Value Chain Analysis of Honey Production in Fiji

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This value chain analysis for honey production in Fiji will assist in the formulation of plans for developing a more economically robust honey industry. The development of this report occurred as part of ACIAR funded projects AGB/ 2014/057 (Pacific Agribusiness Research for Development Initiative Phase 2 - PARDI 2) and SRA LS/2017/100 (Novel Approaches for Increasing Participation in Honeybee Industries in the Pacific). It was developed jointly through consultation with key informants, and an analysis of the legal, regulatory and policy environment in which the industry sits. The primary objective of PARDI 2 is to improve the incomes of economically disadvantaged, rural families and individuals engaged in a range of agricultural and marine based activities through improved productivity and commercialization. While the SRA (LS/2017/100) research sought to identify how beekeeping could assist in achieving these aims. This assessment of the honey value chain is to identify constraints that need to be addressed and also opportunities for value adding within the industry.

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1. Executive Summary

Each activity involved in the production process of a commodity, right through to final consumption, influences the value of a product. Value chain analysis (VCA) is a way to visually analyse this flow and assists in identifying the various actors in the value chain at each stage in production, their roles and functions, and the vertical and horizontal linkages within the production process. The use of VCA is beneficial for analytical and policy purposes as it provides an understanding of the dynamics of the industry and identifies its key strengths and constraints. The following report is a VCA of the honey industry in Fiji.

Fiji has a favourable environment for honey production in the drier and intermediate rainfall regions of Viti Levu and Vanua Levu, with considerable native forest and mixed land-use areas as yet untapped. Honey is a high value commodity and there is currently a greater demand for honey than supply, enabling greater profits for actors along the value chain. The key players in the value chain are: beekeepers; input suppliers; bulking and processing agents (who bulk, process, package, and market the honey); distributors; Government Ministries and Departments; non-government organisations (NGOs); and, financial institutions.

The main constraints for beekeepers include: pest and disease (American Foul Brood, Varroa mite, cane toads, insects and ants); limited technical skills and knowledge; limited access to quality training programs; limited access to beekeeping equipment (bee suits, bee hives and other accessories); and, poor quality queens (age and genetics).

For community beekeeping development programs, assistance is needed in: training and extension on bee management and business development; understanding of cooperative models and group work dynamics; and, how to optimise uptake and success of beekeeping programs under differing social and economic structures.

Challenges being faced by small-scale processors include: inconsistent or low supply of honey; limited coordination between producers; and, limited access to proper storage, processing and packaging equipment. This makes it inherently difficult for processors to supply consistent, high quality products and obtain safe food handling standards that are required to access international markets.

Provision of extension services varies between districts, with the Ministry of Agriculture (MoA) and NGOs being the main extension service providers. However, this has been haphazard and inefficient (observed during data collection phase of this project). Improving the capacity of the MoA and NGO's to provide quality extension services is of high importance to improve the productivity and profitability of the industry.

In conclusion, the following report identifies the key actors and functions within the Fijian honey industry's value chain, highlights their strengths and constraints, and identifies opportunities to improve the industry's productivity and profitability.

2. Introduction

Honey and other beekeeping byproducts are highly demanded worldwide, providing significant economic incentives for honey production. However, the benefits of honey production exceed purely economic goals as beekeeping offers significant potential for sustainable development and improved livelihoods for individuals in Fiji, and around the world. Small-scale beekeeping has low labour input, requires little time dedication, and provides significant returns that are able to help with family and living costs (Bradbear, 2009; Engindeniz, Ucar, & Basaran, 2014; Gupta et al., 2014). Beekeeping is accessible to women's and youth groups, as well as rural, poor, and landless groups, encouraging inclusive development (Bradbear, 1987; Griffiths, 2009; Gupta et al., 2014; Lloyd, Somerville, & Schouten, 2016). Further, pollination services benefit agricultural enterprises in the surrounding region by: increasing crop yields; maintaining biodiversity; and, improving food security – particularly in regions where native pollinators are on the decline (Klein et al., 2007; Kluser & Peduzzi, 2007; Olschewski, Tscharntke, Benítez, Schwarze, & Klein, 2006). Evidently, developing a robust honey industry provides ample economic, social, and environmental benefits for Fiji and the Pacific Islands region generally.

The following report uses value chain analysis to understand the dynamics of the honey industry in Fiji. In doing so, the report seeks to identify current strengths and constraints of the industry, and to identify opportunities for industry development.

2.1. Overview of Value Chain Analysis

A product's value is influenced through each step involved in the production process, right through to final consumption. In the 1980's, Michael Porter described this process as the 'value chain'. Value Chain Analysis (VCA) is a way to visually analyse this flow, it involves: identifying the actors within the chain; their roles and functions; and, the linkages between them. Furthermore, it helps identify:

- Which part of the chain holds up progress in the others?
- Which bottlenecks deserve priority attention?
- Which bottlenecks can be resolved by the private sector and which require public-private partnership?
- Where can the donor agencies help?

This is useful for decision making and action planning as it gives an overview of the dynamics of the sector and identifies its key strengths, challenges, threats, and opportunities for improvements.

2.2. Background to Beekeeping in Fiji

While no firm records exist, the north-western European dark bee (often called the German 'black' bee (*Apis mellifera mellifera*)) was believed to have been introduced by missionaries onto many Pacific Islands in the nineteenth century. While hardy, these

bees were considered aggressive and to be poor producers when compared to the Italian strain of honeybee (*Apis mellifera ligustica)*. Driscoll (2009) reports that New Zealand aid programs in the 1970s and 1980s resulted in improved production through genetic improvement via the importation of Italian queens and targeted extension.

The Fiji honey bee industry has previously operated in a highly favourable environment, with ample floral resources for bees and few major honey bee pests and diseases. However, the industry has been increasingly impacted by American Foul Brood (AFB) which has resulted in loss of hives and associated with declines in productivity and profitability for beekeepers. Furthermore, recent reports from Biosecurity Authority of Fiji (BAF) and the Ministry of Agriculture (MoA) have raised major concerns regarding an outbreak of Varroa mites (*Varroa jacobsoni*) which have been associated with significant declines in honey bee populations worldwide. If AFB can be controlled, this would allow improved access for the sector to a broad range of potential markets for Fijian bee products such as honey, propolis, wax and even queen bees (pending raised production levels and quality assurance). Although, if Varroa becomes established, then the use of miticides may affect access to the higher valued organic market for honey and wax.

2.3. Socioeconomic Profile of Beekeeping Sector

In Fiji, the beekeeping industry is primarily subsistence based (1-40 hives), with subsistence farmers holding 51% of the country's total hives and the remaining 49% of hives held by semi-commercial and commercial beekeepers (41-75, and ≥76 hives respectively)(Agriculture 2018). Beekeeping is predominately undertaken by farmers who use it to supplement and diversify their income and it is a predominantly male-orientated activity, with the Head of Apiculture for the Ministry of Agriculture Fiji estimating only 5% of beekeepers are women (A Kumar 2019, personal communication 2 February 2019).

Government statistics indicate that there are approximately 950 beekeepers registered, managing 12,000 hives and producing 109 metric tons of honey, see Table 1. Interview data, obtained as part of industry consultation, indicates that the 12 larger-scale beekeepers alone produce this quantity of honey and that there are around 805 smaller beekeepers, averaging 7 hives each, producing around 200 metric tons or nearly double the official estimate (Narayan, S, unpublished report to Ministry of Agriculture and Livestock 2018). Official figures indicate average honey production of 22-25kg/hive with up to 40kg/hive achieved on some outer islands. The number of farmers, hives, and production levels were seriously affected by Tropical Cyclone Winston in February 2016, evident in Figure 1. Since then, recovery action has seen levels of participation and

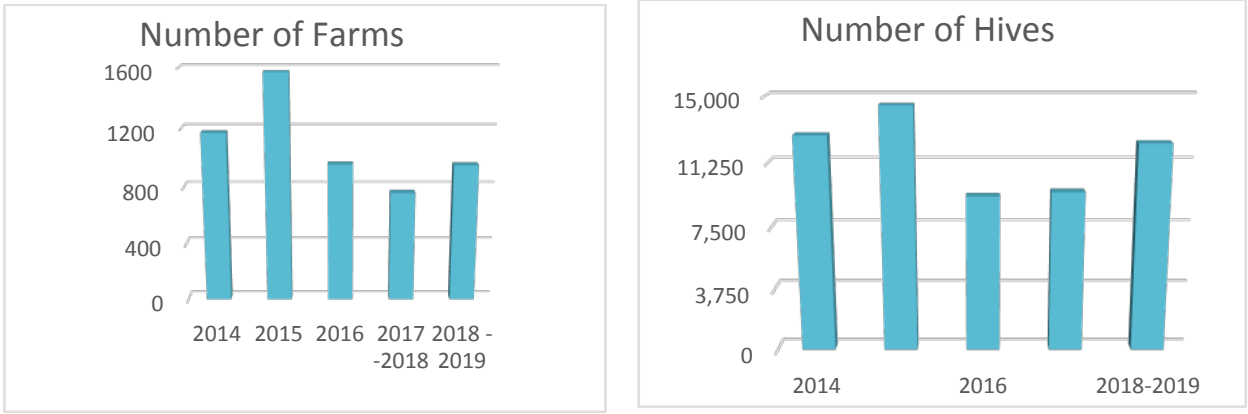
production increasing – not yet reaching pre-TC Winston levels but progressing nonetheless.

Table 1 - Number of Farmers, Hives and Production Levels by Location

Source: Ministry of Agriculture Apiculture Report Q1 2018-2019 (Agriculture 2018)

Location	*Farmers*	*Hive Numbers*	*Honey Production (Tons)*
Western	478	6448	82.40
Northern	295	4675	14.07
Central	118	538	5.95
Eastern	59	702	6.74
Total	950	12,363	109.16

Figure 1 Number of Farms and Hives



Source: Ministry of Agriculture Apiculture Report Q1 2018-2019 (Agriculture 2018)

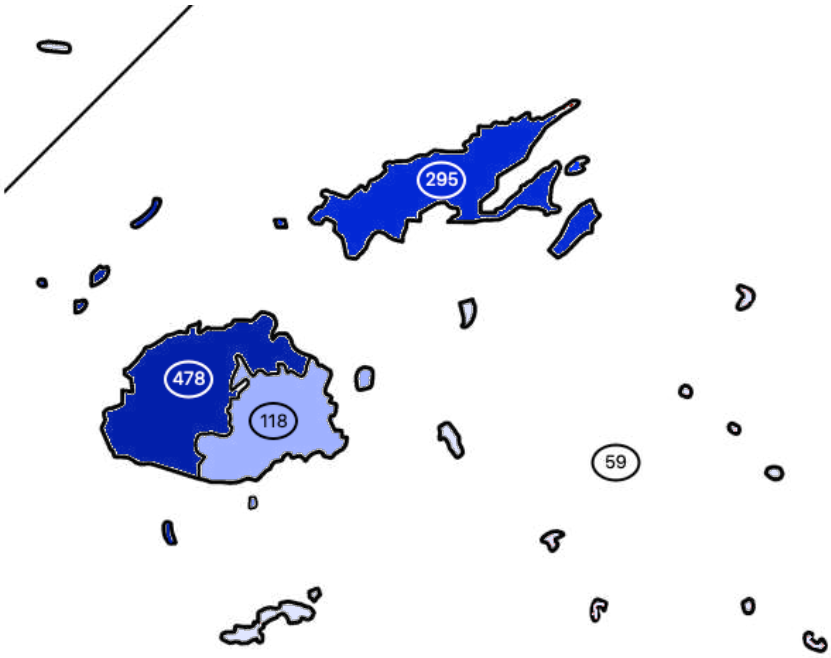
2.4. Major Beekeeping Areas

Beekeeping is difficult in Fiji's high rainfall zones and therefore focused in the drier and intermediate rainfall areas found in the Western Division on Viti Levu and Northern Division of Vanua Levu, as is visible in Figure 2.

There are two annual harvests or honey flows - one in May-June and the other in November-December. Only a few larger beekeeping operations migrate hives to take advantage of flowering events/nectar flows in different regions. Many reported limited access to sites and difficulties in getting permission to access forest sites. Consequently, most beekeeping is stationary and based around the beekeepers' farm or villages. All

respondents reported a lack of drones between January and March indicating a dearth in food and few interviewed indicated that they have supplementary feeding programs, nor were they aware of the need to do so. Many small holders reported robbing hives during this time of dearth to cover school costs for children, unaware of consequences and potential for colony collapse due to starvation.

Figure 2 - Number of Beekeeping Enterprises by Division



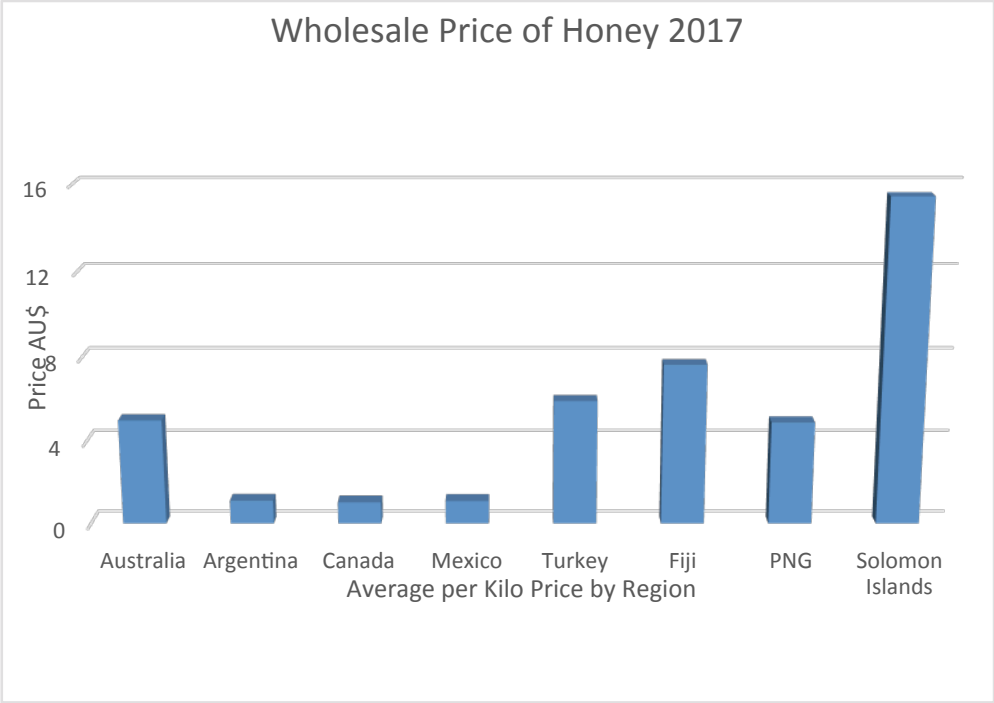
Source: Ministry of Agriculture Apiculture Report Q1 2018-2019 (Agriculture 2018)

2.5. Competitive Advantage

Beekeeping in Fiji is currently underdeveloped and has the potential to provide significant income generation and employment opportunities for beekeepers, input suppliers, and through value-adding to bee products.

The current ban enacted under Biosecurity Authority of Fiji (BAF) in 2013 on honey imports has reduced the supply of honey in the market, and with a continued demand, the domestic price for honey has increased notably. The per kilo price for honey in Fiji is high on an international scale, as is evident in Figure 3. This has assisted in creating a favourable environment for local honey producers through greater profitability in their operations and a lack of cheap international competitors in the market.

Figure 3 - International Wholesale Price of Honey



Opportunities exist to increase profits throughout the industry by entering high value markets and charging premium prices. Honey produced in the Northern Division has a distinctive red colour which is a unique and preferred quality by some consumers. Fijian honey is also organic by default – although this is threatened by the recent outbreak of Varroa. Opportunities exist for Fair Trade and organic certifications, as well as mono-floral/single-source honey – including mangrove, noni and coconut honey. This combined with the picturesque image of Fiji's tropical islands offers plenty marketing opportunities for Fijian honey, which could increase the profitability for new and existing enterprises. Although Fijian honey has the potential to sell into export markets, current production levels are insufficient to meet local demand. To meet these opportunities, assistance is required in increasing supply, linking producers and processors to markets, and in the development of successful marketing strategies.

3. Value Chain Actors and Functions

The key actors within the Fijian honey value chain include:

- Input suppliers – who provide various beekeeping equipment to beekeepers, and supply storage and packaging materials to beekeepers and processors;
- Financial institutions – that provide financial support in the form of grants and loans to beekeepers and processors;
- Producers – beekeepers as individuals or in groups, who are the primary producers of honey;
- Bulking and processing agents – who undertake secondary processing, packaging, and marketing;
- Distributors – such as retailers and hotels, who connect the product to end-markets; and,
- Supporting agents – Government Ministries and Departments and Non-Governmental Organizations (NGOs) that are supporting various agents within the

chain with technical know-how, linkages, capacity building, quality control, and provision of equipment.

The following section describes these actors and their function within the value chain. The section is categorised functionally, in the following order: input supply; production; collection, bulking, processing and packaging; support services; distribution; marketing; and, end markets.

3.1.1. Input Supply

i. Input Suppliers

Input suppliers represent organisations involved in the construction and distribution of beekeeping equipment. There are three main input suppliers based in Fiji. Commercial Beekeeping Supplies and McKenzie Beelines are both based on the main island of Viti Levu, while Azaad Constructions serves the market in the Northern region of Vanua Levu. The majority of the equipment supplied is imported – as of 2008 suppliers benefit from duty free importation on products used for agricultural inputs. Addressing high demand for beekeeping inputs and rising costs of imports, local businesses are manufacturing boxes and frames using local materials and labour. As such, they have brought the prices down for smallholder farmers, although at the cost of quality – there is limited access to, and a high cost associated with the use of kiln-dried wood. As a result, local untreated wood is used contributing to a reduced longevity of the bee box.

Suppliers noted there is a much greater demand for cheaper inputs over quality materials, with both Commercial Supplies and Azaad Constructions indicating less than 5 percent of beekeepers are willing to pay more for higher quality inputs (S Narayan 2019, personal communication 30 January; M Sameer 2019, personal communication 5 February). This reflects the subsistence nature of beekeeping for majority of farmers. Cheaper inputs also reduce the barriers to entry for honey production, benefitting farmers through increased accessibility and affordability. High quality inputs were reportedly sought after by beekeepers operating at a larger-scale (i.e. those with ≥41 hives), who likely derive a greater proportion of their income from beekeeping and spend more time managing their bees.

Suppliers are able to manage regular seasonal demand for inputs however, they report issues in supplying development programs that place significantly large one-off orders at short notice. Issues have been noted in the supply of weak hives, newly purchased hives dying, and in spreading of pest and diseases (Varroa). As of February 2019, Biosecurity have enacted a mandatory restriction on the movement of hives, suppliers are now required to get BAF approval before hives can be moved between farms. Although this is a serious impediment to the industry and to supplier operations, the goal is to stop the spread of pest and diseases.

Key Inputs:

Modern Beehives (Langstroth Hives): These types of hives are either imported or manufactured by carpenters. The total cost of a single-story hive, including fames and bees in Fiji is FJD 475.

There are some beehive suppliers in Fiji, such as Commercial Honey Supplies, that import and assemble components, and numerous carpenters who are contracted from time to time to manufacture beehives on behalf of beekeepers. Some operations were using corflute nucleus hives attracted by weight and cost considerations (FJD 5 per unit purchased in lots of 1200).

Bait Hives: to attract bees, beeswax or propolis is used but sometimes sugar syrup or honey may be used as bait. Sugar is locally manufactured in Fiji and is bought from local shops, although white sugar is world-wide industry standard, it was reportedly not available at affordable prices and in bulk. There were few reports on the use of swarm traps during conversations with key informants.

Bee (Harvesting) Suits/ Veils: this is protective clothing which includes a veil, gloves, boots and an overall that are used to protect the bee keeper from being stung by bees. The protective clothing is imported and price of the whole set ranges from FJD 110. Despite Fiji's history in textile production we found no local manufacture across the country and found no materials for making them in stock.

Smokers: are used to calm the bees during hive inspections and harvest. They are imported and cost around FJD 50 each.

Buckets: to store honey during harvesting and transportation to the markets or collection points. Most beekeepers use 15-20 litre size plastic buckets, which are imported (or reused from other purposes such as cooking oil, syrup or biscuit tins). Commercial beekeepers do not use bulk storage containers as neither they, nor the wholesalers they are supplying, have the capacity to load and offload them onto trucks. Instead commercial beekeepers use 30kg drums and manually load and off load.

Although these are standard inputs required for beekeeping, many beekeepers in Fiji are unable to access modern bee hives and associated equipment particularly harvesting suits, smokers and mechanical extractors (unless supplied by government or NGOs) due to lack of access to loans. In fact, the various NGOs that are working with beekeepers mainly provide the equipment – some for free and some on loan but the results of those who provided on loan have been disappointing. It should be noted, and discussed further

that beekeeping loans in Fiji have, reportedly, the highest failure rate of all agribusinesses.

Table 2 - Price of Equipment

	PNG		Fiji		Aust
Item	PGK	AUD (equiv)	FJD	AUD (equiv)	AUD
Box Local	57	23	100	65	24
box imported	87	36	48	31	
Nucs (bees)	200	81	300	192	100
Frame	3.5	1.4	5	3.2	1.65
wax foundation	5.9	2.4	1.5	1	2.85
lid (local)	40	16.2	30	19	33
bottom board(local)	35	14.12	25	16	20
split board (local)	30	12	-	-	
bayvrol strips	7	2.9	n.a.	n.a.	
overalls	300	122	-	-	105
Boots	-	-	41	26	
Smoker	260	105	50	32	22
Hive Tool	85	35	29	19	14
Veil/jacket	106	43	110	71	33
single beehive with bees	-	-	475	303	300

ii. Finance/Grants

This section of the value chain describes financial services available to beekeepers to start and expand their operations.

Fiji Development Bank (FDB)

The FDB provide financial assistance in the form of loans to enterprises. Agriculture is the banks' prime sector of interest and the highest contributor to the total FDB portfolio (FDB 2016). Challenges arise in the technical knowledge needed to be able to report accurately on agricultural production, and particularly in forecasting income. This is especially evident in honey production due to its highly technical nature which greatly

influences the success or failure of each beekeeping enterprise. As such, FDB rely on the Ministry of Agriculture (MoA) for technical support.

Northern Development Program (NDP)

The aim of the NDP is to foster the start-up and growth of micro, small and medium enterprises (MSMEs) through equity assistance in the form of a grant. NDP operates in the Northern Division as it is more rural and less developed than other regions. NDP provide a grant component if the applicant gets approved a loan by FDB. This grant/loan combination mitigates risks in lending to those considered risky clients. It also increases the pool of funds available for the applicant while reducing the subsequent debt burden. NDP face challenges in regard to technical knowledge required for accurate reporting on beekeeping operations and thus rely on MoA for support.

Integrated Human Resource Development Program (IHRDP)

The goal of IHRDP is to develop programs which foster employment and income generation for disadvantaged communities. They provide grants in the form of equipment to village groups. Following TC Winston, IHRDP provided 59 villages with 20 double story hives in Vanua Levu. Major challenges have arisen in training and skill development, hive management, pest and diseases, and monitoring of these projects. As a result, many hives have died and been left to rot. IHRDP rely heavily on MoA for technical assistance, training, and extension services. The organisation requires: guidance on how to best implement community beekeeping programs; support in regard to technical beekeeping information; and, training and skill development for the village beekeepers.

Ministry of Industry, Trade and Tourism (MITT)

The MITT provide grants to start or expand micro and small businesses for lower income households. The $1,000 grant is paid directly to suppliers. There are no training requirements for farmers to receive these funds and as a result, there is a sizable number of beekeepers with no training or technical skill who own 2-3 hives. Challenges have arisen with unreal expectations in management of hives, access to other beekeeping equipment (centrifuge), and overdependence on MoA for support.

3.1.2. Production

This section of the value chain comprises the primary producers of honey. Producers are categorised into four groups: subsistence farmers; semi-commercial farmers; commercial farmers; and community farmer groups. The categorical definitions for producers are in line with the Fijian Ministry of Agriculture definitions at 1-40 hives for subsistence, 41-75 hives for semi-commercial and ≥ 76 for commercial enterprises.

Subsistence farmers sell their honey to the local market (including extended family, friends and colleagues), bulking and processing agents, and cooperative societies. During focus group discussions a common issue raised was the lack of market for farmers to sell their honey into. Surveys conducted in the Northern Division revealed the price paid for honey ranges from $10-30/kg with a mean of $16.75, further prices for some key bulking agents and cooperative societies are listed in Table 3. Middlemen in the village reportedly pay $10-12/kg who then bottle it and sell in the produce markets for $25/kg. Middlemen are seen as unreliable by some farmers as they do not provide a stable market and prices are subject to fluctuation. Bulking and processing agents are also seen to offer too low a price. Consequently, farmers emphasized the need to source their own market in order to attain better prices for their honey.

Beekeepers are currently untrained or undertrained and require access to quality training programs to increase their skills and the productivity of their enterprises. In a survey of farmers from the Northern Division, 43% of respondents had not received any formal training. Consequent issues include poor understanding of bee nutrition, which has led to overharvesting and inadequate food reserves left for bees to survive the dearth. There is also a lack of understanding of the need to re-queen for youthful vigour and/or to improve genetics – many beekeepers we met reported that they had not seen a queen bee nor could they identify brood cells from capped honey cells. Most could not even do simple 'walkaway' splits to increase hive numbers or replace failed hives. Woodware tended to be untreated and in a poor state[1], bee sites were often established in flood zones[2] or not properly secured during the cyclone season. John Caldeira, from the Fiji Beekeepers Association, noted that most smallholders do not have: the benefit of traditional agricultural extension; government or NGO-sponsored training; or, access to beekeeping books in any language. When asked what farmers required to increase production, 62% of respondents listed inputs (more boxes or hives, extractor/tools, and finance) and a further 19% listed more knowledge and skills. It was noted that a major obstacle to building hives by small holders was the absence of training on the construction of basic beekeeping inputs. Evidently, training and skills development is of key importance to increase industry production, particularly with: basic beekeeping skills; construction of inputs; producing splits; and managing swarms. Business training is also required for beekeepers — basic bookkeeping, cash flow management, planning for equipment replacement, marketing and understanding customers.

[1] It should be noted that the rotting away of beehives after 3-4 years had the advantage of removing a reservoir of pests and disease. This may also however, exacerbate issues of AFB with colonies being 'robbed' by other bees and thus infecting other apiaries within a 4km radius.

[2] Where land was freely available or uncontested.

There is currently no significant wax market being utilised in the country and as such, wax is disposed of, rather than seen as an opportunity for increased profits. Surveys revealed that 85.7% of respondents did not sell any other bee-related products (i.e. wax and propolis). Beeswax has significant potential in: creating value-products (candles, soaps, balms, etc.); creating lower cost inputs (wax foundations); and, is a highly demanded product in global markets. Evidently, utilizing beeswax offers significant opportunities to increase the profitability of current enterprises.

Semi-commercial and commercial farmers sell their honey to bulking agents, cooperative societies or direct to retailers – packaged and branded. Commercial producers face challenges with expansion, with little mentorship and guidance, and limited large-scale companies in-country to benchmark and learn from.

An understanding of floral resources in forest reserves and other reserves is also required so that an increased number of people bordering protected areas and larger scale commercial beekeepers have access to honey pasture.

Villages with community-owned hives face challenges in: management and maintenance of the hives; cooperative work and incentives; and, reinvestment into the hives and equipment. The skills and technical capacity for the village beekeepers is also poor, as well as access to training and support services. As a result, production levels from these projects have decreased markedly since project inception.

Table 3 - Wholesale Price for Honey

Association	*Price*
Fiji Agromarketing	$13/kg (was $11 prior to 12/02/19)
Central Bee Keepers Association (CBK)	$15/kg
Northern Beekeepers Association (NBA)	$20.83/kg (converted from $30/L)
Nahls Pure Honey	$10-12/kg

3.1.3. Collection, Bulking, Processing, & Packaging

Processors and consolidators play a key role in the value chain as they provide access to markets through bulk purchasing, collection, processing and packing of honey. These agents move honey from remote points of production to their respective processing units, package the honey, and market it to distributors and end market consumers. This stage through the value chain is significant in enabling honey to reach from the farm level to

end markets, and at the quantity required. The main collectors, bulking agents, processors and packagers include:

- Middle men who sell at local produce markets
- Private sector companies who sell under a unified brand name
- Cooperative societies
- Government organisations

The high demand for honey year-round paired with the bi-annual honey flow and lack of honey produced during the wet season, creates challenges for bulking agents. Producers want to sell their honey immediately after harvest, requiring bulking agents are to purchase and hold inventory. This can be hampered by poor cash flow management and purchasing capacity of these enterprises.

Farmer-owned cooperative societies offer a competitive price for producers to sell their honey. They also face challenges in supply as production levels are unable to meet the demand.

Fiji Agromarketing are a government organisation who purchase honey wholesale from the farm gate for the Northern Division whose market hasn't yet been served by the private sector. They process and package it for sale in a small number of minimarkets around Suva and to hotels and resorts. Their biggest challenge is securing enough supply to meet their orders. Forecasted demand is 1 tonne/month, however some months they can only secure enough to meet 20-50% of these orders, with some orders put on hold for up to two weeks.

3.1.4. Support Services

i. Government Support

National Government agencies that provide support to the honey industry include the Ministry of Agriculture; Biosecurity Authority of Fiji; Ministry of Industry, Trade & Tourism; Ministry of Strategic Planning, National Development & Statistics; and, Ministry of Social Welfare, Women & Poverty Alleviation.

The Ministry of Agriculture (MoA) maintains two small honeybee research centres — one at Batiri (Macuata Province, Vanua Levu) and the other at Dobuilevu (Ra Province, Viti Levu). While intended to support queen breeding and colony improvement, in recent times these centres have focused on the provision of nucleus colonies to beekeeping development programs dealing with the aftermath of TC Winston (2016). Currently there is little genetic selection occurring as neither beekeepers, nor the queen breeding centres, appear to be systematically selecting for desirable traits and have a limited understanding of queen breeding programs and techniques, apart from a preference for

yellow over dark bees (believing a correlation exists between the genetics for aggression and colour).

The MoA are responsible for education and extension services to beekeepers, as well as national production levels. All MoA extension officers have had training to provide beekeeping assistance to farmers. However, extension officers are usually responsible for up to seven other commodities, have limited beekeeping skills, and are unable to provide the technical support needed for beekeepers. The majority of enquiries are then sent to the Head of Apiculture.

The Apiculture Department provides demand-based free training to farmers covering basic beekeeping skills, construction of inputs, queen breeding, and bee pest and diseases. On top of supporting individual farmers, other organisations that rely on technical support from the MoA include FDB, NDP, and IHRDP. MoA in some cases are asked to essentially manage 'hand out' hives from development programs and try to give training while they are on site. The capacity for MoA to attend to all the dependent parties is limited, and further stretched with the implementation of new development programs and grants that have begun without consultation and collaboration.

The *Biosecurity Promulgation Act 2008* provides for honey import controls, border quarantine and inspection, ongoing field surveillance, and the ability and willingness to respond to serious outbreaks of pests and diseases. Biosecurity Authority of Fiji work closely with cooperatives on management of pest and diseases. Commercial shipments of honey do not receive import permits and illegal imports are destroyed although, up to 20kg of honey can be imported into Fiji for personal use without heat treatment for control of the honeybee diseases EFB and chalkbrood. Sugar syrups have been reportedly imported and mixed with honey to form an adulterated product that would not comply with the international food standards '*Codex Alimentarius'*.

ii. Cooperatives

Cooperatives offer support through training and educational materials, technical assistance, and community forums. The Fiji Beekeepers Association (FBA) provides beekeeping information and training in order to improve skill levels of beekeepers, conducts innovative mentorship programs to connect less experienced beekeepers with experienced mentors and has been particularly successful in encouraging women into beekeeping. Most technical skills and knowledge stem from FBA, which is filtered through regional cooperatives, and down to the farm level. FBA work closely with divisional cooperatives, including Northern Beekeepers Association (NBA), Central Bee Keepers (CBK), Ba Rural Beekeepers Association and Taveuni Beekeepers Association. These divisions assist in the dissemination of information to the farm level, provision of

training and education materials, and in providing a market for farmers to sell their honey. The strong link between the farmers and cooperatives facilitates communication not only within the industry, but also between FBA and government bodies (MoA, BAF).

In regard to training and extension, the current technical skills and quality of training provided by the cooperatives is limited. Further challenges were also reported with infrastructure needed to host training sessions. Building the capacity for the cooperatives provide quality training and education materials will facilitate skill development for new and existing beekeepers.

3.1.5. Distribution

This section of the value chain provides the link to consumers and comprises the local market stalls, retailers and hotels. Through these channels honey is distributed fairly widely throughout Fiji. The main retailers are minimarkets and supermarkets, particularly Max Valu-U, IGA, Ram Jattan Supermarket, and RB Patel Supermarket.

3.1.6. Marketing

The marketing strategy of different bulking agents influences the real and perceived value of honey, as well as the price.

Placement in the market has partly influenced the price, with higher prices observed closer to the capital city Suva and lowest prices in the Labasa produce markets. Honey sold in pharmacies and airport stores benefit from premium prices. In the local produce markets of Suva and Labasa, the average price for honey was $25-31/kg and $20-23/kg respectively. Honey was of consistent colour from different stalls and all sold in recycled plastic bottles. In the supermarkets, honey brands observed were predominantly from commercial suppliers and bulking agents. Prices range from $25-35/kg depending on size and brand. In minimarkets, honey was from commercial suppliers, bulking agents, or local producers. Prices range from $21-27/kg depending on size and brand. The honey observed in pharmacies in Suva was being sold at a higher price at $32/kg. The same brand observed in a supermarket in Nausori was priced at $26-28/kg, indicating the medicinal value of honey is worth a premium price to consumers.

Cooperative brand honey was not observed in any supermarkets or minimarkets and Fiji Agromarketing's presence was minimal.

There is little influence of different quality products on price. Organic honey sold in the Nadi airport charged a substantial premium (although with a different target market), however with retail honey, it is mainly dependent on consumer preferences with some preferring red over the gold honey, and vice versa. There appear to be only limited

quality issues at present, however there is little evidence of testing for sugar syrup adulteration.

There were few differences in packaging between commercial suppliers/bulking agents with honey sold in plastic bottles with basic labelling. Only two brands observed had a squeeze lid. No honey was observed in glass jars.

The development of greater marketing strategies for bulking agents and commercial producers can offer significant benefits in reaching higher value markets and enabling premium prices.

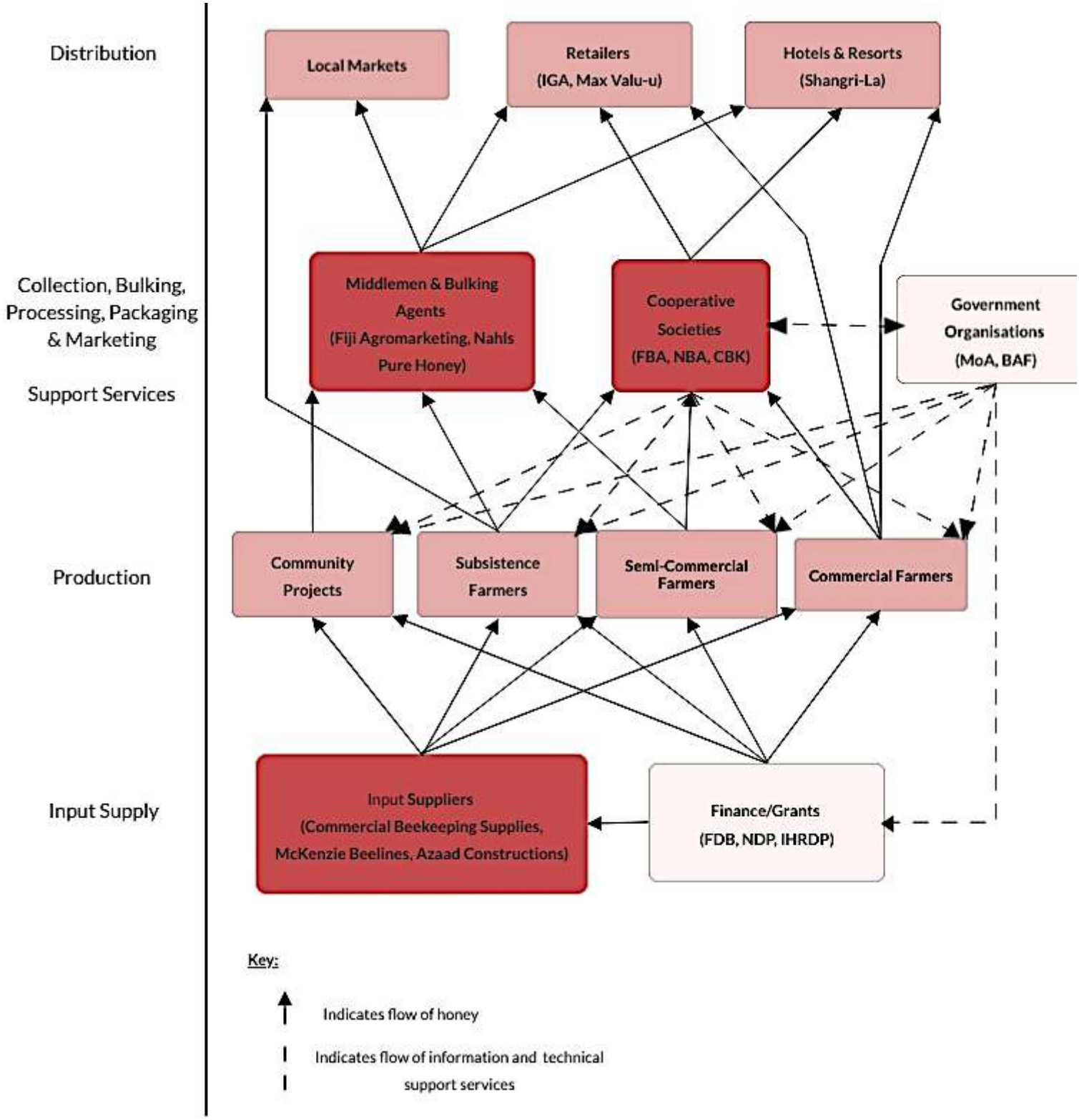
3.1.7. End Markets

The main market for packaged honey is the domestic consumer market who use honey as a table food product and in cooking. Nearly all of the honey produced within Fiji is consumed locally. The per capita consumption of honey in Fiji is either 220 grams or 440 grams per year (depending on which production figures are accepted) compared to 800-900 grams per capita in Europe and 4 grams of purchased honey per capita in PNG. While honey imports into Fiji are banned, government officials are investigating possible breaches in recent times. Recently, reports of artificial/adulterated honey sales have emerged which has the potential to cause reduced domestic sales due to price competition or lack of consumer confidence in local honey quality (fear of adulteration).

Honey was observed in small 45-85g medicinal bottles in supermarkets, minimarkets and pharmacies. These small quantities are primarily used for cultural purposes as part of Hindu rituals or alternatively for medical purposes (i.e. wound dressing). The per kilo price is much higher at $39-55, however this is a smaller niche market.

4. The Value Chain Map

Figure 4 - Fijian Honey Value Chain Map



5. Analysis

The following observations and recommendations have been identified to improve the industry's competitive position, productivity and profitability:

- Quality control of beekeeping inputs must be encouraged, particularly to increase the longevity of bee boxes. The cost of using treated timber need to be evaluated in terms of return on investment for the beekeepers and suppliers.

- Access to finance remains a key challenge especially to beekeepers and small-scale processors who are the primary actors in the chain. However, it is emphasized that many Fijian bee-keepers receiving finance are unable to service debt due to a lack of understanding of basic beekeeping and economics.

- Increasing the skills and technical capacity of farmers needs to be a key priority in increasing the productivity and profitability of the honey industry. There is a significant number of untrained beekeepers who could not only benefit their livelihoods through a deeper knowledge and understanding of beekeeping but would also be less reliant on MoA for support, and less likely to exacerbate current pest and disease issues. Beekeepers ought to also be supported through the provision and support of beekeeping equipment and group storage facilities.

- Following an increase in the overall skill level of beekeepers, an emphasis needs to be put on treating beekeeping as a business by investing in a minimum of 10 hives each. Training needs to emphasize the approach of beekeeping as a family business/enterprise.

- Increasing women's engagement in beekeeping must be emphasised through targeted training and mentorship programs.

- There are overseas seasonal employment opportunities for skilled Fijian beekeepers in New Zealand and Australia where seasonal shortages of skilled beekeepers exist. Not only would this benefit the hosting countries, but it would also allow the transfer of skills and experience back to Fiji.

- The wax market currently remains untapped despite great potential for increased profits for actors at various stages in the value chain. Building capacity for institutions to process wax and produce value-added products needs to be highlighted.

- A focus on understanding and improving the return on investment for beekeeping aid programs must be stressed, particularly for community beekeeping programs. Current programs require: training and mentorship programs to increase skills for beekeepers; an analysis of cooperative models to find applicable strategies; and, strategies to encourage genuine engagement by communities need to be identified and implemented.

- Improvements in the productivity of beekeepers would produce downstream effects in assisting processors and packers to supply their current demand for honey. Assistance with marketing strategies and linking processors and packers to high value markets will enable higher returns and greater profitability in the industry.

- Training the trainers needs to be a key component for stimulating industry growth, particularly for extension officers from Department of Agriculture and Livestock, larger beekeeping operations, NGOs and BAF. Current training programs have been inadequate in creating sustainable enterprises. Increasing the quality of training provided to beekeepers will facilitate skill development, increase productivity and profitability of enterprises, and enable industry growth.

- Increasing the capacity of apiculture staff within the MoA to support farmers and other relevant stakeholders is necessary for industry development. Current capacity for apiculture staff to produce high quality queens, provide training to new beekeepers, support existing beekeepers, provide technical support for other dependent organisations, and manage day-to-day procedures is limited and demand for such services is strained.

- Beekeepers in cooperatives need a strong governance structure, an understanding of the roles and rewards, and an ability to price their honey correctly.

- Current BAF strategy to eradicate varroa requires further analysis for feasibility, and its projected impacts on the industry need to be measured. BAF's restriction on movement of bees and hives is minimizing risk of pests and diseases spreading, however it is creating a serious impediment to the industry's productivity.

- The current linkages across the VC are weak, even amongst the various players there lacks deliberate efforts to link in and collaborate with each other. Facilitating communication between parties will enable a more efficient and effective flow of information and support industry cooperation and collaboration.

- Critical to the success of the value chain is that industry stakeholders or the private sector have buy in and drive the process of improvement.

To conclude, Fiji has significant potential in creating a productive, profitable and viable honey industry. Employment and income-generating opportunities exist at various stages along the value chain. Emphasis needs to be on capacity building for beekeepers and supporting institutions, which would produce flow-on benefits along the value chain. Further strategies were identified to increase value-addition and competitive advantage throughout the industry.

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