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**AN ANALYSIS OF THE
INFORMATION FLOW IN THE
SUGAR BEAN VALUE CHAIN IN
ZIMBABWE. A CASE OF
MKOBA AND INSUKAMINI
SMALLHOLDER IRRIGATION
SCHEMES, ZIMBABWE.**

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LIST OF ABBREVIATIONS

DOI	Department of Irrigation
NGO	Non-Governmental Organization
IFAD	International Fund for Agricultural Development
FAO	Food and Agriculture Organization
IMC	Irrigation Management Committee
GOZ	Government of Zimbabwe
SIRP	Smallholder Irrigation Revitalization Programme
SIP	Smallholder Agriculture Programme

EXECUTIVE SUMMARY

This study analyses the information flow in the sugar bean value chain in Zimbabwe that involves farmers at Mkoba and Insukamini smallholder irrigation schemes. The study paid particular attention to the essential bottlenecks in which farmers and PHI Commodities view as the stumbling block in improving the sugar beans value chain. The challenge areas identified included the production, market & prices, finance and the quality & standards challenge areas. These were deliberately chosen after preliminary interviews with both the farmers and PHI Commodities.

The data collection tools included a questionnaire, a semi structured interview with PHI Commodities, 3 key informant interviews with IFAD, FAO and AGRITEX. The questionnaire was used in a survey taken on the farmers and PHI Commodities using statements under each challenge area and the data collected was subjected to the 2-2 trade tool. This produced the differences of perceptions between farmers and PHI Commodities which inherently showed the imbalances caused by the information flow in the sugar bean value chain.

The research produced a sugar bean chain map which showed the information flow which is mostly in direction of the farmer and little information from the farmer to other stakeholders. A stakeholder analysis showed the available information and the missing information per each stakeholder involved in the sugar bean value chain. The finance challenge area was the biggest in which information flow is limited and bringing the greatest disparities. As such the First Mutual Micro finance was recommended to intensify their farmer education on financial management whilst the government of Zimbabwe, through the department of Irrigation, create and setup credit insurance for smallholder irrigation farmers.

1. CHAPTER ONE INTRODUCTION

1.1.INTRODUCTION AND BACKGROUND

Smallholder irrigation in Zimbabwe dates back to the pre independence era where irrigation projects were established mainly as a drought mitigation intervention to improve food security at household and community level. The idea was to complement dry land production yields with those from the irrigation plots enhancing the food quantity accessible to a rural household (FAO, 2005; Chazovachii 2012; Nhundu & Mushunje 2012). Smallholder irrigation projects in Zimbabwe are characterized by a group of farmers sharing irrigation infrastructure with each farmer owning a small plot of the whole area affixed with irrigation infrastructure. Plot sizes range from as small as 0.2ha to 5ha with the overall irrigation scheme area ranging from 10 hectares to as big as 2000hectares.

Mutiro et al. (2015) posit that nearly 60% of irrigation schemes in southern Africa can be considered successful. The Government of Zimbabwe has continued to rehabilitate existing irrigation schemes and establishing more as a means to abate food insecurity and foster food self-sufficiency. The huge investments made by governments and development partners in the smallholder irrigation sub sector, are aimed at capacitating smallholder farmers to increase their household incomes through farming throughout the year (Hanjra et al. 2020). The success of smallholder irrigation development is not benchmarked on installation of irrigation infrastructure alone. IFAD (2021) claims that access to markets by smallholder irrigation farmers is a key variable that contributes to the realization of government's initial objective for investing in smallholder irrigated agriculture. Product markets in agriculture imply the institutional arrangements by which buyers and suppliers interact. Market functions in agricultural systems feature sequentially arranged activities which are carried by several actors to ensure goods and services reach the intended consumers (Saccomandi 1998). Intended consumers are usually farther away from production areas and the ability for smallholder farmer's products to reach these farther away consumers is constrained and overly shows as a market access constraint (IFAD 2021). In Zimbabwe almost all the irrigation schemes on the Zimbabwe smallholder irrigation schemes database cite product market inaccessibility as a major challenge in their different farming projects (DOI 2021). This is further substantiated by Moyo et al. (2017) who argue that market access is a productivity constraint in smallholder irrigation development.

Smallholder irrigating farmers involved in various crop chains face more or less the same constraints with regards to market accessibility at local, regional or international levels. Market access is a huge problem which embeds small various facets with which one of them is the strength of relationships and trust between or among actors in that supply chain. In Zimbabwe, smallholder irrigation farmer's efforts are premised on the idea to improve food security at a household level and as such common crops grown include maize sugar beans, leafy vegetables, cowpeas, potato, butternut among others (Mutiro et al. 2015).

IFAD (2021) further explains the different and direct mechanisms that influence smallholder farmer's product market access and these include production happening in remote locations, high transportation costs, limited knowledge and limited business acumen. On this backdrop, this thesis

research explores the limited information flow between PHI Commodities (an agricultural commodity processor firm) and smallholder irrigation farmers in the sugar beans value chain in Zimbabwe. Firms have got their interests whilst farmers have theirs. Sometimes these interests converge whilst at times they diverge. The degree to which these interests converge/diverge explains a case of sufficient or limited knowledge exchange between the two actors (Schrader et al. 2015). The findings are meant to expose factors that close the limited knowledge exchange gap between the interests of farmers and those of firms thereby contributing to strong relationship building between these two important actors. The knowledge will be useful in coming up with refocussing and retooling strategies to improve those areas of constrained relationship strength in the sugar beans value chain development in Zimbabwe.

1.2.Problem statement

Initial investments in smallholder irrigation infrastructure, by Government and its development partners which include the Food and Agriculture Organization, International Fund for Agricultural Development, United Nations Development Programme, the European Union among others have the goal to increase productivity and income levels for the rural poor (IFAD, 2016; FAO 2019). Mutambara et al. (2014) claims that smallholder irrigation is neither viable nor sustainable due to various constraints which include a poorly developed agricultural market for farmers which prevents farmers from engaging in high value crops which could enhance the sustainability of most irrigation schemes. Availability of infrastructure, access to finance, prior training, access to markets and an enabling regulatory framework are some of the productivity determinants substantiated by Tatiana et al. (2014). Moyo et al. (2017) posit and single out “constrained market access by smallholder farmers” as one of the core problems in smallholder irrigated farming. This research problem is that the government lacks information on the bottlenecks between agricultural commodity firms and smallholder irrigation farmers to stimulate and facilitate stronger actor’s relationships which contribute to reducing the smallholder farmer’s market access constraint. This research is done for the government of Zimbabwe, the Department of Irrigation in particular. Berg et al., (2006) claim that information flow, in agricultural value chains, among actors is limited or sometimes nonexistent creating a fertile ground for mistrust and weak relationships to grow among the actors.

Sugar beans is a cash crop and Moyo et al. (2017) posit that higher value crops need to be integrated into functional value chains hence its analysis. The information gap between the smallholder irrigation farmers (Insukamini and Mkoba Irrigation schemes) and agricultural commodity firms (PHI Commodities) has the effect that smallholder farmer development initiatives by government are insufficiently informed and the overall goal by government of increasing household incomes for smallholder irrigation farmers is threatened. Such findings will help government and development agencies to retool their interventions and focus more on areas where relationships are weak. In addition the findings will help the smallholder farmers and the firms to understand each other better enhancing buildup of stronger sustainable value chains ultimately improving product market access for smallholder irrigation farmers.

1.3.General objective

- a. To investigate how a better information flow and exchange could improve the sugar bean value chain in Zimbabwe

1.4.Specific objectives

- a. Identify the potential stakeholders and their roles in the sugar bean value chain involving distributor firms (PHI Commodities) and irrigation smallholder farmers (Insukamini and Mkoba irrigation schemes) in Zimbabwe
- b. Identify the current information and knowledge available between distributor firms (PHI Commodities) and irrigation smallholder farmers (Insukamini and Mkoba irrigation schemes) in Zimbabwe
- c. Identify the missing product market information between distributor firms (PHI Commodities) and irrigation smallholder farmers (Insukamini and Mkoba irrigation schemes) in Zimbabwe
- d. Identify areas of improvement to close the information and knowledge gap between distributor firms (PHI Commodities) and irrigation smallholder farmers (Insukamini and Mkoba irrigation schemes) in Zimbabwe
- e. Identify actors/supporters who could improve the information and knowledge gap between distributor firms (PHI Commodities) and irrigation smallholder farmers (Insukamini and Mkoba irrigation schemes) in Zimbabwe

1.5.Main research question

What are the factors that contribute to a better market information flow in the sugar bean value chain of smallholder farmers in Zimbabwe?

1.6.Sub questions

- a. Who are the potential stakeholders and their roles in the sugar bean value
- b. What is the current product market information available between the firm (PHI Commodities) and irrigation smallholder farmers (Insukamini and Mkoba irrigation schemes) in Zimbabwe
- c. What is the missing product market information between the firm (PHI Commodities) and irrigation smallholder farmers (Insukamini and Mkoba irrigation schemes) in Zimbabwe
- d. What could be improved to reduce the product market information and knowledge gap between the firm (PHI Commodities) and irrigation smallholder farmers (Insukamini and Mkoba irrigation schemes) in Zimbabwe
- e. Which actors would improve product market information and knowledge exchange between the firm (PHI Commodities) and irrigation smallholder farmers (Insukamini and Mkoba irrigation schemes) in Zimbabwe

2. CHAPTER TWO LITERATURE REVIEW

2.1.HISTORY OF SMALLHOLDER IRRIGATION DEVELOPMENT IN ZIMBABWE

Smallholder irrigation development strategies in Zimbabwe can be traced to about 5 decades into pre-independence Zimbabwe (Rukuni 1988). These initiatives have mainly been a role left to the government and aid agencies with a few private sector organizations being involved. A variety of models for developing irrigation schemes exist. These include the communal irrigation scheme model, the joint venture irrigation scheme model, the Build Operate and Transfer (BOT) model and the company-based irrigation model (DOI 2021). However, in pursuit of food security, poverty reduction and wealth creation, aid agencies have continued to partner the government of Zimbabwe in establishing communal irrigation schemes. The approach has seen more than 800 communal irrigation schemes being established in the country since independence (FAO 2004).

The government of Zimbabwe has continuously invested in smallholder irrigation development in an effort to abate the risks of drought and also the risks posed by the poor rainfall distribution in terms of rainfall fluctuations experienced during the wet season (Chazovachii 2012). This would then enable the rural farmers to produce sufficiently and increase their access to food through own production and, in addition, cushion themselves from hunger. However, in the early 1990s the focus shifted from being merely a food insecurity issue to focus more on economic development at household and community level. The government sought to withdraw slowly its heavy footprint on the management and directing of daily operations and cede the power to the farmers. Farmers were encouraged to create Irrigation Management Committees (IMCs) which would then be supported by government extension agents to make operations sustainable (Mombeshora 2003). However, the government of Zimbabwe would continue to assist in major capital cost services such as irrigation infrastructure repair and replacement. The approach was to make smallholder irrigation schemes self-sufficient and economically sustainable (Zawe 2006).

By the turn of the millennium in year 2000, the government sought to increase its footprint again on the management and decision making of smallholder irrigation development in Zimbabwe. The government directed on what to grow (mainly maize and wheat in summer and winter seasons respectively) and subsequently provided the product markets at pre-defined producer prices. However, late payments and flawed programmes structuring to support these initiatives slowly made farmers at different irrigation schemes deviate into their own production and market linkages (Mazwi et al. 2019). Slowly, farmers increased the land portion allocated for sugar beans, a crop which would be lucrative, relatively easy to grow and market considering the circumstances faced by the smallholder farmers (USAID 2015; Basera 2019).

The momentum in the early 1990s premised on national economic programmes, mainly the Economic structural adjustment programme, made efforts to reform and restructure the main product marketing channels for smallholder farmers which were through state marketing boards and this favored liberalization of markets not just in Zimbabwe but in most countries in the sub-Sahara Africa region (Kay Muir-Leresche 1998). This changed the face, construct and understanding of agricultural

chains for most smallholder farmers who had to compete in the open market. The earlier heavy reliance by smallholder farmers on marketing boards had created a huge market information gap on part of the farmers. Government tried to close this information gap by providing extension agents but extension agents' capabilities seemed to be more pronounced on agronomy issues and were limited in market information analysis and dissemination.

The irrigation schemes production and productivity development trajectory naturally regressed as smallholder irrigation farmers went through a learning curve to incorporate the other marketing functions other than the production function which they were competent in. The private sector extension systems began to prop up and find strength in which agribusiness firms would extend contracts for particular crops. The firms would then build farmers' capacity through marketing and agronomic trainings, assist with inputs or shreds of operational capital, out-grower schemes among other smallholder farmers' inclusive strategies. Notable examples of such horticultural firms which consolidated their relationships working with smallholder farmers in Zimbabwe included Chegutu Cannery, Cairns Foods and Probest Veg (Liesdek et al. 2020).

Although most irrigation schemes had been established for merely food production, their operational sustainability hinged on many facets which inevitably included a viable business case. Most irrigation scheme farmers did not have the information nor the knowledge to structure agricultural production activities into a viable business concern (Moyo et al. 2017). The government extension systems, then, lacked the capacity to fully impart business and entrepreneurship skills to farmers. This made farmers, without contracting companies, continue on a wave of growing mainly cereals (maize and wheat) in which the government would be the residual buyers through the state run grain marketing board. The concept of "residual buyer" was to give the farmer a free will to retain some produce for own consumption and surplus would find its own way to the open market which were dominated by the private sector. For those farmers who found it difficult to access any buyers in the open market, the government would then buy through the state's grain marketing board but at a lower price compared to that prevailing in the open market space (Bautista 2002).

However, on the other hand the food and nutrition policy of 2013 pushed for the growing of nutritive crops under the promotion of healthy diet. Crops such as sugar beans were adopted to integrate the economic value together with the nutritive value of crops grown by smallholder farmers (Mutukura, 2015). The food and nutrition policy created a movement supported by non-governmental organizations and government that saw a rise in the acceptance and adoption of cash crops in irrigation schemes and sugar beans became a household crop of choice with multiple uses for the farm family which included creation of wealth (sugar beans could be exchanged for livestock), enhancement of household nutrition (sugar beans being a legume has a higher protein content), increase in household income (higher gross margins).

Whilst these policies would seek to achieve certain ends using irrigation development as the means to their end, direct sub-sector irrigation policy required to support the core objective of the irrigation scheme farmer remained an unfilled vacuum (Zawe et al. 2015). This for long, made irrigation development an embedded priority within other cores such that when the main objective (of other

cores) was abandoned, irrigation development and progression would also die a silent death. In Zimbabwe, smallholder irrigation development has been used as a tool for consolidating power where although the governance of irrigation schemes lies mainly with the farmers through an irrigation management committee (IMC), the traditional community leadership and the local authorities play a pivotal role in its progression/regression (Mosello et al. 2017). These “other” centres of power are (specifically) legally supported by acts of parliament, that is, the traditional leaders act and the rural district councils act whilst the IMCs are a local formation without a legal basis derived from an act of parliament.

The ministry of water regulates the use of all water in Zimbabwe through the water act and as such provides a key resource to the smallholder irrigation scheme, which without water there is no irrigation scheme to mention the first. Water being a key variable in the operational sustainability of smallholder irrigation schemes, naturally transfers power to those that are mandated to regulate its provision. As such the Ministry of water also wields power as to the trajectory of irrigation development in Zimbabwe. The government of Zimbabwe noticed the disharmony brought about by these conflicting policies and acts of parliament in directing irrigation development and in an effort to plug this vacuum, in 2005, 2010 and 2011, the government set to craft an irrigation policy which would be directed at the irrigation subsector. The policy framework was championed and implemented by the department of Irrigation, a government department responsible for the regulation of irrigation related activities in the country (Zawe et al. 2015). It was until 2021 that a Statutory Instrument 38 of 2021 enunciated the irrigable areas regulations to specifically support issues to do with irrigation development in Zimbabwe (GOZ 2021). Interestingly, this statutory instrument consolidates government’s power through the ministry of Agriculture’s district and provincial engineers who are expected to govern over the development of smallholder irrigation in Zimbabwe.

2.2.Features of Product Market Information Access for smallholder irrigation farmers in Zimbabwe

Agricultural value chains are stronger if actors are able to generate relationships and trust between each other. Relevant information pertaining the experiences borne by each actor and appreciation of the value the actor is playing in the chain form the pinnacle and fortitude of stronger chains (KIT et al. 2006). Schrader et al. (2015) posits that there are seven core aspects of information which should exist in near perfect match between the farmer and the commodity firm.

2.2.1. Product and Market

Agricultural chains form the basis of food management systems in which the quality attributes required by the clients in particular markets ought to be observed and respected. Quality entails meeting aspects about the product in a certain market much more than just the product intrinsic attributes, (Luning et al. 2020). Agricultural commodity firms are usually close and aware of the quality requirements expected by the consumer whilst farmers might not be privy of the same information and knowledge. Figure 1 below shows the complexity of managing the food management system by Luning et al. (2020) and is also supported by Schrader et al. (2015) who asserts that

there are additional variables such as seasonality, product price fluctuations in markets spatially or temporally integrated.

The need to integrate and convey the product market information, at the consumption stage, to be appreciated by all the actors in the chain enhances the marketing strategies that make that chain stronger. FAO (1997) argues that commodities are appreciated by consumers in form of the convenience, enjoyment and comfort that is generated by that product in the consumer. Thus, whilst farmers sell for example sugar beans to processor firms, these in turn sell the value the sugar beans generate in the consumer and such information need to be shared and understood between farmers and firms.

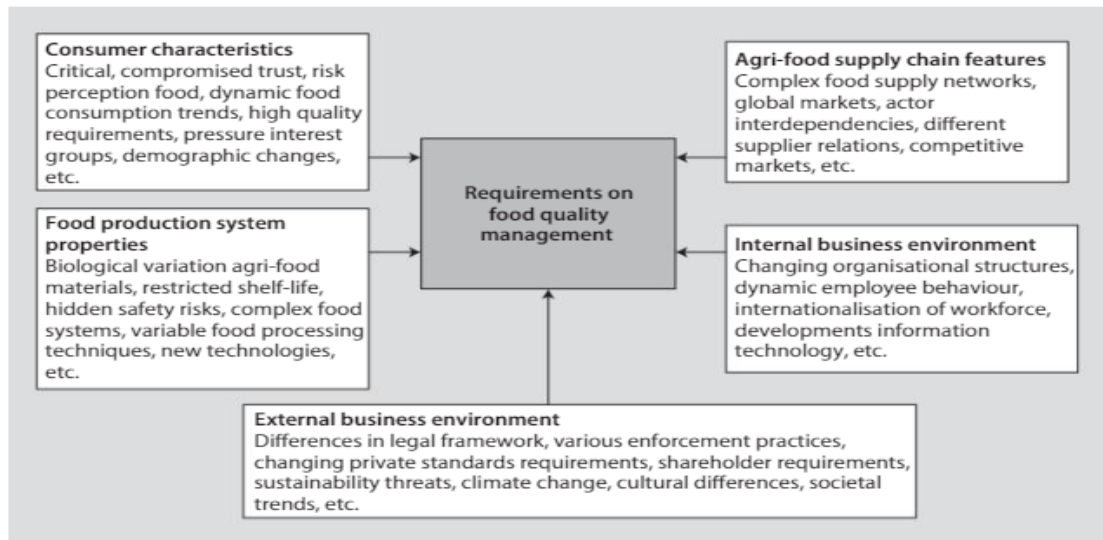


Figure 1: Characteristics of consumers, food production systems, agri-food supply chains Source: Luning et al., (2020-pp20)

In Zimbabwe most sugar beans are not transformed into a new product and hence the intrinsic and extrinsic attributes squarely entail attributes of the sugar bean in its raw form.

2.2.2. Firm

The classification of agricultural commodity firms plays an important role to bring out information on the capabilities and functions of these important actors in the agricultural value chains. Techniques, skills, entrepreneurial acumen, goods and financial resources embedded within the firm's capabilities make it unique and defines its capacity to effectively play its important role in the agricultural value chain. Information about the ownership structure, firm assets and farmer's knowledge about the particular firm contribute to building trust and strengthening relationships in the value chain (Schrader et al., 2015).

2.2.3. Farmer's Organization

Obi et al. (2007) posit that market access is delineated by different components which include market information access by farmer organization which is cascaded down to the farmer represented. In Zimbabwe, most smallholder irrigation schemes including Mkoba and Insukamini have a Marketing subcommittee which is an integral part of the main Irrigation management Committee. It is paramount that farmers are organized into some union or association for ease of information dissemination and management. Whilst farmers at irrigation schemes might individually be part of a

national farmer's union, the Irrigation management committee is the main gateway to interactions that bring market information, (contracts, prices, new actors and so on) to them. The capability of farmer's organization to put mechanisms that facilitate the smooth flow of growing and bulking nodes at a local level creates a favorable platform for agricultural commodity firms to engage in trade with the particular group of farmers (Kayoby, 2016). Smallholder irrigation farmers are mainly governed by a farmer driven constitution which stipulates statutes that direct and guide operations at farm level. The marketing subcommittees are also governed by the same statutes (DOI 2021). This shows a level of organization that should at least lure other chain actors to want to engage farmers at smallholder irrigation schemes and share pertinent product information to build stronger value chains.

2.2.4. Farmers

Mombeshora (2003) argues that most farmers at smallholder irrigation schemes have limited access to the market institutions. Irrigation management committees assume this role on behalf of farmers. This allows farmers to concentrate fully on production. An understanding and appreciation of production issues which are intertwined with satisfying household food and general economic livelihood requirements is a prerequisite by firms and actors relying on the same farmer's produce for business. Whilst firms are interested in getting the raw product at the least possible price, information on the importance of the crop for farm-family livelihood in terms of household food basket, marketable surplus among other variables that affect farmers' decisions to partake in that particular value chain, is important to merge strategies that bring together understanding of issues at hand between firms and farmers (Barrett 2010).

2.2.5. Agribusiness System

Agribusiness systems form a network of businesses that ensure products move from the point of production to their point of consumption. These systems exist in an institutional environment which enables or disables the efficient flow of goods and services in agricultural value chains (Kondowe, 2021). The makeup and arrangement of the agribusiness system is pronounced by the level of access to finance, inputs, markets, stakeholders and other important facets such as the socio-economic, politico and legal stability. These factors affect each actor differently in space and time. Actors in the chain reduce skepticism and increase trust if information about all these factors, and how they affect each actor, is shared and understanding is at the same frequency from one actor to the other.

2.2.6. Communication and Planning

The seasonality of agricultural products in most sub-Saharan countries make it very difficult to plan for a continuous consistent supply of the same product into the market. A cobweb cycle of highs and lows characterizes the supply of many agricultural products (Haji 2014). Sugar beans, even under irrigation, follows the same supply pattern where there is a glut during harvest periods and bare minimum during off season periods. This calls for a great level of planning and communication between firms and smallholder farmers and agreements have to be reached before the planting season. This enables firms to forecast storage space required, logistics and a steady constant supply of the product to the consumers. On the other hand farmers are able to know beforehand the prices

their produce would be paid and the quantities they are expected to produce (Parirenyatwa et al. 2014).

2.2.7. Delivery & Performance

Following on the planning and communication that would have been entered into prior to the start of the season, firms and farmers need to deliver. Farmers are expected to timely deliver the correct quantities of the correct quality whilst firms are expected to honor their obligation to pay farmers adequately and timely. Information on the aspects of satisfaction from both firms and farmers need to be investigated to ensure improved relationships which build stronger chains (FAO 1997; Kabwe et al. 2018; Smaller et al. 2018)

2.3. Needs of Agribusiness firms

Like any other business, the main aim of an agribusiness firm is to make profit. Essentially, agribusinesses want to procure raw materials at the least cost (or at no cost if they could), process the goods at the lowest cost possible and sell at the maximum price possible. Their major drive is to reduce the average cost of producing a unit and create a huge gap between the average cost of production and the price of that unit to make maximum profits. Thus, a business case fundamentally creates the back rock of commercial firm's engagement with smallholder farmers (Wytske 2019). In view of their input-output relationship, agribusiness face various challenges and risks right from arrangements for procuring or sourcing the raw material up to the stage goods are dispatched out of their warehouses after processing. For some agribusiness firms, they remain with ownership of products even if the products have been passed on to the next actor (usually supermarkets) and this adds to the several of risks they face to sustain a profitable business (Kirsten et al., 2002).

In light of the above context, agribusiness firms have developed a criteria which addresses their needs and attempts to avoid or reduce the effect of risks associated with all business activities that ensure products move from their point of production to their final point of consumption.

2.3.1. Collective Organization of Smallholder Farmers

Smallholder irrigation farmers own very small pieces of land. The need to accommodate and diversify production forces farmers to inevitably further subdivide the small plot which further reduces the area allocated per enterprise. This then results in small amounts of production per farmer. The arrangement of smallholder irrigation schemes brings together farmers to produce within the same geographically site. This is encouraging for the agribusiness firm since it would be much easier to then collectively organize farmers producing at a certain irrigation scheme to integrate them into a particular value chain. Collective organization ensures rightful quantities for the firm, reduced logistics, shared management responsibilities/risks (with farmers' management) and culminate into reduced transaction costs for the agribusiness firm (Trebbin et al. 2012). This resonates well with the intention of the firms to reduce the average production cost as much as possible.

2.3.2. Commitment by Suppliers

Agribusiness firms, in part, convey the consumer product quality requirements to the farmer where firms become a mirror reflection of what the market requires so that the producer also knows. The

market is always evolving, tastes and preferences are dynamic such that Agribusiness firms are supposed to swiftly act and accommodate changes in the market space (Lees et al., 2015). This also requires farmers to rise to the challenge of such swift changes. The fluctuation of market demands pose a lot of frustration and uneasiness in producers, given their relatively rigid production systems due to crop biology and investment levels which take time to adjust. Commitment to embrace these changes and frustrations is a key requirement sought after by Agribusiness firms. Efforts by producers to adapt and always take cognizance of the new quality demands and quickly make changes to enterprises indicate commitment by the producers. These changes could be changing a few practices in an enterprise to abandoning an enterprise and adopting a new one altogether.

2.3.3. Cognitive social capital

Producers participate in embedded social networks which have an ability to build strong relationships based on the inherent mutual trust and association within such local groups. Connectedness of producer groups based on shared values and social connections avail some social capital that helps bring producers together and work towards the same objective (Drost et al., 2012; Lees et al., 2015). Having a group with a shared meaning or interpretation, of the requirements of a particular value chain, makes it much easier for Agribusiness firms to then convey messages and get the same understanding. This is also supported by Wytke (2019) where he asserts that social connectedness reduces risk and facilitates the ease of information transfer to and from agribusiness firms.

2.3.4. Farm Physical Resources

Porter (2009) points out that high quality specialized inputs enable and create a competitive base for suppliers and as well for the whole supply chain. Farm physical resources range from the natural endowments at farm site (good soils, water availability, weather, topography and aspect) up to farmers' own investments in infrastructure, machinery, equipment and operational capital. Although capacitating farmers in circumstances where they fall short of some farm physical resources is the benchmark of building trust and sustainable relationships which culminate into stronger value chains, Agribusiness firms are usually production risk averse and are reluctant in investing in farmers' physical resources (Moss 2010).

2.4. Needs of smallholder farmers

Smallholder farmers face difficult circumstances so much that they feel agribusiness firms should be forthcoming in one way or the other to understand and support them in those situations they are found wanting (Kolavalli et al. 2015). In so doing, smallholder farmers have got a way of looking at agribusiness firms which forms the basis for their expectations and the subsequent buildup of trust/mistrust in their engagements (Camilla et al. 2015).

2.4.1. Flexibility in Quality Requirements

The concept and theory of food quality management system as put by Luning et al. (2020) entails huge investments in infrastructure and technical knowhow in which this is usually limited for most smallholder farmers. Camilla et al. (2015) claim that due to the production circumstances faced by

smallholder farmers, they expect a compromise in quality requirements as opposed to rejection of the whole lot of produce or the severe lowering of prices.

2.4.2. Viable Prices

There seems to be discrepancies in enterprise budgets faced by smallholder farmers and those of large scale commercial producers. A higher average cost of production as a result of low returns to scale emanating from the uniqueness of operations characterize the smallholder farmer enterprise budget. This is worsened by the production of low quality products fetching relatively lower on the markets. Thus, farmers expect agribusiness firms to consider their plight and the circumstances they would have gone through and at least offer viable prices which permit sufficient reinvestments whilst enjoying a profit (Camilla et al. 2015; Pennstate Extension 2019). Smallholder farmers also seek preservation of value which is threatened by the fluctuation of product prices (Onumah 2007). The assurances by firms on a certain price enhances planning on part of the smallholder farmers.

2.4.3. Inputs Cost cushioning

The cost of production, especially for high value products such as horticultural products, is relatively out of reach for most smallholder farmers. Besides having irrigation and associated infrastructure, machinery and equipment smallholder farmers still require cushioning on inputs costs. This could be arranged as a contract where costs would be deductible upon delivery of the product or a matching contribution to the operational costs by firms.

2.5. Power Relationships and Information Sharing

Value chain governance explains the arrangement of power dynamics which are founded on the principles of information flow within the value chain (Dunn 2005). Webber et al. (2010) analyses governance in value chains as anchored on different types of relationships revolving around information flow and market power. They argue that on basis of the information quality a relationship between two actors in a value chain can be described as one of the following:

2.5.1. Market Relationship

This is a relationship where information flow is very limited and contractual agreements are temporary and short term between (actors) firms and farmers. Actors usually limit their interactions to the exchange functions of the marketing system which entails mainly buying (for the firm) and selling (for the farmer). Beyond these functions, there are no other significant relations shared. The existence of many buyers and suppliers in the value chain promotes actors switching back and forth with whomever they deem fit to engage in this type of value chain governance typology (Dietz 2009; Smith et al. 2020).

2.5.2. Balanced Relationship

A relationship in which both sides appreciate the importance of the other and technically need each other making it very difficult for any actor to substitute the other (Webber et al. 2010). Information flow to and from both ends could be described as extensive and farmers and firms are both willing to negotiate or figure a way out of their peculiar problems.

2.5.3. Direct Relationship

Firms have a more advanced understanding of the whole value chain including the functions and what is expected of the farmers. Information is held tightly by the firms such that farmers are relegated to production only and in some instances as farm labour producing under the firm's instruction. Such information asymmetry between the firms and the farmers consolidate the power matrix in favour of one actor (firm) who can manipulate the conditions to restrict farmers' flexibility whilst enhancing theirs. Information about production systems, standards for products, contracts, government regulatory frameworks is mainly the prerogative of firms who are entirely reluctant to share it with the farmer (Dietz 2009).

2.6. Integrating Relationships in Agricultural Supply Chains

Traditionally, agricultural supply chains involving smallholder farmers in Zimbabwe have been characterized by a market relationship between farmers and firms where the exchange function of the marketing system prevails much more than any other relationship building functions. Like in most developing countries, Say's law prevails where supply will find its own demand (Bresser-Pereira 2014). Production is not very much demand driven. Firms have a culture of offering a price to the farmers at the peak harvesting season and amass and store enough product in their warehouses until the next peak harvesting season. Most times this has left firms with uncertainty as to who will supply them, when and how much? On the other hand, farmers are also uncertain of how much to produce, who will buy their product, at what price and in which form (Liesdek et al. 2020).

It is of paramount importance that actors in the agricultural chain in Zimbabwe start to build and strengthen their relationships based on trust to integrate purposeful relationships and create sustainable agricultural chains. Contract farming was noted as a workable relationship building strategy which is all inclusive in which smallholder farmers can also play a pivotal role in the development of agriculture in Zimbabwe (World Bank. 2019).

2.7. Success cases of smallholder irrigation farmers product information flow in Zimbabwe

Various agricultural value chains in Zimbabwe have seen the growth and establishment of contract farming as a means of connecting smallholder farmers to finance and product markets. Horticultural organizations including Nhimbe Fresh Exports pvt limited have successfully integrated smallholder horticulture farmers in their fresh produce export chains. Farmers with as small as 0.1ha have managed to cultivate high value crops such as mange tout and sugar snaps for export into the European Union (HSTV ZIM 2021). Such cases bring hope and confidence in the capabilities and potential of smallholder farmers in Zimbabwe.

Masasi et al. (2019) studied how a market systems approach would foster efficiency in agricultural chains involving smallholder irrigation farmers and the study argues that a market systems approach implemented at Mutema irrigation scheme (Zimbabwe) improved gross margins and livelihoods of farmers at the scheme. This was thanks to a successful engagement of the scheme and a firm, Matanuska ltd, in a banana value chain in Zimbabwe. Thus, notwithstanding the complexities of agribusiness systems, firms and farmers in Zimbabwe are still able to circumvent situations based

on trust and information sharing. At the same irrigation scheme USAID (2014) reports that farmers were also able to successfully engage firms (Pannar and Progene pvt ltd) in the sugar beans value chain. Livelihoods were changed for the better due to the ability of firms and farmers to converge and strengthen their business relationships.

2.8.The 2-2 Trade Theory

The 2-2 trade theory is premised on the idea that the roles played by firms and smallholder farmers as actors in a particular chain are important but both players seem not to appreciate each other. The 2-2 trade tool then attempts to analyze the degree of congruence or whether it exists at all in the actors' perceptions about a particular issue. Convergent perceptions would entail a same level understanding of a particular issue and its importance in the value chain development and perfect information between the actors (farmers and firms) can be assumed. Divergent perceptions could indicate a dysfunctional value chain where information sharing is limited resulting in mistrust and comparatively weaker relationships (Schrader et al. 2015).

Perceptions are regarded as a keypoint of comparison and investigation of the value chain structural factors as they affect the concerned parties. Laura et al. (2020) supports the 2-2 trade theory and claim that smallholder farmer inclusive businesses are affected by the type of product and market in which it is traded, type of firm, agribusiness system (institutional setup) among other factors. This resonates with Schrader et al. (2015) in their conceptualization of the 2-2 trade theory. They take these factors into consideration to evaluate their importance as perceived by each actor between firms and farmers. A level of close to perfect information flow would show almost the same rating and vice versa.

2.9.Conceptual Framework

A conceptual framework brings together the overview of the reasoning behind a research project. This research adapts and draws from the causality reasoning behind a value chain map and a relational sense underpinned by the 2-2 trade tool. If information about the indicators shown is sufficiently and timely provided under the seven aspects mentioned then the information quality is improved and hence the flow and exchange of information between farmers and firms is anticipated to improve as well. Figure 2 below shows a conceptual framework for this research.

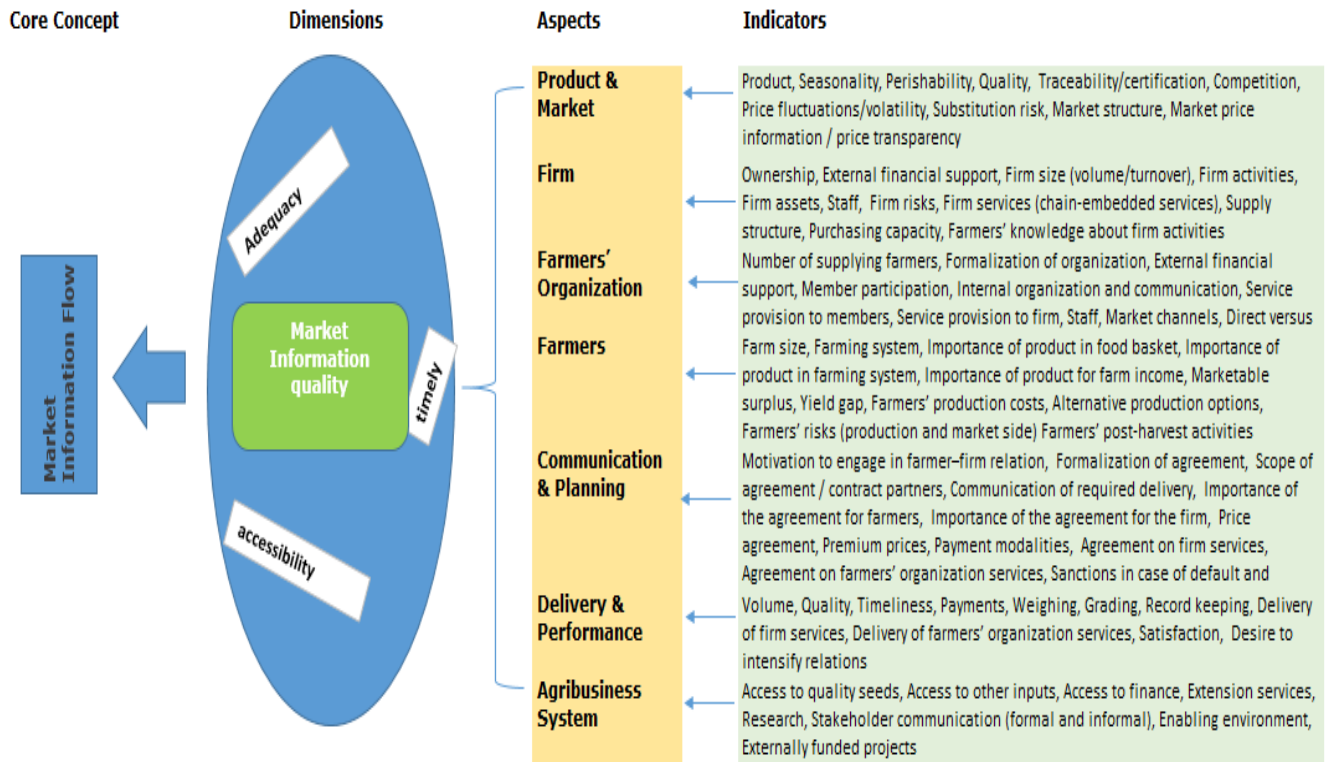


Figure 2: conceptual framework for this research; source; Author

Information flow is described by Chaffe (2001) in the context of information logistics which entail the movement of information from one variable to another. This research mainly focuses on the movement of product market information between the agricultural commodity firms and smallholder irrigation farmers. The concept of market information flow implies a dimension of market information quality which is supported by the adequacy, timeliness and accessibility of the information. The level of market information quality, with regards the product market aspects, reveals the information asymmetry/symmetry in value chains which limits/promotes the efficiency of marketing systems (Mawazo et al. 2014). High quality of market information, hence, promotes a favorable engagement of firms and farmers and thus leads to a development of stronger agricultural value chains in the long run.

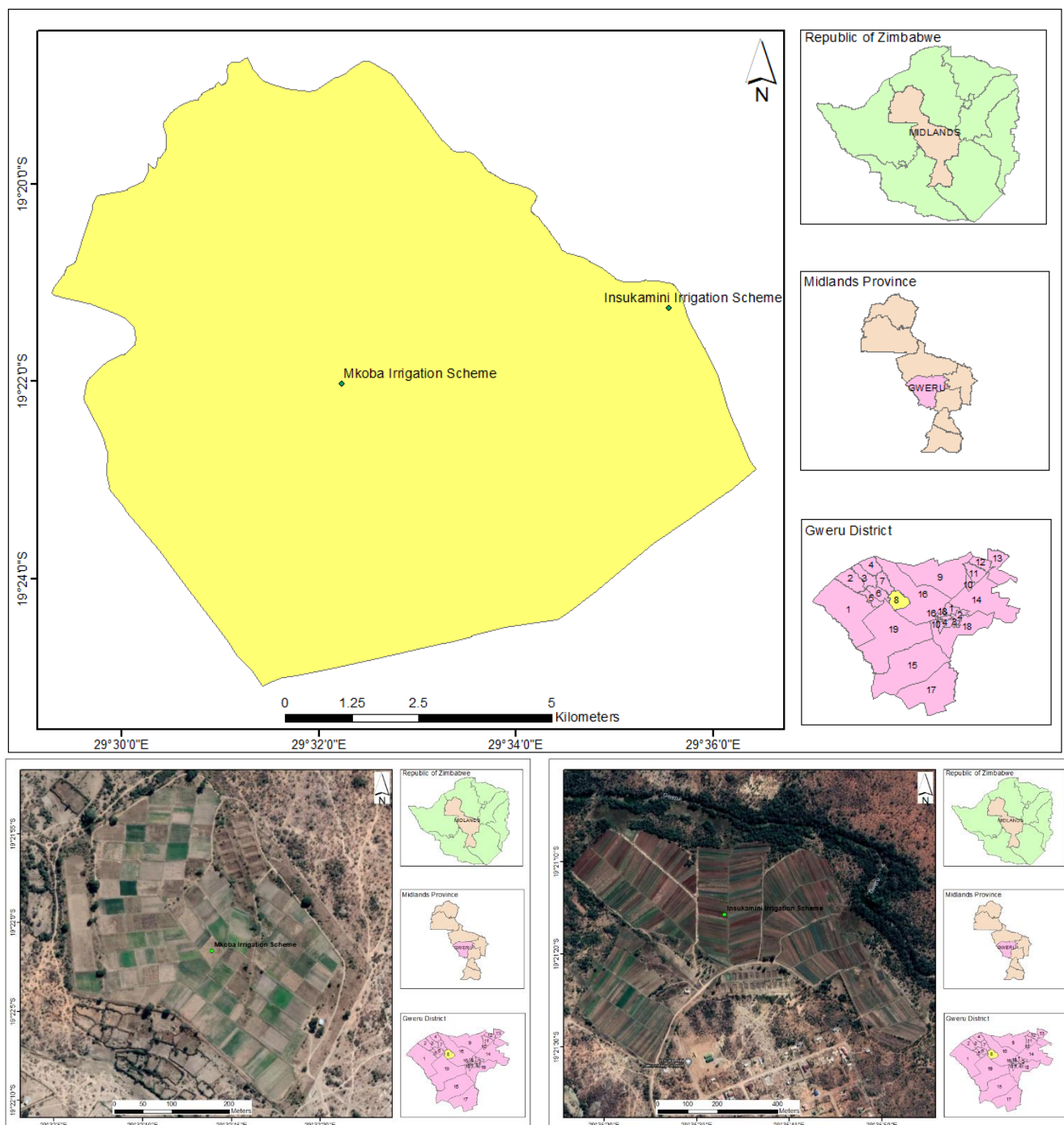
3. CHAPTER THREE RESEARCH METHODOLOGY

3.1.Study Area

Gweru District is found in the Midlands Province of Zimbabwe. Its capital, Gweru City (coordinates: S19° 23' 38.0", E29° 41' 0.28.2") is located 300 kilometers along the Harare-Bulawayo highway. The district is located in Zimbabwe's Middle veld at an altitude of about 1 350 meters above sea level. It is located in the tropics but its high altitude modifies this to a warm temperate climate. The average annual temperature is 19 °C. The climate is hot and wet during the summer rainy season from mid-November to mid-March, with cool, dry weather from May to mid-August in the winter season, and warm dry weather from August to mid-November. Winters are characterized mainly by their cold nights, with an average minimum temperature of 7 °C, and are the sunniest time of the year. Gweru falls under Natural Ecological region III and IV and characterized by annual rainfall of 500-750mm in Region III and 450-600 mm in Region IV (FAO, 2021, Makuvaro et al. 2018). The predominant farming system is smallholder agriculture. Most farmers in communal Irrigation schemes are practicing dry-land farming outside the schemes; farmers in areas such as those that fall under natural ecological region IV in the district rely entirely on Irrigation for them to realize substantial crop yields so much that all their efforts are directed to crop production in Irrigation schemes.

Mkoba Irrigation scheme is located in Lower Gweru, Ward 8 (Coordinates: S19° 22' 53.6", E 029° 32' 10.7"). The scheme was commissioned in 1968. The soils are predominantly loamy. The primary source of water is Mkoba dam and lies under Gwayi catchment. The total area which the scheme was designed for is 10.2 Hectares. The total number of current beneficiaries is 75. Agricultural produce is sold locally and at Lower Gweru shops and Gweru city supermarkets. The common crops grown at Mkoba irrigation scheme include Green mealies, Sugar beans, wheat, and okra among others. Insukamini Irrigation scheme is located in Lower Gweru District Ward 8 (coordinates: S19° 22' 24.4, E 029° 35' 25.7"). Insukamini irrigation scheme was constructed in 2001 with a total number of 115 beneficiaries (DOI 2021). The common crops grown at Insukamini Irrigation scheme include leafy vegetables, maize, wheat, sugar beans, butternut among others.

Individual informal traders make a significant link in the agricultural produce chain for smallholder farmers (KIT et al. 2006). This is the case with both of the aforementioned irrigation schemes. In addition registered formal organizations have the irrigation schemes as their raw product supply base in which PHI Commodities play a very important role in the sugar beans value chain.



Mkoba Irrigation scheme
Insukamini Irrigation scheme
 Figure 3: location of Mkoba and Insukamini Irrigation schemes source: Google maps

3.2. Study design

The study employed the 2-2 trade tool which analyzed and characterized areas of strength and weaknesses in terms of relationships between the firms and the farmers. The method is participatory where an initial investigation and understanding of the nature of requirements by both farmers and firms led to formulation of statements which were matched in interviews to see if farmers or firms perceptions are congruent of each other. Perceptions with greater deviations from each other would imply limited relationships and more information need to be exchanged and vice versa (Schrader et al. 2015).

Qualitative descriptive statistics combined with desk studies is a good approach for data analysis since a researcher is able to explain both the process and outcome of an event through observation, reconstruction and analysis of variables under investigation (Zaidah 2007). As such, the study made use of qualitative methods which enhances the analysis of data to reveal the importance of variables such as Product & Market. Interviews held included with one agricultural commodity firm (PHI Commodities). This organization was identified after a prior review of the local extension officer records which indicated that the bulk of the sugar beans from the two irrigation schemes was being sold to this private organization. In addition, 2 preliminary interviews with irrigation management committees (1 per irrigation scheme), one Agribusiness specialist, a government official under the department of AGRITEX responsible for all support services concerning smallholder farmers agribusiness issues in Gweru District, one with the Monitoring and Evaluation Officer at IFAD Zimbabwe, SIRP Programme and another with an Agribusiness Consultant at FAO Zimbabwe. These are supporter organizations in the development of smallholder irrigation in Zimbabwe. The advent of the covid19 restricted data collection through interviews to be online only. A research assistant was engaged to setup the online interviews in which an interview checklist was shared beforehand to assist the research assistant and the interviewees with the focus of the interview beforehand. The research assistant who partook in the research is my colleague at the Department of Irrigation who has some experience in data collection. Feedback to farmers to convey the challenge areas and facilitate understanding of perceptions outcome from the 2-2 trade tool was done by the local extension worker whilst feedback on the same to PHI Commodities was done by the researcher online.

A desk study was used to produce information requirements and how the same could be exchanged between farmers and firms. The desk study also revealed stakeholder roles in the sugar beans value chain particularly focusing on Mkoba and Insukamini smallholder irrigation farmers. A sugar beans chain map was produced to contribute to answering the state of relationship/s between the firms and farmers. In addition the desk study was used to triangulate and verify information from the interviews and surveys.

A survey was carried out to collect data on the perceptions of both farmers (from the two irrigation schemes) and the firm on particular aspects under each identified challenge area. Forty (40) questionnaires were sent out but thirty nine (39) responded.

Table 1: Analytical Framework

Research Questions	Variables for analysis	Testing procedure	Results
Who are the potential stakeholders and their roles in the sugar bean value	Input suppliers, farmers, 1 processors, 2 wholesalers, 3 retailers, local consumers	Value Chain Map (Desk study, 1 Semi structured Interview with a	Value Chain Map, Stakeholder analysis

		commodities firm)	
What is the current product market information available between a firm (PHI Commodities) and irrigation smallholder farmers (Insukamini and Mkoba irrigation schemes) in Zimbabwe	Product & Market, Firm, Farmers' Organization, Farmers, Communication & Planning, Delivery & Performance, Agribusiness System	2-2 trade Descriptive statistics (Desk study, 3 Semi structured Interviews with supporter organizations, 2 Surveys with farmers 1 and firms 1)	Essentials according to facilitator
What is the missing product market information between a firm (PHI Commodities) and irrigation smallholder farmers (Insukamini and Mkoba irrigation schemes) in Zimbabwe			Essentials according to firms
What could be improved to reduce the product market information and knowledge gap between a firm (PHI Commodities) and irrigation smallholder farmers (Insukamini and Mkoba irrigation schemes) in Zimbabwe			Essentials according to farmers
Which actors would improve product market information and knowledge exchange between a firm (PHI Commodities) and irrigation smallholder farmers (Insukamini and Mkoba irrigation schemes) in Zimbabwe			Top challenges Matching graphs of top challenges Stakeholder analysis

3.3.Sampling techniques

Appropriate sampling is a key research activity contributing to the research validity upon which inference can be drawn over a larger population of the research unit. This study focused on the product market information and knowledge gap between distributor firm (PHI Commodities) and irrigation smallholder farmers (Insukamini and Mkoba irrigation schemes) in which inference could then be drawn to guide other horticultural firms which are dealing with smallholder farmers in sugar beans chains or other crop chains. Thus, convenience sampling was chosen to select the firm, irrigation schemes and the farmers. Particularly for farmers, the local extension officer records were used to identify farmers who were growing sugar beans and selling to PHI Commodities. The records were not complete hence snowballing was then used to spread the word and identify other farmers to include in the research. For the irrigation schemes purposive sampling was used on the backdrop of researcher's prior knowledge that the irrigation schemes are closer to each other and sugar beans is a crop of choice at the scheme. For the survey taken by PHI Commodities, 3 personnel responded to the questionnaire out of the 4 sent. Responses were received from the company's director of operations, an agronomist and the administrative assistant responsible for procurements and payments.

4. CHAPTER FOUR RESULTS

Results were consolidated from 2 surveys, a desk study, a semi structured interview with the PHI Commodities (a private firm) and 3 interviews from supporter organizations namely Agritex, IFAD and FAO. The following results were produced inclusive of a sugar bean chain map, stakeholder analysis, essentials for farmers and firms as well as the areas where an enhanced information flow would improve the sugar bean value chain development

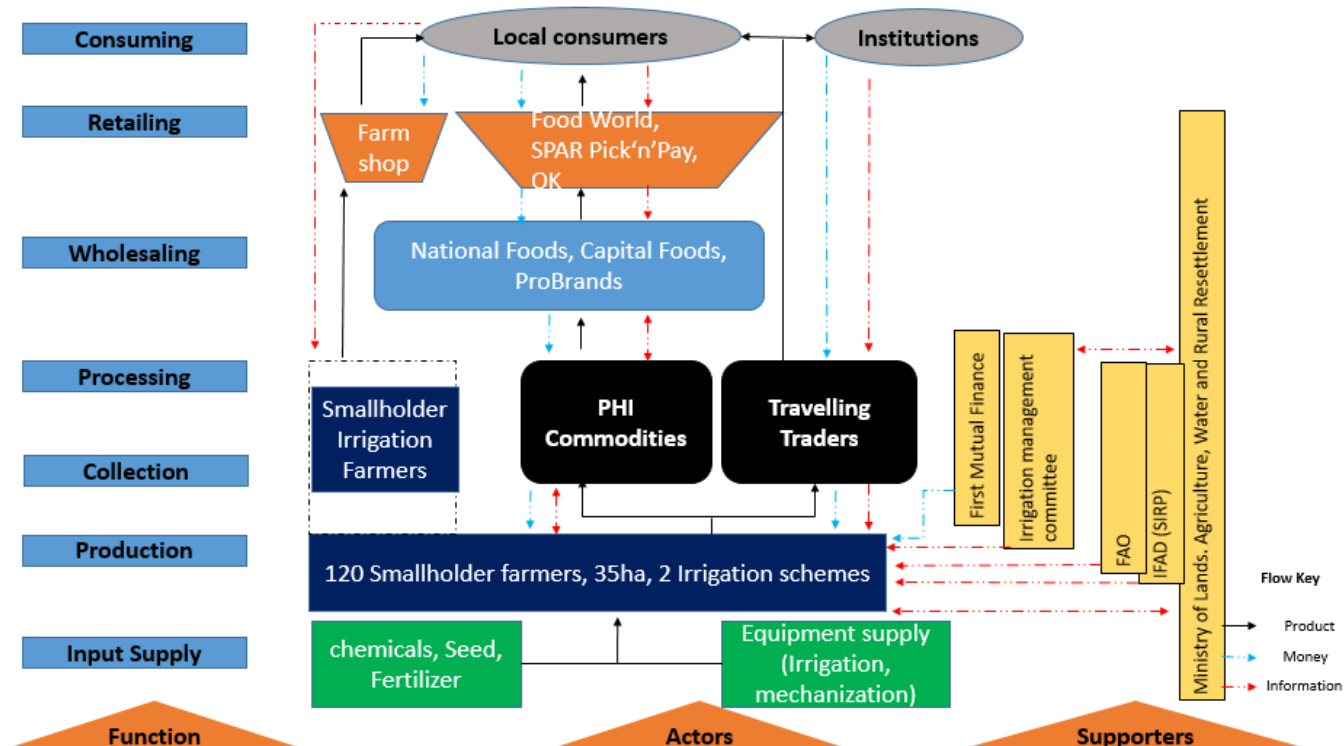


Figure 4: Sugar bean value chain MAP: Source: Author

The map in figure 4 shows that there are several channels in which the smallholder irrigation farmers sell their sugar beans and these include

- Farmers sell directly to each other and members of the community
- Farmers sell to informal travelling traders who then process to sell directly to consumers at city open markets. Travelling traders also sell to Institutions such as schools and hospitals
- Farmers sell through contracts to PHI Commodities who process and sell to wholesalers such as national foods, ProBrands and capital foods who in turn sell to supermarkets (Pick 'n' Pay, SPAR, OK, Food World) and then consumers
- PHI Commodities is a private firm that deals directly with farmers and aggregates and process sugar beans. It holds supply contracts with wholesalers such as National Foods and Capital Foods
- First Mutual finance is a microfinance organization that is in a tripartite agreement with PHI Commodities and farmers. Loans advanced to farmers are paid when farmers deliver their sugar beans to PHI Commodities through a stop order system.
- Farmers productivity is approximately 1.5tons/ha and on 35ha this translates to about 52tons
- PHI Commodities pays a higher price of USD1100/ton compared to USD900/ton paid by the traveling traders

4.1.Stakeholder Analysis

The table below presents specific stakeholders and their roles in the sugar bean value chain.

Table 2: Sugar bean value chain stakeholders and their function

Function	Stakeholder	Service
Input Supply	Zimbabwe Fertilizer company, PHI Commodities, Department of research, SEEDCO, Agricura Chemicals, Fossil Agro, Zadzamatura	Provision of fertilizers, seed, chemicals, irrigation infrastructure repairs
Production	Smallholder Irrigation Farmers (Insukamini and Mkoba Irrigation schemes)	Yearly production of at the 2 irrigation schemes with an estimated combined area of 35ha for sugar beans yielding approximately 52tons
Collection and Processing	PHI Commodities	Contracting farmers, agronomic technical extension, market creation and buyers of produce
	Traveling traders	Produce buyers
Wholesaling	National Foods, Capital Foods, ProBrands	Break bulk, repacks and brands. Links the aggregator with supermarkets.
Retailing	Spar, OK, Pick'n'Pay.	Reliable channel for reaching consumers
Supporters	IFAD	Provision of finance for irrigation infrastructure, mechanization, farmer training and government extension officers' capacity building. The finance is provided to the government of Zimbabwe. However, all payments are done by IFAD although contract works done at the irrigation scheme would be agreements between the government and private contractors doing work at the scheme
	FAO	Provision of finance for irrigation infrastructure, mechanization, farmer training and government extension officers' capacity building. The finance is provided to the government of Zimbabwe. However, all payments are done by IFAD although contract works done at the irrigation scheme would be agreements between the government and private contractors doing work at the scheme
	Department of Irrigation	Provision of technical and engineering services, infrastructure repair and refurbishment, capacity building through training of farmers in irrigation infrastructure operation and maintenance
	Department of AGRITEX	Provision of technical and agronomic extension services
	Department of Water	Provision of water, Water use regulation
	Department of Research	New sugar bean seed varieties research and production
	Agricultural Marketing Authority	Regulation and registration of agricultural commodities buyers
	First Mutual Finance	Provision of microfinance, credit worthiness screening
	Irrigation Management Committee	Scheme representative with other stakeholders. Acts as the point of reception for stakeholders before they engage freely with farmers

Source: Research interviews with FAO, IFAD, PHI Commodities, AGRITEX; (Liesdek et al., 2020)

A further investigation in the stakeholder analysis through the interviews and the survey produced the following findings in the table 3 below about the information flow in the sugar bean value chain

Table 3: Sugar bean Value Chain Information availability

Direction	Information	
	Available	Missing
PHI to farmers	Agronomic advice, commodity prices, quality requirements	*How prices change when buying *how stop orders are working
Farmers to PHI	Area available for a season, Inputs requirements, farmer capability and technical knowhow, farm resource endowments	*other farmers in the vicinity to create a sufficient large supply base *quantities required for household consumption *reason for diverting product to other buyers
First Mutual Finance to Farmers	Creditworthy rating criteria, Interests rates, loan tenor	*how other farmers not meeting the credit criteria get loans *why credit is not coming in monetary terms
Farmer to IFAD	Social and economic setup of irrigation scheme members	*farmer technical capabilities on market intelligence
IFAD to Farmers	Irrigation scheme rehabilitation technical information, asset management information, Input and Product markets,	*extent to which program/s will rehabilitate irrigation infrastructure *
Traders to Farmers	quantities required on the spot	Time for buying, prices, quality requirements, payment modalities
Wholesalers to PHI	Quantities required, quality, prices	
Ministry to Farmer		
Department of Research	Better adapting and resilient varieties information	
AGRITEX	Technical agronomic information	
Department of Irrigation	Operation and maintenance technical information	
Department of Mechanization	Machinery use, maintenance and repair technical information	
Agricultural Marketing Authority	Information on registered buyers	*Centres to access the information on registered firms *relevance of the department
Water department	Information on the legal use of water	*How water is billed

Source: research interviews with IFAD, FAO, AGRITEX, PHI Commodities

4.2. Essentials according to facilitator

Preliminary interviews with the farmers to ascertain the challenges to work with were done by the government local extension officer who then relayed her findings through the research assistant. The preliminary interview with the PHI Commodities was done by the researcher online. Triangulation was done with a desk study and noted that the essential challenge area is the area of finance.

4.3. Essentials areas according to Famers and PHI Commodities

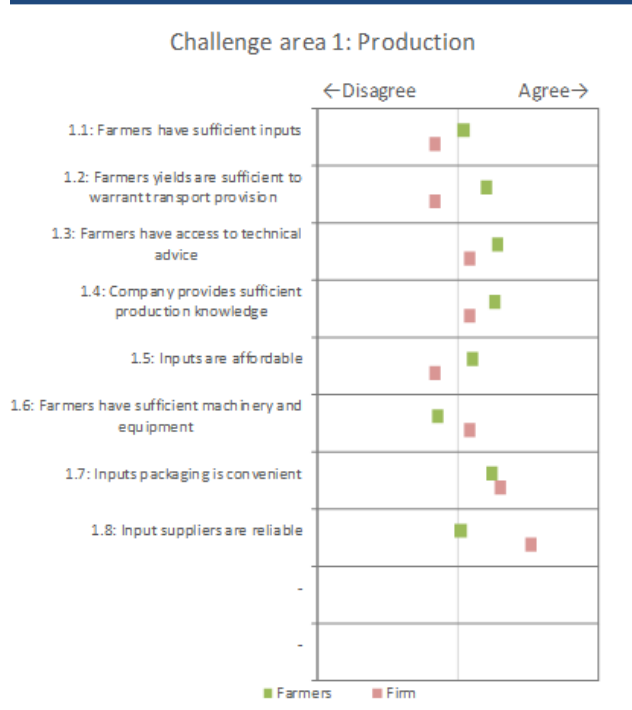
PHI Commodities and farmers pointed out important aspects within all challenge areas. The 2-2 trade tool version 2017 was used to run the analysis. Figures 5-9 show the overview of how farmers and the firm perceive the major challenge areas. The findings show that there is huge difference in perceptions within the Finance challenge areas but relatively small difference in perceptions within the market & prices and Quality & standards challenge areas. There is relatively higher degree of congruency within the production challenge area.



Figure 5: All Area Challenges: Source: Survey data

The following are graphs showing the perceptions of farmers and firms specific to each challenge area. The graphs show how divergent/convergent the perceptions of farmers and PHI Commodities are on particular issues of interest around a challenge area. H/H would mean farmers and PHI Commodities highly agree with the statement. H/L would mean farmers agree but PHI Commodities disagrees with the statement. L/H would mean farmers disagree but PHI Commodities agrees with the statement. H/H would mean farmers and PHI Commodities disagree with the statement. Annexure 3 shows the survey scores which generated these graphs.

Challenge area 1: Production



Statements	H/H	L/L	H/L	L/H
1.1: Farmers have sufficient inputs			X	
1.2: Farmers yields are sufficient to warrant transport provision			X	
1.3: Farmers have access to technical advice	X			
1.4: Company provides sufficient production knowledge	X			
1.5: Inputs are affordable			X	
1.6: Farmers have sufficient machinery and equipment				X
1.7: Inputs packaging is convenient	X			
1.8: Input suppliers are reliable	X			

Figure 6: Production Challenge area: Source: Survey data

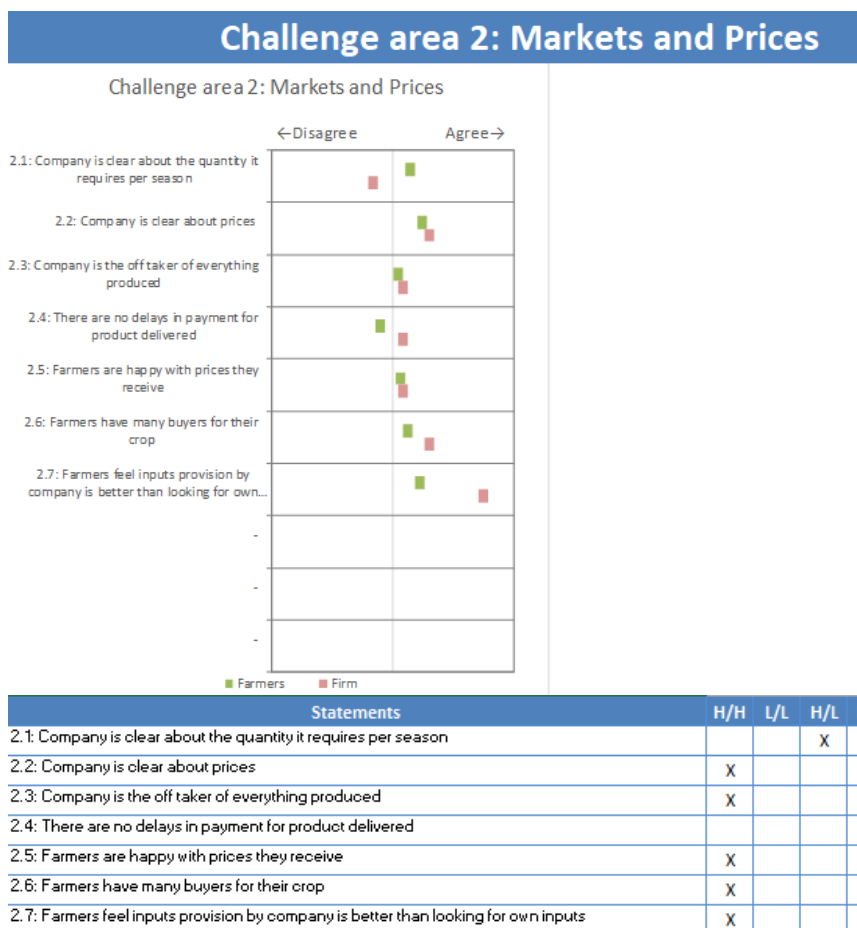


Figure 7: Markets and Prices: Source: Survey data

Challenge area 3: Finance



Statements	H/H	L/L	H/L	L/H
3.1: Farmers can access operational credit			X	
3.2: Farmers can access subsidized inputs			X	
3.3: Lending rates are competitive			X	
3.4: Tenor of facility is convenient to farmers	X			
3.5: Farmers prioritize paying back loans			X	
3.6: Farmers understand the creditworthy screening by funders		X		
3.7: Farmers understand the need for crop insurance	X			

Figure 8: Finance Challenge area: Source: Survey data

Challenge area 4: Quality and standards



Statements	H/H	L/L	H/L	L/H
4.1: Company is clear about standards	X			
4.2: Farmers understand why crop is rejected	X			
4.3: There is a satisfactory incentive for higher grades	X			
4.4: Farmers understand the Food hygiene and safety requirements	X			
4.5: Company staff observe the hygiene and food safety requirements when procuring produce from farmers	X			
4.6: Company gets the correct quantities at any one time they require them			X	
4.7: Farmers keep records of production processes			X	

Figure 9: Quality and standards Challenge Area: Source: Survey data

4.4.Areas for Improvement

The results indicated by graphs in figures 6-9 are summarised in table 5 to show non-congruent lowly performing areas in which improvements in information flow are required. The non-congruent areas are those where perceptions differ and point where information differences exist.

Table 4: Specific areas for improvement

Challenge area	Statement reference	Particular area
Production	1.1	Inputs adequacy
	1.2	Product transportation
	1.5	Inputs affordability
	1.6	Machinery and Equipment adequacy
Market and Prices	2.1	Product quantities sufficiency
	2.4	Product prices
Finance	3.1	Access to credit
	3.2	Access to subsidized inputs
	3.3	Loan tenor
	3.5	Credit screening criteria
Quality and standards	4.6	Product extrinsic attributes
	4.7	Farm Records

Source: Survey data, research interviews

In addition to the above, during the feedback session with PHI Commodities, the finance challenge area in form of credit risk was pointed to be the biggest. Attraction of more financial service players to the sugar bean value chain could be achieved if government cushions the finance service providers and absorb some of the credit risk involved with working with smallholder farmers. The influx of more players to the sugar bean value chain would inherently increase credit information accessibility to farmers as more players avail financial information in different outlays to reach and enable uptake by smallholder farmers.

On feedback to the farmers and the discussion thereof, lack of organization into a consolidated production unit such as a cooperative or producer group was said to be causing the low production quantities that are not meeting the firm's requirements. Farmers proposed the government to take to task to organize and create a producer group that can professionally handle matters with PHI Commodities and First Mutual Finance. The same proposition came from PHI Commodities where they suggested that such an arrangement will make it easy to direct operational information rather than dealing with individual farmers.

5. CHAPTER FIVE DISCUSSION OF RESULTS

5.1. Sugar bean value chain and the potential stakeholders

5.1.1. Information flow: Role of Competition

The sugar bean value chain in Zimbabwe that involves smallholder irrigation farmers at Insukamini and Mkoba irrigation schemes follows different supply chains which involve farmers selling directly to local consumers, farmers selling to travelling traders and farmers selling to PHI Commodities through a contract arrangement. PHI Commodities a private, organization, acts as a lead firm and provides all the inputs under a loan arranged by First Mutual Finance. Primary processing of sugar beans is mainly done by farmers where they mainly dry and remove physical impurities. The lot that is passed on to PHI Commodities undergoes some thorough cleaning and at PHI Commodities they grade and package for some wholesalers whilst they grade only for the other wholesalers who buy in bulk from them. Traveling traders do not do any significant processing on the sugar beans but they create the place and time utility to offer a very important link in the value chain. Although, the traveling traders offer a lower price than PHI Commodities, their existence breed a perfect ground for competitiveness. Porter (2009) confirms that entry of new actors demanding the same product from a supply base makes prices more competitive benefiting the supplier and in this case the farmer. Thus traders come with market price information that would rather be inaccessible to the smallholder irrigation farmer. In addition, Trienekens (2011) posit that access to such market information by producers develops their market intelligence skills and techniques, application and utilization which enhances confidence when negotiating contracts and engaging outside actors. This could be a contributing factor to the high price that is being offered by the lead firm.

5.1.2. Multi-stakeholder emphasis

International organizations play a pivotal role through developmental programs such as smallholder irrigation revitalization programme (SIRP) spearheaded by IFAD and Smallholder Irrigation Programme (SIP) by FAO in Zimbabwe. These organizations have enabled transfer of technical information on agronomic and good agricultural practices to create capacitated smallholder farmers. These organizations have also gone an extra mile to capacitate the government extension personnel who in turn repeat and remind farmers on the same information over time to the effect that repetition of the same information from different stakeholders creates an increased rate of innovation adoption. Yigezu et al. (2018) confirm that repeated awareness coming from different stakeholders enhances adoption and articulation of an innovation by smallholder farmers.

5.1.3. Bilateral Information Flow

The organization and coordination of stakeholders shown in the value chain map puts information flow at the centre of the value chain, particularly between the lead firm and smallholder farmers. As is put forward by FAO (2005) the chain map confirms a traditional movement of information in most agricultural supply chains where private organizations, Government institutions and supporter organizations like non-governmental organizations provide more information to the farmer than the farmer provides them. Whilst this arrangement seem to work in the short term, it is of paramount importance that more information about the farmer be shared and known by these stakeholders.

Schrader et al. (2015) claims that information about the importance of the crop at household level, farmer resource endowments, marketable surplus among other variables at farm level should be known and integrated into the agribusiness system such that the firms are able to project a business case in dealing with the smallholder farmers. PHI Commodities has set up a feedback system that allows their personnel to interact with farmers at a local level to enable physical contact and observation in collection of such information. This could be the reason for a relatively strong relationship between the firm and the farmers. Information flow between PHI Commodities and the smallholder farmers is two-way on the value chain map which could be the reason for stronger ties between the two actors.

5.1.4. Well Knit arrangements

The coming together of a financier, contractor and smallholder farmers necessitates the flow and understanding of market and financial information especially on the part of farmers. Whilst supporter organizations such as IFAD, AGRITEX and FAO also provide financial information which is generic, farmers still require information on the access and management of finance which is specific to their conditions. This is the reason why PHI Commodities linked with a financier, First Mutual Finance. The financial information transferred to farmers by First Mutual Financiers is buttressed by PHI Commodities through their local agronomist. The need for a financier to provide financial information and absorb part of the financial risk in an agricultural value chain is claimed by FAO (2004); Wytske (2019) who put it through that a financial appraisal of farmers against a credit criteria reduces the occurrence of failure or non-payment of loans by smallholder farmers. They also affirm that integration of a financier to closely interact with actors who spend more time and have contact with farmers helps transfer of relevant and specific information which benefits every actor in the value chain particularly the financier and the smallholder farmers. FAO and IFAD concur with this assertion and in their supporter roles throughout the country's irrigation schemes where they are involved, they always introduce a financier to create a tripartite arrangement bringing together a contractor/off taker, financier and the smallholder farmers.

5.1.5. Coordinated Information flow

Whilst the government through the ministry of Lands, Agriculture, Water and Rural Resettlement transfers technological information to farmers through various departments, the flow of information seems to be in a haphazard and uncoordinated fashion since each department will be pushing for own agenda. The need to harmonize policies such that they speak to each other might assist in reducing the confusion and abating the coordination. Zawe (2015) points out how important an irrigation subsector policy would be in directing what needs to be done sequentially without confusing the farmer as the main stakeholder. Thus, information flow to the farmer ought to be systematic, organized and packed in a manner that is understandable and appreciable by the smallholder irrigation farmer.

5.1.6. Accessible information from all corners

Whilst information flow on the sugar bean chain map shows production responding to market requirements, Parirenyatwa et al. (2014) argues that smallholder farmers produce and then find a

market after production. The position was echoed by IFAD SIRP programme that in their baseline surveys before interventions they found this to be factual. Hence, the deliberate proliferation and movement of information by supporter organizations to create a demand driven production activity by smallholder farmers cannot be overemphasized. This fills a great information void in which farmers need to use such information to shift their orientation of thinking that their production will find its own way into the markets.

5.2.Essentials according to Facilitator

Facilitation of bringing the farmers and the firm together enables understanding of both ends with an independent view of the issues at stake. According to the facilitator the majority of issues under each challenge area the firm and farmers seem to concur, understanding and perception is noticeably different in the Finance challenge area. Farmers gave an account of how they do not understand the financial jargon in contracts in which they sign up with the firm. On the other hand the Firm attributed the resale of inputs and subsequent failure to honour debts by farmers to a culture embedded in the system by mainly government and NGO programmes. These programmes have nursed a culture of free inputs for smallholder farmers to an extent that farmers just treat all input receipts as grants to improve their household food and nutrition security. PHI Commodities reiterated that even though they have included the services of a financier in their agricultural chains, farmers are still far from understanding financial management and how it works. At the same time farmers claimed a very high understanding and value of honouring their arrears. To cushion financiers, PHI Commodities suggests that government host some credit insurance which cushions financiers from defaulting smallholder farmers. This will reduce the credit risk burden on the financiers resulting in more financial service providers unlocking credit opportunities for smallholder farmers.

5.3.Essentials according to farmers and firm

5.3.1. Production Challenge Area

Farmers prioritize mainly issues to do with production (annexure 3 shows the actual scores). This could be the fact that inherently, farmers were cultured to focus on production only whilst other areas of finance and marketing were handled by the state. Although a major focus on production by farmers is existent, the firm still gets low quantities to satisfy their yearly requirements. An overall score for the production challenge area shows that farmers and PHI Commodities are somehow moving at the same level frequency of understanding issues. Particularly there is a perception by farmers that their inputs are adequate whilst PHI Commodities share a different view from the farmers. This could be because PHI Commodities looks at “inputs” in its holistic nature as put through by FAO (2001) that adequacy of inputs does not just relate to quantities of chemicals, seed and fertilizer. Inputs go beyond to include the quality and nature of inputs. For example, some farmers use retained seed from last harvest and would claim they have sufficient seed as an input. The information flow should allow to clear such misunderstandings and equip the farmers with the correct information on the adequacy of the inputs.

The level of production by farmers of approximately 1.5tons/ha is low by standards of national average of 2.5 tons/ha (USAID 2011). However farmers are upbeat and rank themselves as highly

producing to warrant transport provision by the firm. The firm asserts that the transport they provide is highly costly and increases severely the average cost of producing a kilogramme of sugar beans from their processing plant. The firm's high production average costs are mainly attributed to the low production volumes they collect from the irrigation schemes. The theory of costs posit that average costs should be lower than the price at which the firm sells a unit. This leaves PHI Commodities with a constricted profit margin and such information is unbeknown to the farmers. Thus, the need on information flow about the costs encountered by firms as a result of variables like low production by the farmers need to be communicated to the farmer and emphasised.

5.3.2. Market and Prices Challenge Area

It is contradictory that PHI Commodities lowly thinks about their clarity on quantities they require whilst farmers highly consider the clarity by PHI Commodities. This could be explained by the expectations of the relationship between the market information surrounding quantities required provided by PHI and the resultant quantities being produced by farmers which are way too low, meaning the information provided might not be sufficient enough. PHI Commodities have shared information about the quantities they require but the information is not enough to conclusively say farmers have all the information regarding quantities. However, on the other hand, farmers feel they have enough information about quantities required. Farmers refer to the trainings they have done, the printed materials that have been shared to them as enough information. However, these methods of information flow do not guarantee comprehension. Shah et al. (2012) recommend the use of continued emphasis throughout the season as a strategy to ensure information communicated is adopted rather than having one training at the start of the season, farmers tend to forget as they progress into the season. One such method of emphasis is to continuously send texts and reminders about your production targets and what is expected from the farmers.

Farmers lowly perceive the prices they are receiving from PHI Commodities whilst the opposite is true for PHI Commodities on prices. KIT et al. (2006) claim that this is the traditional expectation between farmers and agribusiness firms. Farmers always want a higher price whilst firms want to pay the lowest price possible. Schrader et al. (2015) confirms that the rift about prices is natural as each actor tries to profiteer off the other. However, having noted that the traveling traders buy the sugar beans at a much lower price per ton, PHI Commodities might be offering the best deal to the farmers.

5.3.3. Finance Challenge Area

Most of the variables under this challenge measured the perception on the ability of farmers to minimize the financial risk in the sugar bean value chain. The firm lowly perceived the farmers' consciousness about financial issues and the willingness and ability to pay back their loans. Farmers thought so highly of themselves and there was a huge disparity in perceptions between PHI Commodities and the farmers. Whilst farmers perceive highly how they are paying back the loans where they assert that the household challenges that require cash at harvest time overwhelm them but however they make strides in paying back the loan even though it would not be the total due. Farmers actually accuse the firm of not understanding their plight and the sacrifices they would have

made when they make a part payment of their loan instead of the full amount/s due. PHI Commodities confirms the unwillingness and the non-prioritisation of paying back loans by farmers. This credit risk of farmers not willing to pay back their loans is claimed by Mwala (2011) and Murwisi (2015) as the comparatively biggest risk in dealing with smallholder farmers. Information flow as supported by the 2-2 trade framework necessitates understanding of farmers' plight when coming up with inclusive financial mechanisms which do not strain both the lender and the borrower. The misunderstanding could also be explained by the limited information flow in the direction of the farmers to the rest of the stakeholders where the socio-economic position of the farmer is crucially important to consider for financial inclusiveness. However, whilst understanding of the farmer's background and creating inclusive financial services is profound, indications are that the credit risk is too big and requires spreading to different actors and not financiers alone. The fact that government and its development partners manage to install and supply relatively expensive irrigation equipment to the farmers, shows that there is strong belief by government in the capacities of these smallholder farmers. As such, for government, going an extra mile to provide credit insurance for the same farmers would play a pivotal role in addressing many contentious areas within the finance challenge area.

Farmers feel the tenor of facility, which is just one season (3-4 months) for their loan, is sufficient to payback whilst PHI Commodities maintains that agricultural loans need to go for 2-3 seasons which would equate to a year or above. Chandio et al. (2021) agrees with PHI Commodities that for farmers to make meaningful and sustainable investments in Agriculture, loans should be availed for a longer period than the season long short term loans. Thus, the coming on board of a financier but with limited information crossing floors, farmers tend to think and take the deal as the best whilst in terms of financial principles the tenor is not the best. This points to the lack of information flow and comprehension of agricultural finance issues and principles on part of the farmers.

Both farmers and PHI Commodities have a lowly ranked perception on the credit screening criteria. Most farmers maintain that the credit screening criteria is communicated to them but surprisingly they see some who they know won't fit the criteria successfully getting the loans. It is more confusing to the farmer to understand the credit screening criteria. PHI Commodities on the other hand maintains that although they directly deal with farmers, the responsibility of credit screening lies with First Mutual finance, a micro finance institution. The information that they provide to PHI Commodities which is then transferred to the farmers is generic and does not get to the details which First Mutual Finance claims are difficult for laypeople to understand. PHI Commodities also suggests that government should provide credit insurance to attract more financiers in the Agricultural chain. The operation of more financiers will provide financial information from a variety of players and this would enhance the financial information flow to farmers.

5.3.4. Quality and Standards Challenge area

Farmers and PHI Commodities share the same perception on the bulk of issues concerning the quality and standards. PHI Commodities claims that the motivation and the narrative especially from the NGOs that farmers should just produce food regardless of the quality dimensions since food produced

will still add to the household food and nutrition security. This has affected how quality and standards requirements could be applied in sugar bean value chain. Thus very basic quality requirements are outlined by PHI Commodities which farmers are able to meet and hence explains the few if any rejections. Luning et al. (2020) defines quality as the ability to meet or exceed consumers' expectations. This might implicitly mean that although quality and standards are not well communicated to farmers, farmers are cognizant of the need for such parameters in the value chain. This has attributed to the highly ranked perception on quality and standards by both actors.

5.4.Reflection on the Research

The research was setup backed by a research methods module which set the foundation and direction of the research project. The module presented a tremendous footing that enable the research to reveal most of the intended results in which information flow plays an important role in the sugar bean value chain development of Zimbabwe. Prior preparation for a research is of paramount importance to produce credible findings.

The data collection for the survey had to adopt the use of a research assistant. This was necessitated by the advent of the covid9 pandemic which resulted in imposition of travel restrictions worldwide. It took an extra mile and effort to seek for an appropriate research assistant, train, capacitate and monitor the assistant during data collection. This posed some challenges since for some empirical evidence it would be more proper for the researcher to have own observation of circumstances obtaining at the irrigation schemes. This limited a complete interpretation of the situation on the ground. However, the strict monitoring of the research assistant through consistent reporting, triangulation of data and the prior experiences of the research assistant in data collection salvaged the situation to present reliable data and subsequently relevant findings. The need for proper and in-depth scrutinizing of data collected formed the basis of reliability and validity of the findings.

Whilst interviews for the private sector had initially been planned for the wholesalers (Capital Foods and National Foods) it turned out that these do not directly deal with farmers and a separate private firm (PHI Commodities) which was then included for analysis, supplies both companies with sugar beans.

The 2-2 trade tool is a useful tool in analysing perceptions which can give a mirror reflection on the degree to which information is available/limited from one actor to the other in an agricultural value chain

6. CHAPTER SIX CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

6.1.1. Potential stakeholders

Potential stakeholders from the public, private and civil society sectors are involved in the sugar bean value chain. More importantly for the farmers at Insukamini and Mkoba Irrigation schemes are PHI Commodities, the ministry of agriculture departments and the NGOs. Particularly the supporter organizations involved include the First Mutual Finance a financier, FAO and IFAD are international development partners who are playing a significant role in technical information provision among other pertinent issues. These make the fulcrum and pivot upon which the sustainability of the sugar bean value chain is hinged. Traveling traders are important actors in the sugar bean value chain who bring competitiveness to the whole chain.

6.1.2. Available and missing information

The sugar bean value chain, like most of the agricultural chains follows a traditional chain in which producers sell to aggregators who in turn sell to wholesalers, retailers and consumers. As clarified by the sugar bean value chain map information flow mainly moves towards the farmer with little information moving from the farmer towards other stakeholders. The available information for the farmers includes technical production information from Agritex, PHI Commodities and the NGOs. First Mutual Finance provides information on financial management, although indirectly through PHI Commodities. Market and prices information is availed by PHI Commodities and the traveling traders. However, some stakeholders are not providing sufficient information to the farmers and more importantly such as the clarity around the credit screening criteria from First Mutual Finance, the change of product prices by PHI Commodities among other missing information.

6.1.3. Areas for improvement in the Sugar bean value chain in Zimbabwe

Although financing smallholder agriculture may be deemed risky by many, it is of paramount importance to integrate a financier with abilities to usher in a credit screening criteria so that the credit risk is reduced. However, it is also important at the same time that the financial information especially the credit screening criteria be communicated in its simplest of terms to the farmers such that there is full understanding of why one farmer's application for loan is accepted/rejected (see figure 8 and annexure 3). PHI Commodities could resolve with First Mutual Finance to allow the financier more time and a direct contact with the farmers to unpack most of the issues raised by farmers on the finance challenge area. In addition it is critical for a value chain to attract many financiers. Many financiers create a competitive environment which increases the flow of information to the farmer. This can be achieved, as recommended by PHI Commodities, if government creates a credit insurance that protects the financiers from smallholder farmers who default payment when time is due.

The production challenge area could improve on the quantities produced since both actors (farmers and PHI Commodities) agree that the way forward is to create a producer group that would function to consolidate and represent farmer's requirements when dealing with PHI Commodities. As such this would result in improved farmer organization.

6.2.Recommendations

Based on this research study it is recommended that:

- Government, through the department of irrigation, leads the creation of a producer group that can be able to consolidate and coordinate production efforts as recommended by the smallholder farmers in the feedback session.
- Government, through the department of Irrigation, creates a credit insurance that cushions financiers when farmers fail/delay to pay back their loans as recommended by PHI Commodities in the survey feedback session.
- First Mutual Finance to intensify direct farmer trainings on financial skills and techniques rather than conveying the information through PHI Commodities to enhance the effectiveness of the information delivered.

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Annexure 1: Survey Questionnaire

Statements		Scores			
		1	2	3	4
		Strongly disagree	Disagree	Agree	Strongly agree
		☹☹	☹	☺	☺☺
1 Production Challenge area					
1.1	Farmers have sufficient inputs				
1.2	Farmers yields are sufficient to warrant transport provision				
1.3	Farmers have access to technical advice				
1.4	Company provides sufficient production knowledge				
1.5	Inputs are affordable				
1.6	Farmers have sufficient machinery and equipment				
1.7	Inputs packaging is convenient				
1.8	Input suppliers are reliable				
2 Markets and Prices					
2.1	Company is clear about the quantity it requires per season				
2.2	Company is clear about prices				
2.3	Company is the off taker of everything produced				
2.4	There are no delays in payment for product delivered				
2.5	Farmers are happy with prices they receive				
2.6	Farmers have many buyers for their crop				
2.7	Farmers feel inputs provision by company is better than looking for own inputs				
3 Finance					
3.1	Farmers can access operational credit				
3.2	Farmers can access subsidized inputs				
3.3	Lending rates are competitive				
3.4	Tenor of facility is convenient to farmers				
3.5	Farmers prioritize paying back loans				
3.6	Farmers understand the creditworthy screening by funders				
3.7	Farmers understand the need for crop insurance				
4.1	Company is clear about standards				
4.2	Farmers understand why crop is rejected				
4.3	There is a satisfactory incentive for higher grades				
4.4	Farmers understand the Food hygiene and safety requirements				
4.5	Company staff observe the hygiene and food safety requirements when procuring produce from farmers				
4.6	Company gets the correct quantities at any one time they require them				
4.7	Farmers keep records of production processes				

Annexure 2: Interview checklist and guide: IFAD/FAO/AGRITEX/PHI Commodities

1. What is the role of your organization in the agricultural value chain involving smallholder irrigation farmers in Zimbabwe (in particular sugar bean farmers)
2. Potentially, what could be the expected growing area per farmer per season, number of farmers per scheme, yields/ha (before and after your interventions)
3. How do smallholder farmers market their sugar beans
4. Who could be the potential stakeholders in the sugar bean value chain involving smallholder Irrigation farmers
5. Which information about the sugar bean value chain do you think is available/missing to firms
6. Which information about the sugar bean value chain do you think is available/missing to farmers
7. What are the challenges faced by firms/farmers
8. What are the opportunities for firms/farmers
9. What do you think could be done better or differently by firms, farmers or any other stakeholder to enhance understanding of each other between firms and farmers

Annexure 3: Survey scores

Challenge area 1: Production

Statement		1.1: Farmers have sufficient inputs	1.2: Farmers yields are sufficient to warrant transport provision	1.3: Farmers have access to technical advice	1.4: Company provides sufficient production knowledge	1.5: Inputs are affordable	1.6: Farmers have sufficient machinery and equipment	1.7: Inputs packaging is convenient	1.8: Input suppliers are reliable
Scores	Farmers	54	62	66	65	57	45	64	53
	Firm	44	44	56	56	44	56	67	78

Challenge area 2: Markets and Prices

Rank by farmer		3	1	6	7	5	4	2
Statement		2.1: Company is clear about the quantity it requires per	2.2: Company is clear about prices	2.3: Company is the off taker of everything produced	2.4: There are no delays in payment for product delivered	2.5: Farmers are happy with prices they receive	2.6: Farmers have many buyers for their crop	2.7: Farmers feel inputs provision by company is better than
Scores	Farmers	59	64	54	47	55	58	63
	Firm	44	67	56	56	56	67	89

Challenge area 3: Finance

Statement		3.1: Farmers can access operational credit	3.2: Farmers can access subsidized inputs	3.3: Lending rates are competitive	3.4: Tenor of facility is convenient to farmers	3.5: Farmers prioritize paying back loans	3.6: Farmers understand the creditworthy screening by	3.7: Farmers understand the need for crop insurance
Scores	Farmers	63	63	53	54	58	48	60
	Firm	44	22	44	67	33	33	67

Challenge area 4: Quality and standards

Statement		4.1: Company is clear about standards	4.2: Farmers understand why crop is rejected	4.3: There is a satisfactory incentive for higher grades	4.4: Farmers understand the Food hygiene and safety	4.5: Company staff observe the hygiene and food safety	4.6: Company gets the correct quantities at any one time they	4.7: Farmers keep records of production processes
Scores	Farmers	58	63	55	61	56	58	71
	Firm	89	67	56	56	56	22	33