and sell in all markets have positive signs while variable don't sell fruits from the forest carries a negative sign. Like *U. kirkiana* consumption factor 1, the signs means that as attempts to improve marketing activities of *S. cocculoides* increase, attitude against selling of *S. cocculoides* from the forest decreases or vice versa. The implications are as explained in the *U. kirkiana* consumption factor 1. This factor is named as “*Strychnos* promote”.

The third purchase factor for *S. cocculoides* fruits include two positive variables. The variables are traders should continue selling *S. cocculoides* fruits and to continue selling *S. cocculoides* will increase government revenue. Since they have the same sign, it means that as traders continue selling *S. cocculoides* fruits, government revenue will also increase. This scenario is true because as the marketing activities continue, the government gains from the market fees. Since these variables explain the role of marketing in increasing government revenues, the factor is named as “*Strychnos* revenue”.

Strychnos cocculoides purchase factor 4 has only one variable loaded with a negative sign. The variable indicates willingness to buy yellow *S. cocculoides* fruits as against green. However, the negative sign might indicate that people are against buying yellow fruits compared to green. These results are contradictory to the descriptive analysis of the buyers' attitudes and willingness to buy explained in subchapter 4.2.2.5. The name of this factor has been acquired from the single variable loaded in the factor. For that matter, the factor is therefore known as "*Strychnos* colour". The fifth *Strychnos cocculoides* purchase factor comprises of variables sorting and grading of the fruits, all loaded with positive signs. That means all efforts go together to improve the quality of the products in the markets. Therefore since all the variables talk about quality control, the factor is called "*Strychnos* quality".

And lastly, the sixth factor includes variables planting the fruit trees to increase the fruit supply and encourage children and expecting women to consume the fruits. Since these variables have a similar sign, they suggest that as planting to increase fruit supply increases, the encouragement to children and pregnant women to consume *Strychnos cocculoides* fruits also increases. The logic of these results is the same as explained in *Uapaca kirkiana* consumption factor 2. Therefore since the variables have different meanings, the factor has acquired its name from planting variable because it has the highest loading as compared to the other and hence the name "*Strychnos* planting".

In summary, factor analysis separated variables associated with concerns on vitamins, marketing mix and fruit characteristics by both buyers and non-buyers. Therefore, there is need to identify the direction of the association (whether positive or negative) and the magnitude of the factors towards the two behaviours. However, since consumption and purchase behaviours are binary variables holding the values of 1 for occurrence of the event and 0 for non-occurrence, logistic regression analysis is used. The following section explains how logistic models were applied to identify characteristics associated with consumption and purchasing behaviours.

4.2.3.2 Logistic regression

Logistic regression sometimes known as logit model is a special case of a Generalised Linear Model where the random component for the determinations (success, failure) is binomial. In this model, for binary variable dependent variable Y and explanatory variable X, the logistic

regression function can be expressed in two forms, the first one is the logistic probability function which refers directly to the success probability, and expressed using the exponential function $\exp(\chi) = e^\chi$:

$$\Pi(\chi) = \exp(\alpha + \beta\chi) / [1 + \exp(\alpha + \beta\chi)]$$

In this formula, $\Pi(\chi)$ represents the probability of a success that an event is occurring, and the logistic regression coefficient (β) is interpreted using the “odds”(AGRESTI, 1996 p.107). The odds are defined as the relative number of success probability relative to the failures probability:

$$\Pi(\chi) / (1 - \Pi(\chi)) = \exp(\alpha + \beta\chi) = e^\alpha e^{\beta\chi}$$

For this function, the odds increase by e^β for every one-unit increase in χ .

The second function is the linear form for the logit of the probability and direct success probability (ibid., p. 103). This can be expressed as:

$$\text{Logit} [\Pi(\chi)] = \log \left(\frac{\Pi(\chi)}{1 - \Pi(\chi)} \right) = \alpha + \beta\chi$$

Where $\Pi(\chi)$ is the success probability when X takes the value of χ . The relationship between the dependent variable $\Pi(\chi)$ and the independent variables χ are non-linear and the formula implies that $\Pi(\chi)$ increases or decreases as an S-shaped curve of χ . However, the link function is the logit transformation $\log \left(\frac{\Pi(\chi)}{1 - \Pi(\chi)} \right)$ of Π .

While Π is restricted within the range from zero to one, the logit can vary into any number. The logistic coefficient β , determines the rate of increase or decrease of the S-shaped curve. In case, the probability of success is greater than zero, $\Pi(\chi)$ increases as χ increases and when the probability is less than zero, $\Pi(\chi)$ decreases as χ increases. The magnitude of the logistic coefficient (β) determines how fast the S-shaped curve increases or decreases. As the absolute value of $|\beta|$ increases, the curve has a steeper rate of change. But when $\beta = 0$, the curve flattens to a horizontal line, that means the dependent variable is independent of the explanatory variable and the explanatory variable cannot contribute to the explanation of the success or failure.

Logistic regression models as already mentioned are used to estimate dependencies between variables if the dependent variable is binary. In the study of marketing system of *U. kirkiana* and *S. cocculoides* indigenous fruits, logistic regression is applied to predict which consumer characteristics, attitude factors and socio-demographic attributes are in favour of consumption or non-consumption and purchase or non-purchase behaviours. This is an important information towards targeting customers in the marketing mix. Therefore, SPSS computer program has been applied using stepwise Forward:Wald inclusion procedure. This is a method in which independent variables are sequentially entered depending on their discriminatory power they add to the group of variables. The results of factor analysis together with socio-economic variables have been regressed against the dichotomous variables. The following sections, explain the different logistic models set up using data collected from the consumer formal survey for the two fruits, and the discussion of the results of the different models.

Uapaca kirkiana consumer characteristics

To check characteristics associated with the probability of consuming *U. kirkiana* fruits, a model was estimated using factors relevant for consumption, including *Uapaca* promote and *Uapaca* children both continuous variable¹² together with socio-economic characteristics of *U. kirkiana* consumers. The socio-economic attributes include age, education, total income of the family and total number of family members, all discrete variables. Others are sex¹³ marital status¹⁴, Harare¹⁵, Gokwe¹⁶ and Murehwa¹⁷ districts (dummy variables) (Appendix 4.13). These variables were selected according to the results of the factor analysis carried out to structure attitudes towards *U. kirkiana* fruits. Additionally, socio-economic factors have been included for consumer behaviour theory, because it is suggested that these factors also influence consumption behaviour (subchapter 2.2). In the estimation procedure, base model shown in Appendix 4.14 was calculated for all respondents consuming *U. kirkiana* fruits

¹² Numeric variable

¹³ Dummy variable, 1=Male, 0=Otherwise

¹⁴ Dummy variable, 1=Married, 0= Otherwise

¹⁵ Dummy variable, 1=Harare, 0=Otherwise

¹⁶ Dummy variable, 1=Gokwe, 0=Otherwise

¹⁷ Dummy variable, 1=Murehwa, 0=Otherwise

regardless of site. From this starting point the different variables have been successively examined whether they are contributing to the explanation or not.

The selection of the variables for the stepwise Forward:Wald inclusion procedure was based on the highest score statistics, which indicate the presence of association between the variables and their significance at 0.05 level. From the zero step, variables MUREHWA, HARARE, EDUCATION and MARRIED were selected. In the first step, variable HARARE was entered, adding variable EDUCATION in the second phase, variable MUREHWA in the third and finally variable MARRIED in the fourth. For each of the four steps, SPSS provided results of log likelihood ratio and Hosmer-Lemeshow values. The latter indicates the intensity of the relationship between the dependent and independent variables. In addition, Nagelkerke R^2 value showing the proportion of variance of the dependent variable about their means that can be explained by the explanatory variable; and chi-square value were provided. For each variable, the SPSS output gave the values for the logistic regression coefficients (β) and their associated standard errors (SE (β)). The Wald statistics used to assign the statistical significance of the estimated logistic coefficients was also displayed. The estimated odds ratio ($\exp(\beta)$) of a probability of an event to occur to a probability of the event not to occur as well as the confidence interval for the odds ratio (C.I. for $\exp(\beta)$) were also shown.

For all the models, the best model fit was chosen based on the lowest log likelihood ratio and significance level of the variables included at the 0.05 level. Additionally Nagelkerke R^2 measure has been assessed. Hosmer and Lemeshow value has also been considered, in which the best fit was indicated by its non-significant chi-square value (HAIR, et. al., 1998, p. 320).

Assessing these values, the stable model characterising consumers of *U. kirkiana* fruits was selected. It includes two explanatory variables but only one of the variables - MARRIED is statistically significant (Appendix 4.15). The model indicates that marriage status is associated with consumption of *U. kirkiana* fruits. The logistic coefficient of MARRIED variable has negative sign, which suggests that married respondents consume less *U. kirkiana* fruits compared to non-married people. Singles, divorced, widows and separated individuals consume more of the fruits. All other variables were not significant and hence considered not to influence the consumption behaviour of *U. kirkiana* fruits. These results are practically and economically difficult to explain. The lack of meaning of these results might show that either the data collected was not sufficient to clearly address the attributes of *U. kirkiana* consumers

or because there was no discrimination of the consumers against non-consumers as 94% of the respondents are consuming the fruits. Therefore, further research is needed to explore the characteristics associated with consumers of *U. kirkiana* fruits.

Strychnos cocculoides consumer attributes

To identify characteristics associated with consumption behaviour of *S. cocculoides* fruits, the same procedure as for *U. kirkiana* consumption is applied. The explanatory factors used include *Strychnos* promote and *Strychnos* vitamins continuous variables together with socio-economic characteristics of *S. cocculoides* fruits consumers (appendix 4.13) comprising of age, education, total income of the family and total number of family members, all discrete variables. Others are sex, marital status, Harare, Gokwe and Murehwa districts, which are dummy variables. The base model shown in Appendix 4.16 was calculated and as with *U. kirkiana* fruits each variable assessed for further inclusion in the stepwise method. The final model was selected using the stepwise Forward:Wald inclusion procedure as explained in the *U. kirkiana* consumption section.

Results indicate that GOKWE, AGE and MALE explanatory variables are associated with the consumption of *S. cocculoides* fruits (Appendix 4.17). The logistic coefficient for GOKWE variable is (- 1.556) which suggests that the behaviour of consuming *S. cocculoides* fruit is less in Gokwe site. However, these results were not expected because Gokwe is the potential district for production and marketing of the fruits. Furthermore, findings show that as one becomes older, there is less likelihood of consuming the fruits. These results follow the trend of preliminary findings reported by GUMBO, (1990), that the proportion of young people especially in rural areas consuming these fruits is high as they spend most of their time collecting the fruits during the ripening seasons. Sometimes they consume them when they are herding livestock or on their way to school.

The model also predicts that MALE variable is associated with less consumption of *S. cocculoides* fruits. That is female gender is more likely to consume *S. cocculoides* fruits as compared to their counterparts. For the rural women, this phenomenon can be explained by the fact that, women, like their children, spend most of their time in the forests collecting firewood and natural foods for their families. This behaviour gives them a better chance to consume the fruits than males. Also as reported in section 4.1.2.3 of the trading part of this

report, women are more involved in the business of IFs, which might also give them an opportunity to consume the fruits.

Despite the failures to interpret results of Gokwe town, the predictive equation for consumption behaviour of *S. cocculoides* fruits is:

$$\text{Log} \left(\frac{\Pi(\chi)}{1 - \Pi(\chi)} \right) = 1.418 - 1.56\chi_1 - 0.03\chi_2 - 0.74\chi_3$$

Where,

χ_1 = Gokwe

χ_2 = Age

χ_3 = Male

Using this equation, the probabilities of a given respondent to consume of *S. cocculoides* fruits can be calculated by inserting the variable values of the consumer in question:

$$\Pi(\chi) = \exp(1.418 - 1.56\chi_1 - 0.03\chi_2 - 0.74\chi_3) / 1 + \exp(1.418 - 1.56\chi_1 - 0.03\chi_2 - 0.74\chi_3).$$

Uapaca kirkiana buyers characteristics

Since the aim of the study is to gather information to be used to increase the marketing activities, buyers are extremely important. Apart from expanding the marketing activities, the study is also finding out if the characteristics influencing decision making to consumption are the same as purchasing the fruits. This section examines the characteristics associated with buyers of *U. kirkiana* fruits. In the first step, a base model consisting of purchase attribute factors consisting of *Uapaca* price, *Uapaca* sale, *Uapaca* planting and *Uapaca* exotics was estimated with socio-economic variables associated with the buyers of *U. kirkiana* fruits as shown in Appendix 4.18. The variables include age, education, total income of the family, total number of family members, sex, marital status, Harare, Gokwe and Murehwa districts. Like on the consumption section, the best model was chosen based on stepwise Forward:Wald procedure. From the base model of *U. kirkiana* buying behaviour (Appendix 4.19), six variables were selected because of their high score statistics and significance at 0.05. These are MUREHWA, HARARE, EDUCATION, AGE, INCOME and *Uapaca* sale.

The variables were included in four different steps and the “final” model selected had the lowest log likelihood ratio of 609.420, non-significant chi-square and Nagelkerke R² value of 0.232 (Table 4.37). The final model suggests that important variables in predicting buyers of *U. kirkiana* fruits are MARRIED, EDUCATION, HARARE and MUREHWA.

Table 4.37 Characteristics allied with buyers of *U. kirkiana* IFs

Variable	β	S.E.	Wald statistics	Significance	Exp(β)	95% C.I. for EXP(β)	
						Lower	Upper
MARRIED	0.499	0.198	6.344	0.012	1.646	1.117	2.426
EDUCATION	0.142	0.033	18.039	0.000	1.153	1.079	1.231
HARARE	0.959	0.243	15.584	0.000	2.609	1.621	4.200
MUREHWA	- 0.962	0.327	8.666	0.003	0.382	0.202	0.725
Constant	- 2.168	0.428	25.683	0.000	0.114		
Log likelihood value				609.420			
Model χ^2 [df]				9.683 [8] ^{NS}			
Nagelkerke R ²				0.232			

Source: Consumers' formal survey, 2000

n = 255

β = Logistic coefficient showing the weighing factor of the independent variable

S.E (β)= Standard error of the logistic coefficient, value showing the expected variation between the constant and the logistic coefficient

Wald statistics = $(\beta / S.E)^2$, a value used to judge the statistic significance of the estimated logistic coefficient

Exp(β) = Estimated odds ratio

C.I. for exp(β) = Confidence interval of the Exp (β) at 95%

The MARRIED logistic coefficient is positive. This indicates that married consumers are more likely to buy *U. kirkiana* fruits than unmarried respondents. This can be explained by the fact that since most married people are responsible to buy food for their families, they also buy indigenous fruits in the process of buying other food items. Furthermore, although economic and practical implications of these finding are not very clear. These findings signifies the existence of the family influence on the purchase behaviour of *U. kirkiana* fruits. Therefore, Further research is needed to explore the members responsible for the purchase of IFs for design of marketing strategies to increase sales.

Unexpectedly, findings of this study show that education (EDUCATION) is positively associated with the buying behaviour of *U. kirkiana* fruits. High-educated respondents are more likely to buy IFs than their colleagues with less education. However, an earlier assumption was that higher education is associated with high-income individuals, who might not buy indigenous fruits because they have high ability to pay for products. That is why in this study, higher education respondents were expected to buy more exotic fruits, which are more preferred than indigenous fruits. Therefore, the increased IFs buying behaviour among educated buyers cannot be explained by this data, but it might have happened due to the fact that the majority of the interviewed people were educated.

Still, with respect to sites, results show that the purchasing behaviour of *U. kirkiana* fruits is high in Harare site (HARARE variable) compared to Murehwa and Gokwe markets. At the same time MUREHWA has less buyers of the fruits compared to the rest of the sites. Both of these findings are practically feasible. As discussed in section 4.1.2.2 Harare is the capital city of Zimbabwe inhabiting individuals coming from all over the country including the ones formally used to consume the fruits at their rural homes. In addition, Harare hosts Mbare market, the central market for all types of fruits and IFs, the probability of finding buyers of *U. kirkiana* fruits in this market is high. On the other hand, there are less *U. kirkiana* fruit buyers in Murehwa as compared to Harare. This might be caused by high availability of the fruits in the nearby communal forests, farmers' fields and even along the roads where people freely pick for consumption. In this site, potential buyers are only travellers along the Harare-Mutoko and Harare UMP roads. Therefore, the predicted equation for buyers of *U. kirkiana* fruits is:

$$\text{Log} \left(\frac{\Pi(\chi)}{1 - \Pi(\chi)} \right) = -2.17 + 0.50\chi_1 + 0.14\chi_2 + 0.96\chi_3 - 0.96\chi_4$$

Where,

χ_1 = Married

χ_2 = Education

χ_3 = Harare

χ_4 = Murehwa

The probabilities of a respondent to buy *U. kirkiana* fruits can be calculated, by:

$$\Pi(\chi) = \exp(-2.17 + 0.50\chi_1 + 0.14\chi_2 + 0.96\chi_3 - 0.96\chi_4) / 1 - \exp(-2.17 + 0.50\chi_1 + 0.14\chi_2 + 0.96\chi_3 - 0.96\chi_4)$$

Strychnos cocculoides buyers' characteristics

Similar to the objectives of the proceeding section, this part examines the characteristics associated with buyers of *S. cocculoides* fruits. Therefore, a base model consisting of purchase behaviour dependent and independent variables comprising of attitude factors for *Strychnos cocculoides* purchase behaviour plus socio-economic attributes was estimated. The attitude factors include *Strychnos* promote (continuous variable), *Strychnos* revenues (continuous variable), *Strychnos* colour (continuous variable), *Strychnos* quality (continuous variable) and *Strychnos* planting (continuous variable). The socio-economic factors (Appendix 4.18) include age, education, total income of the family, total number of family members, sex, marital status, Harare, Gokwe and Murehwa districts.

Analogous to the *U. kirkiana* purchase model, the analysis was conducted using Forward:Wald stepwise method. Five variables statistically significant at 0.05 and with high score statistics were chosen from the base model (Appendix 4.20), for further steps. The variables were MALE, MARRIED, FAMILY SIZE, EDUCATION and GOKWE. Five steps were performed each adding a new variable among the selected ones. The stable model was selected due to its lowest log likelihood ratio of 428.84 and non-significant chi-square of 4.471 (df = 8). However, it had a relatively weak Nagelkerke R² value of 0.15.

Results of the stable model are shown in Table 4.38. Similar to buyers of *U kirkiana* fruits, MARRIED, MALE, EDUCATION, GOKWE and HARARE are the significant explanatory variables for buyers of *S. cocculoides* fruits. As presented in the table, married status (MARRIED) is positively allied with buying *S. cocculoides* fruits as compared to non-married. The same is true to male respondents as compared to females. This might be due to the fact that males do not spend much time in collecting wild foods for their families. Therefore, their major source of accessing the fruits is buying. In addition, consumers who spent more years in formal school are more likely to buy *S. cocculoides* fruits than those who spent less years. Consumers in Harare are more likely to buy *S. cocculoides* than the other sites. However, Gokwe has also more buyers of the fruits than Harare and Murehwa. The Gokwe findings looks practically viable. The few *S. cocculoides* fruit trees within Gokwe town might cause the existence of high buying activities in the site unlike Murehwa for *U kirkiana* fruit trees. Therefore, for the town dwellers, buying is among the better option to

acquire the fruits than travelling to the rural areas or waiting for gifts from friends and relatives.

Table 4.38 Characteristics associated with buyers of *S. cocculoides* fruits

Variable	β	S.E.	Wald statistics	Significance	Exp(β)	95% C.I. for EXP(β)	
						Lower	Upper
MARRIED	0.546	0.247	4.882	0.027	1.726	1.064	2.800
MALE	0.538	0.266	4.077	0.043	1.712	1.016	2.885
EDUCATI	0.091	0.039	5.376	0.020	1.095	1.014	1.183
GOKWE	3.067	0.757	16.408	0.000	21.484	4.870	94.770
HARARE	2.544	0.734	12.002	0.001	12.734	3.019	53.717
Constant	- 5.617	0.899	39.047	0.000	0.004		
Log likelihood value				428.841			
Model χ^2 [df]				4.471 [8] ^{NS}			
Nagelkerke R ²				0.152			

Source: Consumers' formal survey, 2000

n = 91

β = Logistic coefficient showing the weighing factor of the independent variable

S.E (β)= Standard error of the logistic coefficient, value showing the expected variation between the constant and the logistic coefficient

Wald statistics = $(\beta / \text{S.E})^2$, a value used to judge the statistic significance of the estimated logistic coefficient

Exp (β) = Estimated odds ratio

C.I. for Exp (β) = Confidence interval of the Exp (β) at 95%

In this case, the likely equation for buyers of *S. cocculoides* fruits is:

$$\text{Log} \left(\frac{\Pi(\chi)}{1 - \Pi(\chi)} \right) = - 5.62 + 0.55\chi_1 + 0.54\chi_2 + 0.09\chi_3 + 3.07\chi_4 + 2.54\chi_5$$

Where,

χ_1 = Married

χ_2 = Male

χ_3 = Education

χ_4 = Gokwe

χ_5 = Harare

Buyer probabilities of *S. cocculoides* fruits can be calculated, as follows:

$$\Pi(\chi) = \exp - 5.62 + 0.55\chi_1 + 0.54\chi_2 + 0.09\chi_3 + 3.07\chi_4 + 2.54\chi_5 / 1 - \exp(- 5.62 + 0.55\chi_1 + 0.54\chi_2 + 0.09\chi_3 + 3.07\chi_4 + 2.54\chi_5)$$

Summary of characteristics associated with consumption and purchase behaviours

In brief, logistics regression models have been used to check any characteristics associated with consumption and buying behaviour of *U. kirkiana* and *S. cocculoides* fruits. Factors summarising attitude variables derived from factor analysis and socio-economic characteristics were tested. But the consumption behaviour models were not able to clearly detect the relationship between the tested variables of two fruits. The conclusion comes out because of the poor model fit as measured by Nagelkerke R^2 and the poor signs of the logistic coefficients, which were not practically and economically interpretable. For example, the model for *U. kirkiana* fruits consumption shows that the only important characteristic associated with consumption of the fruits is married status. Being married decreases the chance of consuming the fruits than single, divorced, widowed or separated respondents.

For *S. cocculoides* fruits high consumption is associated with Gokwe site, age and sex. In areas other than Gokwe, people of low age and female gender are more likely to consume the fruits. The Gokwe finding is inconsistent with practical situation of Zimbabwe. Gokwe being the production site is supposed to have positive effect on consumption. However, the case of AGE and SEX is also economically difficult to explain using these results. Consumer decisions towards the two IFs are expected to be similar. In that case sex and age are also expected to influence the consumption of *U. kirkiana* fruits, which is not the case in this study. Therefore, further research is recommended.

On the purchase side of the fruits, the study found out that marriage (MARRIED), education (EDUCATION), Harare (HARARE) and potential production districts influence purchasing behaviour of the two fruits. High education and being married increase the likelihood of purchasing the fruits. However, the difference between the two fruits is, Murehwa is associated with less purchase of *U. kirkiana* fruits while Gokwe is associated with high purchase of *S. cocculoides* fruits. None of the attitude factors came out of the final models,

therefore, this study considers them not significant indicators of consumption and purchasing behaviours of *U. kirkiana* and *S. cocculoides* fruits.

However, as reported earlier, there are a number of additional attributes influencing buying behaviour of *U. kirkiana* and *S. cocculoides* fruits. These include size, colour, package and quantities. Informal and formal surveys' results indicate that these attributes also determine the preference and buying behaviour of the two fruits. Therefore, from this fact, there is also need to judge the importance of these characteristics and their levels on the preference and willingness to buy and pay for the fruits. Due to the nature of these variables they could not be entered in logistic regression models, therefore, conjoint analysis multivariate analysis was conducted.

4.2.3.3 Conjoint analysis

Conjoint analysis is a method used to separate the different values of various attributes of a product. In this study, *U. kirkiana* fruits were selected for the conjoint analysis because there is a substantial amount of marketing activities for the fruits compared to *Strychnos cocculoides*, and therefore, the idea of increasing its market demand is more viable. In addition to that, resources such as time and funds to cover the two fruits were inadequate. The first objective of the conjoint analysis is to find out which kind of *U. kirkiana* fruits consumers prefer. Particularly, what fruit attributes and at what levels are considered important and how much does each of the attribute contributes in the willingness to pay for the fruits. And the second objective is to determine consumer-preferred combination of the fruits' attributes and levels.

According to the results of informal discussions, consumers of *U. kirkiana* fruits buy the fruits depending on size, quantity, freshness, colour and shape. Therefore, based on these findings, the conjoint analysis was performed using size sorted in small, big and mixed; weight measured in 300g, 400g and 500g, brown and yellow colours and round fresh and rough non-fresh appearances. Price was not directly included in the assessed attributes because in the markets the differences in price are not obvious to consumers. The fruits are sold at a constant price of Z\$¹⁸ 5.00/packet in Murehwa, Gokwe and Harare despite of the quantity differences. The principle investigator in this study thought that the resulting information on consumer

¹⁸ 1US\$ = Z\$ 50.00 in December 2000

preferred size and colour of the fruits would facilitate breeders' tree selection process on the long run. Also it will direct producers in growing indigenous fruit trees which have consumer-desired attributes. However, on the short run, the information about desired attributes will help traders to design a strategy to increase market demand of the fruits.

With the attribute and levels for use in the conjoint analysis specified, the next step was to create the stimuli. A full factorial design consisting of size assortment (small, big and mixed), weight (300g, 400g and 500g); colour (brown and yellow) and appearance (round fresh and rough non-fresh) levels, would result into $(3 \times 3 \times 2 \times 2)$ 36 stimuli. Since it could be a burden for respondents to evaluate 36 stimuli, the stimuli were subjected to a fractional factorial method using orthogonal design of SPSS computer program, which identified nine stimuli displayed in Table 4.39.

Table 4.39 Indigenous fruits stimuli used in the conjoint experiment

Profile symbol	Colour	Quantity (g)	Appearance	Size Assortment
♠	Brown	500	Rough non fresh	Small
□	Brown	500	Round fresh	Mixed
♦	Brown	400	Round fresh	Mixed
©	Brown	400	Rough non fresh	Big
♣	Brown	300	Round fresh	Small
®	Brown	300	Round fresh	Big
●	Yellow	500	Round fresh	Big
∇	Yellow	400	Round fresh	Small
♥	Yellow	300	Rough non fresh	Mixed

Source: *Uapaca kirkiana* conjoint experiment, 2000

This is the minimum number required to estimate the main effects of each attribute and level. Although recent review of commercial data sets from choice based conjoint users have found that respondents could evaluate as many as 20 conjoint measurements (JOHNSON & ORME, 1996 p. 17), this study used the nine stimuli. The stimuli were pre-tested to assess among other things the workload to respondents before administration. In the pre-testing exercise, respondents managed to rank the nine stimuli without problems, possibly because they know the fruits very well, and also representatives of consumers identified the attributes during the informal discussions and therefore they were familiar to them.

For easy administration of the conjoint experiment, real fruits instead of pictures were used. The nine stimuli were packed in separate plastic bags, and in order to avoid revealed sequential orders, they were labelled using symbols as shown in Table 4.39. In order to expose the respondents to real market situation (CATTIN & WITTINK 1982 p. 47), a full profile presentation method, in which a basket of all the fruits' packets was presented at once for evaluation by each consumer. The consumers were then asked to sort and rank the fruit packets according to their preference order and willingness to buy, starting from one, which is equal to "most preferred" to nine "least preferred".

A full profile presentation method was also used in this study because of the low level of literacy of some of consumers in the rural markets (Murehwa and Gokwe) and high-density market (Mbare) in Harare. In these cases, presentation of full combinations of the fruits to consumers was easy to administer and brought less confusion to respondents. Furthermore, the number of attributes selected for evaluation was less than 6, therefore full presentation design is recommended. It is advised that for factors ranging between 7 and 10 trade off approach is appropriate while for 10 or more an adaptive conjoint method can be applied (GREEN & SRINIVASAN 1990). Apart from full profile, other methods of presentation used in conjoint analysis are trade-off and pairwise presentation methods, each one having a number of advantages and disadvantages as explained by HAIR, et. al., (1998 p. 412).

Model estimation

The estimation technique of the conjoint model depends on whether the scale of the dependent variable is ordinal, interval or nominal. Ordinal dependent variables are estimated by Monotonic Analysis of Variance, interval scaled by Ordinal Least Squares while the nominal dependent variables by LOGIT or PROBIT models (HAIR, 1998 p. 419). Since the dependent variable of the *U. kirkiana* conjoint is ordinal, part worths for each attribute were estimated. The assumption is that the overall preference towards the fruits is formed from a sum of separate part worth of attributes. The general form of the part worth functional model is expressed as:

$$W_{ij\dots n} = \beta_0 + \sum(\beta_{i1}X_1, \beta_{j2}X_2, \dots, \beta_nX_m)$$

Where

$W_{ij\dots n}$ = Total worth/preference for product ij...n

β_0 = Constant

β_i = Part worth of level i for attribute 1

β_j = Part worth of level j for attribute 2

β_n = Part worth of level n for attribute m

X = Attributes

n = Levels of attributes

m = Number of attributes per product

As mentioned earlier on, the expected outputs of the conjoint analysis were to identify the preferred combination of attributes and levels, assess specific features of the combination that influence the preference and reveal the relative importance of each attribute for each respondent. Since respondents sorted out stimuli from one (most preferred) to nine (least preferred) a sequence of data collection (SEQUENCE) subcommand was used to show the arrangement of information in the data set. In order to get part worths of each respondent which could later be used in cluster analysis, a SUBJECT subcommand facilitated the calculation of the part worths for each respondent's questionnaire number (QNN). Discrete models were specified for all the factors including appearance (APPEAREN), colour of the fruits (COLOR), size assortment (SIZE) and quantity (QUANTITY). This is because the experiment is an exploratory study in which there is no prior information on the direction of the relationship of the factors.

From this model specification, an estimation of separate part worths and relative importance of each was conducted and then aggregated. In this process, the higher the absolute part worth value of a level, the more it has contributed in the overall utility of that attribute. Therefore, the relative importance of each attribute such as size, quantity, colour and appearance in the overall preference decision were estimated. In addition, the extent of each level of the attributes such as yellow colour or small size contributed in the preference structure were calculated.

In order to know whether the model predicts the set of preference stimuli ranked by the respondents, Kendall's tau correlation coefficient and its significance were considered. This measure shows the strength of the correlation between the actual and predicted ranks of the stimuli. Therefore, since this model of the conjoint study of *U. kirkiana* fruits has a significant value of Kendall's tau coefficient, it is considered accurate. The subsequent section explains the results of the conjoint analysis.

Important characteristics preferred by buyers of U. kirkiana fruits

The average preference structure of *U. kirkiana* fruits among 250 buyers is presented in Table 4.40. Size attribute is the most important with an average weight of 36%. Among the different size assortments presented to buyers, small size has a higher positive effect on the preference structure than big. In general, these findings are contradictory to the findings of descriptive statistics on buyer attitudes and willingness to buy, explained in section 4.2.2.5. Most buyers said that they would buy big *U. kirkiana* fruits with less price. However, in that case, it might be possible that most people were more concerned with the notion of low price than size. Also, buyers were instructed to disregard taste, which might be incorporated in the decision making process in the conjoint experiment. However, on the other hand the results support views of the informal discussions that small fruits are more tasty than the big ones, and hence according to the consumers the tasty is the good quality.

Further more, other findings of the conjoint experiment are as anticipated. Quantity is the second most important attribute, with an importance value of 30%. The 500g quantity is preferred and the tendency is to dislike 300g. Although price was perceived to be fixed, but the fact that the quantity varied, implies that even price was changing, such that the larger the quantity the cheaper. Therefore, the result suggests that consumers prefer lower prices.

Appearance of the fruits takes the third position on the preference structure carrying an average importance of 18%. Consumers prefer to buy round fresh (part worth value = 0.317) to rough non-fresh fruits. This is practically meaningful, as consumers always prefer fresh produce as they consider them of high quality. The preference of fresh fruits might be derived from the existing qualities and past experiences of the consumers on exotic fruits sold in the markets. Lastly colour was considered the fourth in the preference structure. In this case, brown fruits are preferred to yellow fruits. In summary, the ideal product identified by the

aggregate buyers is a packet weighing 500g, with brown, small and round fresh *U. kirkiana* fruits. Therefore, in order to increase sales, traders must fulfil consumer expectations of the identified characteristics.

Table 4.40 Results of the Conjoint Analysis for *U. kirkiana* fruits

Attribute	Level	Utility	Average importance (%)
Colour			16
	Brown	0.630	
	Yellow	- 0.630	
Quantity			30
	300g	- 0.735	
	400g	0.072	
	500g	0.657	
Size			36
	Small	0.844	
	Mixed	0.105	
	Big	- 0.949	
Appearance			18
	Round fresh	0.317	
	Rough non fresh	- 0.317	
Kendall's tau	0.778		
significance	0.0018		

Source: Consumers' formal survey, 2000

n = 250

Question asked: Suppose you went to the market and found the following packets of *U. kirkiana* fruits sold at Z\$ 5 each. The packets have fruits with different characteristics such as colour, size, weight and appearance as labelled. Can you sort and arrange the packets according to your choice to buy, from the first to the last?

However, the aggregate results differ from the individual part worth values. Not all individuals prefer packets weighing 500g, with brown, small and round fresh fruits. This is because there are many buyers of these fruits, with different needs and buying practises. Therefore in order to satisfy the needs of consumers from different backgrounds, perceptions and buying behaviour the market has to be segmented. One way of segmenting the market is by the use of cluster multivariate analysis. After identifying the segments, it will be easier to

select one or more groups depending on the resources of the trader and develop marketing mixes to reach the targeted consumers. This is the efficient way of serving consumers, instead of aiming at the entire market. Hence, the following subchapter explains the cluster analysis method as applied in segmenting the market of *U. kirkiana* fruits.

4.2.3.4 Cluster analysis

For easy targeting of future marketing interventions, this study has proceeded to define buyers of *U. kirkiana* fruits into groups of similar utility levels. Since the part worths were estimated for only *U. kirkiana* fruits as per reasons explained in 4.2.3.3, the clustering of the individuals with the associated part worth values also used the same type of fruits. The estimated clusters are then explained using socio-economic attributes associated to each of them. The classifications are expected to facilitate marketers to formulate marketing mixes with different messages for the distinct divisions. Also they will aid in answering the question about which socio-economic characteristic individuals are related to which part worth (utility) scores.

The choice of variables to be used in cluster analysis is usually guided by theory and practical considerations of the research topic (HAIR, et. al., 1998, p. 481). Therefore, this study is considering characteristics of *U. kirkiana* fruits preferred by buyers of the fruits as revealed by the conjoint analysis. Utilities of variables brown colour, small size, 500g and fresh fruits were used to cluster the respondents. Clustering is based on the preferred characteristics instead of the entire set of tested stimuli in the conjoint analysis because the marketing activities are still in their early stages, so that these attributes are targeted as a starting point. Consequently, classification of individuals with regard to these attributes will help in identifying the target groups for improvement of marketing sales.

Since the four attributes were utility values with similar units, they were not standardised to qualify for clustering procedure. However, they were tested for correlation to avoid dominance of one or more variables in the cluster solution. According to BACKHAUS, et. al., (1994), variables to be included in cluster analysis should have a correlation coefficient less than 0.5. Therefore, correlation coefficients and descriptive characteristics of variables used in classifying buyers of *U. kirkiana* fruits were calculated and results are shown in Table 4.41. From this table, all the variables have a correlation coefficient less than 0.5 and hence they are suitable for use in the further steps of cluster analysis.

Table 4.41 Correlation coefficients of preferred traits of *U. kirkiana* IFs

Trait	Correlation coefficients				Mean	Standard Deviation
	Brown	Small size	Round fresh	500g		
Brown	1.000	- 0.022	0.067	- 0.076	6.300E-02	0.9204
Small-size	- 0.022	1.000	0.116	0.151	0.8440	1.1238
Round-fresh	0.067	0.116	1.000	- 0.024	0.3170	0.9031
500g	- 0.076	0.151	- 0.024	1.000	0.6573	1.1087

Source: consumers' formal survey, 2000

n = 250

There are two algorithm procedures commonly used in cluster analysis, hierarchical and non-hierarchical methods. While the former involves a stepwise procedure towards the construction of the clusters, the latter classifies individuals based on a predefined initial cluster centres. Both of these methods have their own advantages and disadvantages as explained by HAIR, et. al., (1998, p. 497). But, to cluster the utilities of *U. kirkiana* fruits' preferred attributes; both hierarchical and non-hierarchical methods are used at different stages.

Agglomerate hierarchical cluster procedure was used to pre-identify the number of clusters. The idea behind agglomerate hierarchical cluster method is, individual cases are fused into groups, one at a time using their closest distances to the furthest, each time reducing the number of groups by one. Further than that, clusters close to each other are combined to form new ones. There are a number of similarity measures for the cases included in the cluster analysis. But in this study, similarities of the cases are measured by Squared Euclidean distance, which is the sum of squared differences over all the variables (SPSS, 1994, p. 84). The clusters are then combined using Ward's method, which was chosen bearing in mind its ability to combine clusters with few observations. Hence, in Ward's method, the distance between clusters is the sum of squares between the two clusters. Clusters that merge at each clustering step, is a result of the smallest increase in the sum of squares within cluster distances (SPSS, 1994, p. 98, HAIR, et. al., 1998, p. 496).

Table 4.42 Hierarchical agglomeration coefficients of *U. kirkiana* preferred traits

Stage	Cluster Combined		Coefficient	Stage Cluster First Appears		Next Stage	% change in coefficients	Cluster number
	Cluster 1	Cluster 2		Cluster 1	Cluster 2			
240	5	21	353.9154	232	216	243	7.76	10
241	28	99	381.3944	234	238	244	8.99	9
242	9	94	415.6636	217	236	247	9.23	8
243	2	5	454.0417	230	240	246	10.01	7
244	12	28	499.5116	235	241	249	10.92	6
245	1	14	554.0796	233	239	248	14.52	5
246	2	3	634.5313	243	237	247	15.43	4
247	2	9	732.4379	246	242	248	17.55	3
248	1	2	860.946	245	247	249	20.17	2
249	1	12	1034.571	248	244	0	0.00	1

Source: consumers' formal survey, 2000

n = 250

The number of clusters for the final solution was determined by considering percentage change of agglomeration coefficient values for the first 10 clusters presented in Table 4.42. Since the greater agglomeration percentage changes occurred from combining clusters two to one (20% change) to six to five (11% change), all the five cluster solutions were taken for further examination by the non-hierarchical clustering method. However, since the procedure of using agglomeration coefficients to assign the number of clusters is still not approved (HAIR, et. al., 1998, p. 499), close examination of the clusters was done to make sure that the number of selected clusters is distinct to each other. In addition, the number of clusters was sufficient to represent the sample under study and easy to communicate the results to the interested parties.

The major task for the non-hierarchical clustering was to identify final clusters, which were significantly different. The selection was aided by the examination of ANOVA tables of all the five cluster solutions. Since there was an improvement in the characteristic of the cluster structures from the second to the sixth pair, the latter cluster solution was chosen. Apart from the improved characteristics of the clusters' structures, the six-cluster solution was selected because all the clustering variables were significantly different across the five groups (Table

4.43). Moreover, variability between the five clusters as shown by the Cluster Mean Square was higher than variability within the clusters as indicated by the Error Mean Squares for each variable.

Table 4.43 ANOVA Table for six cluster solution of the preferred attributes

Preferred trait	Cluster		Error		F test	Significance
	Mean Square	df	Mean square	df		
Brown	21.230	5	0.429	244	49.429	0.000
500g	42.257	5	0.389	244	108.759	0.000
Small-size	39.276	5	0.484	244	81.150	0.000
Round-fresh	13.423	5	0.557	244	24.092	0.000

Source: consumers' formal survey, 2000

Cluster Mean Square = Measure of variability between clusters

Error Mean Square = Measure of variability within clusters

n = 250

Results of the preference structure in the six clusters are shown in Table 4.44. The table gives the average utilities for each of the preferred variables and the number of respondents in the six clusters, consisting of 55, 21, 37, 29, 57 and 51 people.

Table 4.44 Preferred traits of the six clusters

Preferred trait	Clusters					
	1	2	3	4	5	6
Brown	0.34	0.63	1.24	- 0.90	- 0.31	- 0.36
500g	0.24	- 1.10	0.91	- 0.63	1.12	1.86
Small-size	2.04	- 0.97	0.60	0.92	0.06	1.31
Round-fresh	0.34	0.64	0.57	0.47	- 0.57	0.89
Number of respondents	55	21	37	29	57	51

Source: consumers' formal survey, 2000

n = 250

From these findings, it is clearly seen that not all buyers prefer the aggregate preference structure which consists of brown colour, 500g, small size and round fresh fruits as identified by conjoint analysis. Several other preferences exist in the sample of surveyed buyers. For

example, all buyers in clusters one and three comply with the identified product profile. But brown colour is more preferred by buyers belonging to cluster three than by the rest. Fondness to brown fruits is also observed in clusters one and two, while the other clusters do not like the colour of the fruits. Therefore, these findings harmonise with the economic theory that buyers are too varied in their needs and hence mass marketing cannot satisfy their desires.

In the case of quantity, clusters one, three, five and six prefer the largest quantity of 500g at varied degrees but the remainder doesn't. Small size fruits are preferred by all except buyers of cluster number two. While all buyers like fresh fruits, those of cluster number five do not favour them. This indicates that a short term plan to increase market sales can be attained by intervening into clusters one and three through sorting and grading to supply the preferred combination of brown colour, 500g, small size and round fresh fruits. This is because 37% individuals in the market prefer the product. In the near future, clusters two and four might not be worth intervening because they have relatively few members as compared to other groups. Furthermore, in the long-run, the domestication and breeding programs could concentrate more on selecting trees which could yield brown and small size fruits to increase consumption and purchasing behaviour.

In order to characterise individuals in each of the clusters; a cross tabulation analysis between the clusters and their socio-economic attributes was conducted. Results of this exercise are displayed in Table 4.45. Generally most people in clusters one and three are found in Harare especially Mbare followed by Westgate and City Botanical gardens. In addition more than 40% of their family members are below 6 years old. These are the groups which prefer all the identified fruit attributes including brown colour, 500g, small size fruits and round fresh fruits. The opposite of clusters one and three is cluster two. In this group, 57% of them have family size of three or less people and 66% of the people are found in Murehwa and Westgate. The other noteworthy group is cluster number five in which most of its members are found in City Botanical gardens.

Table 4.45 Socio-economic attributes (% cases) of the clusters of buyers of *U. kirkiana* IFs

Socio-economic characteristic	Clusters					
	1	2	3	4	5	6
<i>U. kirkiana</i> buying frequency						
• Once a week	39	50	44	32	48	38
• 2 times a week	0	0	0	0	2	0
• 3 times a week	37	40	36	39	28	35
• Daily	24	10	19	29	22	27
<i>U. kirkiana</i> buying quantity						
• < 20 fruits	8	5	8	11	15	4
• 20 fruits	62	67	56	67	52	56
• > 20 fruits	30	28	36	22	33	40
Family size						
• ≤3 people	33	57	46	41	19	28
• 4 - 6 people	42	14	32	35	62	43
• > 6 people	25	29	22	24	19	29
Age of the respondent						
• Children (1 – 17 years)	3	5	5	3	0	8
• Workers (18 – 65 years)	95	95	95	97	100	92
• Retired (above 65 years)	2	0	0	0	0	0
Monthly household income						
• Low (Z\$1 – 3,500)	26	52	35	45	35	39
• Medium (Z\$3,501– 10,000)	49	19	41	31	26	35
• High (above Z\$10,000)	25	29	24	24	39	26
Years attended formal school						
• None (0 years)	2	5	0	0	0	0
• Ordinary (1 – 13 years)	91	76	92	86	68	78
• High (above 13 years)	7	19	8	14	32	22
Sex						
• Male	64	48	73	62	74	57
• Female	36	52	27	38	26	43
Marital status						
• Single*	51	43	46	38	44	35
• Married	49	57	54	62	56	65
Site of the interview						
• Mbare	29	14	51	24	21	28
• West gate	25	33	22	21	25	27
• City Botanical gardens	31	14	13	21	32	16
• Murehwa	4	33	3	14	5	6
• Gokwe	11	6	11	21	17	23

Source: consumers' formal survey, 2000

n = 250

*Includes widowed, separated, divorced and unmarried

Note: Family, frequency of purchase, quantity purchased, age and income classifications are based authors mean data values.

In summary the preferred product profile is associated with buyers with family members from one to six and most of them found in Harare. Therefore, Harare portrays a potential for increased marketing of *U. kirkiana* fruits.

These findings have given light on the existing situation on the marketing of the fruits. The following section is trying to give a summary of the study and possible interventions in order to improve the marketing system.

5 SUMMARY AND CONCLUSIONS

Chapter 1 of this study presents the problem analysis and derives the objectives of the research. The major problem towards conducting this research is poverty associated with food insecurity and environmental degradation in Africa. The three aspects are interrelated such that tackling them together sounds contradictory. However, in recent years, governments, NGOs and international organisations interested in rural poverty eradication have initiated some work to combat the three problems. One example of accomplishing such efforts in Southern African region is the conservation and domestication of indigenous fruits of the miombo ecozone. This is a result of the observed wider uses of the fruits by the poor households surrounding the woodlands. The expected outcomes of conservation and domestication research are high yields through extensive cultivation by farmers, followed by increased consumption, thereby improving nutrition; enhance food security and commercialisation to increase cash income of poor households.

However, to encourage the poor farmers to cultivate the fruit trees in order to enhance commercialisation needs prior economic analysis. Knowledge on the existing production system as well as the characteristics of the prevailing marketing system and consumer behaviour is essential. A collaborative study between the University of Hannover and ICRAF was designed to solve this problem. It was carried out in Zimbabwe, and financed by the BMZ/ICRAF Domestication of Indigenous Fruits Project.

The study presented here is part of an economic investigation of the different aspects of the production-to-consumption system¹⁹. The marketing study provides baseline information on the existing marketing system of the two top priority indigenous fruits selected by farmers of Southern Africa (*U. kirkiana* and *S. cocculoides*). Specifically, the study assesses the market structure, including among other things, actors along the market chain, extent of barriers to entry and exit and product differentiation. It also examines price formation mechanism, costs incurred and profits accrued. Due to the crucial role of consumers in the marketing system, the study estimates consumers demand through investigating consumers' willingness to pay and factors influencing consumption and purchase behaviours.

¹⁹ For the production systems see Mithöfer's study

Having defined the problem and the main objectives of the study, the theoretical concepts applied are reviewed in **chapter 2**. The **Structure-Conduct-Performance (SCP)** approach to structure the analysis, price theory and competition policy to explain the relationships between the parameters are discussed. In addition, during the field research, empirical evidence has shown that the prevailing institutional arrangements are a predominant factor influencing the production-to-consumption system of IFs. Therefore, property rights and transaction costs are shortly analysed. Also, **consumer behaviour** approaches are presented to assess factors, which affect consumer attitudes, preferences and willingness to pay for the fruits.

In chapter 3, the framework of data collection is presented. In order to get a deeper insight of the marketing activities including the consumption behaviour of the fruits at the same time capture the regional variations; three sites from different districts with intense production and marketing activities were selected. The areas are Gokwe and Murehwa rural growth point markets and Mbare urban market in Harare. The thought behind selecting rural and urban markets is from the argument that the major users of these fruits are the poor people in the rural areas. But based on the objectives of this study, it was also necessary to gather information on the urban peoples' attitudes, preferences and willingness to pay because they are among the buyers of the fruits, a process which is expected to improve the cash income of the rural IFs traders. For the consumer survey, additional sites including City Botanical gardens and Westgate shopping centre in Harare were considered to observe the effect of the perceived income differences on the consumption and buying behaviours of IFs.

In this study, a stepwise data collection process was followed in order to gather sufficient and reliable information for both marketing and consumer analyses. The procedure started by reviewing literature and analysing secondary data, then followed by Rapid Market Appraisal including informal discussions and personal observations. Afterwards, formal interviews of producers, retailers, wholesalers, policy makers and consumers were conducted. Finally a conjoint experiment was carried out.

During data collection phase, a number of limitations were encountered. Nevertheless, a substantial amount of information about the existing marketing system of *U. kirkiana* and *S. cocculoides* fruits in Zimbabwe was collected. Therefore, **Chapter 4** discusses the empirical findings on the extent of marketing and consumption activities. Starting with the marketing

analysis, results suggest that *U. kirkiana* and *S. cocculoides* fruits are highly traded but the marketing system is still in its infancy stage. The market structure is far from perfect competition because it does not meet the conditions of the model. In the case of *U. kirkiana* marketing, although there are many producers/collectors, retailers, vendors and consumers, there are few wholesalers. The large number of retailers and producers facilitate adequate competition on those levels unlike on wholesalers' stage. High market concentration is found in the wholesaler section, which was supposed to indicate market power, but this was not the case for the 1999/2000 season. Despite wholesalers being on the market most of their time, also be more aware of the marketing supply information than producers, they received relatively lower margins compared to other actors in the chain. This might be due to the raising factor costs especially fuel caused by inflation, their inability to negotiate for lower buying price and rise selling price. The latter is caused by the fact that producers will decide to sell to retailers and vendors and on the other hand retailers will not buy from them instead purchase the fruits straight from the producer. Information on *S. cocculoides* wholesaling is missing. This study could not classify individuals to be wholesalers of the fruits for that season, because of the strict by-laws prohibiting marketing of the fruits which scared traders to provide information.

There are no sophisticated **product differentiation** activities in the system. However, there are natural/genetically-modified characteristics like different sizes, colours and freshness leading to existing slight preferences. Therefore, at each market level, similar fruits consisting of mixed natural colours, freshness and sizes are sold. But, recently, attempts to simple grading and packing are found within the retailing level. However, the activities are not conducted in favour of price formation process. They are mainly done to improve preferences and very few traders suggested that they use them to set prices.

The marketing system operates by using an informal marketing information system. There is no official or unofficial information chain, and hence producers acquire price information mainly from neighbours who have visited the market during that selling season. Retailers and wholesalers reported that they are mainly setting prices depending on the costs of transportation and fruit purchase, but also consider prices set by other market participants.

Nevertheless, regional **price differences** for *U. kirkiana* fruits are high; this situation might be facilitated by the lack of transparency in the marketing activities of the fruits. The in-

transparency in price formation is caused by the fact that there is no unit price for the different utensils used to measure the fruits. The use of varied equipment makes it difficult to compare the prices, supply and demand with exotic fruits, which are normally sold in fixed quantities packed in plastic bags. The entire IFs' prices in the markets look similar, but retailers and wholesalers adjust quantities of the fruits in different measurement units. The price trends for both *U. kirkiana* and *S. cocculoides* fruits show that higher prices are found in urban markets than in growth point and farm-gate levels. High inflation, leading to an increase of factor prices may be used to justify these results.

Furthermore, the results indicate that although producers incur transport costs to come to Mbare, the higher producer prices at Mbare might create an incentive for producers and retailers in Murehwa and Gokwe rural areas to transport their fruits and sell in Mbare and Gokwe town markets respectively. However, in all the marketing activities of *U. kirkiana* and *S. cocculoides* fruits and at all market stages cash is the main mode of payment. Although there are few retailers and wholesalers selling on credit, there are neither interests nor higher prices charged in this context. Contractual arrangements between buyers and sellers were also not found in the marketing system of these fruits.

In conclusion, the market system of *U. kirkiana* and *S. cocculoides* indigenous fruits is imperfectly competitive. Since there are many actors, the market conduct and performance could be explained by preferences based on the concepts of imperfect competition or monopolistic competition. That means the market supply was supposed to be determined by preferences or reacting to product differentiation. However, that is not the case with the market system of *U. kirkiana* and *S. cocculoides* indigenous fruits. Therefore, there is need for intervention to improve the system.

The rigid by-laws prohibiting marketing of IFs as reported by the interviewed traders attracted some attention of this study. Therefore, natural resource management policies and property rights were thoroughly examined in order to find out the existing policy set-up, natural resource management regimes and their influence on the existing and future expansion of the marketing system. Findings show that, the use and management of natural resources in Zimbabwe is being guided by five property rights regimes. The first one is state land and tree tenure in which land, trees and other forest products are managed and controlled by

government through the Forestry Commission, but the rural communities have no access to the lands and forest products found in this tenure system.

The second system is land and trees found in resettlement areas in which the district council controls the indigenous trees, while the resettled people are limited from using the forest products. In the third system, groups or organisations plant the trees, therefore, members are solely responsible to manage and use the tree products. Trees on commercial farms constitute the fourth tenure system. Owners of the commercial farms are in control of the land and non-timber products. The fifth tenure arrangement which is land and tree tenure in communal areas is the most interesting for this study because all the sites for this study are found in this type of tenure system. In addition, almost all fruits for consumption and selling are harvested from the communal forests. In this tenure system, the Ministry of Local government, Rural and Urban Development under the president control the land. All trees with commercial value such as timber belong to the district council. Other indigenous trees are owned and controlled by traditional authorities, local institutes or individual field owners depending on their commercial values.

However, in all these systems, there is **no transparency** about ownership and user rights of indigenous fruit trees. In most cases they are still treated as a common pool resource, with no formal rules in place to direct the management and uses. This is a crucial aspect of natural resource politics. Furthermore, the law is backed up by the traditional attitude that the fruits are a gift from god therefore no one should pay for them. In former days, the traditional chiefs were collecting fines in case they caught anyone selling the fruits. The magnitude of the fines depended on the number of times the crime has been committed, and ranged from a chicken to several goats. But, due to low population and reasonable incomes of the people there was no competition towards the fruits.

But recently, the rising population coupled with a decline of disposable income in the population has increased the uses and competition for the fruits. On the other hand, the in-existence of a tenure system, which clearly specifies the ownership and user rights of the indigenous fruit trees and fruits, imposes difficulties in managing and controlling the use of the fruits. The fact that the fruits are still a common resource has resulted into the overuse of the good. As a result village traditional leaders are practising the old taboos and beliefs to help managing and conserving the fruit trees, which brings high uncertainties to traders. These

findings therefore, suggest that commercialisation of indigenous fruits in Zimbabwe needs a prior consideration of the ownership and use regulations on the trees and fruits. There is need for formal institutional arrangements to protect the forests against environmental damages and extinction of the tree species.

Despite marketing, the fruits are also consumed mostly in fresh form in both rural and urban areas. Since consumers are important individuals in the production-to-consumption system this study has evaluated the consumer side in detail to examine whether people are willing to consume and buy the fruits, as without consumption there is no need to increase production. Apart from traders, the information will also assist ICRAF's program on domestication of indigenous fruit trees to produce indigenous fruit trees with characteristics pre-defined by consumers. Therefore, to understand the extent of consumption, attitudes, preferences and willingness to pay for the fruits, consumer analysis was conducted. Both descriptive and advanced multivariate tools were used to analyse the information.

Descriptive analyses have shown that 94% of people interviewed consume *U. kirkiana* fruits, and out of them 56% consume *S. cocculoides* fruits. Most of them consume them as snacks between meals, while others consume the fruits to gain nutrients. These are important characteristics, which might enhance consumer willingness to pay. Therefore, the attributes can be used in the promotion activities to increase demand of the fruits. Due to high availability in the rural areas, consumption in these areas is high and people consume twice as much than in urban areas. Furthermore, the notion that people consume the fruits to satisfy hunger was not supported by the findings of consumer study; instead, people consume the fruits because it is a habit. Therefore they are worried on the declining supply due to extensive deforestation.

In the case of purchase, more buying activities for *U. kirkiana* are in the urban areas than in rural areas but the vice versa is true for *S. cocculoides* fruits. Out of the 94% consumers of *U. kirkiana*, 50% are buyers, more in urban areas. People in Harare for example; buy twice as much *U. kirkiana* fruits than in Gokwe and Murehwa. Apart from the availability in the rural areas, the other reason might be that urban people have more cash income to buy fruits than people in rural areas. This explanation is supported by the production study by Mithöfer (2002) that most rural dwellers depend on remittances from their family members living in urban areas. But the situation of *U. kirkiana* fruits is different from that of *S. cocculoides*

fruits. Out of the 56% consumers of the fruits, 30% are buyers, but more are found in Gokwe rural area despite being the potential production site. This is because the fruit trees are far from the town. People who want to harvest them free have to incur transportation costs. In such case the better option remains to buy from the markets. Therefore, these results suggest that improving sales of *U. kirkiana* fruits, through supplying more of the fruits to the urban markets, might likely improve the cash income of the rural poor. But for the *S. cocculoides* fruits, increased supply should focus both rural and urban markets.

Findings of the consumer formal survey indicate that indigenous fruit trees and fruits are highly valued. Consumers have positive attitudes towards improving the marketing system and hence the potential for commercialisation is high. All consumers, buyers and non-buyers like the idea of increasing marketing activities of the IFs in question. The improvement process should consider increasing fruit access to all consumers by distributing them in all market types and enhance market supply by encouraging producers to plant the trees for more yields. Apart from yields, planting IFs will facilitate ownership of the indigenous fruit trees to the producers and hence they will sell the fruits freely without problems from the village leadership.

With respect to prices, both buyers of *U. kirkiana* and *S. cocculoides* fruits are willing to pay for the fruits at too cheap price, which was considered low in quality and expensive prices assumed unaffordable. These findings further indicate that the potential for the market expansion is high because buyers are willing to pay from Z\$ 7.00 to 27.00, twice the prevailing market price of Z\$ 5.00. The fact that IFs buyers, found in both rural and urban markets have positive attitudes towards the trade, and more importantly, they are willing to pay even prices they consider expensive, shows a good perspective to the marketing system. What is needed now is to improve the market supply of high quality fruits.

In this study of marketing system of *U. kirkiana* and *S. cocculoides* indigenous fruits, information on the consumer attitudes and socio-demographic characteristics influencing consumption and purchase behaviours is crucial, to be used in formulation of appropriate marketing mix. Therefore, components from the factor analysis together with socio-economic variables are used to estimate logistic regression models to predict the extent of the relationship between the attributes and consumption and buying behaviours of the two fruits. Moreover, the final results could not clearly explain the type of the existing relationship

between the factors and the consumption behaviour. This conclusion is reached due to the unexpected signs of the significant variables and lack of their practical and economic interpretation. For example, the sign of GOKWE in the model to detect the consumption behaviour of *S. cocculoides* fruits is negative. This means that there is less consumption of the fruits in Gokwe compared to Harare and Murehwa. This finding is practically difficult to explain because Gokwe is the potential site for the production of *S. cocculoides* in Zimbabwe and hence one would expect more consumption of those fruits than the other sites.

However, in the purchase behaviour of the two fruits, the study found out that consumer buying behaviour is associated with married status, education, Harare site and production districts of the respective fruit. Educated and married people are more likely to buy *U. kirkiana* and *S. cocculoides* fruits, than their counterparts. But while there are more purchasing activities of *S. cocculoides* fruits in Gokwe, there are less for *U. kirkiana* fruits in Murehwa. While these results have given some light on the characteristics associated with purchasing behaviour, further research is recommended. This is because the socio-economic characteristics such as age and sex of consumers and buyers for both the IFs are expected to have similar influence because all the IFs are at the same level. In that case sex and age are also expected to influence the consumption of *U. kirkiana* fruits, which is not the case in this study. The attitude factors were not significant in the models, therefore, considered not to influence the consumption and purchasing behaviour of the fruits.

During both informal and formal data collection exercises, it was found that the preferences and buying behaviour are influenced by natural differentiation of *U. kirkiana* fruits including size and colour, also presale practises. Therefore, this study is going ahead to examine the importance of these characteristics on the preferences and willingness to buy and pay for the fruits. Conjoint analysis is used to perform this task. The analysis is conducted to only *U. kirkiana* fruits because there are more buyers of the fruits than the *S. cocculoides* fruits, such that improvement of sales seems feasible. In addition time and funding was inadequate to cover the two fruits.

Results of the **conjoint analysis** show that small size is the most preferred attribute because consumers believe that small size is associated with sweet taste. Further more, quantity, as an indicator of price is the second most important attribute, most consumers prefer large which means relatively cheap to small quantities. Also consumers prefer to buy fresh to non-fresh

fruits and lastly colour is the fourth in the preference structure, in this case, brown fruits are preferred to yellow fruits. Therefore, the aggregate product preference structure to buyers of *U. kirkiana* fruits is a packet weighing 500g, with brown, small and fresh fruits. This suggests that, presale activities aiming to classify the buyers preferred fruits' traits might meet consumer expectations and hence increase market sales.

However, the aggregated buyers' needs and desires differ from individual ones. Some consumers don't like the same combination as identified by the group. This is because buyers differ in their backgrounds and hence their desires. Therefore in order to satisfy the needs of consumers from different backgrounds, perceptions and buying behaviour, the market is segmented by the use of cluster analysis, to simplify the development of a marketing strategy which will focus on one or few groups. Therefore, cluster analysis is conducted considering the utility values of the four traits, and the market is divided into six segments. The clusters confirmed that only clusters one and three completely complied with the aggregate preference structure identified by the 250 buyers of *U. kirkiana* fruits. The rest had a preference of only two to three traits from the preferred combination. Since clusters one and three have the majority of the preferred traits and also have a high proportion of consumers, targeting these groups might increase market sales.

Therefore, from these findings the following recommendations are proposed in an effort to improve the market fruit supply and demand. The recommendations can also be combined in the ongoing ICRAF's research on conservation and domestication of indigenous fruits to improve the current situation.

- To improve the marketing system of indigenous fruits, the government may set up a reliable institutional framework, which favours private action by reducing risk and uncertainty. In this case, people can be allowed to collect the fruits for selling without fears of being punished. This can be facilitated by issuing collection licences to traders, free of charge or sold to them. Reducing hesitancy to collectors may also facilitate the introduction of the IFTs on-farm, as people will be sure that they will be allowed to sell the fruits from indigenous fruit trees they have planted.
- Standardising units of measurements, which will allow prices to change at constant quantities, may improve marketing transparency. In addition, establishing price-monitoring systems at all marketing levels may also reduce the problem. The current

government publications, under the Central Statistical Office of Zimbabwe, reporting the prices of other commodities can report IFs prices and make it available to traders and consumers throughout the country via the normal newspaper marketing channels or broadcasting. Transparency may in-turn enhance competition and adjust prices according to supply and demand.

- Since demand seems promising, high quality fruits may be supplied to urban markets in the case of *U. kirkiana* and both markets for *S. cocculoides* fruits to increase sales and benefit the rural poor. Traders may re-organise themselves and initiate intensive sorting, grading and packing into brown fruits, small in size and fresh, which could increase their returns. In addition to improve the hygienic situation, practises like washing, grading and packing will make the fruits attractive to consumers.
- ICRAF's breeding research may focus in selecting trees, which yield small fruits and brown in colour.

The results of this study have contributed some knowledge on the marketing system of the fruits in Zimbabwe. While extrapolating the findings to other SADC countries including Malawi, Tanzania and Zambia is possible, it might not work in all the aspects. This is because the political, economic and socio-cultural set up of these countries is not the same. This calls a need:

- To compile information of the existing marketing systems of other countries involved in the domestication of indigenous fruits program to draw appropriate conclusions to facilitate regional IFs market improvement.
- Monitor the consumption and marketing activities and the might be positive (increased nutrition) and negative effects (e.g. reduce labour availability in the agricultural production) of the commercialisation activities to the rural poor.
- To ease the problem of perishability of *U. kirkiana* fruits, further research on the introduction of co-operative activities between producers and the marketing system is recommended. Co-operatives may co-ordinate the flow of the fruits to different markets by introducing storage facilities to foster steady market supplies. Storage facilities may also be used to even up the short-term inequalities between supply and demand, help in

increasing producer bargaining power and enhance competition among traders. Also they may reduce wastage, improve returns to traders and can assure the expansion of the marketing activities to far areas from the production sites with minimum losses.

6. KURZFASSUNG UND SCHLUSSFOLGERUNGEN

Armut, unsichere Nahrungsversorgung und wachsende Umweltprobleme sind Hauptprobleme im Entwicklungsprozess afrikanischer Länder. Nichtregierungs- und internationale Organisationen haben sich in den letzten Jahren dieser Problematik angenommen und begonnen, nach Lösungen zu suchen. Ein Beispiel für diese Aktivitäten sind die Bemühungen des International Centre for Research in Agroforestry (ICRAF), unterstützt durch das BMZ, einheimische Baumfrüchte (indigenous fruits, IFs) zu erhalten und züchterisch weiter zu entwickeln. Ziel dieses Vorhabens ist es, den traditionellen Konsum der in den Wäldern vorkommenden Wildformen durch eine bäuerliche Produktion für den Markt auf eine nachhaltige Basis zu stellen. Damit soll gleichzeitig ein Beitrag zur Ernährungssicherheit, zur qualitativen Verbesserung der Ernährung und zur Einkommenserzielung in einer arbeitsteiligen Wirtschaft geleistet werden.

Vor diesem Hintergrund sind - ergänzend zu den Züchtungsarbeiten - die beiden in **Kapitel 1** erläuterten ökonomische Untersuchungen in Kooperation zwischen dem ICRAF und dem Institut für Gartenbauökonomie der Universität Hannover durchgeführt worden, die einerseits die Voraussetzungen für die Entwicklung einer kommerziellen Produktion in landwirtschaftlichen Betrieben untersuchen²⁰, andererseits die Vermarktungsperspektiven für einheimische Baumfrüchte in südafrikanischen Ländern herausarbeiten sollen. Die Untersuchungen wurden in Zimbabwe durchgeführt, wobei die beiden in der Region verbreitet vorkommenden und konsumierten Arten *Uapaca kirkiana* und *Strychnos cocculoides* von den beteiligten Forschergruppen ausgewählt wurden.

Das Ziel der hier vorgelegten Arbeit besteht zunächst darin, die existierenden Vermarktungsverhältnisse zu erfassen und systematisch zu beschreiben, um darauf aufbauend Chancen und Risiken für eine stärkere Kommerzialisierung des Sektors ableiten zu können. Unter den beteiligten Akteuren nehmen die Verbraucher insofern eine Schlüsselrolle ein, als von ihrem Verhalten letztlich Erfolg und Misserfolg der eingeleiteten züchterischen - d.h. angebotsorientierten - Maßnahmen abhängen. Aus diesem Grunde wurden Verbrauchererhebungen durchgeführt, die über die Einstellungen und Präferenzen sowie die Zahlungsbereitschaft der Konsumenten Auskunft geben sollten.

In **Kapitel 2** werden die in der Arbeit verwendeten theoretischen Erklärungsansätze kurz dargestellt. Dies ist einerseits der problemstrukturierende Marktstruktur-Marktverhaltens-Marktergebnis-Ansatz (structure-conduct-performance- oder "SCP"-Ansatz) in Verbindung mit preis- und wettbewerbstheoretischen sowie institutionenökonomischen Kenntnisse zur Analyse des Vermarktungsprozesses. Andererseits werden wichtige Aspekte der Konsumtheorie angesprochen, die zur Abschätzung der Chancen und Risiken für eine Ausweitung der kommerziellen Nachfrage herangezogen wurden.

Kapitel 3 gibt einen Überblick über das gewählte schrittweise Vorgehen bei der notwendigen Datenerhebung: ausgehend von einem Literaturstudium als Ausgangsbasis für die folgenden Stufen wurde eine Marktübersichtsstudie (Rapid Market Appraisal) durchgeführt. Sie diente dazu, die empirischen Verhältnisse vor Ort (Märkte an zwei ländlichen Standorten und in der Hauptstadt Harare) in das weitere Vorgehen einzubeziehen. Zusätzliche informelle Interviews von Produzenten, Groß- und Einzelhändlern sowie Konsumenten und Vertretern der Politik auf den verschiedenen Verwaltungsebenen wurden anschließend genutzt, um das Erscheinungsbild zu vervollständigen und einen Fragebogen zu entwickeln, der in einer umfangreicheren Konsumentenerhebung an den drei Standorten eingesetzt wurde. Die erhobenen Daten wurden u.a. mit Hilfe von verschiedenen multivariaten Verfahren analysiert.

Die empirischen Ergebnisse der Untersuchung werden im **Kapitel 4** aufbereitet, wobei das Vermarktungssystem (Abschnitt 4.1) vor dem Konsumentenverhalten (Abschnitt 4.2) behandelt wird. Dem SCP-Ansatz folgend werden in einem ersten Schritt charakteristische Strukturelemente des Marktes systematisiert und in einem zweiten Schritt eine ökonomische Bewertung unter Einbeziehung von Verhaltens- und Ergebniskriterien vorgenommen.

Die Erhebungen haben zunächst gezeigt, dass die beiden ausgewählten Früchte in durchaus nennenswertem Umfang auf Märkten gehandelt werden, wenn auch der überwiegende Teil der Produktion am Markt vorbei in den Haushalten der Sammler und deren Verwandten und Freunden verzehrt wird. Während der Datenerhebung erwies sich jedoch als erschwerend, dass die IFs ursprünglich nicht vermarktet wurden, sondern die Bevölkerung seit jeher das Gewohnheitsrecht hat, Früchte für den Eigenbedarf in den Wäldern zu sammeln. Ein Verkauf der Früchte wurde früher von den Dorfältesten sogar oftmals unter Strafe gestellt. Diese

²⁰ Vgl. zu diesem Problemkreis MITHÖFER: "Economics of Use and Planting of Indigenous Fruit Trees in Zimbabwe". Die Arbeit wird im Laufe des Jahres 2002 abgeschlossen.

Verhältnisse wirken auch heute noch nach; denn die Sammler, Groß- und Einzelhändler gaben häufiger nur zögernd Auskunft über ihr Geschäftsgebaren, weil sie sich in der rechtlichen Beurteilung ihres Tuns auf einem mehr oder weniger informellen Markt nicht ganz sicher waren. Dies gilt um so mehr, als auf lokaler Ebene sehr unterschiedliche Regeln für die Ernte und Vermarktung der Früchte gelten. Besonders problematisch ist die Situation bei *S. cocculoides*; denn deren Vermarktung ist auch heute noch grundsätzlich durch Regelungen auf Dorfebene verboten. Aus diesem Grunde gibt es auch keinen Großhandel mit *S. cocculoides*. Dennoch gelang es letztlich, wichtige Informationen zusammenzutragen, die einen guten Einblick in die existierenden Verhältnisse bei der Vermarktung beider IFs geben können. Die Marktteilnehmer lassen sich allerdings nicht eindeutig den Produzenten (besser: Sammlern; denn eine gezielte Produktion für den Markt gibt es nicht), Groß- und Einzelhändlern zuordnen. Vielmehr nehmen die Akteure nicht selten gleichzeitig mehrere Funktionen wahr. Deshalb wurden alle Akteure, die Früchte in den Wäldern sammeln und an Händler verkaufen, pragmatisch den "Produzenten" (Sammlern) zugerechnet. Großhändler (nur für *U. kirkiana*) sind entsprechend Teilnehmer, die Früchte von Sammlern kaufen und an andere Händler weiterverkaufen. Einzelhändler schließlich verkaufen selbst gesammelte oder zugekaufte Früchte an Endverbraucher.

Die Verteilung der Marktteilnehmer auf den verschiedenen Vermarktungsstufen nach **Anzahl und Größe** ist grundsätzlich als Unvollkommenheit (Marktmängel im Sinne einer vom Modell der vollkommenen Konkurrenz abweichenden Struktur) zu interpretieren: zahlreiche kleine Sammler stehen einer relativ kleinen Anzahl von Großhändlern auf den Märkten gegenüber, wobei die Verteilung der Marktanteile auf die Großhändler einen hohen Konzentrationsgrad aufweist. Auf der Absatzseite handeln die Großhändler wiederum mit einer Vielzahl kleiner Einzelhändler. Diese Charakteristika legen Marktmacht (Preissetzungsspielräume) der Großhändler auf dem Beschaffungs- und Absatzmarkt nahe, ein Phänomen, das typischerweise auf Nahrungsmittelmärkten in Entwicklungsländern anzutreffen ist. Die Vermutung gilt um so eher, als die Sammler ganz überwiegend nur sporadisch am Markt tätig und letztlich gezwungen sind, ihre aus den Forsten herangeschafften Früchte - u.a. wegen der (vor allem bei *U. kirkiana*) raschen Verderblichkeit, der angefallenen Transportkosten und des bekundeten Zwecks "cash" für notwendige Einkäufe zu generieren - am gleichen Markttag zu verkaufen. Daraus könnte einerseits geschlossen werden, dass Sammler "price taker" - möglicherweise sogar

Optionsempfänger - sind, andererseits, dass Großhändler allein durch ihre geringe Zahl und ständige Marktpräsenz über Informations- und Machtvorsprünge verfügen, die sie preispolitisch nutzen können. Die strukturellen Gegebenheiten sind zwar nicht zu bestreiten, die Schlussfolgerungen sind indessen nicht zulässig. Die Sammler haben nämlich zahlreiche Wahlmöglichkeiten zwischen verschiedenen Abnehmern. Sie können nicht nur an andere Großhändler (bei *U. kirkiana*), sondern auch an die vielen Einzelhändler (retailers) und kleineren Straßenhändler (vendors) verkaufen - und sie tun dies auch. Folglich ist die aus marktstruktureller Sicht bestehende Marktunvollkommenheit in Form der unterschiedlichen Zahl und Größe der Marktteilnehmer für den Preisbildungsprozess ganz offensichtlich nicht relevant, weil der wettbewerbliche Austauschprozess funktioniert. Dies wird u.a. auch durch die Erhebungsergebnisse insofern bestätigt, als die befragten Großhändler im Vergleich zu den Sammlern und Einzelhändlern - zumindest zum Zeitpunkt der Erhebung - durchschnittlich offenbar die niedrigsten Gewinne erzielten²¹.

Marktunvollkommenheiten in Form von **Produktdifferenzierungen**, die zielgerichtet, al. s Instrument zur Durchsetzung individueller, von den Wettbewerbern abweichender Preise eingesetzt werden, konnten nicht festgestellt werden. Mithin kann der Preisbildungstyp auch nicht mit dem Modell des "monopolistischen Wettbewerbs" (E. H. CHAMBERLIN) beschrieben werden, der in der Realität für die betrachteten Märkte typisch ist. Eher entspricht der Markttypus dem Modell des "unvollkommenen Wettbewerbs" von JOAN ROBINSON, der auf heterogenen Präferenzen beruht. Zumindest auf der Einzelhandelsstufe ist nämlich häufig zu beobachten, dass die Früchte nach Größe, Farbe und Frischezustand sortiert oder gewaschen und in Gebinden (Plastikbeuteln, Schalen, Dosen u.a.m.) von 300, 400 oder 500 g oder von 1,5, 2,5 oder 5 ℓ angeboten werden. Diese einfachen produktdifferenzierenden Aktivitäten

²¹ Dieses überraschende Ergebnis dürfte indessen auf Sondereinflüsse zum Zeitpunkt der Erhebung zurückzuführen sein: die aktuelle Wirtschaftssituation war - und ist - durch hohe Inflationsraten, kurzfristig und unvorhergesehen steigende Kraftstoffpreise (sofern Diesel/Benzin überhaupt verfügbar waren) u.a.m. gekennzeichnet. Insbesondere die Kalkulation auf der Großhandelsstufe wird dadurch erschwert; denn dort fallen die höchsten ausgabewirksamen Vermarktungskosten an, vor allem Transportkosten (ausschließlich LKW-Nutzungen), und bereits gekaufte Früchte mussten nicht selten zu höheren als den kalkulierten Kosten vermarktet werden. Sammler und Einzelhändler hatten demgegenüber niedrigere ausgabewirksame Kosten (Transport zu Fuß, auf Sackkarren oder mit dem Bus), und Einzelhändler konnten offenbar die Kaufkraft und Zahlungsbereitschaft der Endverbraucher relativ gut und aktuell einschätzen, so dass sie sich in der gegebenen Situation wirtschaftlich günstiger standen.

zielen aber nach Aussagen der befragten Händler in der Regel nicht auf höhere Preise. Sie werden vielmehr aus Gründen der Hygiene und/oder sollen die Verbraucher durch ein günstiges und einheitliches Erscheinungsbild des Angebots zum Kauf anregen, d.h. Käuferpräferenzen schaffen. Nach der ökonomischen Theorie sollten allerdings auch in dieser Situation Preisdifferenzierungen beobachtet werden, weil die Präferenzunterschiede zu einer differenzierten Zahlungsbereitschaft führen, die von den Anbietern ausgenutzt wird.

Umso mehr erstaunt, dass die geforderten Preise auf der Groß- bzw. Einzelhandelsstufe eines gegebenen Marktes weitgehend identisch sind, **Preisdifferenzierung** folglich nicht betrieben zu werden scheint. Auf der Großhandelsstufe mag dieses Ergebnis damit zu erklären sein, dass die Großhändler nach eigenen Aussagen ihre Preise nicht nur an ihren Kosten - Einstandspreise für die Früchte, vergleichsweise hohe Transportkosten (LKW-Transport) u.a.m. -, sondern auch an den Preisen der anderen Großhändler ausrichten. Eine Preisführerschaft gibt es dabei nicht. Diese Verhältnisse lassen auf eine hohe Wettbewerbsintensität (oligopolistische Interdependenz) im Parallelprozess schließen, die zu einheitlichen Preisen und einer Nivellierung der Gewinne führt. Für diese Interpretation sprechen auch die bereits erwähnten Möglichkeiten der Sammler (und Einzelhändler) unter einer Vielzahl von Tauschpartnern zu wählen und die festgestellten mäßigen, ja sogar vergleichsweise niedrigen Gewinne der Großhändler. - Weniger einsichtig ist dagegen die weitgehende Einheitlichkeit der Preise auf der Einzelhandelsstufe, zumal die Anbieter Kosten verursachende Aufbereitungen vornehmen. Bei näherer Betrachtung zeigt sich denn auch, dass die Preise tatsächlich nur scheinbar einheitlich sind. Der **wahre Preisbildungsprozess** wird nämlich dadurch **verschleiert**, dass die marktliche Bewertung der Früchte über Mengenanpassungen bei konstanten nominellen Preisen erfolgt. Dieses Phänomen ist zwar auch auf der Großhandelsstufe zu beobachten. Dort wird es indessen kaum merklich und in geringem Ausmaß durch eine "Anpassung" der Größe der Vermarktungsbehälter (unterschiedlich starkes Zusammendrücken der Blechbehältnisse mit der Folge einer geringeren Menge als dem "Standard" von 20 Litern (à 11 kg), z.T. auch 5 und 10 l) praktiziert. Auf der Einzelhandelsstufe ist es dagegen eine ständig und ausgeprägt zu beobachtende Form der Preisanpassung. Der **Preisbildungsprozess** ist mithin **ausserordentlich intransparent**, und eine Vergleichbarkeit der Preise wird - insbesondere auf der Einzelhandelsstufe - praktisch unmöglich. Wenngleich auch nach den Untersuchungsergebnissen letztlich keine Marktseite überdurchschnittliche Gewinne

realisieren kann, die "Märkte" ihre Funktion also insoweit erfüllen, als die Preise gegen die Kosten tendieren, sprechen sowohl die (verdeckten) Preisdifferenzierungen auf einem gegebenen Markt als auch die - selbst nominal - unterschiedlichen interregionalen Preise für ein erhebliches Ausmaß an Marktineffizienzen. Die hohe Intransparenz der Angebots-Nachfragesituation und der Transaktionsbedingungen verunsichert die Marktteilnehmer, verfälscht die Funktion der Preise als Knappheitssignale, verringert das Vermarktungsvolumen, erhöht die Marktverluste und unterbindet die effizienzsteigernden Funktionen der Arbitrage.

Zusammenfassend ergibt sich aus der Analyse der Vermarktungssituation bei den untersuchten IFs, dass die bedeutendsten Hemmnisse für die Entwicklung formeller, funktionierender Märkte als Voraussetzung für eine erfolgreiche kommerzielle Produktion von IFs in unzureichend ausgestalteten institutionellen Rahmenbedingungen bestehen. Dieses Ergebnis ist bei den abzuleitenden Empfehlungen zu berücksichtigen.

Im **2. Abschnitt des 4. Kapitels** werden schließlich die Verhaltensweisen der Verbraucher eingehender analysiert. Ein wichtiges Ergebnis ist zunächst, dass die beiden ausgewählten Früchte in Zimbabwe eine hohe Wertschätzung in der Bevölkerung genießen und sich dieses auch im Konsum niederschlägt: nicht weniger als 94% der befragten Konsumenten essen zumindest *U. kirkiana*, und davon wiederum etwas mehr als die Hälfte auch *S. cocculoides*. Folglich ist das Marktpotential grundsätzlich als groß zu bezeichnen. Unter den - in der Befragung vorgegebenen - Verzehrgründen rangiert "als Zwischenmahlzeit" vor "Vitaminträger". Mit einigem Abstand folgen "Tradition" und "gegen den Hunger". Diese Einschätzungen sind insofern wichtig, als sie die Arbeitshypothese des ICRAF, die Kultivierung der Baumfrüchte könne einen Beitrag zur Ernährungssicherheit leisten, durch die vorliegende Erhebung nicht stützen. - Ein großes Problem stellt die Tatsache dar, dass die Bevölkerung die IFs traditionell selbst in den Wäldern unentgeltlich sammelt und im Haushalt verbraucht. Verbraucher und Käufer sind folglich nicht identisch. Aus diesem Grunde wurde besonderer Wert auf die Gruppe der Käufer und deren Einstellungen gelegt. Die diesbezüglichen Ergebnisse zeigen zunächst einmal, dass immerhin 46% aller Verbraucher von *U. kirkiana* IFs auch auf den Märkten kauft. Daraus folgt, dass das Käuferpotenzial zwar vermutlich kleiner als das Verbrauchspotenzial ist, andererseits spricht aber die allgemeine Wertschätzung dafür, dass ein Teil der bisherigen Nichtkäufer unter den Verbrauchern bei der

Aufnahme einer kommerziellen Produktion und geregelter Vermarktung Käufer werden könnten.

Die (nur für *U. kirkiana*) durchgeführte Analyse des Käuferverhaltens ergab, dass - allerdings bei großer Streuung der Antworten - die Zahlungsbereitschaft relativ hoch sein dürfte. Bei einem herrschenden Marktpreis von 5 Zim\$ äußerten beispielsweise immerhin noch 25% der Käufer ihre Bereitschaft, ein für die Befragung zusammengestelltes Angebot von *U. kirkiana* zu einem Preis zwischen 7 und 27 Zim\$ zu kaufen. Sicherlich sind solche Ergebnisse nicht überzubewerten. Sie zeigen aber, dass die IFs eine hohe Verbraucherpräferenz genießen und die Bemühungen, eine kommerzielle Produktion aufzubauen, durchaus nicht chancenlos sind.

Interessant sind die Ergebnisse bezüglich der Wertschätzung unterschiedlicher qualitativer Eigenschaften der Früchte. In dem durchgeführten Conjoint Experiment bevorzugten die Verbraucher eindeutig kleine (sie sind süßer als große) und braune (sie gelten im Vergleich zu gelben als "reif" für den Verzehr) Früchte, und sie sind auch bereit, für solche Sortierungen einen Preisaufschlag zu gewähren. Erwartungsgemäß wurden zudem frische Früchte und größere Mengen vorgezogen. Letzteres entspricht dem allgemeinen Nachfragegesetz, nachdem sinkende Preise (im herrschenden Preisbildungssystem allerdings bei konstantem Nominalpreis über Mehrmengen zu interpretieren) eine steigende Nachfragemenge bewirken. Die Conjoint-Analyse ergab dabei, dass kleine Früchte den weitaus höchsten Teilnutzen haben, gefolgt von der Menge (also dem Preis) und der Eigenschaft "Frische". Die Farbe hat nach den Ergebnisse den geringsten Teilnutzen. Die Ergebnisse sind insofern überraschend, als auf dem Markt diesen Präferenzen entsprechende Maßnahmen der Anbieter fehlen. Offenbar haben die Händler nur unklare Vorstellungen über die Präferenzen und die Zahlungsbereitschaft der Käufer. Diese gewonnenen Ergebnisse könnten evtl. bei der Züchtung berücksichtigt werden, um eine besser der Nachfrage angepasste Produktion zu gewährleisten.

Die unternommenen Versuche, die Wahrscheinlichkeit für einen Kauf mit Hilfe logistischer Regressionen auf die in einer vorgeschalteten Faktorenanalyse identifizierten Bestimmungsfaktoren zurückzuführen, sind nicht überzeugend ausgefallen: die letztlich - aus statistischer Sicht - herausgefilterten "Erklärungsfaktoren" hatten nicht immer das erwartete Vorzeichen, und ihre ökonomische Interpretation erwies sich als wenig plausibel.

Schließlich wurden die Verbraucher mit Hilfe einer Cluster-Analyse gruppiert, in der Hoffnung, Marktsegmente zu identifizieren, die sich durch charakteristische Merkmale der Probanden abgrenzen lassen (Ausbildung, Einkommen, Familienstand, Wohnort usw.). Die Ergebnisse zeigen, dass 2 Cluster über einfache produktdifferenzierende Massnahmen (Sortieren und Standardisieren nach Größe, Farbe, Frischezustand) gezielt angesprochen und Kaufkraft durch höhere Preise abgeschöpft werden könnten.

Die Ergebnisse der vorliegenden Untersuchung haben gezeigt, dass die **größten Hemmnisse** für einen Aufbau einer Produktion von IFs in bäuerlichen Betrieben aus Sicht der Vermarktung im Bereich der institutionellen Regelungen liegen. Dafür sprechen die herausgearbeiteten zahlreichen Tatbestände, die in bisher vorliegenden ad hoc-Beschreibungen des Sektors nicht zu finden sind. Aus diesem Grunde bestehen die **Empfehlungen** auch im Wesentlichen aus Forderungen nach **Schaffung funktionsfähiger Institutionen**.

Ein, wenn nicht der wichtigste Hemmfaktor für die Entwicklung eines effizienten Vermarktungssystems ist dabei zweifellos die Allmende-Gut-Eigenschaft der Wildfrüchte. Da alle Einwohner eines Dorfes grundsätzlich das Recht haben, Früchte für den Eigenbedarf in den umliegenden Wäldern zu ernten, gibt es einen gespaltenen "Markt" für einheimische Früchte. Auf der einen Seite steht die unentgeltliche Beschaffung in den Forsten, auf der anderen Seite der in den letzten Jahren entstandene kommerzielle Sektor. Damit verbunden ist einerseits ein vergleichsweise geringes und unsicheres Marktangebot; denn nur die über den privaten Verbrauch hinausgehenden Mengen werden gehandelt. Andererseits hat die Versorgungslage mit Nahrungsmitteln und die Suche nach Einkommensquellen in den letzten Jahren zu einer zunehmenden Übernutzung der Baumbestände (einschl. Verletzung der Bäume durch Einsatz von Schlagstöcken bei der Ernte) geführt, so dass die Verfügbarkeit insgesamt rückläufig tendiert. Unter dieser Entwicklung dürfte in erster Linie der kommerzielle Sektor leiden; denn ein geringes und unregelmäßig fließendes Marktangebot erhöht die Unsicherheit und die Marktverluste, verstärkt kürzerfristige Preisschwankungen, erschwert die Suche nach Marktinformationen und beeinträchtigt so die Effizienz des Vermarktungsprozesses. Dies gilt insbesondere für die interregionale Vermarktung, weil Arbitrageaktivitäten wegen fehlender oder unsicherer Informationen unterbleiben.

Eine Eindämmung oder **Beendigung der Übernutzung** der Ressourcen und eine Erhöhung der Vermarktungseffizienz kann nur erwartet werden, wenn es in den Ländern gelingt, eindeutige **Eigentumsrechte an den Bäumen bzw. Früchten** zu definieren. Die Zuteilung von Verfügungsrechten und die Schaffung von Rechtssicherheit bei ihrer Nutzung und Übertragung stellt die Regierungen in Entwicklungsländern zweifellos vor erhebliche Probleme, gleichwohl wird sie ganz generell als die wichtigste Vorbedingung für die Nutzung marktwirtschaftlich organisierter Austauschprozesse angesehen. Das gilt auch für den Aufbau eines formellen Marktes für IFs, der für die angestrebte systematische Produktion in bäuerlichen Betrieben unabdingbare Voraussetzung ist. Eine Lösung des Problems wird darin gesehen, gesetzliche Regelungen zu erlassen, die den bisher schon regulierend tätigen lokalen Entscheidungsträgern (Chiefs) formell die Kompetenz einräumt, Eigentumsrechte an den Früchten (oder den Bäumen), beispielsweise in Form von Lizenzen zum Sammeln bzw. Ernten zu vergeben und Verstöße zu sanktionieren. Die Lizenzvergabe könnte dabei unentgeltlich oder gegen Entgelt erfolgen. Damit könnte einerseits einer Übernutzung entgegengewirkt, andererseits aber auch ein deutlicher Anreiz für eine Ausweitung marktlicher Transaktionen gesetzt werden. Die Erzeugung könnte - wegen der zu erwartenden nachhaltigeren Bewirtschaftungsweise und des rückläufigen Eigenverbrauchs - zu einem höheren Marktvolumen bei sinkenden Verlusten führen, und die Preiseffizienz könnte steigen. Eine solche Politik würde gleichzeitig die vom ICRAF und anderen Organisationen eingeleiteten Maßnahmen zur gezielten Produktion für den Markt begünstigen oder ihnen überhaupt erst eine Chance eröffnen; denn Landwirte werden die Pflanzung und Bewirtschaftung von Obstbäumen für ein Marktangebot von IFs wohl nur dann aufnehmen, wenn sie über die Ernte zweifelsfrei verfügen dürfen und auf dem Markt nicht mit dem Makel zu kämpfen haben, sich an einem "Geschenk Gottes" für alle Menschen und Tiere vergriffen zu haben. Die Zuteilung von Verfügungsrechten ist folglich die wichtigste Voraussetzung für die Überführung der jetzigen informellen Märkte in einen zweifelsfrei legalen, formellen Sektor. Die Verbraucher unterstützen offenkundig eine solche Entwicklung; denn die überwiegende Mehrzahl der Befragten befürwortet Pflanzungen von Privaten, und die Mehrheit ist auch bereit, entsprechende Eigentumsrechte zu respektieren.

Während die Definition von Eigentumsrechten und deren Übertragung sowie Sicherung durch den Staat den vermutlich größten und wichtigsten Beitrag zur Entstehung bzw. Weiterentwicklung von formellen Märkten darstellen, können ergänzende Maßnahmen

vorgeschlagen werden, die eine Erhöhung der Funktionsfähigkeit der Märkte durch Abbau der Intransparenz bewirken können. Auch die Intransparenz erweist sich im vorliegenden Fall als Folge unzureichender Institutionen, die formell, durch den Staat beseitigt werden sollten, weil entsprechende Maßnahmen dem Bereich der öffentlichen Güter zuzurechnen sind.

Unabdingbare Voraussetzung für eine transparente Preisbildung ist eine Änderung des derzeitigen Handelssystems. Grundsätzlich ist es zwar gleichgültig, ob eine gegebene Menge zu unterschiedlichen Preisen oder unterschiedliche Mengen zu einem identischen Preis gehandelt werden. **Normierung** durch Private oder **Standardisierung** durch den Staat sind dazu aber in jedem Falle erforderlich, weil sonst keine Transparenz der Tauschbedingungen an den Märkten zu erreichen ist. Zweckmäßig erscheint es daher eine (staatliche) Standardisierung einzuführen, die - wie das in den untersuchten Märkten übrigens angelegt ist - eine bestimmte einheitliche Menge (auf der Großhandelsstufe sind dies heute 20-Liter-Kanister, auf der Einzelhandelsebene in der Regel 500 g) als Referenz festlegt. Wechselnde Knappheitslagen sollten dann wie auch auf anderen Märkten üblich ihren Niederschlag in unterschiedlichen Preisen finden. Dieses Vorgehen würde auch erst ein sinnvolles **Monitoring** ermöglichen - eine weitere empfohlene Regelung. Das Monitoring könnte beispielsweise in das in Zimbabwe bereits existierende Markt- und Preisberichtssystem (stats flash) des Central Statistical Office integriert und die Informationen könnten über das Radio und die Tagespresse verbreitet werden. Die Markt- und Preisberichterstattung sollte möglichst zeitnah erfolgen und alle Marktstufen auf allen Märkte einer Region umfassen. Dies könnte die Transparenz der herrschenden Marktbedingungen und die Marktentwicklung deutlich erhöhen und die Marktorientierung aller - auch nur sporadisch auftretender - Marktteilnehmer erleichtern. Gleichzeitig würden die intra- und interregionalen Wahlmöglichkeiten für die Produzenten, Groß- und Einzelhändler verbessert und so risikolose Arbitragegeschäfte begünstigt werden.

Inwieweit der Staat über die institutionellen Regelungen hinaus auch organisatorische Maßnahmen ergreifen sollte, kann nicht auf der Grundlage der vorliegenden Ergebnisse entschieden werden. Immerhin erscheint nicht ausgeschlossen, dass eine Erleichterung oder Förderung von gemeinsamen Aktivitäten der Erzeuger oder Vermarkter - etwa in Form von Genossenschaften - die Entwicklung funktionierender Märkte unterstützen könnten. Denkbar, aber angesichts der beobachteten Verhältnisse nicht zwingend, wäre auch, dass gemeinsame Vermarktungsorganisationen eine verbesserte Marktbeschickung in quantitativer, qualitativer

und zeitlicher Hinsicht erleichtern könnten, möglicherweise auch durch eine begrenzte Lagerhaltung. Bevor solche Möglichkeiten ins Auge gefasst werden, sollten sie indessen in gezielten, weiterführenden Untersuchungen sehr sorgfältig geprüft werden, um eine Fehllenkung knapper Ressourcen zu vermeiden.

Schließlich sei darauf hingewiesen, dass die vorliegende Untersuchung für zwei ausgewählte Baumfrüchte an drei Standorten in Zimabwe durchgeführt wurde. Es spricht viel dafür, dass die Verhältnisse von Land zu Land, vermutlich auch von Fruchtart zu Fruchtart unterschiedlich sind. Die festgestellten - auch regionalen - Unterschiede in Behandlung von *U. kirkiana* und *S. cocculoides* legen eine solche Vermutung nahe.

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APPENDICES

Appendix 4.1: Guideline questions for Rapid Market Appraisal, 1999/2000

Variable	Components
Market structure and institutional arrangements	<ul style="list-style-type: none"> • Number of sellers and buyers • Entry and exist barriers • Product differentiation including existing presale activities e.g. grades, assortments, processed products • Existence and role of contracts and co-operatives if any • Central government involvement in markets of <i>U. kirkiana</i> and <i>S. cocculoides</i> through rules, by-laws and regulations on prices, interest rates, taxes, subsidies, barns, and licenses • Local government and traditional leadership influence on <i>U. kirkiana</i> and <i>S. cocculoides</i> marketing through taboos and customary laws • Property and user rights of <i>U. kirkiana</i> and <i>S. cocculoides</i> fruits and trees • Marketing stages involved (from the source to the end user)
Market conduct and performance	<ul style="list-style-type: none"> • Activities on assembly, transportation and distribution • Perishability, storage, handling, processing, packaging • Trend of prices at farm-gate, wholesale and retail levels • Price determination and mode of payment at all marketing stages • Price variations across markets • Quality price differentials (prices of graded as against ungraded) • Close substitutes, and complements of <i>U. kirkiana</i> and <i>S. cocculoides</i> • Sources, uses and distribution of marketing information • marketing costs and selling prices at all market levels
Consumer behaviour	<ul style="list-style-type: none"> • Exotic and indigenous fruits consumed, sources, habit of consuming <i>U. kirkiana</i> and <i>S. cocculoides</i>, change of habit over the years, frequency of consumption, amounts consumed, attributes of IFs preferred
Market infrastructure	<ul style="list-style-type: none"> • Market location, size and change of the market size over the years • Storage facilities • Transport, communication, electricity and water supply
Export market	Evidence of export activities and their impact on domestic markets
Constraints and opportunities	Constraints, opportunities, comments and suggestions for improvement at different levels of the market chain

Appendix 4.2: Producer formal survey questionnaire, 1999/2000

Date..... Market..... Enumerator..... District.....

1. Do you have IFTs in your crop field? 1. Yes 2. No

2. If Yes which ones?.....

3. Have you ever planted IFTs? 1. Yes 2. No

4. If planted, which ones?.....

When have you planted them?.....

5. Do you collect any IFs?.....

6. Where do you collect them?.....

Which IFs do you collect?.....

7. What is the travelling and collection time for the following IFs?

Parameter	<i>U. kirkiana</i>		<i>S. cocculoides</i>	
	Peak period	Non-peak period	Peak period	Non-peak period
Time of travel (hrs)				
Distance to the collection area (km)				
Number of trips				
Quantity of fruits collected per trip (20lt buckets)				
Time spent to collect one 20lt bucket				

8. Do you sell any of the IFs you collect? 1. Yes 2. No

If yes, which ones do you sell?.....

9. How much *U. kirkiana* and *S. cocculoides* do you collect and sell? (give units)

Fruit	Usually		1999 season	
	Collect	Sell	Collect	sell
<i>U. kirkiana</i>				
<i>S. cocculoides</i>				
3rd fruit.....				

10. Apart from selling, where do the other fruits (in %) usually go?

Uses	<i>U. kirkiana</i>	
	Usually	1999 season
Sale		
Wasted		
Gifts		
Payments		
Home consumption		
Others		

11. Who is involved in the collection of the fruits for sell?

Involved person	<i>U. kirkiana</i>		<i>S. cocculoides</i>		3 rd Fruit	
	Usually	1999	Usually	1999	Usually	1999
Myself only						
Me and my wife						
Wife, me and children						
Children only						
Hired labour						
Others						

IF HIRED LABOR CONTINUE WITH No. 12, IF NOT GO TO NUMBER 16

12. If hire labour for collection, how many people?.....

13. Where do you get them?

1. Within the village 2. Neighbour villages, specify..... 3. Others, specify.....

14. For how long do you hire them?

1. Whole season 2. Peak season 3. Few days,days

15. Which is the form of payment and how much?

Form of payment	How much per unit
Cash	
Food	
Clothes	
Others	

16. Does the collection this year varied from the last year? 1. Yes 2. No

17. Why?.....

18. When did you start selling IFs?.....

19. Where do you normally sell the fruits?

<i>U. kirkiana</i>		2 nd fruit		3 rd fruit	
Market	Distance (km)	Market	Distance (km)	Market	Distance (km)
On-farm-gate					
Village market					
GP market					
Mbare market					

20. Do you sell to a permanent customer or any one coming across?.....

21. If permanent why always the case?.....

22. At what prices (Z\$) have you been selling IFs per bucket (20lts) at different markets?

Market	Distance	<i>U. kirkiana</i>		Other	
		1998	1999	1998	1999
On-farm-gate					
District market					
Mbare market					

23. In which months of the ripening season do you experience high and low supply?

High supply..... Low supply.....

24. Is it possible to sell all the fruits you wanted to sell during periods of high supply?

1. Yes 2. No

25. Which form of payment do you normally charge?

Form of payment	Usually		2000 season	
	Amount	Unit measure	Amount	Unit measure
Cash				
Food				
Cloth				
Others.....				

26. Do you sell some of the fruits on credit? 1. Yes 2. No

27. What percent of your sells do you sell on credit?.....

28. When crediting, do you charge higher prices, interest or neither?

1. Higher prices 2. Interest 3. Neither 4. Others.....

29. How do you determine prices of the IFs you sell?

1. Previous season 2. Total cost 3. Other market information 4. Others.....

30. Do you know the prices of these fruits in other areas? 1. Yes 2. No

31. Which are your preferred customers?

1. Middlemen 2. Consumers 3. Wholesalers 4. Others.....

32. Do you conduct any presale practices?

1. Yes 2. No

IF YES CONTINUE, IF NO GO TO No. 35

33. If yes, which ones? Washing, Sorting? Grading? Packing?.....

34. Why do you practice these activities?.....

35. If Not, why don't you practise?.....

36. Do you store your fruits before sale? 1. Yes 2. No

37. If yes, where do you store the fruits?

38. For how long do you store them ?.....

39. Do you pay for storage? Yes 2. No

40. If yes, how much per 20 litres bucket per period?

Unit stored	1998		1999	
	cost	time	cost	time
20 litres				
Others.....				

41. Do you store fruits for sell later in the season? 1. Yes 2. No

42. If yes, do you think it pays to store the fruits during peak season and sell later on?

Yes 2. No

43. Generally, which problems do you experience in storing?.....

44. Which transport do you use to the selling point?

45. How much do you have to pay to transport 20lts bucket per a given transport type?

Type of transport	1998		1999	
	Unit	Price	Unit	Price

46. Do you experience any other transport problems? 1. Yes 2. No

47. If yes, which problems?.....

48. Do you get information on market prices of *U. kirkiana* in advance?

	<i>U. kirkiana</i>	<i>S. cocculoides</i>	Other.....
Yes			
No			

49. What expenses do you incur at selling place?

Expenses	How much	
	1998	1999
Market fees		
Loading		
Unloading		
Others.....		

50. Which are other constraints do you face in selling IFs?.....

51. How do you use the money obtained from selling IFs?.....

52. What is your intention for the coming season?

Collect more

2. Collect less

3. None next season

53. Why such intentions?.....

54. Is selling of IFs your only occupation?

1. Yes

2. No

55. If no, which are the other business do you do?

1. Civil employment

2. Crop production

3. Livestock production

4. Petty trading

5. Others

56. What percent income do you get per year from the following?

Activity	% income per year	Rank
Civil employment		
Crop production		
Livestock production		
Petty trading		
IFs selling		
Others.....		

57. Which percentage of your time do you spend in selling IFs during the ripening season?.....

58. What is your age?.....

59. Sex

1. Male

2. Female

60. How many years have you spent in formal school?.....

61. What is your marital status?

1. Single

2. Married

3. Separated

4. Divorced

5. Widowed

62. How many people are in your household?

1. Under 18 years

2. 18 – 55 years

3. Above 55

63. In which tribe do you belong?

1. Shona

2. Ndebele

3. Others.....

Appendix 4.3: Retailer formal survey questionnaire, 1999/2000

Date..... Market..... Enumerator..... District.....

1. Do you normally collect the IFs you sell? 1. Yes 2. No
2. If Yes, which IFs do you normally collect?.....
3. Where do you collect?.....
4. Apart from U. kirkiana, which other indigenous fruits do you usually sell?.....
5. When did you start selling IFs?.....
6. Do you buy IFs for sell? 1. Yes 2. No
7. If yes, where do you buy the fruits for sell?.....
8. Apart from this market where else do you normally sell *U. kirkiana*?

Other markets	Name	Distance (km)	Quantity bought since Oct. 1999	Price per bucket
Village				
GP market				
Mbare market				
Others.....				

9. Do you sell to permanent customers or anyone?.....
10. If permanent customers, why?.....
11. Do you hire people to help selling IFs? 1. Yes 2. No
12. If yes, how many?.....

IF NO GO TO 16

13. Where do you get them?.....
14. For how long do you hire them?
15. Which is the form of payment and how much per person?
 1. Cash.....
 2. Food.....
 - Clothes.....
 - Others.....

16. At what prices (Z\$) do you sell IFs per unit?

Unit	<i>U. kirkiana</i>		<i>S. cocculoides</i>	
	1998	1999	1998	1999
200g				
500g				
1.5kg				
2.5kg				
10 litres				
20 litres				
Each fruit				

17. Is it possible to sell all the fruits you have bought/collected during high supply?

1. Yes

2. No

18. What is the average prices (Z\$) of fruits at times of low and high demand?

Fruit	Unit	1998		1999	
		Peak	Non peak	Peak	Non peak
<i>U. kirkiana</i>					
Other					

19. Apart from cash, which other forms of payment do you normally charge for *U. kirkiana*?

Form of Payment	Usually		1999	
	Amount	Unit	Amount	Unit
Food				
Cloths				
Others				

20. Do you sell some of the fruits on credit?

1. Yes

2. No

If NO GO TO 23

21. If yes, what percent of your sells do you sell on credit?.....

22. When crediting, do you charge higher prices, interest or neither?

1. Higher prices

2. Interest

3. Neither

4. Others.....

23. How do you determine prices of the IFs you sell?

1. Previous season

2. Total cost

3. Other market information

4. Others.....

24. Do you know the prices of these fruits in other areas/regions?

1. Yes

2. No

25. Which are your preferred customers?

1. Middlemen

2. Consumers

3. Wholesalers

4. Others.....

26. Which are your preferred inlets/suppliers?.....

27. Do you conduct any presale activity?

1. Yes

2. No

IF NO GO TO 30

28. If yes, which ones? Washing, Sorting? Grading? Packing?.....

29. Why do you practice these activities?.....

30. If Not, why don't you practice?.....

31. Do you store your fruits before sale?

1. Yes

2. No

IF NO GO TO 38

32. If yes, where do you store the fruits?.....

33. Do you pay for storage?

1. Yes

2. No

34. If yes, how much per given unit per particular period?

Quantity stored	1998		1999	
	cost	time	cost	time
20 litres				
Others.....				

35. Do you store fruits for sell later in the season?

1. Yes

2. No

36. If yes, do you think it pays to store the fruits during peak season and sell later on?

1. Yes

2. No

37. Generally, which problems do you experience in storage?.....

38. Which transport do you use to the selling point?.....

39. How much do you have to pay to transport 20litres bucket per a given transport type?

Type of transport	1998	1999
	Price	Price

40. Do you experience any other transport problems?

1. Yes

2. No

41. If yes, which problems?.....

42. Apart from the market fees, which other expenses do you incur at selling place?

Expenses	How much	
	1998	1999
Loading		
Unloading		
Others.....		

43. Which constraints do you face in selling IFs?.....

44. How do you use the money obtained from selling IFs?.....

45. What is your intention for the next season?

Sell more 2. Sell less 3. None next season

46. Why such intentions?.....

47. Is selling of IFs your only occupation throughout the year? 1. Yes 2. No

48. If no, which are the other produce do you sell (list them)?

1. Livestock products..... 2. Vegetables 3. Exotic fruits
4. Other crops..... 5. Employed.....

49. Which one is more important business/give more income per year?

Business	Rank	Percent income per year
IFs		
Livestock products		
Vegetables		
Exotic fruits		
Others crops		
Husband/wife job		
Others.....		

50. Which percentage of your time do you spend in selling IFs during their season?.....

51. What is your age?.....

52. Sex 1. Male 2. Female

53. How many years have you spent in formal school?.....

54. What is your marital status?

1. Single 2. Married 3. Separated 4. Divorced 5. Widowed

55. How many people are in your household?

1. Under 18 years 2. 18 – 55 years 3. Above 55

56. In which tribe do you belong? 1. Shona 2. Ndebele 3. Others.....

Appendix 4.4: Wholesaler formal survey questionnaire, 1999/2000

Date..... Market/Village..... Enumerator..... District.....

1. Do you normally collect any IFs you sell? 1. Yes 2. No
2. If yes which ones do you normally collect?.....
3. Do you sell any of those you do collect?.....
4. If yes, which ones do you sell?.....
5. When did you start selling IFs?.....
6. Do you buy fruits for sell? 1. Yes 2. No
7. If yes, where do you buy the fruits for sell?

Village/market	Price per unit

8. Do you sell the fruits to any or permanent customer?.....
9. If permanent customer, why always the case?.....
10. Do you hire people to sell IFs? Yes 2. No
11. If yes, how many?.....

IF NO GO TO 16

12. Where do you get them?.....
13. For how long do you hire them?
14. Which is the form of payment and how much per person?
 1. Cash..... 2. Food..... 3. Clothes..... 4. Others.....
15. At what prices (Z\$) do you sell per unit?

Unit	U. kirkiana		S. cocculoides	
	1998	1999	1998	1999
500g				
1.5kg				
2.5kg				
5 litres				
10 litres				
20 litres				

16. Is it possible to sell all the fruits you have bought/collected during high supply?

1. Yes

2. No

17. What is the average prices (Z\$) of fruits at times of low and high demand?

Fruit	Unit	1998		1999	
		Peak	Non peak	Peak	Non peak
<i>U. kirkiana</i>					
Other					

18. Apart from cash, which other forms of payment do you normally charge for *U. kirkiana*?

Form of Payment	Usually		1999	
	Amount	Unit	Amount	Unit
Food				
Cloths				
Others				

19. Do you sell some of the fruits on credit?

Yes

2. No

IF NO GO TO 22

20. If yes, what percent of your sells do you sell on credit?.....

21. When crediting, do you charge higher prices, interest or neither?

1. Higher prices

2. Interest

3. Neither

4. Others....

22. How do you determine prices of the IFs you sell?

1. Previous season

2. Total cost

3. Other market information

4. Others.....

23. Do you know the prices of these fruits in other areas/regions?

1. Yes

2. No

24. Which are your preferred customers?

1. Middlemen

2. Consumers

3. Wholesalers

4. Others

25. Do you conduct any presale activity?

1. Yes

2. No

IF NO GO TO 28

26. If yes, which ones? Washing, Sorting? Grading? Packing?.....

27. Why do you practice these activities?.....

28. If Not, why don't you practice?.....

29. Do you store your fruits before sale? 1. Yes 2. No

IF NO GO TO 36

30. If yes, where do you store the fruits?.....

31. Do you pay for storage? 1. Yes 2. No

32. If yes, how much per given unit per particular period?

Quantity stored	1998		1999	
	cost	time	cost	time
20 litres				
Others.....				

33. Do you store fruits for sell later in the season? 1. Yes 2. No

34. If yes, do you think it pays to store the fruits during peak season and sell later on?

1. Yes 2. No

35. Generally, which problems do you experience in storing?.....

36. Which transport do you use to the selling point?.....

37. How much do you have to pay to transport 20 litres bucket per a given transport type?

Type of transport	1998	1999
	Price	Price

38. Do you experience any other transport problems? 1. Yes 2. No

39. If yes, which problems?.....

40. Do you get market information in advance? 1. Yes 2. No

41. Apart from the market fees, which other expenses do you incur at selling place?

Expenses	How much	
	1998	1999
Loading		
Unloading		
Others.....		

42. Which constraints do you face in selling IFs?.....

43. How do you use the money obtained from selling IFs?.....

44. What is your intention for the next season?

1. Sell more 2. Sell less 3. None next season

45. Why such intentions?.....

46. Is selling of IFs your only occupation throughout the year? 1. Yes 2. No

47. If no, which are the other produce do you sell (list them)?

1. Livestock products..... 2. Vegetables 3. Exotic fruits
4. Other crops..... 5. Employed.....

48. Which one is more important business/give more income per year?

Business	Rank	Percent income per year
Ifs		
Livestock products		
Vegetables		
Exotic fruits		
Others crops		
Husband/wife job		
Others.....		

49. Which percentage of your time do you spend in selling IFs during their season?.....

50. Do you export IFs?.....

51. If yes, where? 1. Neighbour country 2. Europe 3. Others.....

52. What is your age?.....

53. Sex 1. Male 2. Female

54. How many years have you spent in formal school?.....

55. What is your marital status?

1. Single 2. Married 3. Separated 4. Divorced 5. Widowed

56. How many people are in your household?

1. Under 18 years 2. 18 – 55 years 3. Above 55

57. In which tribe do you belong? 1. Shona 2. Ndebele 3. Others.....

Appendix 4.5: Policy assessment questionnaire, 2000

Date..... Enumerator..... Village.... District.....
 Interviewee..... Age..... Title..... Education.....

1. Are there any regulations with respect to:

- (i). Indigenous Fruit Trees 1. Yes 2. No
 If yes, what do they say?
- (ii). Indigenous fruits 1. Yes 2. No
 If yes, what do they say?
- (iii). Sale of indigenous fruits 1. Yes 2. No
 If yes, what do they say?
- (iv). Collection of indigenous fruits 1. Yes 2. No
 If yes, what do they say?
- (v). Planting of indigenous fruits 1. Yes 2. No
 If yes, what do they say?

IF THE ANSWER TO ANY OF (i – v) IS YES THEN CONTINUE WITH QUESTION 2, IF ALL NO GO TO QUESTION 16

- 2. Are there any objectives of such regulations? 1. Yes 2. No
 If yes, which ones?.....
- 3. Are there any effects of the regulations at the
 - (i). Village level? 1. Yes 2. No
 If yes, which effects?.....
 - (ii). National level? 1. Yes 2. No
 If yes, which effects?.....
- 4. Who is responsible for enforcing/implementing the regulations?.....
- 5. Is there any problem in making people obey the regulations? 1. Yes 2. No
- 6. What will happen if someone breaks the law?
- 7. Do they pay fines? 1. Yes 2. No
- 8. If yes, which sort of fines?

Type of fine	Which law? e.g.. cutting a tree?, selling IFs?

9. Who set the fines?.....
10. How are they determined?.....
11. Do people pay the fines? 1. Yes 2. No
12. Who gets the fines?
1. Chief 2. Village 3. The poor 4. Other,
13. Which steps are to be taken for those who don't pay?.....
14. Does the district council help in enforcing the regulations? 1. Yes 2. No
15. If yes, how?.....
16. If No, why?.....
17. Which are your personal views about the selling of IFs, collected from the forests?.....
18. If farmers plant their own indigenous fruit trees, will they be allowed to sell the fruits?
1. Yes 2. No
19. If yes, is there a limit to the number of trees they should plant? 1. Yes 2. No
20. If yes, how many?.....
21. Is there a limit to the amount of fruits they would be allowed to sell from their own-planted fields?
1. Yes 2. No
- If yes, how much?.....
22. In the efforts of promoting/developing the marketing of IFs, what are your views in easing the regulations, which limit the collection and marketing of the fruits through:
- (i) Establish co-operative groups/bodies, which will collect and sell the fruits
 - (ii) Issue licenses to individuals and groups who collect and sell the fruits and revenue being utilised by the villages/district councils
 - (iii) Support farmers to plant indigenous fruit trees in order for them to sell

Appendix 4.6: Formal questionnaire for market administration staff, 1999/2000

1. What is the name of the market?.....
2. Where is it located?.....
3. What is the market total area?.....square km
4. Who is supervising the market and what are his/her responsibilities?

Supervisor	Responsibility

5. What is the frequency of marketing operations?
 1. Daily
 2. Weekly
 3. Few day a week
6. If few days, which ones?.....
7. Which is the area/villages served by this market and how far?.....

Area ^a	Estimated number of households	Estimated population

^a villages, production area or others

8. What is the average number of customers and total sales (Z\$) per period?

Parameter	Average day	Peak day
Total sales		
Number of customers		

9. Which equipment are available in the market?

Equipment	Size	Quantity

10. What is the type and number of market staff?

Type	Number	Time allocation ^c	Functions	Source of salary
Secretary				
Manager				
Auctioneers				

^c 1 = full time 2 = part time

11. Is there any marketing fee? 1. Yes 2. No

12. If yes, which ones?

Fees	Fee determination^d	How much	How collected^e	Who collects^f
Marketing				
Grading				
Animal holding				
Storage				

^d 1 = per head 2 = per shop 3 = per unit

^e 1 = at the gate 2 = in the market yard 3 = time of settling accounts

^f 1 = market staff 2. = traders 3. = contracted people

13. What is the total amount of market fees per average day?.....

14. Where is this money kept?

1. Special account 2. paid to a local revenue office 3. Others.....

15. What are the uses of the fees?

1. Market operations 2. Market investment 3. Revenue of local government

16. How are prices of the following commodities set?

Commodity	Closed bidding	Individual bargaining	Open bidding	Others
Mango				
Orange				
<i>Uapaca kirkiana</i>				
<i>Strychnos cocculoides</i>				

17. How is payment of the following commodities made?

Commodity	On-spot cash	cash in the market office	Others
Mango			
Orange			
<i>Uapaca kirkiana</i>			
<i>Strychnos cocculoides</i>			

18. What is the average monthly price variation (change) for the following fruits in neighbour markets?

Month	<i>Uapaca kirkiana</i>	<i>Strychnos cocculoides</i>	Mango	Orange

Appendix 4.7: Travelling and collection costs of *U. kirkiana* IFs

Average travelling time to collect the fruits	Mbare	Murehwa	Gokwe	Notes, source of data
Distance (km) to the collection point during non-peak	0.44	0.44	0.31	Km, survey data
Return distance (km) to the collection point during non-peak	0.88	0.88	0.62	Km, calculated
Distance to the collection point during peak	0.44	0.44	0.08	Km, survey data
Return distance to collection point during peak	0.88	0.88	0.15	Km, calculated
Distance travelled per trip	0.88	0.88	0.39	Hours, survey data
Time (min.) of travel to collection point during non-peak	21.95	21.95	9.77	Minutes, survey data
Time (hrs.) of travel to the collection point during non-peak	0.37	0.37	0.16	Hours, survey data
Return time (hrs.) of travel to collection point during non-peak	0.73	0.73	0.33	Hours, calculated
Time (min.) of travel to collection point during peak	21.18	21.18	4	Minutes, survey data
Time (hrs.) of travel to collection point during peak	0.35	0.35	0.07	Hours, calculated
Return time (hrs.) of travel to collection point during peak	0.71	0.71	0.13	Hours, calculated
Time (hrs) of travel per season	0.72	0.72	0.23	Hours, calculated
Rate of travel to collection point during non-peak	1.20	1.20	1.91	km/hour, calculated
Rate of travel to collection point during peak	1.24	1.24	1.15	km/hour, calculated
Rate of travel per season	1.22	1.22	1.53	km/hour, calculated
Number of trips per season during non-peak	10.05	10.05	7.62	Trips, survey data
Number of trips per season during peak	19.18	19.18	12.91	Trips, survey data
Total trips	29.23	29.23	20.53	Trips, survey data
Total travel time (hrs) per season	31.38	31.38	12.25	Hours, calculated
Average collection time for 20lts bucket				
Quantity of fruits collected per trip in 20lt buckets during non-peak	49.64	49.64	16.69	Litres, survey data
Quantity of fruits collected per trip in 20lt buckets during peak	12.64	112.64	50.42	Litres, survey data
Quantity (lt.) of fruits collected per season	2371.72	2371.72	688.88	Litres, calculated
Total average quantity (lt.) collected per trip	81.14	81.14	33.56	Litres, calculated
Total time used to collect 20lts buckets of the fruits during non-peak	72.95	72.95	46.08	Minutes, survey data
Total time used to collect one 20lts buckets of the fruits during peak	39.86	39.86	24.17	Minutes, survey data
Total average time (min.) to collect 20lts of	56.41	56.41	35.13	Minutes, calculated

the fruits				
Total average time (hrs.) to collect 20lts of the fruits	0.94	0.94	0.59	Hours, calculated
Total collection time per season	76.28	76.28	19.64	Hours, calculated
Total labour time (hrs) to travel and collect 1946,16 litres of fruits	107.58	107.58	31.85	Hours, calculated
Total labour time (hrs) to travel and collect one bucket (20lts)	0.91	0.91	0.92	Hours, calculated
Other measurements				
Number of buckets in a bag	3	3	3	Researcher measurements
Weight (kg) of a 20lt bucket of fruits	11	11	11	kg, researcher measurements
Weight (kg) of a bag of fruits	33	33	33	kg, Calculated
Wage rate				
Industrial wage rate/day in Harare (8 hrs), Murehwa maize zone (6 hrs), Gokwe cotton zone (6 hrs)	40	40	34.94	AGRITEX, 2000
Industrial wage rate/hour in Harare (8 hrs), Murehwa maize zone (6 hrs), Gokwe cotton zone (6 hrs)	5	6.67	5.82	AGRITEX 2000
Labour costs				
Total labour costs (Z\$) per bucket	4.54	6.05	5.38	Z\$ calculated
Total labour costs (Z\$) per bag	13.61	18.14	16.15	Z\$ calculated

Source: Traders' formal survey, 1999/2000

Appendix 4.8: Travelling and collection costs of *S. cocculoides* IFs

Average travelling time to collect the fruits	Gokwe	Source of information
Distance (km) to collection site during non-peak	0.50	Km. survey data
Return distance (km) to collection site during non-peak	1.00	Km. calculated
Distance to collection site during peak	0.48	Km. survey data
Return distance to collection site during peak	0.95	Km. calculated
Average distance travelled per trip	0.98	Hours. calculated
Time (min.) of travel to collection site during non-peak	11.45	Minutes. survey data
Time (hrs.) of travel to collection site during non-peak	0.19	Hours. calculated
Return time (hrs.) travel to collection site during non-peak	0.38	Hours. calculated
Time (min.) of travel to collection site during peak	8.64	Minutes. survey data
Time (hrs.) of travel to collection site during peak	0.14	Hours. calculated
Return time (hrs.) of travel to collection site during peak	0.29	Hours. calculated
Time (hrs) of travel per season	0.33	Hours. calculated
Rate of travel to collection site during non-peak	2.62	km/hour. calculated
Rate of travel to collection site during peak	3.30	km/hour. calculated
Rate of travel per season	2.96	km/hour. calculated
Number of trips per season during non-peak	9.91	Trips. survey data
Number of trips per season during peak	17	Trips. survey data
Total trips	26.91	Trips. survey data
Total travel time per season	78.06	Hours. calculated
Average collection time for a 20lts bucket		
Quantity of fruits collected per trip (No.) during non-peak	96.7	Fruits. survey data
Quantity of fruits collected per trip in Nos. during peak	149	Fruits. survey data
Quantity of fruits collected per season	3305.89	Fruits. calculated
Total average quantity collected per trip	122.85	Fruits. calculated
Total time to collect a 20lts bucket during non-peak	29.55	Minutes. survey data
Total time to collect a 20lts buckets during peak	14.82	Minutes. survey data
Total average time (min.) to collect 20lts fruits (time)	22.19	Minutes. calculated
Total average time (hrs.) to collect 20lts fruits (time)	0.37	Hours. calculated
Total collection time per season	45.42	Hours. calculated
Total labour time (hrs) to travel and collect 3305.89 fruits	123.07	Hours. calculated
Total labour time (hrs) to travel and collect one bucket	0.74	Hours. calculated
Other measurements		
Number of fruits in a bucket	72	Survey data
Weight (kg) of a 20lt bucket of fruits	14.12	kg. Mkonda et. al. . 1999
Wage rate		
Wage rate per 6 hours	34.94	(AGRITEX 2000
Industrial wage rate per hour in Gokwe cotton growing	5.82	Z\$
Labour costs (Z\$)		
Total labour cost per bucket	4.31	Z\$ calculated

Source: Traders' formal survey, 1999/2000

Appendix 4.9: Consumer informal survey guideline questions

Age group..... Name of enumerator..... Sex of the group.....

Area Race..... Origin.....

1. Which IFs do appear in this area?.....
2. Do you consume any of these?.....
3. Where do you get them?

CONSUMERS OF IFs

1. Which IFs do you consume?.....
2. Is indigenous fruit eating a habit in this area?.....
3. When do you consume them? On season, off-season.....
4. When did the habit of consuming IFs start?.....
5. Why started at that time?.....
6. Is there any change of the habit over the years?.....

Why?.....

7. What are the frequency of consumption of the IFs? Daily, weekly.....

8. Which are the objectives of consuming IFs when they are in season?

At what times? Meal time, as snacks, anytime.....

9. How many fruits can be consumed per person/day or week?

Strychnos cocculoides.....

Uapaca kirkiana.....

10. Which is the source of the following fruits you consume? Buy, gifts, forests, etc.

Strychnos cocculoides.....

Uapaca kirkiana.....

11. If buy, how much do you buy per given unit? Kilogram, bucket?

	Unit	Price
<i>Strychnos cocculoides</i>		
<i>Uapaca kirkiana</i>		

12. Is there any price variations within the season?

If yes, give an example of last year (1998)

	Beginning season	Middle season	End season
<i>Strychnos cocculoides</i>			
<i>Uapaca kirkiana</i>			

13. How do prices vary over the years?

	Unit	1997	1998	1999
<i>Strychnos cocculoides</i>				
<i>Uapaca kirkiana</i>				

14. In which form do you normally pay? Cash, cloths etc.....

15. What characteristics do you consider in buying or selecting IFs? Taste, size.....

16. Suppose you have gone to buy *Strychnos cocculoides* or *Uapaca kirkiana* fruit and you didn't find them, which fruit could you buy to satisfy your needs?

Instead of *Strychnos cocculoides*.....

Instead of *Uapaca kirkiana*.....

17. Between *Strychnos cocculoides*, *Uapaca kirkiana* and the substitute, which one do you prefer to eat the most? (Rank)

Strychnos cocculoides.....

Uapaca kirkiana.....

Substitute 1.....

Substitute 2.....

18. Why the preference?

Strychnos cocculoides.....

Uapaca kirkiana.....

Substitute 1.....

Substitute 2.....

19. Does the fact that indigenous fruits are being collected from the forest not grown like exotic ones likely to influence your preference to the fruits? 1. Yes 2. No

20. In which way do you prefer IFs to be sold to you? Packed, sorted/graded.....

21. How do you feel about promoting IFs for wider consumption?

22. Do you know of any other uses of the fruits apart from eating them fresh?

Strychnos cocculoides.....

Uapaca kirkiana.....

23. If yes, which are these other uses?

Strychnos cocculoides.....

Uapaca kirkiana.....

24. Are there any processed products made out of these fruits?

25. If yes, which products?

Fruit	Products
<i>Strychnos cocculoides</i>	
<i>Uapaca kirkiana</i>	

26. Are the products sold?

If yes,

Product	Where sold	Unit sale	Price

27. Which products are sold in the areas in absence of the IFs products (substitutes)?.....

28. Among them which ones are being preferred the most?.....

29. Why do you prefer those ones?.....

30. How would you like the IFs products to be improved?.....

NON-CONSUMERS BUT KNOW THE FRUITS

31. How do you feel about promoting IFs for wider consumption?.....

32. What characteristics do you consider in buying exotic fruits? Taste, size.....

33. Why don't you consume these IFs?.....

34. Suppose IFs are the only ones supplied on the market, will you consume them?.....

35. What do you like be improved in order for you to eat IFs?.....

Appendix 4.10: Consumer formal survey questionnaire, 2000

Date..... Enumerator name.....District.....Market/Area.....

1. Do you usually consume the following indigenous fruits?

Fruit	Consume?	Where do you get them?					
	Yes/No	Local market	Supermarket	Gifts	Forest	Field	Other
<i>U. kirkiana</i>							
<i>S. cocculoides</i>							
<i>A. garkeana</i>							
<i>Z. mauritiana</i>							
<i>A. digitata</i>							

2. If you don't consume any of the above IFs, why?.....

(If don't consume go to question 24, If consume continue from question 3)

3. If the answer to any of the above fruit is yes, why do you consume them?

Fruit	Reasons					
	Just as snacks	Have vitamins for my body	Just to satisfy hunger	Because other people are consuming	Follow our ancestors' behaviour	Other reason?
<i>U. kirkiana</i>						
<i>S. cocculoides</i>						
<i>A. garkeana</i>						
<i>Z. mauritiana</i>						
<i>A. digitata</i>						

If buys continue from question 4 - 15, and then continue from question 21 on.....

If don't buy, start with question 16 on...

BUYERS ONLY

4. If buy from the markets, why buy these fruits?

1. Because they are cheaper than exotic fruits 2. Just because they are available in markets
 3. Because other people are buying 4. Others, specify.....

5. When *U. kirkiana*, *S. cocculoides*, *A. garkeana*, *Z. mauritiana* and *A. digitata* were in season (1999 season), how frequently in a week did you buy the following fruits?

1. Once a week	3. 2 – 3 times a week
2. Daily	4. No answer

Fruit	Frequency	Quantity/purchase
<i>U. kirkiana</i>		
<i>S. cocculoides</i>		
<i>A. garkeana</i>		
<i>Z. mauritiana</i>		
<i>A. digitata</i>		
Orange		
Apple		
Mango		

6. When *U. kirkiana*, *S. cocculoides*, *A. garkeana*, *Z. mauritiana* and *A. digitata* were not in season (1999 season) how frequently did you buy the following fruits?

1. Once a week	3. 2 – 3 times a week
2. Daily	4. No answer

Fruit	Frequency	Quantity
Orange		
Apple		
Mango		

7. When buying *U. kirkiana* fruits, which of the following attributes/characteristics do you, consider important?

1.Somewhat important	2.Important
3.Not important	4.No answer

Characteristic/attribute	Consider	Can you rank them from the most important to least important (1 = most)
Size		
Colour		
Taste		
Price		
Cleanliness		
Appearance		
Sorting		
Grading		
Parking		

8. If you have enough money for buying only 4 types of indigenous fruits which ones of the following fruits are you likely to buy 1st to 4th? (1 = most likely to buy)

Fruit	Rank
<i>U. kirkiana</i>	
<i>S. cocculoides</i>	
<i>A. garkeana</i>	
<i>Z. mauritiana</i>	
<i>A. digitata</i>	

9. If you have enough money for buying only 7 types, including exotic and indigenous fruits which ones of the following are you likely to buy 1st to 7th? (1 = most likely to buy)

Fruit	Rank
Orange	
Apple	
Mango	
<i>U. kirkiana</i>	
<i>S. cocculoides</i>	
<i>A. garkeana</i>	
<i>Z. mauritiana</i>	
<i>A. digitata</i>	

10. Do you agree with the following statements?

1. Strongly agree	2. Agree	3. Partly agree /disagree
4. Don't agree	5.Strongly disagree	6.No answer

Regardless of other factors (e.g.. taste), I would buy:

Type	Agree?	Why?
Big sized <i>U. kirkiana</i> fruits with less price		
Smaller sized <i>U. kirkiana</i> fruits with high price		
Brownish <i>U. kirkiana</i> fruits as against yellowish		
Packed <i>U. kirkiana</i> fruits as against unpacked		
Sorted <i>U. kirkiana</i> fruits as against unsorted		
Graded <i>U. kirkiana</i> fruits as against an-graded		

11. During this season, which prices (Z\$) will you consider cheap, expensive, too expensive and too cheap (that you will doubt the quality of the fruits) for a packet of 500g *U. kirkiana* fruits at peak and non-peak periods?

Price level	Peak period (Mid Nov. – Dec.)	Non-peak period (Other months)
Cheap Expensive Too expensive Too cheap		

12. How likely are you to buy the 500g *U. kirkiana* fruits at the following prices you have mentioned?

1. I will definitely buy	2. I will probably buy	3. I Might or might not buy
4. I will probably not buy	5.I will definitely not buy	

Expensive price you have mentioned?.....

Too cheap price you have mentioned?.....

13. Do you agree with the following statements on *S. cocculoides* fruits?

1. Strongly agree	2. Agree	3. Partly agree/disagree
4. Don't agree	5.Strongly disagree	6.No answer

Regardless of other factors (e.g.. taste), I would buy:

Type	Agree?	Why?
Big sized <i>S. cocculoides</i> fruits with less price		
Smaller sized <i>S. cocculoides</i> fruits with high price		
Brownish <i>S. cocculoides</i> fruits as against yellow		
Packed <i>S. cocculoides</i> fruits as against unpacked		
Sorted <i>S. cocculoides</i> fruits as against unsorted		
Graded <i>S. cocculoides</i> fruits as against an-graded		

14. During this season, which prices (Z\$) will you consider cheap, expensive, too expensive and too cheap (that you will doubt the quality of the fruits) for one medium sized *S. cocculoides* fruit at peak and non-peak periods?

	Peak period (Mid Nov. – Dec.)	Non-peak period (Others months)
Cheap Expensive Too expensive Too cheap		

15. How likely will you buy the *S. cocculoides* fruit at the following prices you have mentioned?

1. I will definitely buy	2. I will probably buy	3. I Might or might not buy
4. I will probably not buy	5. I will definitely not buy	

Expensive price you have mentioned?.....

Too cheap price you have mentioned?.....

NON-BUYERS ONLY

16. When *U. kirkiana*, *S. cocculoides*, *A. garkeana*, *Z. mauritiana* and *A. digitata* were in season (1999 season), how frequently in a week did you consume the following fruits?

Fruit	Frequency	Quantity
<i>U. kirkiana</i>		
<i>S. cocculoides</i>		
<i>A. garkeana</i>		
<i>Z. mauritiana</i>		
<i>A. digitata</i>		
Orange		
Apple		
Mango		

17. When *U. kirkiana*, *S. cocculoides*, *A. garkeana*, *Z. mauritiana* and *A. digitata* were not in season (1999 season) how frequently did you consume the following fruits?

Fruit	Frequency	Quantity
Orange		
Apple		
Mango		

18. When selecting *U. kirkiana* fruits for consumption, which of the following attributes/characteristics do you, consider important?

1.Somewhat important	2.Important
3.Not important	4.No answer

Characteristic/attribute	Consider	Can you rank them from the most to least important
Size		
Colour		
Taste		
Price		
Cleanliness		
Appearance		
Sorting		
Grading		
Parking		

19. If you were allowed to choose 4 types of the following indigenous fruits for consumption, which ones are you likely to choose 1st to 4th? (1 = most likely to buy)

Fruit	Rank
<i>U. kirkiana</i>	
<i>S. cocculoides</i>	
<i>A. garkeana</i>	
<i>Z. mauritiana</i>	
<i>A. digitata</i>	

20. If you have been asked to choose 7 types of fruits from a mixture of exotic and indigenous fruits as follows for consumption, which ones are you likely to choose 1st to 7th? (1 = most likely to buy)

Fruit	Rank
Orange	
Apple	
Mango	
<i>U. kirkiana</i>	
<i>S. cocculoides</i>	
<i>A. garkeana</i>	
<i>Z. mauritiana</i>	
<i>A. digitata</i>	

BOTH BUYERS AND NON-BUYERS

21. Do you agree with the following opinions?

1. Strongly agree	2. Agree	3. Partly agree/disagree
4. Don't agree	5. Strongly disagree	6. No answer

Opinion	Agree?	Why
Traders should continue selling U. kirkiana fruits		
To continue selling U. kirkiana will increase government revenue		
To improve the marketing of U. kirkiana fruits, advertisement is important		
To improve the marketing of U. kirkiana fruits, they should be sold in all markets (small, and big markets)		
Uapaca kirkiana fruits from the forests shouldn't be sold because they are given by god		
Uapaca kirkiana fruits trees should be planted to increase fruit supply		
Children and pregnant women should be encouraged to consume U. kirkiana fruits because they are rich in vitamins		
Exotic fruits have more vitamins and minerals for our health than indigenous fruits		

22. Do you agree with the following opinions?

1. Strongly agree	2. Agree	3. Partly agree/disagree
4. Don't agree	5. Strongly disagree	6. No answer

Opinion	Agree?	Why
Traders should continue selling S. cocculoides fruits.		
Continue selling S. cocculoides fruits will increase government revenue		
To improve the marketing of S. cocculoides fruits, advertisement is important		
To improve the marketing of S. cocculoides fruits, they should be sold in all markets (small and big)		
Strychnos cocculoides fruits harvested from the forests shouldn't be sold		
Strychnos cocculoides fruits trees should be planted to increase fruit supply		

23. Do you think indigenous fruits do provide food relief in the years of famine?

1. Yes 2. No

24. How many years have you spent in formal school?

25. Sex 1. Male 2. Female

26. What is your age?

27. What is your marital status?

1. Single 2. Married 3. Separated 4. Divorced 5. Widowed

28. Family life style

1. Bachelor 2. Young married 3. long time married

29. What is the size of your household?

1. 6 years and below..... 2. 7 – 17 years..... 3. 18 years and above.....

30. To which tribe do you belong?.....

31. What is your nationality?.....

32. What is your occupation?.....

33. What is your estimated income per year/month/day?.....

34. Do you also get additional income from the following sources? 1. Yes 2. No

35. If yes, which sources and how much?

Source of income	For how many years/months?	Estimated monthly amount (Z\$)
Allowance		
Retirement benefits/pension		
Husband/wife employment		
Business		
Crop sales		
Livestock sales		
Remittances and gifts		
Family enterprises (crafts, etc)		
Others.....		

36. Lastly, Suppose you went to the market and found the following packets of U. kirkiana fruits sold at Z\$ 5 each. The packets have fruits with different characteristics such as colour, sizes and appearance as labelled. Can you rank the packets according to your choice to buy, from the first to the last.

♦	♥	▽	®	©	♠	•	∇	♣
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Why did you rank this way?.....

APPENDIX 4.11: ORIGINAL QUESTIONS FOR FACTOR ANALYSIS**Consumption of *U. kirkiana***

Do you agree with the following opinions?

- Traders should continue selling *U. kirkiana* fruits
- To continue selling *U. kirkiana* will increase government revenue
- To improve the marketing of *U. kirkiana* fruits, advertisement is important
- To improve the marketing of *U. kirkiana* fruits, they should be sold in all markets (small, and big markets)
- *U. kirkiana* fruits from the forests shouldn't be sold because they are given by god
- *U. kirkiana* fruits trees should be planted to increase fruit supply
- Children and pregnant women should be encouraged to consume *U. kirkiana* fruits because they are rich in vitamins
- Exotic fruits have more vitamins than indigenous fruits

Purchase of *U. kirkiana*

Do you agree with the following statements?

- Regardless of other factors (e.g.. taste), I would buy:
- Big sized *U. kirkiana* fruits with less price
- Smaller sized *U. kirkiana* fruits with high price
- Brownish *U. kirkiana* fruits as against yellowish
- Packed *U. kirkiana* fruits as against unpacked
- Sorted *U. kirkiana* fruits as against unsorted
- Graded *U. kirkiana* fruits as against ungraded

How likely are you to buy the 500g *U. kirkiana* fruits at expensive price you have mentioned?

How likely are you to buy the 500g *U. kirkiana* fruits at the too cheap price you have mentioned?

Do you agree with the following opinions?

- Traders should continue selling *U. kirkiana* fruits
- To continue selling *U. kirkiana* will increase government revenue
- To improve the marketing of *U. kirkiana* fruits, advertisement is important
- To improve the marketing of *U. kirkiana* fruits, they should be sold in all markets (small, and big markets)

U. kirkiana fruits from the forests shouldn't be sold because they are given by god

U. kirkiana fruits trees should be planted to increase fruit supply

Children and pregnant women should be encouraged to consume *U. kirkiana* fruits because they are rich in vitamins

Exotic fruits have more vitamins than indigenous fruits

Consumption of *S. cocculoides*

Do you agree with the following opinions?

- Traders should continue selling *S. cocculoides* fruits
- To continue selling *S. cocculoides* will increase government revenue
- To improve the marketing of *S. cocculoides* fruits, advertisement is important
- To improve the marketing of *S. cocculoides* fruits, they should be sold in all markets (small and big markets)

S. cocculoides fruits from the forests shouldn't be sold because they are given by god

S. cocculoides fruits trees should be planted to increase fruit supply

Children and pregnant women should be encouraged to consume *S. cocculoides* fruits because they are rich in vitamins

Exotic fruits have more vitamins than indigenous fruits

Purchase of *S. cocculoides*

Do you agree with the following statements?

- Regardless of other factors (e.g.. taste), I would buy:
- Big size *S. cocculoides* fruits with less price
- Smaller size *S. cocculoides* fruits with high price
- Yellowish *S. cocculoides* fruits as against green
- Packed *S. cocculoides* fruits as against unpacked
- Sorted *S. cocculoides* fruits as against unsorted
- Graded *S. cocculoides* fruits as against ungraded

How likely are you to buy the medium size *S. cocculoides* fruit at expensive price you have mentioned?

How likely are you to buy the medium size *S. cocculoides* fruit at the too cheap price you have mentioned?

- Do you agree with the following opinions?
- Traders should continue selling *S. cocculoides* fruits
- To continue selling *S. cocculoides* will increase government revenue
- To improve the marketing of *S. cocculoides* fruits, advertisement is important
- To improve the marketing of *S. cocculoides* fruits, they should be sold in all markets (small, and big markets)

S. cocculoides fruits from the forests shouldn't be sold because they are given by god

S. cocculoides fruits trees should be planted to increase fruit supply

Children and pregnant women should be encouraged to consume *S. cocculoides* fruits because they are rich in vitamins

Exotic fruits have more vitamins than IFs

Source: Consumers' formal survey, 1999/2000

Appendix 4.12: Variables loaded in each factor

Factors	Loading
Consumption factors for <i>Uapaca kirkiana</i>	
Factor 1: <i>Uapaca</i> promote	
Do you agree with the following opinions?	
• Traders should continue selling <i>U. kirkiana</i> fruits	0.861
• To improve the marketing of <i>U. kirkiana</i> fruits, advertisement is important	0.795
• To improve the marketing of <i>U. kirkiana</i> fruits, they should be sold in all markets (small, and big markets)	0.823
• <i>U. kirkiana</i> fruits from the forests shouldn't be sold because they are given by god	- 0.810
Factor 2: <i>Uapaca</i> children	
Do you agree with the following opinions?	
• <i>U. kirkiana</i> fruits trees should be planted to increase fruit supply	0.802
• Children and pregnant women should be encouraged to consume <i>U. kirkiana</i> fruits because they are rich in vitamins	0.834
Purchase factors for <i>Uapaca kirkiana</i>	
Factor 1: <i>Uapaca</i> price	
How likely are you to buy the medium size <i>U. kirkiana</i> fruit at the too cheap price you have mentioned?	
Do you agree with the following statements?	
Regardless of other factors (e.g.. taste), I would buy:	
• Big size <i>U. kirkiana</i> fruits with less price	0.869
• Smaller size <i>U. kirkiana</i> fruits with high price	- 0.846
Factor 2: <i>Uapaca</i> sell	
Do you agree with the following opinions?	
• Traders should continue selling <i>U. kirkiana</i> fruits	0.834
• To improve the marketing of <i>U. kirkiana</i> fruits, they should be sold in all markets (small, and big markets)	0.677
• <i>U. kirkiana</i> fruits from the forests shouldn't be sold because they are given by god	- 0.813
Factor 3: <i>Uapaca</i> planting	
• <i>U. kirkiana</i> fruits trees should be planted to increase fruit supply	0.935
Factor 4: <i>Uapaca</i> exotics	
• Exotic fruits have more vitamins than indigenous fruits	0.929

Consumption factors for <i>Strychnos cocculoides</i>	
Factor 1: <i>Strychnos</i> promote	
Do you agree with the following opinions?	
• Traders should continue selling <i>S. cocculoides</i> fruits	0.807
• To improve the marketing of <i>S. cocculoides</i> fruits, advertisement is important	0.849
• To improve the marketing of <i>S. cocculoides</i> fruits, they should be sold in all markets (small, and big markets)	0.835
• <i>S. cocculoides</i> fruits from the forests shouldn't be sold because they are given by god	- 0.843
Factor 2: <i>Strychnos</i> vitamins	
Do you agree with the following opinions?	
• Exotic fruits have more vitamins than indigenous fruits	0.984
Purchase factors for <i>Strychnos cocculoides</i>	
Factor 1: <i>Strychnos</i> price	
How likely are you to buy the medium size <i>S. cocculoides</i> fruit at expensive price you have mentioned?	- 0.602
How likely are you to buy the medium size <i>S. cocculoides</i> fruit at the too cheap price you have mentioned?	0.829
Do you agree with the following statements?	
Regardless of other factors (e.g.. taste), I would buy:	
• Big size <i>S. cocculoides</i> fruits with less price	0.880
• Smaller size <i>S. cocculoides</i> fruits with high price	0.870
Factor 2: <i>Strychnos</i> promotion	
Do you agree with the following opinions?	
• To improve the marketing of <i>S. cocculoides</i> fruits, advertisement is important	0.656
• To improve the marketing of <i>S. cocculoides</i> fruits, they should be sold in all markets (small, and big markets)	0.812
• <i>S. cocculoides</i> fruits from the forests shouldn't be sold because they are given by god	- 0.539
Factor 3 <i>Strychnos</i> revenues	
• Traders should continue selling <i>S. cocculoides</i> fruits	
• To continue selling <i>S. cocculoides</i> will increase government revenue	0.626
Factor 4: <i>Strychnos</i> colour	
Do you agree with the following statements?	
Regardless of other factors (e.g.. taste), I would buy:	
• Yellowish <i>S. cocculoides</i> fruits as against green	
Factor 5: <i>Strychnos</i> quality	
Do you agree with the following statements?	
Regardless of other factors (e.g.. taste), I would buy:	
• Sorted <i>S. cocculoides</i> fruits as against unsorted	
• Graded <i>S. cocculoides</i> fruits as against ungraded	0.532
Factor 6: <i>Strychnos</i> planting	
Do you agree with the following statements?	
• <i>S. cocculoides</i> fruits trees should be planted to increase fruit supply	
Children and pregnant women should be encouraged to consume <i>S. cocculoides</i> fruits because they are rich in vitamins	0.827
	0.543

Source: Consumers' formal survey, 1999/2000

n = 510 for *U. kirkiana* consumers, 284 for *S. cocculoides* consumers

Appendix 4.13: Consumers' socio-economic variables and their descriptive statistics

Variable name	Variable definition	<i>U. kirkiana</i> (n=510)		<i>S. cocculoides</i> (n=284)	
		Mean	Std	Mean	Std
AGE	Age of respondent	29.74	12.09	31.59	13.12
EDUCATION	Number of years attended formal school	10.57	3.39	10.54	3.61
MALE	Sex of respondent = 1, then Male = 0, then Female	0.62	0.49	0.67	0.47
TOTFAMIL	Total family members	5.11	2.82	5.01	2.86
TOTINCOM	Total disposable income (Z\$)	8,641	15,165	9,059	16,355
HARARE	Market district = 1, then Harare = 0, then not Harare	0.59	0.49	0.49	0.50
GOKWE	Market district = 1, then Gokwe = 0, then not Gokwe	0.20	0.40	0.29	0.46
MUREHWA	Market district = 1, then Murehwa = 0, then not Murehwa	0.21	0.41	0.22	0.41
MARRIED	Marital status = 1, then married = 0, then not married	0.53	0.50	0.59	0.49
VITAMIN	<i>S. cocculoides</i> fruit consumption factor 1	-	-	3.61E-03	0.80
PROMOTE	<i>S. cocculoides</i> fruit consumption factor 2	-	-	- 1.37E-02	0.79
MZPROMOT	<i>U. kirkiana</i> fruit consumption factor 1	6.4E-04	0.99	-	-
MZCHILDR	<i>U. kirkiana</i> fruit consumption factor 2	- 2.4E-03		-	-

Source: Consumers' formal survey, 2000

Appendix 4.14: Logistic regression base model of *U. kirkiana* consumption

Variable	Score statistics	Significance
MUREHWA	8.013	0.005
HARARE	5.802	0.016
TOTFAMIY	0.156	0.693
MARRIED	6.578	0.010
AGE	2.002	0.157
MALE	2.267	0.132
EDUCATION	0.175	0.676
MZCPROMO	0.004	0.950
MZCHILDR	0.054	0.816
TOTINCOM	2.825	0.093

Source: Consumers' formal survey, 2000

Appendix 4.15: Characteristics representing consumers of *U. kirkiana* IFs

Variable	β	S.E.	Wald statistics	Significance
MUREHWA	- 7.573	15.731	0.232	0.630
MARRIED	- 0.973	0.408	5.688	0.017
Constant	- 2.177	0.225	93.634	0.000
Log likelihood value			217.27	
Model χ^2 [df]			0.004 [2]	
Nagelkerke R ²			0.103	

Source: Consumers' formal survey, 2000

n = 510

β = Logistic coefficient showing the weighing factor of the independent variable

S.E (β)= Standard error of the logistic coefficient, value showing the expected variation between the constant and the logistic coefficient

Wald statistics = $(\beta/ S.E)^2$, a value used to judge the statistic significance of the estimated logistic coefficients

Appendix 4.16: Logistic regression base model for *S. cocculoides* consumption

Variable	Score statistics	Significance
ZIMBABWE	0.111	0.739
TOTINCOM	3.799	0.051
TOTFAMIY	4.353	0.037
MARRIED	4.345	0.037
AGE	0.129	0.720
MALE	4.208	0.040
EDUCATION	6.677	0.010
MUPRICE	0.085	0.771
MUPROMOT	1.136	0.286
MUREVENU	0.021	0.886
MUCOLOR	0.441	0.507
MUQUALIT	0.310	0.578
MUPLANTI	0.724	0.395
GOKWE	7.345	0.007
HARARE	3.079	0.079

Source: Consumers' formal survey, 2000

Appendix 4.17: Attributes of *S. cocculoides* consumers in Zimbabwe

Variable	β	S.E.	Wald statistics	Significance
GOKWE	- 1.556	0.277	31.600	0.000
AGE	- 0.031	0.009	13.403	0.000
MALE	- 0.739	0.200	13.635	0.000
Constant	1.418	0.305	21.542	0.000
Log likelihood value				639.304
Model χ^2 [df]				22.625 [8]
Nagelkerke R^2				0.151

Source: Consumers' formal survey, 2000

N = 284

β = Logistic coefficient showing the weighing factor of the independent variable

S.E (β)= Standard error of the logistic coefficient, value showing the expected variation between the constant and the logistic coefficient

Wald statistics = $(\beta/ S.E)^2$, a value used to judge the statistic significance of the estimated logistic coefficients

Appendix 4.18: Buyers' socio-economic variables and their descriptive statistics

Variable name	Variable definition	<i>U. kirkiana</i> (n=255)		<i>S. cocculoides</i> (n=91)	
		Mean	Std	Mean	Std
AGE	Age of respondent	27.96	9.06	29.33	10.85
EDUCATI	Number of years attended formal school	11.40	2.80	11.41	2.91
MALE	Sex of respondent = 1, then Male = 0, then Female	0.65	0.48	0.71	0.45
TOTFAMIL	Total family members	4.95	2.73	4.55	2.55
TOTINCOM	Total disposable income	10,350	17,583	11,447	17,144
HARARE	Market district = 1, then Harare = 0, then not Harare	0.76	0.43	0.67	0.47
GOKWE	Market district = 1, then Gokwe = 0, then not Gokwe	0.16	0.37	0.31	0.47
MUREHWA	Market district = 1, then Murehwa = 0, then not Murehwa	8.24E-02	0.28	2.20E-02	0.15
MARRIED	Marital status = 1, then married = 0, then not married	0.56	0.50	0.63	0.49
MUPRICE	<i>S. cocculoides</i> fruit purchase factor 1	-	-	-1.03E-02	0.85
MUPROMOT	<i>S. cocculoides</i> fruit purchase factor 2	-	-	-3.78E-02	0.80
MUREVENU	<i>S. cocculoides</i> fruit purchase factor 3	-	-	5.09E-03	0.87
MUCOLOR	<i>S. cocculoides</i> fruit purchase factor 4	-	-	-2.35E-02	0.88
MUQUALIT	<i>S. cocculoides</i> fruit purchase factor 5	-	-	1.97E-02	0.86
MUPLANTI	<i>S. cocculoides</i> fruit purchase factor 6	-	-	3.02E-02	0.86
MZPRICE	<i>U. kirkiana</i> fruit purchase factor 1	-4.62E-02	0.95	-	-
MZSELLIN	<i>U. kirkiana</i> fruit purchase factor 2	-9.12E-02	0.85	-	-
MZPLANTI	<i>U. kirkiana</i> fruit purchase factor 3	1.27E-02	0.96	-	-
MZEXITIC	<i>U. kirkiana</i> fruit purchase factor 4	1.43E-02	0.95	-	-

Source: Consumers' formal survey, 2000

Appendix 4.19: Logistic regression base model of *U. kirkiana* purchase behavior

Variable	Score statistics	Significance
MUREHWA	48.780	0.000
HARARE	59.872	0.000
EDUCATION	30.604	0.000
MALE	1.631	0.202
AGE	11.079	0.001
MARRIED	2.840	0.092
TOTFAMIY	1.620	0.203
TOTINCOM	6.488	0.011
MZPRICE	2.196	0.138
MZSELLIN	8.555	0.003
MZPLANTI	0.165	0.685
MZEXOT	0.211	0.646

Source: Consumers' formal survey, 2000

Appendix 4.20: Logistic regression base model of *Strychnos cocculoides* buyers

Variable	Score statistics	Significance
TOTINCOM	3.799	0.051
TOTFAMIY	4.353	0.037
MARRIED	4.345	0.037
AGE	0.129	0.720
MALE	4.208	0.040
EDUCATION	6.677	0.010
MUPRICE	0.085	0.771
MUPROMOT	1.136	0.286
MUREVENU	0.021	0.886
MUCOLOR	0.441	0.507
MUQUALIT	0.310	0.578
MUPLANTI	0.724	0.395
GOKWE	7.345	0.007
HARARE	3.079	0.079

Source: Consumers' formal survey, 2000