

INDUSTRY ARCHITECTURE: A MODEL TO CREATE VALUE AND APPROPRIATE VALUE IN THE VALUE SYSTEM OF RURAL ECONOMIES IN TANZANIA

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Abstract

How is value created and value appropriated by existing firms in the beekeeping industry in Tanzania? The industry architecture serves to answer two questions: Who does what? and Who gets what? These questions describe the division of activities in the value-creating system as a core determinant of value creation, and appropriation of value as a determinant of sharing of revenue in an industry. Using the qualitative design descriptive approach, 18 firms were purposively sampled, data were triangulated collected, and the saturation criteria were used to limit the amount of data. The interpretative data analysis showed that the beekeeping industry architecture is served by three potential firms: beekeepers, processors, and traders. Beekeepers create lesser value than other firms because they perform lesser activities, the activities they perform create lesser value in the beekeeping value-creating system. Also, beekeepers capture or appropriate lesser value because of intense competition, position in the value chain, and value-adding activities. We suggest changing the existing industry architecture from transactional and arms-length to a collaborative or business ecosystems structure.

Keywords: *industry architecture, commercial beekeeping, value system, Tanzania.*

JEL classification: L16.

1. INTRODUCTION

How value is created and revenue is shared among participating firms in the value [system] chain of rural economies, remain to be a point of interest for management science scholars. The arrangement of firms in the value system is not well defined (International Trade Centre [ITC], 2015; Tutuba et al., 2019), there is no strong institution to govern businesses (Msamula et al., 2018) and it is hard to understand who is doing what to create value (Msamula et al., 2016) as well as sharing revenue. In the forest industry, for example, firms have been working to

present a value proposition through different business models. But the models have not transformed the industry, and have failed to allow firms like carpenters, timber makers (Msamula et al., 2018), and beekeepers (Tutuba et al., 2019) to capture a sizable value. Constructing a business model in rural economies is a complex process which requires enough time to get to the details. The models are sometimes hard to eloquent because too many questions remain unanswered. For example, it might not be clear who the most important customers of the products from a particular rural economic activity are? What bundles of products and services should rural firms offer to a particular customer segment? How value can be created for the target customer group? How value can be captured for all participating firms in the value system? and How firms can ensure that the new business model will help them capture sizable value? This study is set to analyse the existing structure through which value is created and value is appropriated by firms in the beekeeping industry in Tanzania.

Tanzania is among the countries in the world with the highest potential for production of bee products (Nyatsande et al., 2014; Guyo and Solomon, 2015; Tutuba et al., 2018). But, firms in the beekeeping industry are not creating a sizable value and hence they capture lesser value (ITC, 2015; Tutuba and Vanhaverbeke, 2018; Msamula et al., 2018) from the activity. It is important to understand how value is created and how revenue is shared by different firms in the beekeeping industry. This study focuses to answer the question of how industry architecture drives value creation and value appropriation in the beekeeping industry in Tanzania. More specifically, it answers two questions: (1) How is labour organized in the beekeeping industry i.e. who does what? (2) How is profit shared among firms in the beekeeping industry i.e. who takes what? Answering these questions provides the understanding of the division of labour and sharing of profit among firms in the beekeeping industry in Tanzania.

This study is structured as follows. Following this introduction, we outline the commercial beekeeping, industry architecture, and value chain concepts. Next, we briefly describe the approach and methods of the study. Thereafter, we describe the value chain of existing firms as to how they create and appropriate value in the beekeeping industry. The following section offers an interpretation of the evidence. Lastly, we conclude by indicating the limitations and areas for future study.

2. THEORETICAL PERSPECTIVE

This section is set to present the theoretical perspective of the concepts used in this study. The section presents the theoretical understanding of the commercial beekeeping, industry architecture, and value systems.

2.1. COMMERCIAL BEEKEEPING

Beekeeping, also known as apiculture or meliponiculture, has been defined in various ways. But we define the activity as an art of managing honeybees sustainably to tap into the resource benefits (Tutuba and Vanhaverbeke, 2018).

Beekeeping is among rural an economic activity which requires less capital, resources and skills to establish. In developing areas, beekeeping is a traditional honey-hunting (Guyo and Solomon, 2015; Tutuba and Vanhaverbeke, 2018) and rural-based activity. It is mostly practised by local communities (Mpinga, 2016) using local means – in which hive management is critical. The sector has limited extension services and relies on the use of local types of equipment and tools in harvesting, extraction, processing, and the packaging of hive products (Nyatsande et al. 2014). This has resulted in low productivity, low-quality hive products, and unreliable markets. The sector has failed to tap into the potential social and economic benefits. However, in developed areas the sector has been changed by the use of commercial beekeeping equipment and tools. Productivity has increased, and product quality improved. Most important, other hive products such as royal jelly, pollination services, bee collected pollen and bee venom are collected. These products command a higher price than honey and beeswax (ITC, 2015). Therefore, they provide more options for commercial production, social wellbeing and increase the income of the rural economies.

Commercial beekeeping is the activity of managing honeybees to tap their commercial potential. Commercial beekeeping includes professional management of all activities that can efficiently present the value proposition to the target customer and equally capture a sizable value from the activities. Commercial beekeeping includes the use of commercial tools and equipment, suitable technologies, and operating within a well-defined value chain (Mpinga, 2016). Also, the inclusion of other potential firms in the beekeeping value chain is important. The beekeeping activity extends to other economic activities like agriculture: The inclusive beekeeping promotes sustainable beekeeping practices (Msamula et al., 2018; Tutuba et al., 2019). Upgrading the value-creating system of the beekeeping industry improves productivity, product quality, and access to potential and profitable markets. But the challenge is to understand how firms in the beekeeping value-creating system can be structured to present the value proposition and appropriate value: that is, understanding the industry architecture of the beekeeping industry. In the next section, we present a theoretical understanding of the industry architecture to the beekeeping industry.

2.2. INDUSTRY ARCHITECTURE

The concept of “industry architecture” (Jacobides et al., 2006) proposes to describe how labour is organized in an industry, and how profits are appropriated among industry firms within an industry (Jacobides and McDuffie, 2013). It defines both the division of labour (*value creation or ‘who does what?’*) between firms and the division of surplus (*value appropriation or ‘who gets what?’*) in the value-creating system (Tee and Gawer, 2009; Jacobides and Kudina, 2013). Also, IA defines the strategic constructs through which firms can work together to create value to customers and capture value for participating firms (Jacobides et al., 2018; Tutuba et al., 2019). Jacobides (2006) argue that the IA is “*a program on the architecture and design of organizational capabilities*” (p. 160). This concept

considers how IA shapes capabilities, and how different types of capabilities (Teece, 2007, 2018; Tidd and Bessant, 2018) fit together to define the structure of firms and industries alike. This extends the understanding of IA as the set of organizational and inter-organizational roles, rules, customs, structures, business models (Teece, 2018; Jacobides et al., 2018) and relationships that describe the division of labour within a particular industry and determine how and by whom value is typically created, and who captures value (Tee and Gawer, 2009; Jacobides, 2016). The IA provides two frameworks: firstly, a framework showing value creation and the division of labour. Secondly, a framework showing value capture and the division of revenue. It is through this understanding that we use the concept to analyse how firms in the beekeeping industry are structured to create, deliver, and appropriation value.

Provided that the IA consists of a set of transactions, blending of resources, capabilities of different partners and are by definition a specific class of inter-organizational networks. Vanhaverbeke and Cloudt (2006) urge that the IA is build up by four dimensions: value creation, transactions, resources, and networking or inter-links (Adner, 2017). These dimensions have to be considered jointly to understand how firms can create value and appropriate value within the architecture. Therefore, this study addresses the role of value architecture by theoretical frameworks that emphasize the role of these dimensions. The study is limited to the value chain theory (Porter, 1985; Collins et al., 2015; Jaligot et al., 2016) and industry architecture theory (Jacobides et al., 2006, Tee and Gawer, 2009). We define the value-creating system [value chain] and the interlinkage of different firms within the dimensions of IA of the beekeeping industry.

The next section discusses the value creation through the value system or value chain lens of the beekeeping industry in Tanzania.

2.3. THE VALUE CHAIN AND VALUE CREATING SYSTEM

The value chain concept emerged through business management after the pivotal work of Porter (1985). The term “value chain” represents a series of activities that provide value to customers in the form of a product (Walsh, 2011). It is the full range of activities which are required to bring a product from conception to final consumers, and disposal after use (Kaplinsky and Morris, 2001; Jaligot et al., 2016). It is a strategic network between independent business organizations working together (co-create) to deliver value to target customers. Collins et al., (2015) argue that a value chain is differentiated from a supply chain by an additional value that different interconnected firms add-on on a product from raw material acquisition to final disposal after use.

Porter (1985) presented the value chain analysis as a model for the identification and measurement of those activities comprising a firm’s value chain. He argues that “*gaining and sustaining competitive advantage depends on understanding not only a firm’s value chain but how the firm fits in the overall value system*” (p.34). As a result, a value chain represents a set of activities that

different firms operating in a specific industry perform to deliver a product to the market: different firms link, connects, or work together to deliver value to customers. Accordingly, the value chain creates value by a value system or value-creating system and not by a single firm. For example, beekeepers cannot create value alone, they have to strategically link with other firms like honey processors and honey traders, in the beekeeping industry so that they can deliver value to consumers. The benefit to the firm (i.e. value capture) comes in the form of revenues and profits when customers are willing to pay an amount above the costs associated with the value creation.

In the value system, every single firm occupies a particular position within the value chain structure and adds value to the *'inputs'* before passing them to the next actor (Vanhaverbeke and Cloudt, 2006; Jaligot et al., 2016). What is important here is not only the position that the firm hold in the value chain but also the capabilities (Teece, 2018) to carry out activities to add value: the firm has to perform some activities to add value before passing it to the next actor. In this regard, value creation is not just adding value step after step but the configuration of the roles – redefining the value-adding activities – and relationships among firms of the IA – value-creating system. The IA has parallels with the global value chain tradition (Gereffi et al., 2005; Gereffi and Lee, 2012; Lee and Gereffi, 2015), which takes a global perspective on the struggle for competitive supremacy through the terms of engagement in an industry (Jacobides and Winter, 2012; Jacobides, 2016). The value chain concept has been used as a framework for guiding research into agricultural development problems (Australian Centre for International Agricultural Research [ACIAR], 2016; Collins et al, 2015), analysing the international expansion and geographical fragmentation of contemporary supply chains (Gereffi and Lee, 2012), and to help improve the livelihoods of poor farmers (Lee and Gereffi, 2015; Jaligot et al., 2016). Later, the concept linked strategy, value system and logistics as a way of creating value for customers (Vanhaverbeke and Cloudt, 2006; Collins et al., 2015). In this regard, the division of labour among collaborating firms to create value and their ability to appropriate revenue from their activities can better be analysed through the value-creating system or value chain analysis.

The Value Chain Analysis (VCA) is a branch of the value chain that assesses the existing linkages within the subsector, the functions and roles of firms from the input supply to the final consumers (Jaligot et al., 2016; Rosales et al., 2017). VCA can be either a narrow, i.e. firm centred (Porter, 1985) or abroad, i.e. system or industry centred approach (Jaligot et al., 2016) depending on the purpose and scope of analysis. The narrow approach takes in the range of activities performed within an organization. But the broad approach starts from the production system of the raw materials to the consumption and disposal of a particular product. It takes into account of the linkages with other firms and enterprises engaged in processing, assembling, trading, transporting, marketing, and after-sale management (Collins et al., 2015; Rosales et al., 2017). This study was, however, inspired and guided by the broad approach. We first identified

potential firms, only primary firms, in the value chain of the beekeeping industry. Secondly, we analysed all the activities that are performed by firms and their interconnectivity from the point of raw material acquisition to honey consumption. Lastly, we analyse the value creation and value capture mobility of honey from production to consumption.

The next section presents the approach and methods used to analyse the IA of the beekeeping industry in the view of the business model canvas.

3. APPROACH AND METHODS

This study adopted the qualitative approach (Flick, 2009; Yin, 2014), a descriptive design (Elliot and Timulak, 2005; Salkind, 2006; Hair, 2007) as it intends to describe how labour is organized to create value and revenue is shared among existing firms in the beekeeping industry. The study was carried out in the rural areas of Tanzania, in the regions of Kigoma, Dodoma, Iringa, and Dar es Salaam. A total sample of 18 firms in the beekeeping value chain was purposively selected to involve participating units that are considered suitable in the provision of information in the research (Saunders et al., 2009; Yin, 2014). The sample included seven beekeepers from Morogoro; four processors from Kibondo (1), Iringa (2), and Dodoma (1); and seven honey traders from Morogoro (3) and Dar es Salaam (4). Processors were selected based on available honey processing facilities and honey-selling points. Honey traders were selected based on their brand visibility and activities they perform to create and capture value.

Using triangulated data collection techniques (Eisenhardt and Graebner, 2007; Creswell and Clark, 2007; Baxter and Jack, 2008; Creswell, 2009; Yin, 2014) data were collected until saturation. The first technique used was personal interviews. Unstructured face-to-face interviews were used to get data. Thereafter, the observation technique was used. Pictures, voice recording, note-taking, and short clips were used to capture information. Data were transcribed by using transcribing software that included information with the guidance of research questions. Furthermore, I utilized the interpretative data analysis approach (Elliott and Timulak, 2005; Hair et al., 2007; Baxter and Jack, 2008) to analyse the existing beekeeping firms' perceptions of value creation and value appropriation. We use interpretive strategies to analyse how firms in the beekeeping IA create value to the customer and appropriate value for its participants.

4. STUDY FINDINGS

The study findings are presented to show the existing industry firms, their functions, the interrelation between firms, the key-value channels that honey goes through on its way to the various markets. The findings show that the value system has three key channels: the beekeeper or honey producers, processors, and honey traders. Exhibit 1 presents the existing channels of the honey value system in the beekeeping industry in Tanzania. Exhibit 2 presents the core functions (key activities) which are performed by each actor in the value system. Also, exhibit 3

presents price mobility (value capture) along different value chains of the beekeeping firms. Description of each channel as shown in Exhibit 1 is presented below.

4.1. CHANNEL 1: THE BEEKEEPERS' CHANNEL

The beekeepers' channel, also referred to as the honey producers channel is a channel in the beekeeping value-creating system whose firms' primary activity is to produce honey. Potential firms in this channel include honey hunters, beekeepers and their associations. The core activity of the beekeepers is production (see exhibit 2). Also, they work hard to make sure that hives are occupied, both hives and bees are safe, and lastly, they do the harvesting. After harvesting they transport the honeycomb to the village and prepare the honey for selling. In most cases, beekeepers sell honey in both forms: comb and semi-refined in the rural market, depending on customer needs. Potential customers include individual households, honey retailers, honey processors, and local brewers.

Most beekeepers in Tanzania depend on local means of production to produce honey. They use local hives, apiary management techniques and harvesting practices; they depend on inherited knowledge and skills to perform the beekeeping activities. Also, beekeepers that extend their activities to the processing stage, they do so in a local way by using recycling materials. For example, some beekeepers in Mvomero use mosquito nets as an alternative sieve. As a result, production of honey is low and quality of honey is compromised due to contamination. For example, honey which is extracted by using mosquito nets has traces of hard metal, soil particles and comb. Therefore, beekeepers create lesser value in both production and processing. Also, they capture lesser value because they get low price from the low-quality honey they produce, and they collected relatively small revenue from the low volume they produce.

Regarding trading in this channel, beekeepers create lesser value as they pack and sell honey without logo, label and decent standard packaging materials. They mostly pack honey in recycled juice, wine, spirits, and edible oil containers. Also, they capture lesser value because they target the least profitable rural market segment. The market is a low-income segment, hinge on consumers who are price-sensitive but not sensitive to quality and packaging. As a result, the rural market which is mostly served by beekeepers is not deriving much value from investments made to develop the honey product to the level of consumable quality. The most reliable customers in this segment are local brewers, honey traders, and processors. The price in this channel is mostly negotiable depending on the nature of honeycomb honey or semi-refined; season – peak or low season; and location/region. However, the negotiation power of beekeepers is low because of the intense competition among beekeepers, and lack of coordination among them. As a result, beekeepers capture lesser value (see exhibit 1 and exhibit 3) because customers (honey traders and processors) dictate the price and nature of honey they want to buy. On average, the price of 20 litres bucket of comb and semi-refined honey is Tshs 60,000 and Tshs 120,000 respectively.

4.2. CHANNEL 2: THE PROCESSORS' CHANNEL

The second channel in the beekeeping value chain in Tanzania is the Processors' value system or the *processor channel*. In answering the first question of what do the Processors do to create value? It is found that this channel has industry firms who carry out three important activities: production, processing, and trading as indicated in exhibit 2. This is the reason that processors are active in every activity of the beekeeping value chain. They produce honey through both own apiaries and in cooperation with beekeepers – hence they perform all the beekeepers' activities. The Processors have invested in commercial beekeeping tools and equipment like hives, bee suits, smokers and harvesting tools; and they work with people with modern knowledge and skills in beekeeping. Consequently, apiary and bee colony management is good, production is encouraging, and the quality of honey produced is good. Furthermore, some processors cooperate with some beekeepers to improve honey production or supply. They provide commercial hives (with zero-interest loans) to the beekeepers, bee suits, and harvesting materials. Also, processor arranges for beekeeping extension services to beekeepers i.e. they provide advice and assistance to the bee farmer through educational procedures on new beekeeping methods and techniques to improve their production efficiency. After harvesting, the beekeepers sell honey to the particular processor at or above the market price.

Most processors have invested in processing facilities: they have good processing rooms; processing and packaging machines, and storage tools. Also, they have their logos and labels. Consequently, processors process, pack and sell sealed honey, labelled with their logo and packed in nicely designed packaging materials. During processing, most processors blend honey to get honey with consistent taste, colour and flavour i.e. homogeneous honey product. Since they collect honey from a different source and different vegetation, they get honey with varied features like colour, taste and viscosity. So, honey blending is important as it lessens confusion and questions from customers about the quality and variability of honey products. Therefore, processors create more value than beekeepers in both production and processing. By using commercial beekeeping inputs and proper management skills, processors increase the occupancy rate, hive productivity, and reduces post-harvest losses. Also, they create more value by producing honey of good quality as they produce and process honey in a hygienic environment and by using appropriate standard tools and equipment.

After packaging, the next important activity is selling – they perform channel management or trading activities. Most processors sell honey mostly to individual households, hotels and restaurants in the urban markets, and few cases to honey traders. Customers in the urban market have relatively higher income, and hence more purchasing power than those in rural areas. Therefore, by targeting this market segment, processors capture more value than beekeepers who sell in rural markets. So, they sell honey at both wholesaling and retailing at an average price of Tshs 8,000 and Tshs 10,000 per kilo of honey respectively as indicated in exhibit 3. Processors reach their customers through both direct and indirect channels.

4.3. CHANNEL 3: HONEY TRADERS' CHANNELS

The traders' channels are many and vary in length, the number of traders involved and markets served (i.e. rural, urban, or international markets) but they all share common characteristics. Traders' channels take the biggest volume of honey traded in Tanzania. Traders' channels can be split into (1) rural traders' channel – that targets rural markets and (2) Urban traders' channel – one that targets urban markets. Rural honey traders buy honey, mostly comb honey, from beekeepers then process, pack and sell it to consumers in the rural market. The processing is a semi-refining and the packaging is non-professional i.e. local packaging, without labels, and mostly in recycled juice, spirits and wine containers. In some cases, rural traders are also agents of urban traders from mainly big towns and cities. Other activities they perform include aggregation, storage and transportation. Because of low productivity, and most beekeepers are in remote areas, it is difficult for them to reach this potential customer segment in the urban market; they cannot bring honey to village centres or access points within the village. So, rural traders do the transportation and storage activities; they arrange transportation, mostly motorcycles commonly known as “*bodaboda*”, to transport buckets of honey from the beekeepers' places to store or bulking point. Therefore, the most important activities that rural honey traders do to create value includes bulking, semi-refining of honey, transportation and storage, and access to urban traders. Consequently, rural traders capture more value than beekeepers by (1) performing the bulking, semi-refining, and transportation activities and (2) accessing urban traders customer segment. So, semi-refining and bulking activities are important in the beekeeping value chain as they determine the minimum efficiency scale of operation in the honey commercialization process.

The second actor in the honey trader channel in urban traders. This actor collects honey mostly from rural traders, and transport honey to their processing areas. After collecting honey from both rural traders and beekeepers, urban traders process, blend, and pack and sell honey to the urban market, labelled with their logo and packed in nicely designed packaging materials.

Urban traders usually exchange contacts with their honey suppliers – local traders, beekeepers and beekeeping groups. Urban traders contact the honey supplier on their mobile phones once they need honey. Also, they use mobile phones to make payments or advance payment (as part of their commitment or capital financing) through mobile money services like *M-Pesa* and *Tigo Pesa*. However, this business relationship is informal and short-term, there is no commitment or long-term relationships amongst them. So, honey suppliers can sell to a different trader when they get a better deal. Also, buyers can reject an order when they get the honey at relatively low-cost.

Just like local traders, urban traders also aggregate (bulk) honey – semi-refined and refined, and then wait to process and sell honey to urban consumers. Honey is not a full time-produced product, it has some seasons: in general two seasons in a year. During the harvest seasons, the market is saturated and the price

is lowered. After some months, the demand increases and prices rise. This trend causes the fluctuation of honey price in the market. Hence, beekeepers capture lower value as they cannot keep/store their honey and wait for the price to increase; they sell honey during this harvest season. Rural traders capture more value because they can aggregate and store honey until urban traders call in to collect honey. So, aggregation and storage is an important activity as it determines the minimum efficiency scale of operation and it ensures a constant supply of honey to the market.

Concerning trading, honey traders sell honey to customers in the urban markets: the market is more profitable than the rural market. Therefore, by targeting this market segment, traders capture more value than beekeepers who sell in rural markets. Traders reach their customers through mixed channels (see exhibit 3), and they sell honey at an average price of Tsh 10,000 per kilo. Furthermore, traders use social media like Instagram and Facebook to reach customers and manage channels. By using social networks, they create more value as they communicate and promote their products, respond to customer's questions and complaints, and [make a sell] take orders. Also, they capture more value as they reach customers at relatively low costs, and gain confidence and trust from customers.

The next section presents the discussion of the findings by analysing how value is created and how value is capture by the existing value chain firms in the beekeeping industry in Tanzania. Consequently, we described the activities performed by every single actor in the architecture to create value, and the revenue captured by selling the honey product.

5. DISCUSSION OF THE FINDINGS

The existing value chain in the beekeeping industry has three primary firms: the beekeepers, processors, and honey traders. Despite the existing suppliers-customers relationship, there are no formal business relationships among them. The firms were analysed based on the core activities they perform (who does what?) to present the value proposition and the value appropriation (who get what?) among industry firms in the beekeeping IA. Exhibits 2 and 3 presents the activities performed by different firms in the value chain, and the revenue captured by different firms in the beekeeping value-creating system in Tanzania.

5.1. HONEY PRODUCTION

The first most important step in value creation in the beekeeping industry is honey production: the process of managing the bee colony (*apiary management*) effectively and efficiently and yield (*harvesting*) honey. If these activities are not performed as required, all the succeeding steps in the honey value system are of little importance in delivering value to customers. For example, no matter how good the honey is refined and packed, if it was harvested before maturity it will ferment. In the existing beekeeping IA in Tanzania, the honey production activity

is done by both beekeepers and processors. Apiary management is the groundwork for commercial production of honey. If it is not properly done, no honey is produced. Beekeepers produce honey by using local means, they use local tools and equipment and depend on inherited local beekeeping knowledge and skills. Using local tools and equipment limits the ability of beekeepers to create more value by producing extra honey, and of good quality. For example, an average production of refined honey is 5kgs and 10kgs per harvest from a local and commercial hive respectively. Therefore, beekeepers that use local hives create less value in production than those who use commercial hives. Similarly, beekeepers who use local hives capture lesser value, Tshs. 50,000 (5kgs@10,000/- =50,000) per hive, than those who use commercial hives, 100,000 (10kgs@10,000/- =10,000) per hive.

Also, local beekeeping inputs limit the ability of beekeepers to perform some hive management activities like hive inspection and colony division. For example, a beekeeper cannot open the hive if they don't have good bee suit and smokers. This limits the ability of the beekeeper to assess the performance of the colony and to see if the combs are ready for harvest. As a result, beekeepers go for harvest when it is too late, bees have consumed the honey, or too early, the honey is not ready for harvest. In the later situation, beekeepers harvest pre-matured honey which ferments because it is wet, and in the former situation, beekeeper misses the produces because it is all consumed. Furthermore, beekeepers natively manage their hives. As a result, abscond rate is high, occupancy is low, and hence honey production is low. For example, if a beekeeper has 100 hives, and the occupancy rate is 60 per cent, the amount of honey which can be harvested is 600kgs, assuming a hive can produce 10kgs per harvest. If an occupancy rate can be increased to 80 per cent, this particular beekeeper can harvest up to 800kgs (an increase of 200kgs) of honey. Similarly, honey producers who have the means and skills to manage apiaries capture more value (e.g. 200kgs@10,000/- = 2,000,000) by increase production, than those who don't have the means and skills. Therefore, beekeepers create less value as they use local means beekeeping skills which less productive and leads to poor apiary management. Poor management results in higher absconding, low occupancy rate, and poor colony performance: this results in low productivity. Also, beekeepers capture lesser value because they produce less due to poor management of apiaries. This cycle implies that the value creation inability makes beekeepers poor because they also earn lesser than processors who have the inputs and skills to produce more honey.

The second honey production activity performed by honey producers is harvesting. Honey is at its best as when it is in combs. More handling increases the risk of contamination: the less it is contaminated, the better the honey remains. This means, creating value i.e. producing quality honey requires proper and hygienic handling of honeycombs during harvesting, storage, and processing. Beekeepers harvest honey by using local means, and an open fire or too much smoke. They harvest all the combs including the ones with pollen, larvae, and brood – some beekeepers eat larvae and brood. This harvesting behaviour kills the

colony and may cause absconding because it leaves the colony without food, and new bees to be hatched. Furthermore, harvesting in an open fire or by an excessive smoke burn and smoky the combs/honey. The size of the colony decreases, and it will take time before it becomes strong to produce honey. This makes beekeepers not able to harvest at least twice a year, hence value creation and value capture inability as they miss some production/harvest. Also, this behaviour culminates in producing mixed quality honey: taste, colour, water content, and viscosity. This type of honey is less valuable (hence beekeepers fail to create value) in the market, accordingly, beekeepers capture less value.

5.2. HONEY BULKING AND PROCESSING

After harvesting, honey processing is the next activity in the beekeeping value creation system. Honey is a food product, and most customers want to consume safe, clean and healthy products. Most beekeepers do not process honey, and some only do semi-refining. They extract honey from honeycombs by using local tools and techniques and in a less hygienic place, mostly home-based. The semi-refined honey is normally left with foreign bodies like comb particles and parts of dead bees. In this regard, beekeepers create lesser value in extraction as they leave some honey in combs, hence post-harvest loss, and extract honey of low quality due to contamination. Also, beekeepers capture lesser value from productivity because they miss some volume from extraction (post-harvest losses) and in revenue as low-quality honey have a low price. Also, beekeepers create less value in processing by (1) semi-refining honey by using local tools which lowers the quality by contaminating the honey (2) lack of skills in processing hence they do not grade the combs before processing, and (3) the local means of processing have higher post-harvest losses.

Conversely, the Processors and honey traders create value through aggregation and processing. They have a decent and well-established honey processing facility; a processing room or house, and processing machines. Moreover, professionalism and investments in human resources help them in ensuring the productivity and quality of honey products, which is important in creating and capturing value in the beekeeping industry. Skilled people in both beekeeping and processing reduces post-harvest losses and improves productivity, product quality, and ensures hygiene.

5.3. PACKAGING AND TRADING

During processing, honey is aggregated, blended and stored in standard containers. These activities are important in value creation as they produce homogenous honey of standard quality and required hygiene. Honey blending is important as it produces standardized – similar taste, appearance, and features – honey product. Refined blended honey is packed in standard decent containers, and branded accordingly. But beekeepers create lesser value in packaging because they neither have brands nor packaging inputs. They mostly pack honey in recycled

containers which are less hygiene and not appropriate for packaging of honey. Also, beekeepers capture lesser value because the packs they use cannot be traded in formal and profitable markets. Conversely, honey processors and honey traders create more value through the refining, packaging, and sales of honey. They process honey to the required standard and package it to standard containers. In some cases, honey traders buy refined and packed honey from processors; they just label the packs ready for trading. Also, processors and traders capture more value than beekeepers because they can sell their products in more attractive and profitable markets, they gain customer's trust and royalty.

Furthermore, beekeepers sell honey based on volume (*litres*) and not weight (*Kg*) while other firms sell honey based on weight and not volume. Trading honey in litres captures lesser value than in kilogram because honey is denser and therefore heavier. On average, one litre of honey equals to 1.3kgs; a 20 litres bucket of liquid honey has an average weight of 25kgs. For example, in the rural market, 1kg and 1lt of refined honey have the same retail price of Tshs 10,000 and an average wholesale price of Tshs 6,000. So, trading in liters, the actor captures a revenue of Tshs 200,000 (i.e. $10,000 \times 20\text{lt}$) at retail and Tshs 120,000 (i.e. $6,000 \times 20\text{lt}$) at wholesale. But trading in weight, the actor captures a revenue of Tshs 250,000 (i.e. $10,000 \times 25\text{kgs}$) at retail and Tshs 150,000 (i.e. $6,000 \times 25\text{kgs}$) at wholesale. Therefore, through trading in litres, beekeepers lose some value, captures less value of about Tshs 50,000 in retail and Tshs 30,000 in wholesale than trading in Kilogram.

Similarly, beekeepers capture a lesser amount of value by trading comb honey instead of semi-processed honey. For example, the average price of a 20lts bucket of comb honey is Tshs 50,000 (i.e. Tshs 30,000 to 70,000) and that of semi-refined honey is Tshs. 150,000 (i.e. Tshs 120,000 to 180,000). Normally, three buckets of comb honey produce two buckets of liquid honey. So, an average cost of Tshs 150,000 (i.e. Tshs $50,000 \times 3$ buckets of comb honey) create revenues of 300,000 (i.e. Tshs $150,000 \times 2$ buckets of semi-refined honey). This means that beekeepers capture a revenue of Tshs 150,000 by selling comb honey, and Tshs 300,000 by selling semi-refined honey equivalent to comb honey. Also, by selling comb honey, they capture revenue of Tshs 150,000 lesser than selling semi-refined honey. In this regard, industry firms who have invested in assets like a honey extractor, honey presser, and sieve, which add value by refining (semi-refining) comb honey, capture an incremental value of Tshs 90,000. Similarly, firms who have invested in processing facility like processing room/house; packaging, creaming, and sealing machines; and labelling, capture more value (Tshs 180,000), almost twice the value captured by those who have not invested in the processing facility. Furthermore, given some variable costs on packaging containers, labels, seals and transport, at retail, industry firms capture more value from comb honey than semi-processed honey. But this value is mostly captured by rural honey traders who buy comb honey, extract (semi-refining), and sell semi-refined honey to urban honey traders. Also, Processors and honey traders who access potential urban market; they aggregate comb and semi-refined honey from beekeepers and

rural trader, process, pack and sell to customers in the urban market. Beekeepers do not capture this value because they have no means and skills to perform the value addition activities like refining, packaging, and labelling. Also, beekeepers have no means to reach the profitable urban market so they capture lesser value than processors and traders by selling comb honey and selling to unprofitable/unreliable rural market.

5.4. ACCESS TO MARKETS AND CHANNEL MANAGEMENT

Concerning target market and customer segments, most beekeepers sell their honey to the rural markets, mostly to local brewers, traditional healers, and individuals. Also, they sell either comb or semi-processed honey to other industry firms: processors and honey traders. Conversely, processors and honey traders sell packed honey to the urban market, mostly to individual, hotels and restaurants. The rural market is less potential because it has poor, low-income customers, whose honey consumption is non-essential. But, urban market is reliable, potential, and profitable; has customers who value the health, medicinal and nutritional benefit of honey, and has a relatively higher income level. So, beekeepers remain poor because they target the less profitable market segment captures hence they capture relatively lower value than processors and honey traders who target the profitable urban market. Furthermore, honey traders create value by managing the honey trading channel: making honey products available to customers who previously lacked access to them. Beekeepers and processors are mostly serving the rural and district or regional town markets. But there are households in cities and urban areas who cannot be reached without honey traders and middlemen. Therefore, accessibility is an important factor for how honey traders create value in the beekeeping industry.

Concerning channels, it was worth to note the use of social media as a means to create both communication and relationship networks. This becomes valuable as both mobile phones and the Internet are increasingly important channels for bridging the rural-urban interaction gaps. It does away with the existing infrastructure barriers which were limiting access to both information and markets. Also, it reduces the costs of communication, promotion, and distribution costs (see the two cells on the right side of the business model canvas). But most beekeepers cannot afford to buy smartphones, and for some who have smartphones are not competent enough to use them to manage channels. Thus, beekeepers fail to create value by promoting their products, manage their distribution channels and customers. Other channel firms create more value and hence capture value by managing their channels and customers. For example, a trader meets with customers on Instagram, manage their orders and do the delivery but beekeepers are not doing this. Payments are done through '*mobile*' money like M-Pesa, Tigo-Pesa, and Airtel-money. Also, after-sales relationships are managed through Instagram or WhatsApp. Processors and honey traders only need to buy an Internet bundle from their mobile network provider.

6. CONCLUSION AND IMPLICATIONS

The value-creating system of the beekeeping industry architecture is set to perform three important activities: production, processing, and trading or channel management. Beekeepers are the main industry firms which do the production, processors do some production and mostly processing, and traders are mostly doing the trading activity. The beekeeping industry architecture creates value by presenting quality and branded honey from an identified source/origin to customers in the urban market. Therefore, production efficiency, hygienic processing, proper branding, and appropriate channel management are the most important activities to create value and capture value in the beekeeping industry in Tanzania. But beekeepers create lesser value because they lack resources, knowledge, and skills to effectively and efficiently perform the value-adding activities, as well as accessing the potential urban market. They lack financial resources to invest in beekeeping inputs like hives, processing machines, and packaging materials. So, they use local beekeeping inputs and inherited skills which are less productive, and honey which is produced is of low quality.

Similarly, value appropriation for a firm or actor in the beekeeping industry depends on the value-adding activities performed by the respective firms, bargaining or negotiation power, financial power, and the position in the value chain. For example, beekeepers appropriate lesser value because they fail to aggregate, refine, and package honey in standard and branded packages. Also, their position in the value chain as core producers limit their ability to access potential urban markets which are relatively more profitable than rural markets. Furthermore, industry firms with some assets like processing machines create more value and also capture more value. In this regard, value creation and value appropriation are likely to be influenced by business models and collective or collaborative forms of action by firms participating in the industry. This involves collective decision-making among beekeeping value chain firms to work together to create proper value propositions that meet the expectations of specific consumer segments. This means that an efficient industrial architecture creates value by including all industrial firms in the value creation process; produce the right value proposition for the right customer segment.

Furthermore, in this study have some limitations. Since this qualitative study was limited to the beekeeping industry in rural areas in Tanzania, our findings may not be generalizable to other industry settings. It is important to investigate further, and designing additional studies, also by using different cases in different industries. Also, the study has a theoretical limitation; it was analysed by using the industry architecture and value chain literature that is important but may not be sufficient. But it could have been analysed along with the dynamic capabilities (Teece, 2007), the transaction cost view, the resource-based view, or the relational view (Chesbrough et al, 2006). I suggest these theories be incorporated in future studies. Similarly, in a specific IA value will be created in a specific way and captured in a specific way. Lastly, the study is confined to the IA

through the value systems of *existing* firms in the beekeeping value chain. Vanhaverbeke and Cloudt (2006) and Chesbrough et al., (2006) points out that both value creation and value capturing can only be realized if a focal firm acts as an orchestrator and manages the value ecosystem. Therefore, the study to analyse how the beekeeping IA can be changed through the business ecosystems is suggested.

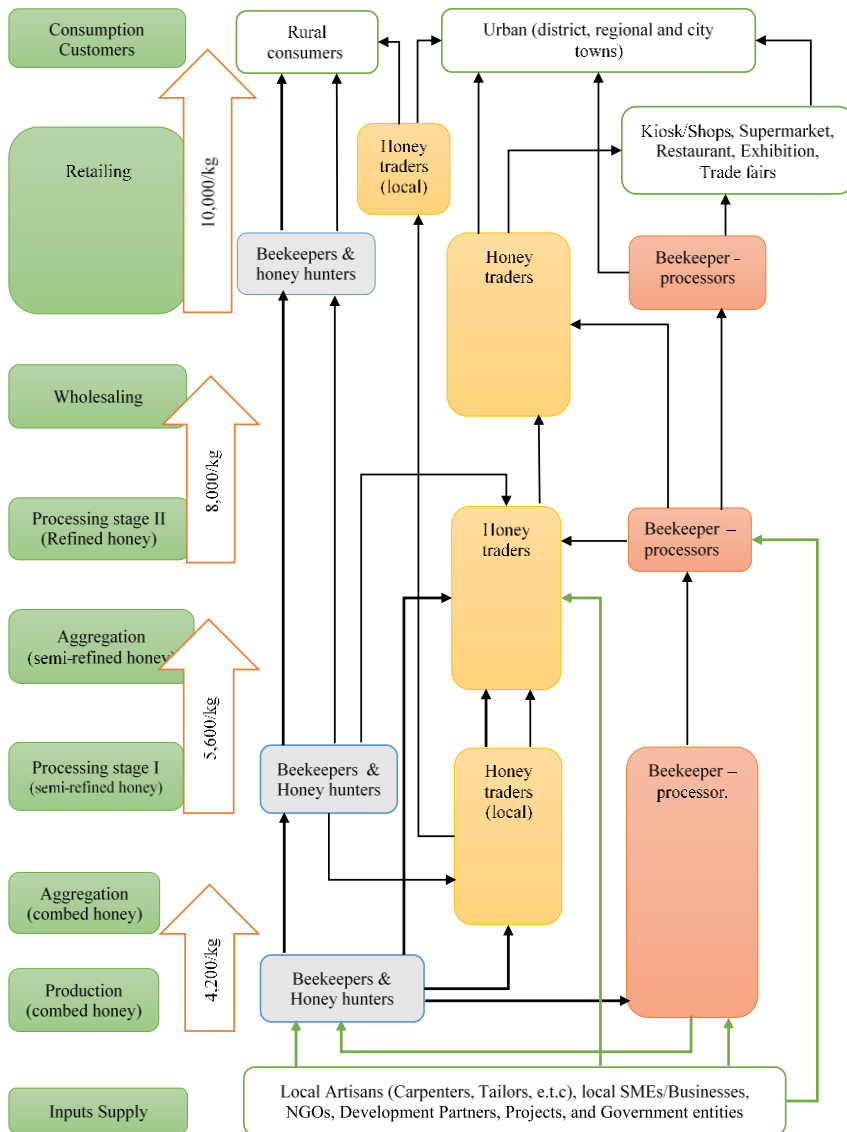
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Exhibit 1. *The value chains existing beekeeping firms in the beekeeping industry in Tanzania*



Key

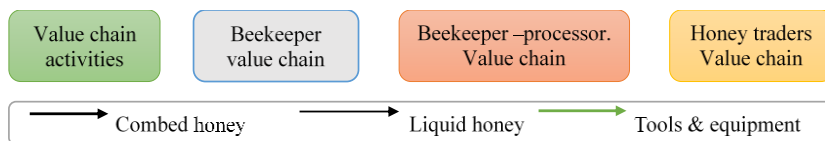


Exhibit 2: Functions performed by existing firms along the beekeeping value chain

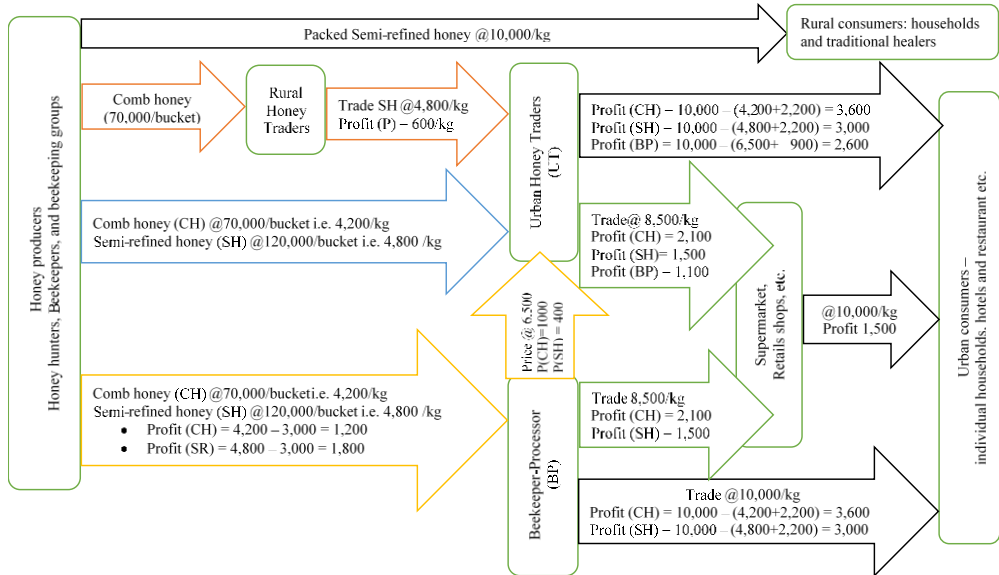
Value chain activities		Functions performed in the activity	Who does what?
Honey Production Output: honeycombs	Apiary setting:	Site selection (apiary assessment), foraging, security, reachability.	Beekeepers Processors
	Occupancy rate:	Hive sitting, hive baiting, swarm catching, colony division, preventing absconding and migration.	
	Managing bee colony:	Colony selection, queen rearing, colony manipulation (queening, de-queening, colony division, colony unification), gaging colony progress, colony feeding and managing swarming, absconding and migration.	
	Hive inspection:	Cleaning, managing bee pests and predators, assessing combs (e.g., larvae and brood, comb construction i.e., no cross-combing, honey and pollen storage), and assessing bee colony (e.g., number of worker bees and drones, colony size, colony performance).	
	Harvesting:	Proper harvesting – maintain hygiene, take only ‘ready’ combs, avoid killing or burning the bees, separate combs by grading – new and old combs. Avoid harvesting losses and do not take out all the honeycombs: leave some honeycombs for the bees, otherwise, the colony will starve or abscond.	
	Transportation:	Taking honeycombs from apiaries to storage, processing, (home) area.	
	Storage:	Keep honeycombs properly – tight and clean containers, avoid dust, dewdrops and unwanted aroma because honey is hygroscopic in nature: it absorbs water, aromas, and dust from the surroundings/air.	
Processing: stage I Output: semi-refined honey	Comb cleaning:	Comb sorting; comb separation and grading; and removing foreign materials like dead bees, grasses, and woods	Beekeepers (some) Traders (local/rural)
	Extraction:	Taking out honey from combs hygienically, avoid extraction or post-production losses – use appropriate extraction tools and techniques.	
	Aggregation:	Bulking or pilling up stocks and Honey blending – making the honey homogeneous by mixing honey from different sources, apiaries, and hives.	

	Storage:	Keep blended and aggregated honey in proper storage tanks.	
Processing: stage II Output: Clear refined packed honey	Comb cleaning:	Comb sorting; comb separation and grading; and removing foreign materials like dead bees, grasses, and woods	Processors Traders (urban)
	Extraction:	Remove the honey from combs hygienically, avoid post-production losses.	
	Filtration or refining:	Refining and cleaning extracted honey – remove the foam, comb traces, dead bee traces. Here you get clear honey.	
	Aggregation:	Honey blending, creaming/de-crystallization.	
	Branding:	Packaging, labelling and sealing.	
	Protection:	Safety and patents, certification (BRELA, TFDA, TBS), product information.	
	Storage:	Storing both clear honey and packed honey.	
Trading Output: sales	Wholesaling and retailing:	Channel decision & management. Pricing and payment structure	Processors Traders
	Customer relationship:	Managing the way you interact with customers	
	Transportation & Storage:	To outlets (kiosk, supermarkets, exhibitions, etc.) And customers.	
Consumptions (Target Customers/Markets)	Rural markets:	Local brewers, individual households and traditional healers,	Beekeepers Traders
	Urban markets:	District centres, Regional centres and Cities.	Processors Traders

Value addition activities	Areas of concern	Firms
Pre-production activities: <ul style="list-style-type: none"> Inputs supply. Apiary management. 	<i>Productivity (volume & quality), taste</i> <i>Commercial tools:</i> beekeeping tools and equipment (hives, suits, smokers, etc.) <i>Forage:</i> Apiary selection, plating for the bees and hive siting. <i>Colony management:</i> queen rearing, colony division, colony unification, and colony feeding. <i>Occupancy rate:</i> proper baiting, swarm catching, colony division, proper harvesting.	Beekeepers Processors

<p>Production activities:</p> <ul style="list-style-type: none"> • Harvesting. • Honey extraction. • Storage. 	<p><i>Productivity (volume & quality), taste, hygiene</i> <i>Harvesting:</i> comb selection, reduce harvesting losses, proper harvesting <i>Transportation:</i> carrying combs from the apiary to the processing area. <i>Storage:</i> proper storage of honeycombs <i>Cleanness:</i> combs sorting, cleaning and sorting; <i>Filtration:</i> extracting honey from combs, honey cleaning, refining, processing and post-harvest losses <i>Aggregation:</i> collecting honey from different sources, honey blending, proper storage of refined and blended honey</p>	<p>Beekeepers Processors</p> <p>Honey traders (some/few)</p>
<p>Post-production activities:</p> <ul style="list-style-type: none"> • Branding. • Storage. • Certification. • Selling. 	<p><i>Branding, channel and selling</i> <i>Branding:</i> packaging, brand name, labelling, colour, taste, viscosity. <i>Certification:</i> protection (safety and patents), product information, compliance with TMDA, TBS, BRELA etc. <i>Storage:</i> proper storage of honey product <i>Selling:</i> promotion/communication, distribution channel, pricing, CRM <i>Transport:</i> from store to the selling point, and customers.</p>	<p>Beekeepers (rural markets)</p> <p>Processors</p> <p>Traders</p>

Exhibit 3. Value capture along with the beekeeping value-creating system



Key:

BP = Beekeeper-processor

CH = Comb honey

P = Profit

SH = Semi-refined honey

SR = Semi-refined

UT = Urban traders

Assumptions:

- The average price of a bucket of comb honey is Tshs. 70,000
- The average price of a bucket (25kgs) of extracted honey is Tshs. 120,000
- On average, three buckets of comb honey makes two buckets @25kgs = 50kgs of extracted honey.
- Average packaging materials is Tshs. 2,200 per kilo of refined honey (container – 1,000; seal 300; label 500; transport 400)