ILRI DISCUSSION PAPER 46

Measuring competitiveness and inclusivity in livestock value chains

CGIAR

INITIATIVE ON
Sustainable Animal Productivity

Measuring competitiveness and inclusivity in livestock value chains

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June 2023

ILRI thanks all donors and organizations which globally support its work through their contributions to the CGIAR Trust Fund.

Editing, design and layout—ILRI Editorial and Publishing Services, Addis Ababa, Ethiopia.

Cover photo—ILRI/ Apollo Habtamu

ISBN: 92-9146-781-2

Citation: Kassie, G.T., Asnake, W., Ouma, E., Yitayih, M., Burkart, S., Baltenweck, I. and Rekik, M. 2023. *Measuring competitiveness and inclusivity in livestock value chains*. ILRI Discussion Paper 46. Nairobi, Kenya: ILRI.

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Acknowledgments

This work was undertaken as part of, and funded by, the CGIAR Initiative on Sustainable Animal Productivity or SAPLING. SAPLING is funded by donors to the CGIAR Trust Fund.

The opinions expressed here are of the authors and do not necessarily reflect those of the International Center for Agricultural Research in the Dry Areas (ICARDA), the International Livestock Research Institute (ILRI), and the Alliance of Bioversity and CIAT (ABC).

1 Introduction

CGIAR is the largest non-profit public agricultural research group worldwide. Recently, it has been restructured with the intention of integrating its capabilities, knowledge, assets, people, and global presence for a new era of interconnected and partnership-driven research towards achieving the Sustainable Development Goals (SDGs) of the United Nations.

CGIAR and its partners has developed more than 30 Initiatives aimed at addressing one or more of the key impact areas of the SDGs. The CGIAR Research Initiative on Sustainable Animal Productivity or SAPLING is one of these. SAPLING intends to contribute to the transformation of the livestock sectors in seven countries to make them more productive, resilient, equitable, and sustainable. This initiative is projected to reach 800,000 people (male and female) by 2024. In the three-year period (2022–2024) SAPLING expects to reach 15% of the expected beneficiaries by 2030 in two countries where relationships and programs will be built (Mali and Nepal), and 35% in five countries (Vietnam, Ethiopia, Kenya, Tanzania and Uganda) where SAPLING is built on well-established relationships and long-term activities (Baltenweck and Rekik 2021). These relationships and activities include the global efforts exerted over the last decade within the auspices of the CGIAR Research Program on Livestock (Livestock CRP)1 and multi-country bilateral projects that covered different livestock value chains.

SAPLING comprises five interrelated work packages. The fourth work package (WP4) of the initiative focuses on innovation packages for competitiveness and inclusiveness of the livestock value chain. This work package serves as an organic link between the innovation-generating work packages (WP1 to WP3) and the innovation scaling work package (WP5) of the initiative. The main objective of WP4 is to generate scientific evidence, innovations, and tools that would improve inclusive and climate-smart competitiveness in livestock value chains.

Enhancing value chain competitiveness is increasingly recognized as an effective approach to generating growth and reducing the rural poverty that is prevalent in the developing world. This can be done by raising productivity and increasing efficiency of agricultural value chains, which are essential for the success of rural economies and the growth of incomes of rural populations (Webber and Labaste 2010). The performance and sustainability of agricultural value chains depends on their competitiveness in domestic and global markets. However, the terms of trade for agricultural products are generally low for developing countries, mainly due to limited value addition and high production and transaction costs. Therefore, all value chain actors must continuously review, perform appropriate interventions, and efficiently upgrade their products and services to increase their competitiveness and gain benefits from their respective value chains.

Investing in the competitiveness of value chains requires understanding of their key indicators in the context of the different value chains and geographic specificities. As explained above, SAPLING's WP4 intends to generate scientific evidence, innovations, and tools to ensure improved competitiveness of livestock value chains so that they are more rewarding for all value chain actors, thus contributing to inclusive and equitable economic growth.

1 The Livestock CRP evolved out of Livestock and Fish CRP.

We are beginning this broad effort with a detailed review of the literature on indicators of competitiveness and inclusiveness of value chains. This will guide the conceptualization of competitiveness and inclusiveness, before narrowing down to the indicators of the value chains being worked on in the different countries. This report presents the findings of the literature review and the indicators identified based on the experiences (CAS Secretariat 2020) and the unique characteristics of our value chains.

The report is structured as follows. First, the key concepts of competitiveness and inclusivity are defined in generic terms (Section 2) and within the context of value chains (Section 3). In Section 4, how competitiveness and inclusivity can be measured is discussed in general terms for agricultural value chains. Then, in Section 5, a summary of the indicators of competitiveness and inclusivity in agricultural value chains is given. Section 6 summarizes the challenges in measuring competitiveness and inclusivity in agricultural value chains and Section 7 presents the indicators identified as the most appropriate to measure competitiveness and inclusivity in the livestock value chains that SAPLING is targeting in the different countries. Finally, brief concluding remarks wrap up the report.

2 Defining competitiveness and inclusivity

2.1 Competitiveness

Economic theory defines the competitiveness of an economic agent in terms of fair and continuous success in markets. More specifically, Babu and Shishodia (2017) defined competitiveness as the attributes and qualities of an economy that allow for a more efficient use of factors of production. Fagerberg (1988) defines competitiveness as the ability to achieve the main economic objectives, including growth in income and employment. Based on Fagerberg's conceptualization, Šegota et al. (2017) discuss that competitiveness at the micro level is usually equated with market success, that is, with the dynamics of market share and its positioning on the quality scale.

In the context of agriculture, competitiveness can be defined as a company's ability to continuously produce agricultural products to meet the demand of the open market (Babu and Shishodia 2017). These authors distinguish between agriculture and agribusiness in defining competitiveness such that in agriculture it is a matter of using specialized production technology, institutional reform, and commercial farming systems, while in agribusiness, competitiveness includes manufacturing and services beyond competitive agricultural production. These authors discuss that high competitiveness can be acquired by working on three categories of factors, i.e., underlying factors, intermediate factors, and immediate factors.

The underlying factors are those that take about 10 or more years to change, such as the political economy of a country, the governance and sophisticated buyer legislative system, the judicial system, the level of corruption, international relations, political stability, natural resources, buyer knowledge and adaptability, and trust in the political system. Intermediate factors include those that take about 5 to 10 years to change. Factors such as the labor market, input-output markets, ease of doing business, infrastructure, market size supporting industries, the stability of the exchange rate, the competence of human resources, the tax system, enforcement of legislation, and investment in research and innovation fall into this category. Immediate factors include those that take about 2 to 5 years to change. Factors such as intensity of competition, innovations in competing markets, skill development, information flow, access to affordable technology, regulation, and access to finance are included in this category. The intensity with which each factor affects competitiveness differs with the country and context (Babu and Shishodia 2017).

2.2 Inclusiveness/inclusivity

During the last three decades, a worldwide consensus has emerged that increasing inequality is a significant threat to sustainable economic growth and there is need for a more socially inclusive and sustainable growth approach (Samans et al. 2015; Benner and Pastor 2016). Inclusive growth emerged as a second school of thought to address inequality as a predecessor of the pro-poor growth strategy (Benner and Pastor 2016). However, inclusive growth

goes beyond pro-poor growth as the focus is not solely on the conditions of the poor, but on the relative conditions of both the poor and the better off (Benner and Pastor 2016). Inclusive growth can be thought of as a strategy to increase the extent to which the top-line performance of the economy is translated into the bottom line result society seeks, that is, broad-based expansion of economic opportunity and prosperity (Samans et al. 2015). Inclusiveness is defined by the Rockefeller Foundation as one in which there is an expanded opportunity for more broadly shared prosperity, especially for those facing the greatest barriers to advancing their well-being (Benner and Pastor 2016). In developing this understanding, the Foundation argues that inclusive economies have five broad characteristics. They are equitable, participatory, growing, sustainable and stable (Benner and Pastor 2016).

At the business level, inclusion is defined as a business model that includes the poor as consumers, producers, workers and entrepreneurs, and combines profit with societal goals in a way that is adopted to local needs (Likoko and Kini 2017). The inclusive business concept emphasizes the commercial, developmental and poverty alleviation potential of small-scale farmer inclusion in global value chains as entrepreneurs (Chamberlain and Anseeuw 2019; Ros-Tonen et al. 2019).

Inclusion has different dimensions. Economic inclusion is considered as the gradual integration of individuals and households into broader economic and community development processes (Andrews et al. 2021). Social inclusion is a process that ensures that those at risk of poverty and social exclusion gain the opportunities and resources necessary to fully participate in economic, social, political and cultural life and enjoy a standard of living that is considered normal in the society in which they live (United Nations 2016).

The literature shows that competitiveness and inclusivity have different dimensions and could mean related but different things depending on the type of value chain and the specific node. Though these concepts can hardly be defined in a way relevant to all economic activities and the different contexts in which they operate, the temporal dimension of the different characteristics of competitiveness and inclusion is crucially important in understanding them.

3 Competitiveness and inclusivity of value chains

Value chains are defined as the full range of activities required to bring a product or service from conception through the different phases of production (involving a combination of physical transformation and the input of various producer services) to final consumers and final disposal after use (Baltenweck et al. 2019). Therefore, they denote numerous actors and could have multiple nodes with one or more intermediate and final goods and services. As such, value chains include all vertically linked interdependent processes that generate value for the consumer, as well as horizontal linkages to other value chains that provide intermediate goods and services (Webber and Labaste 2010).

3.1 Competitive value chains

Looking into competitiveness within the framework of value/supply chains is justified in many ways. Competitive advantage cannot be understood by looking at a firm as a whole (Porter 1985). A systematic way to examine all the activities that a company performs along with its interaction is necessary to analyze the sources of competitive advantage. According to the supply chain literature, a competitive supply chain is essential for a company's go-to-market strategy and important for winning business. It really comes down to three critical elements: excellence, strategic alignment, and optimized demand management (Vokurka, Zank and Lund 2002).

Hence, based on the reviews, competitiveness in the context of agricultural value chains is defined as the attributes and qualities of the value chain which enable a more efficient use of resources to sustainably improve the standard of living of all value chain actors and to provide them with a high level of employment and social cohesion.

3.2 Inclusive value chains

During the past three decades, high-value agricultural markets have become more sophisticated, consolidated, and regulated, making it increasingly difficult for smallholder farmers to participate in these markets. Taking sub-Saharan Africa as an example, there are several key barriers for smallholder farmers participation in high-value agricultural markets including high transaction costs, lack of access to improved technologies and productive assets, lack of collective action, and exploitative intermediaries (Henson et al. 2008; Ola and Menapace 2020). Ola and Menapace (2020) show that access to high-quality inputs is the main constraint for smallholder farmers, followed by concerns about access to credit, the high cost of meeting food standards, absence of cooperatives and exploitative intermediaries. These challenges often lead to low productivity, low income, and food insecurity among smallholder farmers in sub-Saharan Africa.

Determining how to effectively increase the participation of small and medium-sized producers in high-value agricultural markets requires a thorough understanding of how markets work. Henson et al. (2008) suggest that

institutional roles need to be clarified, and knowledge about constraints related to remunerative smallholder inclusion strengthened. Similarly, Barrett (2008) argues that interventions aimed at facilitating smallholder organization, reducing the costs of intermarket commerce, and improving access to improved technologies and productive assets are central to stimulating smallholder market participation.

Inclusive value chain development has been defined as a positive or desirable change in a value chain to extend or improve productive operation and generate social benefits and other development goals (UNIDO 2011). Inclusive value chains typically target smallholder farmers as a large subset of the rural poor, characterized by different degrees of marginalization and destitution, and constrained access to technologies, assets, capital markets, financial services, education training, and input and output markets (Kilelu, Klerkx and Leeuwis 2017).

To identify indicators to measure inclusiveness of value chains, we believe that it is important to understand how inclusiveness can happen in value chains. The value chain literature proposes several strategies toward inclusive value chains (Devaux 2016; Ros-Tonen et al. 2019; Horton et al. 2022). The first strategy involves partnerships between leading firms and producers, with the former playing a supporting role in improving producers' access to markets, knowledge, and technologies (UNIDO 2011). A second approach is social upgrading: improvement in producer rights and working conditions (Alford, Barrientos and Visser 2017). This adds a focus on labor and particularly labor agency in the discussion of inclusive VCs (Ros-Tonen et al. 2019). The third strategy focuses on the empowerment of smallholders. This strategy recognizes that power relations shape farmers' upgrading opportunities, the distribution of added value and income rewards (Bassett, Koné and Pavlovic 2018); may aggravate local inequalities and nonparticipation in chains (Devaux, 2016; Vicol et al. 2018); and /or lock smallholders into dependent relations that give leading firms more control over their supply (Bassett, Koné and Pavlovic 2018). A fourth approach situates value chain participation in a broader perspective of livelihoods, recognizing farmers' (need) diversification of livelihood activities on and off the farm (Vicol et al. 2018). Finally, inclusive value chains recognize the ownership and opportunities of gendered assets and the need to address the bottlenecks to equal participation and benefit sharing of women in value chains. Gender-sensitive value chain literature focuses on enabling policies that level the playing field by reforming laws, policies, and gender norms and relations that constrain women' access to land credit, other assets, and an equal position in labor codes (Stoian et al. 2018).

Despite rapid mainstreaming of inclusiveness in policy discourse, remarkably little literature is available that sheds light on the operationalization of inclusiveness of farmer value chain engagement (Ros-Tonen et al. 2019). In inclusive value chain networks, a balance (the right partner mix) is needed between producers, buyers, public actors, and nongovernmental organizations (NGOs) to ensure that economic viability or welfare concerns such as poverty and food security are not compromised. Inclusive business models should align with local conditions and the diverse livelihood needs and strategies of farmers. There is also a need to engage in frugal innovation that is affordable, simple, and resource-efficient products and services with minimal impact on the environment and high value of use for the bottom of the pyramid (Ros-Tonen et al. 2019).

Inclusivity of value chains implies fair and continuous participation and empowering of different actors across the different nodes of the value chains. We also understand that coming up with a universal definition for inclusion is as irrelevant as it is difficult. For our study, we define inclusiveness of value chains as the observed and unobserved procedures and rules that enable or otherwise expand economic opportunities for more broadly shared prosperity, especially for those actors facing the greatest barriers, for instance, due to social and economic marginalization, to advancing their well-being.

4 Measuring competitiveness and inclusivity of value chains

The measurement of competitiveness and inclusivity depends on the type and key goals of the economic unit, the context in which it operates, and the purpose of the measurement. This implies that there is hardly a one-size-fits-all approach to define measurement, and the methods to do so, for competitiveness and inclusivity. Therefore, we will summarize the broad discussions on measurement of these two key concepts and then investigate measurements within the context of agricultural value chains.

4.1 Measuring competitiveness

There is rich literature on the methodology for measuring the competitiveness of markets and value chains (Wijnands, Berkum and Verhoog 2015; OECD 2021; Pathiraja, Wijetunga and Krishnapillai 2022; Zia et al. 2022). According to OECD (2021) market competition is measured by market concentration, which is the extent to which the distribution of the market across firms is limited to relatively few firms. It can be measured by concentration ratio (CR) and the Herfindahl-Hirschman Index (HHI). CR requires information on the number of firms and the market shares of the largest firms. HHI is more data-intensive than CR as it requires information on the firm size distribution (the market shares of each firm).

Competitiveness may also be measured by the level of entry barriers. Measures of entry barriers are sunk costs, economies of scale, and regulatory barriers. The third measure of competitiveness is dynamic structural measures. This can be measured by entry and exit rates and by the average age of firms. The entry rate can be calculated by dividing the number of new firms in each year by the total number of active firms in that year. The exit rate is also captured using the number of exiting firms in each year. This measure aims to capture the phenomenon that competition may attract new challenger firms to the market and force the exit of the least efficient firms. High entry and exit would be prerequisite for innovative and competitive markets. Performance measures, such as firm markups and firm profits, can also be used to gauge competitiveness.

According to Babu and Shishodia (2017) competitiveness can be measured with domestic resource cost (DRC) ratio, profitability growth, return on asset, return on equity and earnings before interest, taxes, depreciation and amortizations. Total factor productivity (TFP), which is defined as an index of total output over total input, can also be used as a measure of competitiveness (Babu and Shishodia 2017).

Another important method to measure national competitiveness of agribusiness is the revealed comparative advantage (RCA). RCA calculates a country's export share of a single agro-commodity to all agricultural commodities compared to the similar share of a group of countries (Webber and Labaste 2010; Dedehouanou, Diamaranan and Laborde 2019). Dedehouanou et al. (2019) compared the prices of traded goods and the prices of competitors' goods to identify price competitiveness. The increases in efficiency are captured by measuring the agricultural value added per worker, which is also a proxy for agricultural productivity. Productivity in terms of net value added is a

crucial measure of value chain performance (Webber and Labaste 2010). Porter (1985) suggests that to evaluate the level of competitive advantage of a firm, one can examine five competitive forces, i.e., the entry of new competitors, the threat of substitutes, the bargaining power of buyers, the bargaining power of suppliers, and the rivalry among the existing competitors.

Taking a study conducted in Mali as an example, we will show the steps taken to study the competitiveness of the agriculture sector within the value chain framework. First, the production potential for each sector was determined by adding data on the number of producers, production, farm yields, unit price and revenue. Then the regional potential based on comparative advantage was analyzed. Then, subregional identification sheets were created to determine the suitability of crop selection followed by illustration of the growing months and seasonal market demands for all products. Finally, analysis was performed to show constraints and subsequent interventions that would improve value chain competitiveness (Webber and Labaste 2010).

The empirical evidence summarized above shows that the conceptualization and measurement of competitiveness is heavily borrowed from marketing literature. Accordingly, the suggested measurements are directly related to market performance analysis that is based on the rich experience in gauging firm competitiveness. In fact, pre-market activity performance indicators such as efficiency and total factor productivity have also been given considerable emphasis as measuring parameters for competitiveness. The different indicators of competitiveness in the marketing literature can easily be adapted and applied in analyzing competitiveness of value chains.

4.2 Measuring inclusiveness of value chains

Assessing the inclusiveness of a value chain is guided by the dynamic within the value chain in question. Dynamics in value chains implies that firms can enter or move between different stages of the chain to gain higher returns for their participation. In the value chain literature, this movement is referred to as 'upgrading' (Fernandez-stark et al. 2012). Humphrey & Schmitz (2002) identified four types of upgrading. These are process upgrading–the adoption of new technologies to improve the efficiency of the production, product upgrading–the production of higher value products, functional upgrading–acquiring new functions that require a new set of skills, and chain or inter-sectoral upgrading–where actors move into new but often related industries. Upgrading varies between and within value chains. Therefore, inclusiveness must consider this important aspect of value chains with respect to the roles and powers of different actors.

Andrews et al. (2021) say inclusivity is achieved by addressing multiple constraints or structural barriers faced by the poor at different levels:

- Household and individual level
    - Human capital (health education improves skill, agency and networks exercise agency, access and process information and risks in productive investments),
    - physical capital,
    - social capital,
    - intra-household dynamics,
    - human rights, and
    - aspirations.
    - Community level
    - Social norms, gender norms, exposure to risk,
    - Local economy
    - local market for inputs, outputs and labor,

- Integration with regional and national markets,
- Meso-level services (agriculture extension, financial services) and infrastructure,
- Institutional
- Government
- Political, social, and administrative structure, fragility, network of NGO, private sector and civil service organization actors.

Hence, a pathway to economic inclusion at scale enables measuring of inclusiveness at individual, household, community, local and institution level (Andrews et al. 2021).

Another global measure of inclusivity is the inclusive development index (IDI). IDI was introduced by the World Economic Forum in 2017 (Dörffel and Schuhmann 2022). It attempts to benchmark the socioeconomic development of countries in a way that provides a more nuanced vision of inclusive economic progress. The IDI included 12 key performance indicators of inclusive development, that is, gross domestic product (GDP) per capita, employment, labor productivity, health life expectancy, median household income, poverty rate, income Gini, wealth Gini, adjusted net savings, public debt, dependency ratio and carbon intensity of GDP (Brende 2014).

The literature on inclusiveness measurement is inclined towards the economic empowerment of the different actors in the value chain. Inclusivity is, in fact, essentially about the voluntary and rewarding engagement of the socially disadvantaged, politically disempowered and economically marginalized components of the economic society. Therefore, the measurement and the indicators to be used must be determined based on the focus and purpose of the inclusion to be measured. We will focus on measuring inclusion by focusing on economically and socially disadvantaged actors in the livestock value chains.

5 Indicators to measure competitiveness and inclusivity of agricultural value chains

5.1 Indicators to measure competitiveness of agricultural value chains

Numerous studies suggest potential indicators to measure competitiveness from different perspectives. Both country-level and household-level indicators have been suggested. As our interest is in measuring the competitiveness of livestock value chains based on the competitiveness of key actors, we will summarize the indicators accordingly. Among the competitiveness indicators identified by Blandinières et al. (2017), factor productivity, profit, price/cost competitiveness, and quality of the product could be applied in livestock value chain analysis. Similarly, Dedehouanou et al. (2019) suggested that competitiveness be measured through its microeconomic derivers such as labor costs, input costs, productivity, etc.

Webber and Labaste (2010) recommended efficiency as a measure of competitiveness. Productivity, product quality, transaction costs (economies of scale), access to networks access to markets, training (technical and entrepreneurial), collaborative networks (among small produces and within chain stakeholders), and finance could also be used as indicators for measuring competitiveness (Fernandez-stark, Bamber and Gereffi 2012).

At a broader scale, Babu and Shishodia (2017) suggested that efficient land markets, efficient management of agriculture risks, technology adoption and innovation, sustainable management of natural resources efficient institutions, effective infrastructure, a conductive economic environment, investment in health and education, and wide market access could help as indicators for measuring competitiveness in agribusiness. According to Rota (2016) the following indicators could be used as measures of agricultural value chain competitiveness: annual income, stability of income flows throughout the year, physical assets and savings, off-take of livestock and livestock products, number of new market channels providing access for producers and each actor, and the relative importance of these channels.

Baltenweck et al. (2019) categorized indicators that are expected to affect the performance of the value chain into process or efficiency indicators and livelihood impact indicators. Under process or efficiency indicators, they categorized the indicators under structure, conduct, and performance. The indicators of understanding the structure of the value chain are the volume transacted and the market orientation. The volumes of the commodity produced and sold during a specified period are indicators of volume transacted and market orientation. Types of value chain business linkage between actors and prices such as input price, producer price, aggregator price, processor price, retail price, and consumer price are indicators grouped under conduct. Under performance, there are indicators that can be used to measure value chain and equity performance. These indicators include distribution of gross margin, total value added, and distribution of value added along the value chain and financial indicators on business

performance, i.e., annual profits, return on investment, and return on assets. Dedehouanou et al. (2019) identified that price, quality, and degree of product differentiation can also be used as indicators to measure competitiveness.

Finally, following Porter (1985), a broad set of indicators to measure competitiveness could be derived from the Competitiveness Diamond framework. The Competitiveness Diamond framework has been validated by numerous analytical and case studies and is now used by industries and governments worldwide to assess industry cluster competitiveness and to develop strategies for improving competitiveness (Webber and Labaste 2010). The framework is structured around four pillars:

1. factor (input) conditions: skilled labor, infrastructure, and others;

2. demand conditions: size and type of accessible demand;

3. related and supporting industries: presence of supplier and supporting industries; and

4. context for firm strategy and rivalry: conditions for conducting business (Webber and Labaste 2010).

5.2 Indicators to measure inclusivity of agricultural value chains

Fernandez-stark et al. (2012) proposed a series of indicators to measure inclusion. They suggested access to the market (link between smallholders and the private sector, proximity to the final buyer, facilitating intermediaries), access to training (training in productivity and quality, awareness building, technical and entrepreneurial training, and social skill training), coordination and collaboration (farmer empowerment, development of social capital, strong public and private partnership), and access to finance. Additionally, economic scale in production, access to information, reputation (collective action), credit access, access to cheaper inputs, horizontal and vertical coordination, and collaboration were identified as potential indicators.

The framework of inclusive growth indicators developed by the Asian Development Bank in 2014 focuses on two outcome measures, i.e., the reduction of poverty and inequality. The framework focuses on indicators around three pillars, namely, economic growth, social inclusion, and social safety nets, which are underpinned by indicators that measure a foundation of good governance and efficient institutions (Benner and Pastor 2016).

Based on the definition of inclusiveness and the five broad indicators (equitable, participatory, growing, sustainable and stable) given by the Rockefeller Foundation, Benner & Pastor (2016) suggested 15 subcategories, 57 (49 core and 8 additional) indicators that could help in measuring inclusive economy. They identified three subcategories or groups of indicators under each of the broad characteristics. Within equitable upward mobility for more people, inequality is declining and equal access to public goods and ecosystem services were identified. Under participation, people can access and participate in markets as workers, consumers, and business owners, market transparency and information symmetry, and widespread technology infrastructure for the betterment of all were suggested. For growth, increasing good job and job opportunity, improving material well-being, and economic transformation for the betterment of all were identified. For sustainable, social, and economic well-being to be increasingly sustained over time, greater investments in environmental health and reduced use of natural resources were recommended, as well as decision-making processes that incorporate long-term costs. Finally, under stable public and private confidence in the future and the ability to predict the outcome of economic decisions, members of society can invest in their future and economic resilience to shocks and stresses was suggested (Benner and Pastor 2016).

Indicators for measuring inclusivity that were proposed by the United Nations are access to material resources (income, employment, land, and housing), education and health care, people exercise their voice or interact with each other, have rights and dignity, equal respect and protection, have agency or control over important decisions, as well as reduced feelings of alienation and inferiority (United Nations 2016).

6 Challenges in measuring competitiveness and inclusivity in agricultural value chains

6.1 Challenges in measuring competitiveness in agricultural value chains

There is a rich set of literature on measuring business competitiveness that can be adapted to agricultural value chains (Kožená and Chládek 2012; OECD 2021). However, most of the measurements have been done at the country level and the analyses focus on comparisons of competitiveness at the country level. Competitiveness is rare to find measured at the value chain or household level, especially in the developing world. An exception could be the study on the competitiveness of African export commodities such as sesame seeds, legumes, and pulses by Dedehouanou, Diamaranan and Laborde (2019).

The problems associated with adapting to the flexible scope and dynamics within the value chain are also critically important. Agricultural value chains could be domestic, global or both. This could of course change over time. Similarly, the power of the different actors in the agricultural value chains is also heterogeneous and dynamic. Added to these, the contextual characteristics of value chains also make it difficult to suggest broadly applicable indicators or measurement approaches without sufficiently emphasizing the need for contextualization of the approaches.

The fact that we are using the value chain approach is also another source of challenges. Value chain analysis too often focuses simply on improvements within the given value chain, rather than on how value chains can be shifted to target different, more attractive markets and business strategies (Webber and Labaste 2010). Additionally, a value chain analysis is not designed to help businesses and planners weigh choices about the delivery of product quality, information and service (Webber and Labaste 2010).

6.2 Challenges in measuring inclusivity in agricultural value chains

The problems associated with measuring inclusivity in agricultural value chains are closely related to the challenges that remain in defining the term itself and the assumptions around it. The purpose and dimension of inclusion of a given value chain depend on the type of value chain, its location, and the characteristics of the key actors in it. Inclusiveness is not an end in itself. It is a process and needs to be evaluated based on the specific goal that it is meant to help achieve. Hence, contextual definitions and assumptions that guide the conceptualization of inclusion should be considered accordingly.

Ros-Tonen et al. (2019) summarize the contestations around the assumptions regarding positive development effects of market integration and company-producer partnerships in value chains that create some confusion in defining and analyzing inclusiveness. First, these integrations may aggravate existing inequalities and exclude people who, based on gender, ethnicity or age, have less access to land and capital (Crane et al. 2014; Bassett, Koné and Pavlovic 2018). Second, value chain inclusion is often insufficient as a condition for poverty reduction (Ros-Tonen et al. 2015; Tobin, Glenna and Devaux 2016; Kilelu et al. 2017). Third, 'adverse inclusion' occurs when structural market and tenure conditions and farmers' limited agency and access to assets lead to participation without material gains and capital accumulation (Alford, Barrientos and Visser 2017; Kilelu et al. 2017). Fourth, value chain inclusion may lead to disempowerment, as power imbalances and weak state institutions may induce land grabbing, unequal sharing of benefits and risks, and companies unilaterally setting the terms of inclusion (Alford, Barrientos and Visser 2017). Fifth, value chain inclusion is assumed to be the desired state, ignoring that farmers may deliberately disengage from commodity production (Tobin, Glenna and Devaux 2016). Finally, gender inequalities inscribed in formal institutions (e.g., laws, regulations, standards) and informal institution (e.g., norms and attitudes) often limit women's ability to participate in value chains and reap the benefits thereof (Said-Allsopp and Tallontire 2015; Stoian et al. 2018). Such a critique calls for a more nuanced conceptualization of value chain integration.

7 Indicators of competitiveness and inclusivity of livestock value chains

Value chains are an important vehicle for achieving livelihood impacts as they touch on economic, institutional, and social systems. Livestock value chains have unique characteristics, as the main products are relatively high value, bulky and perishable (and therefore their conservation and storage for use is not as easy as it is for other products such as crops (Baltenweck et al. 2019). Moreover, the delivery of some inputs, such as animal health and genetic services, is costly as they require specialized expertise and unique infrastructure. At the livestock keeper level, in addition to providing products such as milk, meat, and eggs for home consumption or sale, livestock performs multiple functions. Livestock assets often comprise the primary means of inflation-proof savings and insurance in rural areas where formal financial services may be unavailable. This means that the decisions of the livestock keepers in terms of type and level of participation in the chain are influenced by many factors (Baltenweck et al. 2019).

We consider producers, collectors/semi-traders, domestic traders, processors, service providers (finance, health, artificial insemination, etc.) and exporters as key actors in livestock value chains in the countries where SAPLING is operating. Therefore, the indicators of competitiveness and inclusivity are listed along the key measurements that need to be made for each of these actors. These indicators will be useful to measure competitiveness and inclusion in value chains in general terms. Specific studies or projects could, however, limit the number of indicators they are using or might introduce others depending on their focus and purpose. The indicators below might not be exhaustive, and yet they could be too many for specific research and/or development intervention. Therefore, researchers and development professionals must identify and prioritize indicators that best serve their purpose.

Table 1: Indicators for competitiveness and inclusivity in small ruminant value chains

	Competitiveness		Inclusivity	
Actor	Indicators	Key measurements	Indicators	Key measurements
Producers	Uniqueness of product(s)	Product quality, timeliness of product delivery scale of supply Price premium	Wealth cluster (proportion of the poor)	Asset and monetary income based wealth clusters Market participation across the wealth groups Market participation across age and sex groups
	Efficiency and productivity	Agricultural value added per worker, total outputs, total inputs	Hired/family labor	Sex and age composition of hired and family workers Seasonal characteristics of family and hired labor use
	Level of commercialization	Marketed surplus, marketable surplus	Access to markets	Distance to market, frequency of market visits, proportion of successful market trips, link between smallholders and private sectors, trust in intermediaries All disaggregated by age and sex when applicable
	Net income	Cost flow, revenue flow	Access to training	Distance of agricultural extension center, number and types of training sessions attended, number of sources of relevant information All disaggregated by age and sex when applicable
	Access to market	Distance to market, frequency of market visits, proportion of successful market trips, link between smallholders and private sectors, trust in intermediaries, barriers to entry (sunk cost)	Access to finance	Distance of sources of finance, quantity of financial loans received, number of loans received, current credit status
	Farm/firm size	Labor use, capital owned, product profile, volumes of the commodity produced and sold	Social and economic partnerships	Number of partnerships with traders, consumers, and other clients Membership in collective actions Social capital within and outside residence Number of informal and formal contracts Number of additional buyers approaching smallholder groups horizontal and vertical coordination and collaboration
	Transaction cost	Market access costs, policy (government intervention) induced costs		

	Competitiveness		Inclusivity	
Actor	Indicators	Key measurements	Indicators	Key measurements
Collectors/ semi-traders	Farm/firm size	Labour use, capital owned, product profile, volumes of the commodity produced and sold	Wealth cluster (proportion of the poor)	Asset and monetary income based wealth clusters Market participation across the wealth groups
	Access to market	Distance to market, frequency of market visits, proportion of successful market trips, link between smallholders and private sectors, trust in intermediaries, barriers to entry (sunk cost)	Hired/family labor	Sex and age composition of hired and family workers Seasonal characteristics of family and hired labor use
	Financial health	Profitability growth, return on assets (ROA), return on equity (ROE), marketing margin, gross profit margin	Net income (absolute and relative)	Cost flow Revenue flow Smallholder return on investment
	Marketing margin	Total quantity purchased, purchasing price, total quantity sold, selling price	Social and economic partnerships	Number of partnerships with traders, consumers, and other clients (by different socio-economic groups) Membership in collective actions Social capital within and outside residence Number of informal and formal contracts, Number of additional buyers approaching smallholder groups Horizontal and vertical coordination and collaboration
Domestic traders	Farm/firm size	Labour use, capital owned, product profile, volumes of the commodity produced and sold	Wealth cluster (proportion of the poor)	Asset and monetary income-based wealth clusters Market participation across the wealth groups
	Access to market	Distance to market, frequency of market visits, proportion of successful market trips, link between smallholders and private sector, trust in intermediaries, barriers to entry (sunk cost)	Hired/family labor	Sex and age composition of hired and family workers Seasonal characteristics of family and hired labor use
	Market share	Total volume of transaction, total market size	Net income (absolute and relative)	Small traders return on investment, marketing margin, gross profit margin
	Financial health	Profitability growth, return on assets (ROA), return on equity (ROE), marketing margin, gross profit margin	Social and economic partnerships	Number of partnerships with traders, consumers, and other clients Membership in collective actions Social capital within and outside residence Number of informal and formal contracts Number of additional buyers approaching smallholder groups Horizontal and vertical coordination and collaboration
	Quality competitiveness	Unique quality of product(s), price premiums		

	Competitiveness		Inclusivity	
Actor	Indicators	Key measurements	Indicators	Key measurements
Processors	Total factor productivity	Value added per worker, total outputs, total inputs.	Wealth cluster (proportion of the poor)	Asset and monetary income based wealth clusters Market participation across the wealth groups
	Firm size	Labor use, capital owned, product profile, volumes of the commodity produced and sold	Hired/family labor	Sex and age composition of hired and family workers Seasonal characteristics of family and hired labor use
	Net income/ gross profit margin	Cost flow Revenue flow	Net income (absolute and relative)	Small service providers return on investment Marketing margin Gross profit margin
	Market share	Total volume of transaction, total market size Disaggregated by outlet types when applicable	Social and economic partnerships	Number of partnerships with suppliers, traders, consumers, and other clients Membership in collective actions Social capital within and outside residence Number of informal and formal contracts Number of additional buyers approaching smallholder groups horizontal and vertical coordination and collaboration
	Financial health	Profitability growth; return on assets (ROA); return on equity (ROE), marketing margin, gross profit margin		
	Quality competitiveness	Unique quality of product(s), price premiums		
Service (finance, health, artificial insemination, feeds, and other) providers	Firm size	Labor use, capital owned, product profile, volumes of the commodity produced and sold	Wealth cluster (proportion of the poor)	Asset and monetary income-based wealth clusters Market participation across the wealth groups
	Market share	Total volume of transaction, total market size	Hired/family labor	Sex and age composition of hired and family workers Seasonal characteristics of family and hired labor use
	Financial health	Profitability growth; return on assets (ROA); return on equity (ROE), marketing margin, gross profit margin	Net income [absolute and relative]	Small service providers return on investment Marketing margin Gross profit margin
	Quality competitiveness	Unique quality of product(s), price premiums	Social and economic partnerships	Number of partnerships with traders, consumers, and other clients Membership in collective actions Social capital within and outside residence Number of informal and formal contracts Number of additional buyers approaching smallholder groups Horizontal and vertical coordination and collaboration

	Competitiveness		Inclusivity	
Actor	Indicators	Key measurements	Indicators	Key measurements
Exporters	Farm/firm size	Labor use, capital owned, product profile, volumes of the commodity produced and sold	Wealth cluster (proportion of the poor)	Asset and monetary income-based wealth clusters Market participation across the wealth groups
	Market share	Age of firm, barrier to entry (sunk cost), total volume of transaction, total market size, total number of exporters	Hired/family labor	Sex and age composition of hired and family workers Seasonal characteristics of family and hired labor use
	Financial health	Profitability growth; return on assets (ROA); return on equity (ROE), marketing margin, gross profit margin	Social and economic partnerships	Number of partnerships with traders, consumers, and other clients Membership in collective actions Social capital within and outside residence Number of informal and formal contracts, Number of additional buyers approaching smallholder groups Horizontal and vertical coordination and collaboration
	Quality competitiveness	Unique quality of product(s) Price premiums	Market concentration ratio	Number of exporters, market shares of top 10% of the export firms.

Conclusion

Competitive and inclusive value chains continuously anticipate the preferences of key consumers of the goods and services produced by the value chain. They explore the opportunities and constraints in the end markets and the key determinants of demand. Focusing on maximizing profit per se is not, however, going to address the inequalities and discrepancies that happen between seas and across ages. Increasing the competitiveness of the livestock value chain requires not only improvement in the competitiveness of individual actors and businesses at different nodes, but also conducive policy and socioeconomic environments to enhance inclusiveness.

Increasing the efficiency of the value chains at all levels per unit of the limiting resources requires a better and detailed understanding of the products and services that make up the value chain and the behaviors of the individual actors and their interactions. The intricacies of any agricultural value chain include the intra- and inter-value chain constraints and opportunities that dictate the efficiency with which the actors operate. Therefore, continuous empirical research is required to identify the challenges faced by all actors, especially choke points for targeted value chains, efficient value addition mechanisms, customized and effective governance structures, and financing and insurance design and implementation mechanisms that ensure lasting competitiveness of value chains.

This document presented the current state of knowledge on the definition, measurement, and indicators, to measure the competitiveness and inclusiveness of value chains. Conceptualization and measurement of competitiveness and inclusivity in livestock value chains is a topic that has hardly been addressed in the published literature. It is therefore imperative that researchers expand on this preliminary documentation of the mechanics of measuring competitiveness and inclusivity. Once the indicators for measuring these two aspects of the value chains are determined, there can be further development of the metrics. These will help in formulating composite indices both for competitiveness and for inclusiveness of livestock value chains.

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ISBN: 92-9146-781-2

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