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Value Chain Dynamics & Impact of Collective Action on Smallholder Livelihood Improvement in Kenya

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Preface

This thesis has been submitted to partially fulfill the requirements of a double PhD degree at the Faculty of Science, University of Copenhagen (UCPH) and the School of Agricultural, Food and Biosystems Engineering, Technical University of Madrid (UPM).

The thesis is comprised of four articles with an introductory chapter that takes a holistic view of the PhD research and provides a brief summary and discussion of the main findings. The original topic for the PhD was “Analysis of business models in production and marketing of selected indigenous fruits: A case of Lake Victoria basin, Uganda”. However, during the early stages of the study, it became apparent that this topic was not feasible due to the nature of the context and the under-development of these indigenous fruit value chains. Therefore, the topic was changed to “Value chain dynamics and impact of collective action on smallholder livelihood improvement in Kenya”.

The thesis consists of the following four articles:

Mutonyi, S., Beukel, K., Gyau, A., & Hjortsø, N. C. (2016). Price Satisfaction and Producer Loyalty: The Role of Mediators in Business to Business Relationships in Kenyan Mango Supply Chain. Published in *British Food Journal*.

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Abstract

Rapid transformations in the agrifood sector have led to changes in the supply chain structures. These changes require increased supply chain coordination and collaboration to ensure supply chain efficiency and to meet consumers' demands. Despite the fact that the importance of building long-term relationships has been identified in the relationship marketing literature, most previous agriculture-related research in Africa has focused mainly on either collective action or contractual arrangements, which limits the understanding of the effect of other governance mechanisms, such as relationship building, on chain performance. Therefore, the aim of this research was to examine the effectiveness of building long-term relationships and horizontal coordination on smallholder performance. To this end, we employed a cross-sectional study design using semi-structured interviews and structured questionnaires. 600 farmers involved in the production and marketing of mango were interviewed. Data were analyzed using structural equation modeling, factor analysis and ordinary least squares regression in order to understand the relationships between the producers and the buyers. Propensity score matching was used to analyze the impact of collective action on smallholder welfare and probit and negative binomial regression were used to assess the determinants of smallholders' participation in collective sale and producer group governance.

First, the results showed that smallholders' perceived price satisfaction is a multidimensional concept and the three dimensions price fairness, price reliability and relative price are important determinants of the producers' trust in the buyer. Moreover, trust moderates the relationship between smallholders' price satisfaction and producer loyalty to the buyer. Second, we found that fairness, closeness and trust are key determinants of supplier/producer performance, while trust plays a moderating role between fairness and producer financial performance. Third, we showed that collective action through producer organizations increases smallholder income and asset holdings thereby reducing rural poverty. Lastly, we found that the determinants of smallholders' participation in collective sale are trust in other producer group members, the farmer's level of education and the production capacity in terms of the number of trees owned. Similarly, group size, farmer age and trust in the producer group leadership were identified as determinants of smallholder's participation in group governance. The thesis concludes that improving the performance of value chains involving smallholders requires both increased collaboration and coordination through the building of long-term relationships between producers and buyers and effective horizontal coordination among farmers through producer organizations.

Abstract-Danish

Store omvæltninger i landbrugssektoren har medført ændringer i forsyningskædernes (supply chains) strukturer. Disse forandringer kræver øget koordinering og samarbejde for sikre kædernes effektivitet og for at kunne imødekomme kundernes efterspørgsel. Til trods for betydningen af at udvikle langsigtede relationer har tidligere landbrugsrelateret værdikædeforskning udført i Afrika enten fokuseret på kollektiv handling (collective action) eller kontraktuelle aftaler. Dette har medført at vores forståelse af andre styringsmekanismers indflydelse på værdikædens ydeevne, for eksempel betydningen af at udvikle inter-aktør relationer i værdikæden, er begrænset. På den baggrund er formålet med dette studie at undersøge betydningen af langsigtede relationer (mellem køber og sælger) og horisontal koordinering (mellem sælgere) for småskala landbrugs ydeevne. Vi anvendte et cross-sectional forskningsdesign baseret på semi-strukturerede interviews og struktureret spørgeskemaer. 600 landmænd involveret i mango produktion og salg blev interviewet. Data blev analyseret ved hjælp af structural equation modeling, faktoranalyse, og ordinary least squares regression med henblik på at forstå relationerne mellem producenten (landmanden) og køberne af deres mango produktion. Propensity score matching blev anvendt til at analysere effekten af kollektiv handling på landmændenes velfærd og negative binominal regression blev anvendt til at identificere determinanter for landmandens deltagelse i kollektivt salg og kooperative beslutningsprocesser.

For det første viser resultaterne at landmandens grad af tilfredshed med salgsprisen er et multidimensionalt fænomen og at de tre dimensioner: pris fairness, pris pålidelighed, og den relative pris er vigtige determinanter for landmandens oplevelse af tillid til sin aftager. Ydermere modererer graden af oplevet tillid relationen mellem tilfredshed med prisen og landmandens loyalitet overfor køberen. For det andet fandt vi at fairness, nærhed og tillid er nøgle-determinanter for producentens finansielle resultat og at tillid spiller en modererende rolle mellem fairness og producentens finansielle resultat. For det tredje fandt vi at deltagelse i kollektiv handling (producenternes afsætningsfællesskaber) øger landmandens indtægt og aktivbeholdning og dermed mindsker fattigdom. Endeligt fandt vi at tillid til andre medlemmer af kooperativet, landmandens uddannelsesniveau og produktionskapacitet i form af antal mango træer er determinanter for deltagelse i kollektivt salg. Tilsvarende er kooperativets størrelse, landmandens alder og tillid til kooperativets ledelse determinerende for deltagelse i kooperativets beslutningsprocesser.

Vi konkluderer at en forbedret ydeevne i forsyningskæder der omfatter småskala landmænd både kræver øget samarbejde og koordinering gennem etablering af langsigtede køber-sælger relationer og effektiv horisontal koordinering gennem etablering af producentorganisationer.

Abstract-Spanish

Las rápidas transformaciones en el sector agroalimentario han llevado a cambios en las estructuras de las cadenas de suministro. Estos cambios requieren una mayor coordinación y colaboración entre las cadenas de suministro, para asegurar su eficiencia y la satisfacción de las demandas de los consumidores. A pesar de que la importancia de la construcción de relaciones a largo plazo ha sido identificada en la literatura del marketing relacional, la mayor parte de esta investigación en la agricultura de África se ha centrado principalmente, o bien en la acción colectiva, o bien en los acuerdos contractuales, lo que ha limitado la comprensión de la contribución de otros mecanismos de gobierno, tales como el efecto de la construcción de relaciones en el rendimiento de estas cadenas. Por lo tanto, el objetivo de la presente investigación ha sido examinar la eficacia de la construcción de relaciones a largo plazo y de la coordinación de tipo horizontal, en el rendimiento de los pequeños agricultores. Con este fin se ha empleado un diseño de estudio transversal mediante entrevistas semiestructuradas y cuestionarios estructurados. Se ha entrevistado a 600 agricultores dedicados a la producción y comercialización del mango. Los datos han sido analizados mediante modelos de ecuaciones estructurales, análisis factorial y modelos de regresión por mínimos cuadrados ordinarios, con el fin de entender las relaciones entre los productores y compradores. Se han utilizado métodos de pareamiento por puntuación de propensión para analizar el impacto de la acción colectiva en el bienestar de los pequeños agricultores, y se han empleado modelos de regresión de tipo binomial, “probit” y negativo, para evaluar los factores determinantes en la participación de los pequeños productores en la venta colectiva y gobernanza de las agrupaciones de productores. En primer lugar, los resultados han mostrado que la percepción de la satisfacción por el precio de los pequeños agricultores es un concepto multidimensional, y que las tres dimensiones de precio justo, fiable y relativo, son importantes factores determinantes de la confianza de los productores en el comprador. Por otra parte, la confianza ha moderado la relación entre la satisfacción por el precio de los pequeños agricultores y la lealtad del productor con el comprador. En segundo lugar, se ha detectado que la equidad, la cercanía y la confianza han sido claves determinantes en el funcionamiento de la relación proveedor-productor, mientras que la confianza ha jugado un papel moderador entre la justicia y el rendimiento financiero del productor. En tercer lugar, se ha demostrado que la acción colectiva, a través de las organizaciones de productores, ha aumentado los ingresos de los pequeños agricultores y su incremento de capital, reduciendo así la pobreza rural. Por último, se ha encontrado que los factores determinantes de la participación de los pequeños productores en la venta colectiva son la confianza en los demás miembros de la

agrupación de productores, el nivel educativo de los agricultores y su capacidad de producción en términos del número de árboles en propiedad. De manera similar, el tamaño del grupo, la edad del agricultor y la confianza en la dirección del grupo de productores, se han identificado como factores determinantes en la participación de los pequeños productores en su gobernanza. La conclusión de la presente tesis ha sido, que la mejora del rendimiento de las cadenas de valor que implican a pequeños propietarios requiere tanto de una mayor colaboración y coordinación a través de la construcción de relaciones a largo plazo entre productores y compradores, como una coordinación horizontal efectiva entre los agricultores a través de las organizaciones de productores.

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1. Introduction

1.1 Drivers of change in agrifood chains in developing countries

Recent changes in agrifood chains are the result of forces on both the supply and demand side (Reardon et al., 2003). The demand side forces include increasing urbanization, a growing middle-class with increasing incomes, diet transformation and increased foreign direct investments creating a competitive domestic market (Reardon & Timmer, 2014; Reardon et al., 2009). On the supply side, changes include transforming factor markets and farm technologies. The midstream and downstream restructuring connect both farm supply and consumer demand (Reardon et al., 2015). The midstream and downstream restructuring of the agrifood system are related to the “supermarket revolution” and the recent “quiet revolution” (Reardon & Timmer, 2014; Reardon et al., 2015).

1.1.1 Urbanization, the growing middle-class, and diet transformation

The growing population in developing countries has led to increasing urbanization (Reardon et al., 2009) and recent economic growth in many countries has led to a growth in the number of middle-class households with rising incomes (Ravallion, 2010). The enlargement of the middle-class and incomes has been accompanied by increased purchasing power, which has led to a rise in the demand and consumption of high value agricultural products (Djurfeldt, 2013; Reardon et al., 2013; Wiggins, 2014). Increased diet diversification and the tendency for the middle-class to demand foods of non-African origin and value-added products have provided more opportunities for markets (Reardon et al., 2013; Tschirley et al., 2015). An increase in the consumption of meat, fresh fruit and vegetables has also occurred (Djurfeldt, 2013; Tschirley et al., 2015). For example, in southern and eastern Africa, perishable products, such as fruit, vegetables and meat, are highly purchased by the middle-class and they account for about 44-55 percent of total household expenditure (Tschirley et al., 2015), thereby creating opportunities for local entrepreneurs and increased economic growth (Tschirley et al., 2015).

The increasing size of the middle-class has contributed to greater demand in the growing urban areas for food from areas, which has increased the size and diversified urban food markets in Africa (Reardon et al., 2013). Recent literature shows that the domestic markets have become more important regarding market opportunities than export markets in Africa (Reardon et al., 2013). The African domestic food market represents approximately 95 per cent of food markets (Reardon et al., 2013). Demand for high value products, such as meat, dairy, fish, fruit and vegetables, is on the rise

(Hawkes & Ruel, 2011), which provides opportunities for smallholders to market their products (Reardon et al., 2013). In Africa, the middle-class is not only growing in urban cities, but also in towns in rural areas (Tshirley et al., 2015), which extends the markets closer to the rural producers.

1.1.2 Globalization

Globalization and the “supermarket revolution” has been a main area of research recently. The liberalization of the food industry led to massive foreign direct investments and a competitive domestic market, which triggered the so-called “supermarket revolution” (Reardon et al., 2009; Reardon et al., 2003). The “supermarket revolution” which started in Latin America, spread to East/Southeast Asia and finally to Southeast Africa, creating increased vertical integration to ensure that the farmers could meet the demands associated with high food quality and safety standards (Reardon et al., 2009). The changes in the downstream segment of the value chain have had a significant impact on the upstream leading to, e.g. changes in the farming methods involving increased intensification instead of traditional subsistence farming and the reorganization of the chain from individual selling to increased collective action and contractual arrangements.

1.1.3 The “Quiet revolution”

The recent change in agrifood chains has been the “quiet revolution,” which has occurred in developing countries in Asia and Africa (Reardon et al., 2015), and is characterized by the rapid rise of small to medium-sized enterprises in wholesale, processing and logistics in the mid-stream segment of the chain (Reardon et al., 2014). Specifically in Africa, the “quiet revolution” has taken place in some sectors, for example, horticultural, dairy, poultry, tubers and grains and in various countries including Kenya, Ethiopia, Zambia, Zimbabwe, Nigeria, Senegal, South Africa, Mozambique and Ghana in different value chains (Reardon et al., 2013) though it is in the early stages. The changes in agrifood value chains provide opportunities for smallholders to participate in urban markets as suppliers of fresh products including fruit and vegetables and other agricultural produce (Reardon et al., 2015).

1.2 Importance of smallholders in agrifood chains

The majority of the populations in Africa, especially sub-Saharan Africa (SSA), live in rural areas (Diao et al., 2010). This constitutes about 61.4 per cent (Dercon & Gollin, 2014) and most of the rural households are dependent on agriculture (Dercon & Gollin, 2014; Diao et al., 2010; Wiggins, 2014; Wiggins et al., 2010). The majority of these are smallholders who account for approximately 70 per cent of food production (ETC group, 2009). They are major suppliers to urban

populations (Reardon, et al., 2013), although they face high levels of poverty (Barrett et al., 2015; Radeny et al., 2012) and the smallholder population in sub-Saharan Africa accounts for approximately 75 per cent of the world's poor (Barrett et al., 2015).

Recent studies have shown that agricultural productivity growth is fundamental for poverty reduction in rural areas (Chen & Liao, 2015), evidenced by the green revolution in Asia, which was characterized by increased funding for agricultural research and extension to promote high-yielding varieties of maize, rice and wheat (Estudillo & Otsuka, 2013; FAO, 1996). This was complemented by the construction of roads and irrigation infrastructure, and the provision of inputs on credit and guaranteed market access for farmers (Wiggins, 2014; Wiggins et al., 2010; World Bank, 2007). This improved agricultural productivity and reduced food shortages increased incomes for farmers and subsequently led to poverty reduction. The resulting increased rural savings were invested in nonfarm activities (Wiggin et al., 2010). The success of technology packages were closely linked to the existence of a favorable socio-economic and institution enabling environment and active market possibilities played an important role (FAO, 1996). This showed that agricultural growth can lead to significant economic growth and act as a transition from subsistence to a more industrialized economy. In Africa, there is current renewed interest in agricultural development because it is the largest source of rural livelihoods (Barrett et al., 2015; Wiggins et al., 2010). Agricultural productivity and smallholder income can be enhanced through sustained market access for smallholders (Wiggins & Keats, 2013).

Agrifood value chain development is one of the concepts advocated by a number of organizations in Africa to increase smallholder market access (Webber and Labaste, 2010). Value chain development refers to the building and strengthening of mutually beneficial relationships between chain partners in order to work together and take advantage of market opportunities (Webber & Labaste, 2010) and involves the building of trust among the value chain partners. It ensures that the whole chain is linked from the input suppliers to the consumers to ensure that consumers' demands are met. This enhanced value chain integration is necessary due to the changes that are taking place in the African agrifood supply chains (Gómez & Ricketts, 2013).

1.3 Challenges to smallholder participation in emerging markets

Despite the improved market opportunities, small farms continue to face high transaction costs when accessing capital, market and technical information, input and output markets (Poulton et al., 2010). Transaction costs are the most significant barriers to smallholder access to emerging markets

and productive assets in sub-Saharan Africa due to their size (Alene et al., 2008; Markelova et al., 2009). High transaction costs account for significant market failures in developing countries (Alene et al., 2008; De Janvry et al., 1991). In sub-Saharan Africa, the aggravated transaction costs are exacerbated by high poverty levels among the small-scale farmers, who are geographically dispersed (Fafchamps & Hill, 2005) with low levels of production, limited education, poor physical and information systems and low density of economic activity in poor rural areas (Poulton et al., 2010). The farmers' transaction costs incurred in market exchange include; a) search cost for identifying a buyer or a market for their products; b) negotiation and bargaining costs due to imperfect information; c) screening and enforcement. Screening costs are incurred because of asymmetry of information as well as ensuring the buyer is trustworthy in case the products are sold on credit, while enforcement costs may be incurred when a buyer defaults (Alene et al., 2008; Barrett, 2008; Heltberg & Tarp, 2002; Key et al., 2000). Other costs include transportation costs, the level of which varies according to the quantity traded (Key et al., 2000) and, therefore, smallholders with low sale volumes are particularly affected. Furthermore, smallholders lack proper coordination, which limits their bargaining power and affects their ability to exploit economies of scale (Markelova et al., 2009). As a result, the smallholders obtain low prices that reduce their incentive to increase agricultural productivity.

1.4 Responses to the transformation of agrifood chains

The existence of high transaction costs creates imperfect markets, sometimes referred to as 'missing markets', in most parts of sub-Saharan Africa (de Janvry et al., 1991). In an effort to overcome some of the challenges associated with this market situation, farmers and other actors have started to rely on new institutional arrangements, such as collective action, through producer organizations (Shiferaw et al., 2009; Markelova et al., 2009), and emphasizing the importance of building long-term relationships (Webber and Labaste, 2010). Non-governmental organizations (NGOs), donor agencies and government have increased support through collective action in producer marketing groups to encourage smallholder participation in the emerging markets (WorldBank, 2007). The new interest in producer organizations reflects the current recognition that they can be important mechanisms for linking smallholders to the emerging markets (Bouamra-Mechemache & Zago, 2015).

Recent studies have shown that collective action through producer organizations assists smallholders to participate in these markets as well as improve their incomes (Jayne et al., 2010;

Markelova et al., 2009; Poulton, et al., 2010). For example, smallholders involved in the collective action are able to access inputs that are important for increasing productivity such as fertilizers, improved technology, innovation and technical assistance (Abebaw & Haile, 2013; Bernard & Spielman, 2009; Fischer & Qaim, 2012; Liverpool-Tasie, 2014). Besides, producer organizations are instrumental in improving marketing arrangements through shortening the long marketing chain by linking the farmers directly to buyers (Markelova et al., 2009). Smallholders can improve their economies of scale through bulking and improve access to market information (Markelova & Mwangi, 2010; Shiferaw et al., 2008), which can overcome the high transaction costs, and improve their bargaining power and ability to earn higher prices. Consequently, participation in producer organizations leads to improved incomes (Ito et al., 2012; Vandeplas et al., 2013).

In the relationship marketing literature, the building of long-term relationships between the supply chains partners has been identified as important for supply chain performance (Batt, 2003; Schulze et al., 2006). Long-term relationships lead to reduced transaction costs, increased chain efficiency (Batt, 2003; Ellam and Hendrick, 1995) long-term profitability for the supplier (Boniface et al., 2010; Gomez et al., 2006); while they also ensure reliability of supply (Rajendran, Kamarulzaman, Nawi, & Mohamed, 2012) and provide a high level of supplier loyalty (Rauyruen & Miller, 2007). The building of long-term relationships allows the supplier to gain a deeper understanding of the partner's needs regarding business to business relationships (Kalwani & Narayandas, 1995). The building of long-term relationships is becoming increasingly important in the agrifood sector due to the changes occurring in the agrifood chains. However, current studies have focused on understanding the buyer's perspective with a limited focus on the supplier's or producer's perspective. A number of studies have focused on the antecedents of trust or customer satisfaction in the buyer-seller relationships, e.g. trust and its antecedents and how they affect customer satisfaction or processors (Boniface, Gyau, & Stringer, 2009; Espejel, Fandos, & Flavian, 2008; Fritz & Fischer, 2007; Gyau & Spiller, 2007; Schulze & Spiller, 2006); trust and communication (Fischer, 2013); price satisfaction and loyalty (Boniface Gyau, & Stringer, 2012); customer satisfaction, loyalty and repurchase intentions (Espejel et al., 2008), while other studies have focused on three dimensions of relationship quality and the determinants, i.e. trust, satisfaction and commitment (Fischer, 2013; Fischer et al., 2010; Rajendran et al., 2012; Sahara, Stringer, & Umberger, 2013).

1.5 Research problem

The rapid transformation of the agrifood sector in developing countries has led to growing domestic and international markets (Reardon et al., 2009; Reardon, 2015). The main drivers have been urbanization and globalization. The globalization of the food industry has led to more competitive domestic markets. In Africa, urbanization is attributed to rapid population growth accompanied by an increase in the number of middle-class income households (Gómez et al., 2011; Trienekens, 2011; Tschirley et al., 2015). On the demand side, there is increased consumer awareness among the middle-class who are demanding high value agricultural produce and increasing diet diversification (Reardon et al., 2013; Reardon, 2015). The changes in agrifood chain consumption require better chain collaboration and coordination between the supply chain actors to meet consumer demand (Hartmann, Frohberg, & Fischer, 2010).

On the side of the suppliers, the rapid changes in agrifood chains have created domestic and international market opportunities for smallholders', which have the potential to lead to improved productivity and income growth, thereby contributing to a reduction in rural poverty (Wiggins and Keats, 2013). Most smallholders in Africa, however, are disadvantaged due to high transaction costs related to access to input and output markets that limit their participation in these markets (Alene et al., 2008; Key et al., 2000; Poulton et al., 2010). Supply chain coordination and collaboration through the building of long-term relationships with the chain partners can reduce high transaction costs, and increase efficiency and profitability (Batt, 2003; Matopoulos et al., 2007; Wu et al., 2006; Wu et al., 2014). At the same time, collective action, for example, in the form of producer organizations can improve coordination of the dispersed smallholders enhancing their participation in the emerging markets.

Despite the widespread recognition of the importance of producer organizations, these together with other coordination mechanisms, such as contractual farming, are faced with problems of mistrust and side-selling, which affects their effectiveness and sustainability. For example, in some studies, contractual arrangements and producer groups have been reported to be unsuccessful in linking producers to markets (Mujawamariya, D'Haese, & Speelman, 2013; Shiferaw, Hellin, & Muricho, 2011; Trebbin, 2014). This, therefore, shows that there is a need to further our understanding of the role of collective action in improving smallholder livelihoods, specifically the impact of collective action on income, asset-holdings and poverty. Previous studies have focused mainly on income with a limited focus on consumption (Maertens et al., 2012) and asset holdings. The factors that affect the intensity of smallholders' participation in the producer organizations have

been given less attention. These factors determine the effectiveness and sustainability of collective action. Furthermore, a better understanding of how long-term relationships can more efficiently be established between the supply chain partners is important for the proper functioning of the chain.

Specifically, the relationship between price satisfaction, trust and producer loyalty from the supplier perspective has been inadequately addressed in the literature. Prior studies on the relationship between price satisfaction and producer loyalty have focused on the relationship between producers and processors (e.g., Gyau and Spiller, 2007). Other focus areas have been specific products and contexts (Boniface et al., 2012; Gyau et al., 2011; Somogyi and Gyau, 2009), and single dimensionality of price satisfaction (Boniface et al. 2010; Gyau et al., 2011). Boniface et al. (2012) studied the multi-dimensional nature of price satisfaction and its influence on relationship business performance through producer loyalty in the dairy industry in Malaysia. However, as emphasized by Fritz and Fischer (2007), the findings may not be generalizable to other products and supply chains as each has its own distinct characteristics and different requirements.

In Africa, despite the importance of building long-term relationships, many studies have focused on collective action as a means of horizontal coordination, and contractual farming as a means of vertical coordination (Fischer & Qaim, 2012; Narrod et al., 2009). Little research has been conducted to understand the relationships between different chain actors or how trust can be built as a significant prerequisite for well-functioning agrifood chains. There is a need for a better understanding of how relational factors influence the performance of agrifood supply chains. The effects of fairness, closeness, communication and trust on supplier performance have been tested separately in different contexts (Ferguson et al., 2005; Griffith et al., 2006; Liu et al., 2012; Lobo et al., 2013; Paulraf et al., 2008), but comparing the effects of these constructs across a common setting is lacking. Such comparison is needed because it enables us to understand the relative importance of the different factors in a given context. Moreover, the investigation of the combined effect of these relational variables can provide a more in-depth understanding of how each factor contributes to the relationship quality and their effect on performance.

1.6 Research objectives and research questions

Based on the above-identified gaps in the scientific literature, the overall objective of this PhD is to contribute to a better understanding of the antecedents and implications of horizontal and vertical collaboration on smallholder farmer performance in the agrifood chain. The overall research

question which guides this thesis is what is the effect of relationship quality and collective action on smallholder farmer performance?

Against this backdrop, I address the following four specific objectives:

1. To investigate the antecedents of smallholder participation intensity in rural producer organizations in the Kenyan mango sector.
2. To determine the impact of collective action on smallholder income, consumption, asset holdings and poverty in the Kenyan mango supply chain.
3. To analyze the mediating role of trust between price satisfaction and producer loyalty in the Kenyan mango supply chain.
4. To evaluate the effects of relational factors on supplier financial performance in the Kenyan mango supply chain.

In order to achieve these four objectives, I ask the following four corresponding research questions which are addressed in the four separate scientific articles:

1. What are the factors that affect the intensity of smallholders' participation in collective sale and group governance in rural producer organizations?
2. Does participation in collective action improve smallholder's household income, consumption or asset holdings?
3. What dimensions of price satisfaction influence the relationship between trust and producer loyalty in the Kenyan mango supply chain?
4. What is the effect of fairness, trust closeness and communication quality on supplier's financial performance?

I address these research questions using producer groups in the Kenyan mango value chain.

1.7 Justification

There has been renewed interest in collective action in most developing countries as a strategy to increase smallholder participation in markets, which has attracted the attention of donors, NGOs and governments (Deng et al., 2010; Devaney, 2011). Most of these initiatives are promising in reducing poverty but few have been evaluated (Wiggins, 2014). Furthermore, most evaluations have not been conducted systematically and have, thus, not led to a clearer understanding of the effectiveness of these value chain interventions on reducing poverty among the targeted communities (Humphrey & Navas-Alemán, 2010).

In this thesis, I provide an interesting case by investigating a value chain intervention conducted by an NGO, TechnoServe, which implemented a four year project in Kenya and Uganda, the objective of which was to improve smallholder income through producer business groups and improve their market linkages by establishing linkages between the farmers' groups, local traders and processors. The study contributes to the understanding of the current linkages or business relationships.

This issue is particularly relevant in the African agribusiness sector, which is developing rapidly and has huge growth potential in terms of local, regional, and international trade (World Bank, 2012). On the other hand, the African business environment is challenged by weak institutions, market failures and imperfections, and infrastructural problems (IFAD, 2011; Jayne et al., 2010), which have exacerbated the challenges of building effective and efficiently performing supply chains necessary for tapping into the growing market opportunities. These challenges are very apparent in the Kenyan mango supply chain. The institutional voids (Khanna & Palepu., 2005) which characterize the business environment in developing countries provide a study context where relationship aspects of producer-buyer interactions are highly influential on chain performance.

Mango provides an interesting case to investigate welfare effects. First, mango is one of the most important horticulture crops in Kenya as it supports a number of smallholder farmers as a source of food and main income in semi-arid areas (Kehlenbeck, Rohde, Njuguna, & Jamnadass, 2012). Second, the case helps to understand the livelihood strategies for smallholders living in resource constrained semi-arid areas who have limited opportunities to improve their livelihoods. Mango is an example of a perishable produce supplied in significant quantities by large numbers of smallholders (Msabeni et al., 2010) and is, therefore, representative of a large number of agrifood supply chains in sub-Saharan Africa.

1.8 Overview of the thesis

This thesis is article-based and comprises the following chapters:

Chapter 1 presents the background literature about changes in agrifood chains in developing countries and Africa in particular, how these changes have led to increased market opportunities for smallholders, the importance of smallholders in agrifood chains and the challenges to smallholder market access in Africa. The research problem is also presented and how it is important due to the changes in agrifood chains and why it is important for smallholders in developing country context. The research objectives and questions are outlined.

Chapter 2 discusses the theoretical framework which is applied to understand the institutional mechanisms.

Chapter 3 presents the study context and discusses the importance of agricultural development for smallholders in Kenya, mango production and marketing, and includes a map of the study areas and of the Kenyan mango value chain.

Chapter 4 discusses the research paradigm and design, the sampling technique and sample selection, the applied data collection methods and how the data were subsequently processed and analyzed and, finally, the quality of the research and research ethics.

Chapter 5 summarizes the study findings presented in the four articles. Each article addresses one of the research questions presented in chapter 1 and provides a brief discussion.

Chapter 6 presents the overall conclusion of the study, its contribution to the research field, the managerial and policy implications, the limitations of the study and an outlook for future research.

Table 1.1: Relationships between specific research questions, theories and scientific articles

Research question	Theories	Key variables	Articles	Differences	Overlaps
1. What are the determinants of smallholder participation intensity in collective marketing and group governance?	<ul style="list-style-type: none"> • Sustainable livelihood framework (SLF): To achieve a sustainable livelihood farmers need to have access to livelihood assets or resources • Social capital theory: Emphasizes the importance of different kinds of social capital for individuals to act collectively and access other resources • Collective action theory: Determinants of successful collective action 	<ul style="list-style-type: none"> • Livelihood assets affect farmer participation in collective action and emerging market opportunities • These include: natural, physical, financial, social and human capital • Group characteristics • Resource characteristics • Enabling environment 	Article 4	Investigates factors that affect the intensity of smallholder participation in collective sale and group governance	Factors that affect collective marketing will affect impact of collective action on smallholder welfare (Article 3)
2. Does collective action improve smallholder income, assets and poverty?	<ul style="list-style-type: none"> • Transaction cost economics: Bounded rationality and opportunism as important in determinants of transaction costs • The choice of governance mechanism is to minimize transaction costs • SLF- the chosen livelihood strategy has an impact on the livelihood outcomes, e.g., reduction of poverty 	<ul style="list-style-type: none"> • Hybrid forms of governance emerge, e.g., collective action to minimize transaction costs • Impact assessment • Smallholder welfare • Reduced transaction costs • Changes in smallholder welfare: farmers' income, asset-holdings, consumption & poverty 	Article 3	Impacts of Collective action on smallholder welfare	Due to the challenges of mistrust and side-selling the effectiveness and sustainability of collective action is affected. Article 1 & 2 addresses the possible solutions through building long-term relationships with the buyers.
3. What dimensions of price satisfaction influence the relationship between trust and producer loyalty in the Kenyan mango supply chain?	<ul style="list-style-type: none"> • Social exchange theory (SET): Importance of economic and non-economic outcomes in relational exchange, e.g., satisfaction that affects trust and commitment. Exchange partners should be satisfied both economically and non-economically for the relationship to be maintained • Macneil's exchange theory: Emphasizes relational norms such as trust, fairness and information exchange 	<ul style="list-style-type: none"> • Relationship building-relational governance • Key variables considered; • Trust • Price satisfaction • Producer loyalty 	Article 1	Dimensions of price satisfaction, trust as a mediator between price satisfaction and producer loyalty	Limited performance of farmer organizations (Article 3&4) can be overcome by building long-term relationships
4. What is the effect of fairness, trust, and closeness and communication quality on supplier financial performance?	<ul style="list-style-type: none"> • Equity theory: Exchange partners should receive rewards or benefits based on their relative efforts of inputs. • Social exchange theory • Macneil's exchange theory 	<ul style="list-style-type: none"> • Fairness • Trust • Closeness • Communication • Improved supplier financial performance 	Article 2	Impacts of relational factors on smallholder financial performance	Smallholder, performance Trust (Article 1)

2. Theoretical perspectives

To understand the governance mechanisms that enable smallholder participation in emerging markets, i.e., the building and maintenance of long-term relationships and collective action, we base our research on different theoretical streams: a) transaction cost economics, which explains the different governance mechanisms; b) relationship building perspectives from relationship marketing, which explains how relationships between exchange partners can be built and maintained; c) collective action theory, which explains the determinants of successful collective action, and; d) sustainable livelihood framework, which explains why some smallholders are able to participate in emerging markets, while others cannot due to access to certain resources and impact of governance mechanisms on smallholder livelihoods (see Table 1.1).

From each of the theories, certain aspects are used to explain the governance mechanisms addressed in this study. For example, Transaction cost economics focuses on the choice of the governance structure based on transaction cost characteristics, i.e., the frequency of the transaction, uncertainty and asset specificity. These three characteristics determine the type of governance mechanism, i.e., market, hybrid or hierarchy; Macneil's Relational contracting theory emphasizes relational norms such as trust, information exchange and fairness (distributive and procedural justice) as important in exchange relationships. In equity theory, the emphasis is placed on the fairness of exchange relationships, while social exchange theory focuses on satisfaction and loyalty or commitment in exchange relationships. The relationship exchange perspectives are used in Article 1 and Article 2, while transaction cost economics; collective action theory and sustainable livelihood framework are applied in Article 3 and Article 4 (Figure 2.1).

2.1 Transaction cost economics

According to Transaction cost economics (TCE), institutions are transaction cost-minimizing arrangements that may change and evolve with changes in nature and sources of transaction cost (Williamson, 1985). Transaction costs include the costs of information, negotiation, monitoring, coordination, and enforcement of contracts (Coase, 1937). Transaction cost economics seeks to understand the interplay between institutional factors and market and non-market exchange under positive transaction costs. Transaction costs arise as a result of bounded rationality and opportunism (Williamson, 1993). Bounded rationality refers to decisions made with limited information, i.e., the human mind cannot identify all alternative options and decision consequences (Williamson, 1979). Bounded rationality is important for smallholders because they face limited technical and market

information (Poulton et al., 2010). Buyers exploit the lack of market information, market trends, alternative markets and prices and offer smallholders low prices. At the same, the limited technical information about the proper use of agro-chemicals leads to the use of sub-standard chemicals and incorrect applications, which affects the quality and quantity of the yields (Msabeni et al., 2010).

Figure 2.1. Antecedents and implications of relationship quality and collective action and underlying theories

Another important aspect of TCE is the possibility of opportunistic behavior, which is defined as a state of self-interest seeking behavior through guile, i.e., any kind of cheating, lying, or stealing (Williamson, 1993). The two factors affect the choice of a governance mechanism. The right governance mechanism economizes on bounded rationality and safeguards transactions against the hazard of opportunism (Williamson, 1991). Firms choose governance mechanisms that reduce transaction costs (Williamson, 1991). The choice of governance mechanism is guided by three

characteristics of transaction costs, i.e., frequency, uncertainty and asset specificity (Williamson, 1996; Ménard, 2007). TCE defines a continuum of governance mechanisms from market exchange to hierarchy.

In market exchange, as in the case of spot markets, there is limited interaction between the exchange partners and low asset specificity, while in the case of hierarchy; there is full control of the transactions and high asset specificity. The intermediate form of governance, which is the hybrid, encompasses both market and hierarchical governance mechanisms; collective action follows under the hybrid form of governance mechanism. Because of the high transaction costs involved in market exchanges, smallholders tend to be excluded from the exchange, while hierarchical exchange may be too competitive or hard for smallholders to achieve due to high investment costs. Therefore, they resort to hybrid forms of governance such as collective action.

Collective action refers to any action taken by a group (either directly or on its behalf through an organization) in pursuit of members' perceived shared interests (Marshall, 1998). Collective action can assist in achieving economies of scale, shortening long marketing chains, increasing bargaining power and, thus, reducing transaction costs and opportunistic behavior (Markelova et al., 2009). Farmer cooperatives reduce the high uncertainty surrounding spot markets through vertical integration and contingent contracting (Staatz, 1989). Agricultural cooperatives are more prevalent in perishable products, such as fruits and dairy, because they are less substitutable (Staatz, 1989). In order for smallholders to participate in collective action activities, they need resources which determine whether an individual participates or not and to what extent the individual participates.

2.2 Sustainable rural livelihood framework and Collective action theory

At the producer level, participation and the intensity of participation in collective action depends on certain factors. From development economics, there are a number of perspectives for understanding what determines the smallholders' participation in markets including; the Sustainable livelihood framework (SLF), which comprises five types of assets or capitals; natural, physical, human, financial and social capital (Bebbington, 1999; Scoones, 1998). The capitals explain why individuals in rural areas are able to participate in certain activities and other not due to the levels of assets envisaged by such individuals. Alene et al. (2008) suggests that differential access to assets and services to mitigate transaction costs are possible factors underlying heterogeneous market participation among smallholders (Alene et al., 2008). These capitals have been explained further either as assets or capital; human capital (Coleman, 1988; Sen, 1997) and social capital (Putnam et

al., 1993; Woolcock, 2001). Natural capital as natural stocks e.g., land, trees, physical capital as produced capital, e.g., tools and equipment, technology, human capital as knowledge and skills, ability to work and adapt, financial capital as savings, access to credit, production equipment and social capital as social networks, affiliations, trust.

Participation intensity of the producers in a producer organization that affects the performance of producer organizations does not only depend on the livelihood assets or resources. Participation intensity refers to members' behavior and actions towards their producer organization. The theory of collective action suggests that the performance of farmer organizations will be affected by the size, homogeneity and purpose of the group (Olson, 1971). Further, Markelova et al. (2009) emphasize that the effectiveness of collective action in marketing depends on a number of factors, such as the group characteristics, type of products, which are referred to as resource system characteristics (Agrawal, 2001), markets, institutional arrangements, and the external environment. Moreover, the formation of collective action in agricultural marketing has an influence on the outcomes of collective action, for instance, whether the collective action is developed by an organization directly controlled by farmers or controlled by a national or regional governmental organization (Vanni, 2014).

SLF provides a framework for investigating the direct and indirect effect of collective action (institution) on smallholder income, asset holdings, consumption and poverty. According to SLF, institutions influence access to the assets or resources, which affects the livelihood strategy. For instance, a given household may choose to intensify, diversify or migrate. If a household chooses to intensify, as in this case of farmers investing in the production and marketing of improved mango varieties, this strategy will be influenced by, e.g., financial, social and physical assets. The livelihood strategy adopted affects the livelihood outcomes, for instance, reduction of poverty (Scoones, 1998). Institutions bridge the gap between livelihood assets and livelihood strategies and livelihood outcomes.

Collective action through producer organizations has been reported in some circumstances as being unable to link smallholders to markets (Shiferaw, Hellin, & Muricho, 2011; Trebbin, 2014) just like other coordination mechanisms such as contractual farming due to the challenges of mistrust and side-selling (Bernard et al., 2008; Masakure & Henson, 2005; Poulton et al., 2010; Titeca and Vervisch, 2008). This weakens its effectiveness and sustainability. The use of relational means of governance becomes relevant.

2.3 Relationship exchange perspectives

Relational governance is critical for successful business-to-business exchange due to the difficulty of creating comprehensive contracts (Ganesan, 1994). TCE is limited in its capacity to explain exchange governance in exchange relationships in which the partners are able to develop relationship-based governance over time (Lambe, Wittmann, & Spekman, 2001). Due to the inefficiency of TCE to explain relationship-based exchanges, researchers have based their explanations on three alternative theoretical perspectives: social exchange (Blau, 1964; Lambe, et al., 2001), equity (Adams, 1965) and relational contracting theory (Macneil, 1980).

In relational contracting theory, Macneil (1980) argues that transactions are not just discrete events and expands on TCE's notion of classical and neoclassical contracts by introducing the concept of contracts, which includes the relationships between people who share norms and values. These norms include fairness, information sharing and trust. Relational governance is based on a set of relational norms that govern acceptable behavior between the exchange partners (Lusch & Brown, 1996). Relational exchange occurs over time; every transaction must be viewed in terms of its history and its anticipated future. The basis for future collaboration may be supported by implicit and explicit assumptions, trust, and planning. Trust is defined as "a willingness to rely on an exchange partner in whom one has confidence" (Moorman et al., 1992, p. 315). Trust exists when one party has confidence in an exchange partner's reliability and integrity (Morgan and Hunt, 1994; Caceres and Paparoidamis, 2007). Trust plays an important role in an institutional environment where there are institutional voids as in the case of smallholders in sub-Saharan Africa. Smallholders operating in such an environment face high transaction costs of exchange so trust can be an important mechanism for safeguarding against opportunistic behavior. Building trust reduces the risk of opportunistic behavior and lowers transaction costs in long-term relationships (Ganesan, 1994). Fairness in exchange relationships points to issues of power; the less powerful partner depends on the fairness actions of the powerful partner (Kumar et al., 1995). Smallholders have limited access to market information due to the presence of institutional voids in the African business environment. The smallholders depend on the fairness of the buyer in terms of information provided, especially the prices.

Relational exchange participants can be expected to derive complex, personal, non-economic satisfaction and engage in social exchange. In social exchange, duties and performance are relatively complex and occur over an extended time period; therefore, the parties may direct much effort toward carefully defining and measuring the items of exchange (Dwyer, Schurr, & Oh, 1987,

p. 12; Lusch and Brown, 1996). Social exchange theory (SET) focuses on the relationship between exchange parties, and as a governance mechanism of exchange, it is important in explaining business to business relationships (Anderson & Narus, 1990; Dwyer, Schurr & Oh, 1987; Lambe et al., 2001). Social exchange theory explains the process of relationship development and maintenance (Narayandas & Rangan, 2004). The basic assumption of SET is that parties enter into and maintain relationships based on the expectation that doing so will be rewarding (Blau, 1968; Homans, 1958). The exchange partner will be loyal or committed to a given exchange relationship if the relationship is rewarding in terms of both economic and non-economic benefits compared to the alternative.

SET postulates that exchange interactions involve economic and/or social outcomes. Over time, each party in the exchange relationship compares the social and economic outcomes of these interactions to those of exchange alternatives which determine their dependence on the exchange relationship. Positive economic and social outcomes over time increase the partners' trust in each other and commitment to maintaining the exchange relationship. Positive exchange interactions over time also produce relational exchange norms that govern the exchange partners' interactions (Lambe et al., 2001). In this regard, farmers' satisfaction with their buyers does not depend on the price offered, which is the economic reward from the relationship, but on the non-economic rewards. The two aspects work together to improve trust, commitment and producer loyalty. Producer satisfaction leads to the building of trust, eventually achieving producer loyalty. Producer loyalty refers to "the motivation of producers to repetitively sell their product and engage in long-term relationships with the buyers" (Boniface et al. 2010, p. 70). This leads to improved chain performance as a result of reduced transaction costs as well as reduced opportunistic behavior among producers and buyers.

SET and equity theory not only helps to understand how to build long-term relationships, but also how these relationships can be maintained between the cooperatives and the buyers and between the small-scale farmers and their buyers. Using these two theories can help explain the reasons behind mistrust and side-selling, which is experienced in some African business relationships and how long-term relationships can be built. Equity theory suggests that people should receive benefits or rewards in proportion to their own relative efforts or inputs (Adams, 1965; Brown, Cobb & Lusch, 2006; Griffith, Harvey, & Lusch, 2006; Kumar, Scheer, & Steenkamp, 1995). According to equity theory, people compare the ratios of their perceived outcomes to their inputs with the corresponding ratios of others. If the ratios seem unequal, the

party with the lower ratio feels inequitably rewarded and often experiences anger or tension. Most people respond by adjusting their own inputs or efforts or undertaking punitive behavior that punishes the other party and stimulates them to shift this unpleasant state into a more equitable one (Adams, 1965; Kaufmann & Stern, 1988; Utne & Kidd, 1980). Equity theory has been used to explain fairness in exchange relationships. This relates to the issue of power, and because the buyers hold the power in terms of information concerning prices, the smallholders are dependent on the fairness of the buyers', who may act opportunistically by concealing the information in order to earn greater profit. Fairness improves supply chain performance by positively influencing commitment and expectations to continue the relationship (Kumar et al., 1995; Zaefarian et al., 2016).

Summing up with reference to Figure 2.1, Transaction cost economics and the sustainable livelihood framework address the impact of collective action on smallholder income, asset holdings and poverty. TCE provides the governance mechanisms for overcoming high transaction costs faced by smallholders. The sustainable livelihood framework provides an explanation for resources which smallholders require to participate in collective action. At the same time, it provides a framework for analyzing the impact of collective action on smallholder welfare and poverty. The institutions influence access to resources that affect the strategy adopted by the farmer, which then affects the livelihood outcome. The intensity of the farmer's participation in collective marketing and group governance is explained by social capital theory, which provides an explanation for social capital in the form of bonding, bridging and linking capital, which is needed for the formation and sustenance of collective action. This works together with access to resources, which is explained by SFL. Collective action alone is insufficient for improved smallholder performance and smallholders, therefore, need to invest in relationships with their buyers, which are explained by Macneil's exchange theory, Social exchange theory and Equity theory.

3. Study context

The mango value chain in the Kenya is a suitable context for studying the different aspects of this study because of the following reasons; smallholders are the main actors at the producer stage of the value chain and one of their main challenges is market access. Due to limited quantities produced, they are faced with limited economies of scale, low bargaining power and poor coordination. Furthermore, the poor skills in production and management affect the quality of the mango produced. As a result, their participation in emerging markets is reduced. Most of the mango produced is sold on the domestic market and is a major source of income and food (Kehlenbeck et al., 2012). The importance of mango in this context has attracted NGOs and government support to enable smallholders to participate in emerging markets through collective action.

3.1 Importance of agriculture for rural livelihoods in Kenya

In the country's national strategy vision 2030 and agricultural sector development strategy (ASDS) (2010-2020), agricultural growth and development have been prioritized as a key strategy for economic development. This is because agricultural production contributes about 24 per cent of the GDP and 25 per cent through agro-based and associated industries (GoK, 2010). Over 80 per cent of the Kenyan population, especially those living in rural areas, derive their livelihoods mainly from agriculture-related activities (GoK, 2008), while approximately 75 per cent of the agricultural output is produced by smallholders, 70 per cent of which is marketed (GoK, 2008; 2010). The main goal of ASDS is the progressive reduction of unemployment, food insecurity and poverty. These two strategies point to increasing market access for smallholders through better supply chain management and assisting in the establishment of farmer organizations to enable farmers to exploit the economies of scale (GoK, 2010, 2008). This makes this context relevant to study the performance of the supply chains and the impact of farmer organizations on smallholder livelihoods. Furthermore, the strategy emphasizes the challenges faced by the current cooperatives that have contributed to limited performance and, thus, understanding the factors that affect farmers' level of participation becomes important. Horticulture is one of sectors in the agricultural sector and comprises fruit, vegetables and flowers. The horticultural sector is becoming increasingly important both on the domestic and export markets contributing 33 per cent of the agricultural gross domestic product and 38 per cent of the country's export earnings (GOK, 2010). The contribution of mango to the GDP has been increasing since 2011 (Figure 3.2).

3.2 Mango production and marketing in Kenya

Mango is the second most important horticultural crop in Kenya (Kehlenbeck et al., 2012; ITC, 2014; USAID-KAVES, 2015). The crop is grown mainly in eastern and coastal provinces of Kenya with the eastern provinces being the leading producer of improved mango varieties (Kehlenbeck et al., 2012). These areas are classified as arid and semi-arid areas (Jaetzold et al., 2009). Mango is also grown in the central, rift valley and western regions, but on a small-scale. Mango is not originally from Kenya, but was brought by Asian traders. The leading producer of mango is India with 18,800,200 tonnes of mango per annum in 2013, while Kenya produces about 582,907 tonnes of mango per annum (Figure 3.1) (FAO STATs, 2016). The importance of mango production is increasing among smallholders evidenced by a significant increase in the number of trees with up to 1.5 million being established in the past five years (USAID-KAVES, 2015). The mango cultivars grown are both local and improved cultivars (Griesbach, 2003). The main improved mango varieties include apple and Ngowe; 50 per cent of apple mango is produced in the eastern region, while 49 per cent of Ngowe is produced in the coastal region. The other varieties include Kent, Tommy Atkins, Van Dyke, and Boribo (Kehlenbeck et al., 2012).

Source: FAO STATs, 2016

Figure 3.1. Mango production in Kenya

Source: FAO STATs, 2016

Figure 3.2. Contribution of mango income to the GDP

Mango is mainly grown by smallholders who make up approximately 75 per cent of the Kenyan population. Smallholders are highly dependent on mango as a source of income and food (Kehlenbeck et al., 2012). The mango sector supports over 200,000 smallholders for their livelihoods at the production stage of the value chain. The remainder of the population is involved in trading, processing, grading, logistics and the export part of the chain. Despite the importance of mango in improving the livelihoods of smallholder farmers, its potential has not been fully developed (Kehlenbeck et al., 2012).

There has been a growing demand in the domestic, regional and export markets for mango and this demand is expected to grow further (GoK, 2012; USAID-KAVES, 2015). Domestically, demand has been driven by the increasing middle-class who are demanding both fresh fruit and processed mangoes. 98 per cent of Kenyan mango is consumed on the domestic markets with the remaining two percent being sold on the international market (Msabeni et al., 2010).

3.2.1 *Mango value chain*

The main actors along the mango value chain include: nursery operators, agro-chemical providers, other input suppliers, farmers, middlemen, traders, processors, exporters, retailers, and consumers (Figure 3.3). With regards to the mango which is traded on the domestic market; the main buyers are the middlemen who are commonly referred to as brokers. The majority of mango is

sold on wet markets, while the rest goes to supermarkets and processors. Increasing value is being added by farmers, while there are three main processors; Sunny, Milly and Kevian. A number of small-scale processors are owned by individual farmers and groups, for example, Malindi farmers' cooperative society, Kitui county fruit processors and others (ITC, 2014).

Legend: ———→ Fresh fruit - - - - -→ Processed

Source: Interviews

Figure 3.3. Kenyan mango value chain map

Mango is processed into puree, juice or dried mango. At the producer stage, there is limited value addition for fresh mangoes and the price offered varies from one to eight Kenya shillings. In farmer groups, some process to solar dried mangoes and puree. At the middleman stage, sorting, grading, bulking and packaging are performed depending on the target markets.

Middlemen act as a link between farmers and local markets, processors, supermarkets and exporters. They play two important roles in the chain, i.e., sourcing mangoes from the farmers because they clearly understand the geographical location with the right mango varieties. They arrange for the transportation of the mangoes from the farmers to different destinations and are at the forefront in the price negotiation process between the farmer and the mango traders. In the mango chain, there are two types of middlemen; local middlemen based at the villages or local trading centers commonly referred to as “brokers” and actual middlemen or mango traders that purchase the mangoes and sell to other traders in the towns and the cities. The brokers are paid on a commission basis by the mango traders. Some mango traders have direct contacts with the farmers and there is no need for the middlemen, once the mangoes are ripe they are contacted directly by the farmers. The mango market is categorized by a higher number of sellers compared to the buyers, there are no clear pricing standards and the products are not homogenous, therefore, it is not a perfect competitive market but rather an oligopoly. The mango traders earn more profits compared to the farmers, for example, the mangoes are sold at 20 to 35 KShs to consumers and the farmer receives 5 KShs per piece of mango sold while the broker gets from 2-3 KShs per piece of mango sold. On the other hand, some farmers transport their produce to the local markets or major urban centers using own or hired vehicles or even public transport these farmers are able to earn better prices compared to those who sell directly to middlemen.

Large scale farmers are fully integrated with direct links to local markets, supermarkets, processors and export markets. Smallholders sell mangoes as individuals or in groups. Recently, government and non-governmental organizations (NGOs) have been advocating for farmers to work collectively to reduce the transaction costs incurred in searching, negotiating, and information costs involved in getting the right buyers. The NGOs include USAID and TechnoServe, which have undertaken projects to improve the performance of the Kenyan mango value chain. This study is based on farmer groups under TechnoServe.

At the processor stage, mango is processed into puree and juice, which is branded according to the processor and distributed to different outlets on the domestic market. The mango juice is

consumed domestically and is distributed to supermarkets, kiosks, and institutions such as schools, hotels and local markets. The processors buy mango directly from the farmers, others have their own farms or through local traders. Processors also import concentrate for processing juice to supplement the domestic supply due to seasonality.

The fresh fruits are sold on the domestic, regional and international markets. The domestic market includes supermarkets, local markets, wholesale markets in Nairobi and other towns, roadside vendors, and kiosks. The regional markets include Uganda, Tanzania and Sudan. The export markets for mango are mainly located in the Middle East.

The mango value chain is supported by a business environment which includes research institutions such the Kenya Agricultural Research Organization, the International Centre of Insect Physiology and Ecology (ICIPE), the World Agroforestry Center (ICRAF) and Universities; all the research organizations conduct research to improve the performance of the mango value chain. The NGOs and the government provide technical assistance, while credit institutions provide credit for some farmer organizations. At the policy level, there is Ministry of Agriculture and the Horticulture Development Authority, the Kenya phytosanitary services and the Kenya bureau of standards, certification and maintaining standards.

The exchanges are dominated by spot markets, though there is a shift towards increasing hybrid forms due to changes in the agrifood chains. Most of the transactions in mango are based on informal contracts or promises with limited formal contracts, especially with exporters in some areas, who provide a suitable case for understanding the issues of both transactional and relational governance.

Market access is one of the challenges faced by the Kenyan mango farmers. The farmers have tried to overcome this challenge through forming farmer organizations. Farmers face other challenges including pests and diseases, limited production and management skills, and transportation (USAID-KAVES, 2015).

4. Study area and Research design

The study was located in four districts in the Eastern province of Kenya, i.e., Mbeere, Embu, Kangundo and Mwala found in Embu and Machakos counties (Figure 4.1). The counties were purposively selected because they are areas where improved mango varieties are grown and because they have infrastructure that provides fairly good market access (Msabeni, Muchai, Masinde, Mato, & Gathara, 2010; Kehlenbeck et al., 2012; Griesbach, 2003).

Source: Geodata Services 2013, Nairobi

Figure 4.1. Map of study area

The improved mango varieties have a high demand both domestically and internationally. Collective action activities are being promoted for farmers involved in growing improved mango varieties because they have the potential to improve smallholder livelihoods through improved market access. The areas had to have fairly good infrastructure for market access, which is important for comparison of the effect of collective action on smallholder livelihoods. When conducting impact evaluations using propensity score matching, one of the requirements is that participants (members) and non-participants (non-members) have access to the same markets to be comparable (Khandker et al., 2010).

4.1 Research paradigm

Theoretical paradigms and perspectives in the research process refer to a “basic set of beliefs, values and assumptions that a community of researchers has regarding the way to conduct research” (Johnson & Onwuegbuzie, 2004). There are a number of research paradigms, i.e., positivism, postpositivism, constructivism and pragmatism (Teddle & Tashakkori, 2009). Positivism and constructivism are at the extreme ends of the continuum, while pragmatism lies between positivism and constructivism. Table 4.1 summarizes the key aspects regarding the different research paradigms based on axiology, ontology and epistemology. This study employed a mixed methods approach, which is referred to as the third research paradigm that lies between the positivism and constructivism perspectives (Johnson & Onwuegbuzie, 2004; Teddle & Tashakkori, 2009). Most scholars suggest that the philosophical orientation underlying mixed methods research is pragmatism (Bryman, 2008; Greene, 2007; Johnson & Onwuegbuzie, 2004; Johnson et al., 2007). Pragmatism refers to dealing with the problems that exist in a specific situation in a reasonable and logical way instead of dealing with ideas and theories (Morgan, 2007). Postpositivism scholars base their investigations on research questions and the research is concerned with unknown aspects of a phenomenon of interest.

With regards to the way the research was conducted and analyzed, this study used both quantitative and qualitative methods. Qualitative methods were used at the beginning of the study and for interpreting some of the results, but the study was dominated by quantitative methods. This is demonstrated by the identification of the research gaps, hypothesis development and testing, and data analysis using econometric models. Therefore, both the postpositivism¹ and pragmatism

¹. Postpositivists acknowledge that their value systems play an important role in how they conduct their research and interpret the data (Reichardt & Rallis, 1994). Pragmatists acknowledge that the values of the researcher play a large role in the interpretation of results. It is about what “works” as the truth regarding questions under investigation.

perspectives are applied to answer the four research questions. The research questions constitute the four articles.

- i. Article 1 & Article 2: research questions, hypothesis development, data collection, data analysis, statistical inferences and interpretation.
- ii. Article 3 & Article 4: research questions, literature review, data collection process and statistical inferences and data interpretation.
- iii. The qualitative data is used for instrument development and explanation of the observed phenomena.

Table 4.1 Research paradigms

Research paradigms	Axiology	Ontology	Epistemology
Positivism	<ul style="list-style-type: none"> • Inquiry is value free and theory laden regarding facts • No influence of personal values 	<ul style="list-style-type: none"> • There is reality • Single truth 	<ul style="list-style-type: none"> • Objectivity
Postpositivism	<ul style="list-style-type: none"> • Personal values play role in research, but can be controlled • Inquiry is also theory-laden 	<ul style="list-style-type: none"> • There is real reality, but only “imperfectly and probabilistically” determined 	<ul style="list-style-type: none"> • Modified objectivity. Believe that the relationship is ‘objective’ with dualism or separateness existing between the knower and the unknown
Constructivism	<ul style="list-style-type: none"> • Inquiry is value-bound, i.e., personal values play role in research 	<ul style="list-style-type: none"> • There is no single truth or reality. • Realities are multiple, and constructed 	<ul style="list-style-type: none"> • Subjectivity. Perceive research as ‘subjective’ with researchers and participants working together to co-construct social realities
Pragmatism	<ul style="list-style-type: none"> • Personal values play role in research both in interpretation of results and drawing conclusion from the studies 	<ul style="list-style-type: none"> • Diverse viewpoints regarding social realities; best explanations within personal value systems 	<ul style="list-style-type: none"> • Both objectivity and subjectivity depending on stage of research cycle • Epistemological issues are a continuum rather than opposing ends.

Source: Teddlie & Tashakkori (2009)

With regards to the axiological, ontological and epistemology that guide postpositivism and pragmatism research; axiology refers to the role of values in inquiry, while ontology is the nature of reality (Guba & Lincoln, 2005), and epistemology is the relationship between the researcher and the participant (unknown) (Teddlie & Tashakkori, 2009).

The axiological assumptions that characterize postpositivism research suggest that inquiry is influenced by personal values, but it can be controlled and is theory-laden regarding facts (Teddlie and Tashakkori, 2009). The main focus is on developing research methods which emphasize both internal and external validity. The methods used aim to reduce the influence of personal values. In this research, the theory development as well as the analysis and interpretation of results was influenced by personal values, but I tried to be objective by conducting statistical analyses, while inferences were followed and a deductive approach was used to determine the relationships between the dependent and independent variables.

Pragmatists believe that values play a major role when conducting research and drawing conclusions from a study. Pragmatists determine what they want to study based on personal value systems. They then investigate that topic in a way that is consistent with their value system, including units of analysis and variables that they feel are most likely to yield interesting results (e.g., Tashakkori & Teddlie, 1998). In this study, the selection of the units of analysis was influenced by my personal values to some extent since I was interested in understanding a given problem which could be best understood by studying it in a given context. For example, to study the effect of collective action on smallholder livelihoods and relationships with the buyers, this topic is of particular importance to understanding better access of farmers to higher value markets. This needed to be carried out in a specific context where there were smallholders and producer organizations.

Ontologically, postpositivists believe there is real reality, but it is only “imperfect and probabilistic” (Guba & Lincoln, 2005, p. 195). In the quantitative part of the study, the postpositivism belief is followed. I formulated and tested the hypotheses and used statistical inferences to determine the relationships between the dependent and independent variables.

Epistemologically, pragmatists challenge the distinct contrast between objectivity and subjectivity. They affirm that epistemological issues occur on a continuum, rather than at two opposing poles. At some points during the research process, the researcher and the participants may require a highly interactive relationship to answer complex questions, but at other points, the researcher may not need to interact with the participants, for instance, when testing prior hypotheses using quantitative data that have already been collected or when making predictions on the basis of a large-scale survey (Teddlie and Tashakkori, 2009). This is observed in this thesis whereby at the beginning of the field work I employed a qualitative study to understand the functioning of the

value chain and I subsequently used these insights to develop the questionnaire, which was used to conduct the household survey and later the insights from the qualitative study assisted in the interpretation and discussion of the survey findings.

The research paradigm determines the methods to be used to address the research question. The emphasis of the mixed methods approach is on how the different methods are combined at the different stages of the research process.

4.2 Research design

This thesis uses a cross-sectional design and employs a mixed methodology combining both qualitative and quantitative methods (Bryman, 2008; Teddlie & Tashakkori, 2009). Mixed method techniques are preferred because they allow triangulation to provide stronger evidence for a conclusion through convergence and the corroboration of findings, and they add insights and understanding that might be missed when only a single method is used, increase the generalizability of the results and produce more complete knowledge necessary to inform theory and practice (Johnson & Onwuegbuzie, 2004). Greene et al. (1989) explain that the purpose of mixed methods is to achieve complementarity, meaning seeking elaboration, enhancement, illustration and clarification of the results achieved with one method through the use of other methods.

The thesis is based on two sub-studies. The qualitative study was followed by the quantitative study and all the research questions were covered by the two studies. The tools used were structured so that they captured all the four research questions (Appendix 2). Table 4.2 details the procedure that was followed.

Table 4.2: Elements of the quantitative and qualitative studies

Elements	Quantitative study	Qualitative study
A. Sampling strategy	<ul style="list-style-type: none"> • Stratified random sampling 	<ul style="list-style-type: none"> • Chain sampling
B. Method of data collection	<ul style="list-style-type: none"> • Household survey 	<ul style="list-style-type: none"> • Semi-structured interviews
C. Data collection tool	<ul style="list-style-type: none"> • Questionnaires 	<ul style="list-style-type: none"> • Semi-structured interview guides
D. Data collection phases: Phase 1 – Preparation	<ul style="list-style-type: none"> • Reconnaissance (April, 2013) 	
Phase 2 – Semi-structured interviews & questionnaire development	<ul style="list-style-type: none"> • Questionnaire development 	<ul style="list-style-type: none"> • Development of semi-structured interview guides • Qualitative study (August-September 2013) • Transcription of data • Participant observations • Participant observations
Phase 3 – Questionnaire administration and data analysis	<ul style="list-style-type: none"> • Questionnaire development • Training of enumerators • Pilot study/pre-testing • Main quantitative survey (Feb-April 2014) • Data analysis & interpretation 	
E. Research quality - Validity/trustworthiness	<ul style="list-style-type: none"> • Questionnaire pre-testing • Judgmental validation • Triangulation • Sensitivity analysis • Testing for construct and discriminant validity e.g., Cronbach's alpha • Statistical inferences • Randomization • Reducing low response rates 	<ul style="list-style-type: none"> • Triangulation • Peer reviews • Recording the interviews and field diaries • Thick descriptions
F. Research ethics	<ul style="list-style-type: none"> • Informed consent, anonymity and confidentiality 	<ul style="list-style-type: none"> • Informed consent, anonymity and confidentiality

Source: Elaborated by the author

4.2.1 Sample selection

Since I had different research questions, I had to decide on the unit of analysis; for research questions 1 and 2, the unit of analysis was a dyad (farmer-buyer relationship), and for research questions 3 and 4, the unit of analysis was the farmer household. The ultimate sampling unit was the farmer household growing mangoes. The districts were selected purposively because I was interested in mango growing areas with improved varieties and where collective action was taking place in order to evaluate the impact of collective action on smallholder livelihoods and the factors which determine the level of participation in groups. Furthermore, in order to understand the relationship quality and the effects of relational factors on supplier financial performance, producers were asked about their perception of their frequent buyers.

To sample individual households, I followed a stratified random sampling technique to increase external validity (Teddlie and Yu, 2007). Within the districts, I selected the sub-locations which had farmer organizations, while adjacent sub-locations that did not have farmer organizations were selected randomly. In the next step, I randomly selected the farmer groups and lastly, eight group members were randomly selected from each group leading to a total 200 group members. From the adjacent sub-locations, 400 non-members were randomly selected to enable me to conduct proper matching. Sub-locations were selected instead of villages, which are the lowest administrative unit because members in a given group would belong to more than one village. The interviewees for the qualitative study were selected based on sequential sampling using chain sampling technique (Teddlie and Yu, 2007).

4.2.2 Tool development and data collection

Prior to data collection, the questionnaire and semi-structured interview guides were developed based on the relevant literature. The operationalization of the latent variables trust, communication quality, closeness, fairness, producer loyalty, supplier financial performance and price satisfaction was based on the agrifood and relationship marketing literature. Both the semi-structured interview guides and questionnaires were shared with specialists in agribusiness and marketing to verify whether the tools captured the intended information in order to increase measurement validity/credibility. For the questionnaire, the leaders of the farmer groups were consulted to check whether the questions were understandable to avoid getting ambiguous responses.

Semi-structured interviews were used because they are useful for measuring attitudes and other content of interest. They allow the interviewer to probe which facilitates elicitation and the gathering of in-depth information from the interviewee (Teddlie and Tashakkori, 2009). However, the data analysis is sometimes time consuming for open ended interviews and of limited value in terms of making statistical inferences. Semi-structured interviews are used as initial studies on topics unfamiliar to researchers, which is very important in cross-cultural and multicultural research when the psychological repertoire of a population is not readily known (Teddlie & Tashakkori, 2009). Because I was coming from a different country with a different cultural setting, semi-structured interviews assisted in understanding the population and context before conducting the household survey using questionnaires.

Questionnaires are useful for measuring attitudes and most other information from responses and are easy to use for making statistical inferences. A weakness of questionnaires is the potentially low

response rate, especially with mail questionnaires, and missing data. However, a low response rate was not the case in this study. Because of the nature of the context, it was not possible to use the mail surveys and instead face-to-face interviews were considered the most appropriate method. To increase farmers' participation in the survey, they were mobilized through local contacts before the interview so that they could be available during the time of the interview. Small tokens were given to those who accepted to participate in the survey.

The data were collected in two phases; in the first phase, I conducted the qualitative study, while in the second phase, I conducted the quantitative study. The thesis is based on data that were collected using two data collection methods, i.e. semi-structured interviews and a household survey. This was supplemented by direct observations for the different activities along the chain.

4.2.3 Phases in data collection

Time ordering of qualitative and quantitative research phases is another important dimension of mixed method research. The phases can be carried out sequentially or concurrently (Johnson and Onwuegbuzie, 2004). This study employed a sequential approach. The data were collected in three phases. The first phase was reconnaissance, during which I established contacts with CGIAR Centre World Agroforestry Centre and the international NGO, TechnoServe, who was implementing a project on linking small-scale mango farmers to markets through producer organizations. The purpose of this phase was to understand the setting of the study area, establish contacts and test the feasibility of the study in the selected country. This phase helped in refining the research questions. The original research was to compare indigenous and exotic fruit value chains. During the reconnaissance, I realized there were no active groups in the indigenous fruit value chain, which meant that there was a need to focus on one fruit value chain, i.e., mango.

The second phase was a qualitative study which involved understanding the performance of the mango value chain. During this stage, key informant interviews were conducted with different actors along the mango value chain, i.e., producers, buyers, processors and input suppliers. The number of cases interviewed at the different segments of the chain was ten producers, five buyers, three processors and one input supplier. These interviews were limited because a number of organizations had already mapped the chain and only in-depth interviews were conducted with segments of the chain that were relevant for answering the research questions. The semi-structured interviews were supplemented by participant observations to observe the different activities along the chain. These were conducted to help us understand the performance of relationships as well as

the performance of the farmer organizations and the performance of the whole chain. The insights from the semi-structured interviews assisted in refining the questions for the household survey. In mixed methods, the qualitative phase might be used to inform the quantitative phase (Johnson and Onwuegbuzie, 2004). In this study, I used the semi-structured interviews for instrument development and triangulation - increasing the credibility of the study as well as the explanation of the results obtained from the quantitative study.

In the third phase, after developing the questionnaire, I pre-tested it with 30 farmers to increase the internal validity of the study. This helped us to further refine some questions to suit the context. For instance, most of the relationship questions had been adapted from a developed country context and studies conducted outside Africa. Finally, I conducted a household survey using face-to-face interviews using structured questionnaires, which were conducted by six trained enumerators who understood the local languages to increase the validity of the responses and 600 farmers were interviewed (for further details on the data collection see methodology sections in articles 1-4). The data collection was performed at different periods: Reconnaissance during April 2013; the qualitative study during August to September 2013; and the quantitative study during February to April 2014.

The structured questionnaire was designed to capture different aspects of the study and it was divided into different sections based on the research questions or the objectives in addition to general information about the household. Section one captured **socio-demographic characteristics**, i.e., age, sex, education level, household size, total farm size, sources of income and access to credit. The next section captured information about mango production and marketing. **Production**; the total number of trees owned, experience in mango growing, main sources of labor and cost of production, yield per variety; **marketing** the main data collected were about the main buyers, satisfaction with the buyer, and frequency of payment, price, marketing channels and total annual income from mango sales. **Income from other sources**: number of other crops grown, their production cost and annual income, livestock production, annual income and cost of production; **off-farm employment** data were collected about household involvement in formal employment and annual income, business, retail shops, gifts and pension. This ensured all the income earned was collected. The variables from this section were used in the socio-demographic characteristics section (Article 1 and 2) and part of Article 3.

The aim of the third section, **relationship quality between producers and their buyers**, was to collect data about the existing relationships between the producers and their main buyers. Information was collected about trust, overall satisfaction, communication quality, producer loyalty, distributive and procedural fairness, price satisfaction (different dimensions), closeness and financial and non-financial performance. These data were used in Article 1 and 2. The fourth section was about household involvement in collective action, i.e., group marketing and processing. The variables were group size and age, position in the group, length in collective action, number of meetings attended, number of times the farmer had participated in collective marketing and processing, other groups to which the farmer belonged (social participation), reasons for participating in collective action, whether they still sold collectively or not and why. This formed part of article 3 and 4. The next section was about household expenditure over the 12 months. I collected data on items such as food, clothing, medical bills, transport cost, communication and school fees. Data for the last two sections were collected about asset accumulation and social capital (trust and networks the individual had) (Appendix IIA).

4.2.4 Data analysis

Data were analyzed using STATA 13, SMARTPLS, AMOS software and different models were estimated based on the research questions as detailed in the article manuscripts in Appendices 7.1-7.4. A summary of the different methods of analysis that were used for the different articles is presented in Table 4.3.

Table 4.3: Summary of data analysis

Research questions	Unit of analysis	Variables		Data analysis	Articles
		Explanatory	Dependent		
1. What are the determinants of smallholder participation intensity in collective marketing and group governance?	Farmer household	Human capital, physical capital, market access, financial capital Social capital Group characteristics	Collective sale	Probit regression analysis	Article 4
		Human capital, physical capital, social capital, financial capital market access group characteristics	Group governance	Negative binomial regression	
2. Does collective action improve smallholder income, assets and poverty?	Farmer household	Human capital, market access, physical capital, social networks	Participation in collective action; household income; total household consumption; total asset holdings; and poverty	Propensity score matching; Poverty analyzed based on head count ratio and poverty index ; Heterogeneity across propensity score and farm size using smoothing difference method	Article 3
3. What dimensions of price satisfaction influence the relationship between trust and producer loyalty in the Kenyan mango supply chain?	Farmer-buyer relationships	Price satisfaction: price fairness, relative price, price reliability, price transparency, price quality ratio and trust	Producer loyalty	Structural equation modelling, mediation and multi-group analysis	Article 1
4. What is the effect of fairness, trust, and closeness and communication quality on supplier financial performance?	Farmer-buyer relationship	Closeness, communication quality, fairness and trust	Supplier financial performance	Factor analysis and ordinary least squares regression, moderation, multi-group analysis	Article 2

Source: Author's own elaboration

In article one, structural equation modeling (SEM) using partial least squares was used to estimate the causal relationships between price satisfaction, trust and producer loyalty and covariance-based SEM using AMOS was used to test for the mediation effect of trust and multi-group for comparing differences across different socio-demographic characteristics. Article 2 was analyzed using factor analysis and direct and interaction effects between relation factors and supplier financial performance was conducted based on ordinary least squares regression. Propensity score matching was used to estimate the impact of collective action on smallholder welfare and poverty (Article 3), and heterogeneity across propensity score distribution and farm size was conducted using smoothing differencing method. In article 4, I applied probit and negative

binomial regression to analyze the determinants of the intensity of smallholder participation in producer organizations.

Structural equation modeling (SEM) was used to investigate the relationships between price satisfaction, trust and producer loyalty (Article 1). SEM is more suitable for estimating complex causal networks simultaneously compared to linear regressions (Lowry and Gaskin, 2014). To determine the relationships between price satisfaction, trust and producer loyalty, partial least squares SEM and smartPLS (3.0) was used. This method adopts a two-step approach as suggested by Anderson and Gerbing (1998) and Hulland (1999) to measure the inner and outer model. PLS SEM is a suitable method for both exploratory and confirmatory studies in cases where data are not normally distributed compared to covariance-based SEM (Lowry and Gaskin, 2014). SEM has two models, i.e., the inner model that specifies the relationships between the independent and dependent variable (latent variables), and the outer model which specifies the relationship between the latent variables and their observed indicators (Wong, 2013).

To test for the appropriateness of the outer model, the following were considered: indicator reliability, internal consistency reliability and convergent validity. For indicator reliability, the factor loadings of the indicators should be above 0.4, but preferably a value ≥ 0.7 (Hulland, 1999). Internal consistency reliability was assessed using the composite reliability, which should be ≥ 0.7 (Bagozzi and Yi, 1988). The convergent validity was examined using average variance extracted (AVE), which indicates whether the construct variance can be explained from the chosen indicators (Fornell & Lacker, 1981). The recommended AVE is ≥ 0.5 (Bagozzi & Yi, 1988), which indicates that the indicators account for at least 50 per cent of the variance. The inner model was evaluated on discriminant validity by comparing the latent correlations and the square root of the AVE (Wong, 2013). Fornell and Lacker (1981) suggest that the square root of AVE of each latent variable be greater than the correlations among the latent variables. All these conditions were satisfied. I bootstrapped (Wong, 2013) to test for the significance of the paths and I tested for reverse causality between trust and price satisfaction.

Mediating effect of trust between price satisfaction and producer loyalty and multi-group analysis was investigated using covariance-based SEM using AMOS because it can test for structural and measurement invariance. This feature makes it a more reliable method compared to PLS SEM. Second, if the sample size is above 500 and path coefficients are ≥ 0.25 , this method is suitable despite the dependent variable being not normally distributed (Qureshi & Compeau, 2009).

Mediation refers to the presence of an intervening variable that transmits the effect of the independent variable to the outcome variable (Aguinis et al., 2016). In practice, mediation refers to the underlying mechanisms and processes that connect antecedents and outcomes. A mediator variable transmits the effect of the antecedents on the outcome, either in part or whole (Baron & Kenny, 1986; Mackinnon, 2008). When the mediator transmits the effect of the antecedent to outcome wholly, this is referred to full mediation and partial mediation occurs when the mediator transmits the effect of the predictor partially. Therefore, mediation is a process whereby the predictor variable affects the outcome variable indirectly in the presence of the mediator variable. In the last step, multi-group analysis was carried out to compare the variations of price-satisfaction across sex, age and education level of the farmer to understand the perception of the farmers across the different socio-demographic characteristics.

Factor analysis combined with ordinary least square regression and 2 stage least squares regression was used to investigate the effect of relational factors on producer/ supplier financial performance and the moderating role of trust between fairness and supplier financial performance (Article 2). In the first step, since the variables were latent, factor analysis using principal component analysis and varimax rotation was used to extract the factors. All factors that had Eigen values above one were extracted. The factor scores were predicted and were used in the subsequent models. I tested for internal consistency reliability and indicator reliability. Indicator reliability; the factor loadings for the latent variables (financial performance, fairness, closeness, communication quality and trust) were above 0.50; these were above the 0.40 cut-off suggested to represent practical significance by Hair et al. (1995), but the preferred value is ≥ 0.6 (Bagozzi et al., 1991). Internal consistency reliability; I then tested for the reliability of the measurement scale using the Cronbach alpha and values were above the recommended threshold of 0.7 (Nunnally, 1978). I tested for the appropriateness of the factor analysis scale using the Kaiser-Meiyer-Olkin (KMO) measure of sampling adequacy (Kaiser, 1970) and it was above 0.7 for all the variables. The recommended value is above 0.5 for factor analysis (Hair et al., 1995).

Ordinary least squares regression (OLS) was used to determine the direct effect of fairness, trust, and closeness, and communication quality on supplier financial performance. I tested for the moderation effect of trust by including the product of independent variables, i.e., fairness, closeness and communication quality and the moderator, i.e., trust as an additional predictor in the model (Equation 6). A moderator variable influences the nature (e.g., magnitude and/direction) of the effect of the independent variable on an outcome variable (Aguinis et al., 2016; Hayes & Matthes,

2009). In moderation, the moderator variable will influence the path relating the independent variable and outcome variable. Moderators affect the direction and or strength of the relation between an independent or predictor variable and dependent variable (Baron and Kenny, 1986). Statistically, the nature of the moderator will determine the analysis to be conducted. For example, when the moderator is categorical, the traditional data-analytical approach is sub-grouping analysis, which consists of comparing correlation or regression coefficients across the various sub-groups or categories (Aguinis & Pierce, 1998; Boyd et al., 2012). When the moderating effect is continuous studies typically depend on moderated multiple regression (Aiken & West, 1991), which consists of creating a regression model that predicts the outcome based on a predictor X, a so-called predictor Z hypothesized to be a moderator, and the product term between X and Z, which carries information on the X-Y relation. The regression coefficient for the XZ product term from X and Z have been partialled out offers information on the presence as well as magnitude of the moderating effect. Since trust was a continuous variable the suitable method was moderated multiple regressions instead of sub-group analysis.

$$Y_i = \beta_0 + \beta_1 T_i + \beta_2 F_i + \beta_3 CLO_i + \beta_4 COM_i + \beta_5 T * F + \beta_6 T * COM_i + \beta_7 T * CLO_i + \beta_7 T * F_i + \varepsilon_i \quad (6)$$

To ensure the robustness of the estimated results, I checked the following: I compared the estimated model with a Tobit model due to the skewness of the dependent variable and I obtained the same results. Due to the high correlation between the independent variables, there was the possibility of multicollinearity, which occurs when the independent variables are highly correlated with each other so that there is not much variation explained in the dependent variable, which leads to biased estimates. I checked for multicollinearity between the independent variables and the variance inflated factors (VIF) and the values were below 2.45. It is recommended that the model should be corrected if the VIFs exceed 10, which indicates signs of serious multicollinearity (Neter et al., 2004). To ensure that there was no specification bias, different variables were added to the model until a stable model was obtained.

We tested for endogeneity by conducting two stage least squares (2SLS) regression during the second stage of the regression when the interactions were added and endogeneity was not detected. Endogeneity occurs when one of the independent variables is correlated with the model error term. The use of instrumental variables is useful in correcting for detected endogeneity in the model. Finally, other methods, such as structural equation modeling (SEM) using partial least squares and

covariance based-SEM (AMOS), may be suitable when estimating the relationships between latent variables (Lowry and Gaskin, 2014). However, our model was simple and did not require complex modeling. Second, using SEM to test for moderations may be problematic (Cortina et al., 2001) and conducting interactions with the product of sum of indicators is more appropriate than partial least squares with product indicators (the strength of relationships is over-estimated and their significance is underestimated in partial least squares (Goodhue et al., 2007)).

Propensity score matching (PSM) was used to estimate the impact of collective action on smallholder welfare and poverty (Article 3). Due to selection problem, the impact of group membership on smallholder welfare, e.g., income cannot be estimated directly. Selection bias may arise from differences in observable characteristics, e.g., age, education of members and non-members. The second source of bias is selection due to unobserved characteristics such as the farmer's attitudes, e.g., trust towards joining collective action. To control for observed characteristics, PSM was used, which constructs a suitable comparison group with members and non-members that are as similar as possible based on the observable characteristics (Khandler et al., 2010).

This method follows two steps; the first step involves the generation of propensity scores based on the observable characteristics (explanatory variables) using a logit model. The propensity scores are then used in the second step for estimating the average treatment effect of group membership on the outcome variable, e.g., income using matched observations between members and non-members. The PSM estimator of the ATT is the mean difference in outcomes between the treatment and control groups appropriately matched by the propensity score (Smith & Todd, 2001). Following Caliendo and Kopeining (2008), the PSM estimator is:

$$\tau_{ATT}^{PSM} = E_{Pr(X)|P=1} \{E[Y(1)|P=1, Pr(X)] - E[Y(0)|P=0, Pr(X)]\} \quad (5)$$

Where ATT is the average treatment effect on the treated, X is the control variable, P is group membership, ($P = 1$, if group member and $P = 0$, if not group member), Y is the outcome, i.e., income, asset holdings....., $Pr(X)$ is the propensity score, i.e., the probability of a farmer being a group member. The propensity score is generated from the logit model. The following three algorithms were used; nearest neighbor, kernel and radius matching. The sensitivity of the estimated ATT due to unobserved characteristics was tested using Rosenbaum bounds and the results were found to be insensitive. A balancing test was conducted, which shows whether the matching

procedure balances the distribution of the explanatory variables between the control and treatment group (Dehejia & Wahba, 2002). Lastly, I tested for heterogeneity across propensity score distribution and farm size using the smoothing differencing method (Xie et al., 2012).

In article four, I used probit and negative binomial regression to analyze the determinants of the intensity of smallholder participation in producer organizations. Probit regression analysis was used to estimate the determinants of the intensity of household participation in collective marketing. The discrete decision of whether to continue selling as part of the group or to sell individually can be modeled using a probit model (Katchova & Miranda, 2004; Wooldridge, 2013). This is because the decision to participate actively in collective marketing is a binary choice problem, taking on the values of zero and one. In probit regression, the dependent variable takes on only two values; zero and one and it is a popular method for binary response variables (Wooldridge, 2013). Therefore, the empirical model for commitment to collective sale (y_i^*) for each individual i , is specified as:

$$y_i^* = \begin{cases} 1 & \text{if } y_i^* > y \\ 0 & \text{if } y_i^* \leq 0 \end{cases} \quad (1)$$

$$P(y_i^* = 1 | x) = \Phi(\beta_0 + \beta_1 age + \beta_2 gender + \dots + \beta_{Inccrop}) \quad (2)$$

Where y_i^* is the dependent variable, $y_i^* = 1$ if the farmer decides to continue selling collectively and $y_i^* = 0$, if the farmer decides to leave the group and sell individually, Φ is standard normal cumulative distribution function, P is the probability that a farmer will choose to continue selling through the producer organization or leave the group to sell individually. $\beta_0, \beta_1, \dots$ are the coefficients, age, gender....are the explanatory variables.

Negative binomial regression: the members' decision to participate in group governance is represented by the number of meetings attended by the farmer $y = 0, 1, 2, 3, \dots, k^{th}$ which are discrete events. Since the number of meetings attended is a count variable, the intensity of participation in the meeting could be estimated using Poisson models, which assume that the variance of distribution (var) of y is equal to the mean (μ), i.e., $var(y) = \mu$. However, the data did not satisfy this assumption. In a situation where the variance is greater than the mean, the standard Poisson model can be replaced by the negative binomial model which relaxes the assumption for the Poisson model (Land, McCall, & Nagin, 1996; Maldonado & González-Vega, 2008; Salmon & Tanguy, 2016). The negative binomial model is used with count data where there is over-dispersion in the data. The negative binomial model also estimates the over-dispersion parameter α . The

negative binomial relaxes the restrictive property of the Poisson distribution. Therefore, since the variance is not equal to the mean (μ), the variance is given by:

$$var(y/x) = \mu + \alpha\mu^2 \quad (3)$$

The probability that the farmer will attend a number of meetings y is then given by:

$$P(X = x/p, r) = \binom{r+x-1}{x} p^r (1-p)^x, \quad (4)$$

Where r = failure to attend meetings and x = number of meetings attended.

Semi-structured interviews: The semi-structured interviews were recorded, transcribed and coded.

4.2.5 Ensuring research quality

When conducting mixed methods research, there are two criteria for assessing the quality of the research, i.e., measurement validity/credibility and reliability/dependability (Teddle and Tashakkori, 2009). Since this study is predominantly quantitative, I primarily focus the discussion on the quantitative criteria. For the quantitative study, the criteria suggested by Tashakkori & Teddle (1998) for overcoming threats to validity and reliability were used. For the qualitative study, the criteria suggested by Lincoln and Guba (1985) and Creswell (2012) for validation and reliability of the research were used.

To enhance internal validity, construct validity and external validity for the quantitative part of the study, the following strategies were employed:

Questionnaire development based on literature: Development of the questionnaire was based on literature so that the right questions were asked to answer the research questions. For example, latent variables: trust, supplier financial performance, closeness, and producer loyalty, fairness and price satisfaction; the questions were based on the agrifood and relationship marketing literature. The questions in relation to collective action were developed based on development literature, specifically, smallholder participation in producer organizations.

Judgmental validation this was done by sending the draft questionnaires to the experts in the marketing and agribusiness fields to establish whether the questions in the questionnaires captured the constructs they were intended to measure. The other aspect was to obtain their opinions about the length, whether anything was missing and whether there were any subjects that should be

removed. Further, the questionnaire was given to chairpersons of the farmer organizations to check whether they could understand the questions to avoid ambiguous responses.

Training of enumerators and daily checking of the questionnaires: Experienced enumerators were trained, all the questions were explained and techniques about how to obtain the right information from the respondents were demonstrated. Master's students from the University of Nairobi with experience in conducting survey research were employed. To ensure that there were no missing data and no mistakes, all the questionnaires were checked on a daily basis during data collection.

Pre-testing of the questionnaire: a pilot study to pre-test the questionnaire was conducted with 30 farmers. During this, each enumerator interviewed at least five farmers and all the problems encountered and time spent were recorded. The answers were checked to ensure the farmers had understood the questions. Then we held a discussion as a group about how the data collection process could be improved. This helped to refine some questions.

Questionnaire administration: The questionnaires were administered in the local languages to ensure that the right responses were obtained. Further, the information about members and non-members was collected at the same time using the same questionnaire and from the agro-ecological zones increasing the comparability of the two groups. In impact evaluation, treated and control households must be interviewed at almost the same time with the same questionnaire in order to avoid bias (Heckman et al., 1999). This relates to Article 3.

Sensitivity analysis: Comparing members and non-members, to control for potential sources of selection bias, propensity score matching was used, and sensitivity analysis was conducted using Rosenbaum bounds to test for hidden bias due to unobserved characteristics.

Construct and discriminant validity: Construct validity, Cronbach's alpha was used to test the reliability and internal consistency of the constructs as explained in Article 1 & 2. Discriminant validity/convergent validity based on average variance extracted, internal consistency using composite reliability and indicator reliability using the factor loadings (Article 1).

Randomization and reducing response bias: Random sampling was conducted to reduce potential sampling bias and increase the generalization of the study findings. To increase farmers' participation in the survey, the farmers were mobilized through local contacts before the date of the interview so that they were available during the time of the interview. Small tokens were given to those who agreed to participate in the survey.

Data analysis: Before running the models, the data were checked for outliers, missing data, incorrectly entered variables that would affect the quality of results from the analysis. There was log transformation and removal of outliers and procedures and assumptions were followed critically depending on the statistical model being applied.

In the qualitative study, the following was conducted to increase credibility and dependability:

Credibility/trustworthiness was achieved through triangulation, peer review or debriefing and thick descriptions.

Triangulation was achieved through the use of several methods: observation, interviews and survey. All these methods complemented each other to increase the credibility of the results.

Peer review or debriefing this was achieved through involving colleagues at the department and outside during the research design, analysis and interpretation of results.

Rich thick description: The individual papers provide a description of the context and quotes from farmers are included in the discussion section of Article 1, 2 & 4.

Dependability: Process of the inquiry, including the appropriateness of the inquiry decisions and methodological shifts (Teddlie & Tashakkori, 2009). The interviews were recorded and transcribed; in addition, detailed field dairies were kept.

4.2.6 *Research ethics*

The University of Copenhagen does not have a research ethics committee, but I followed international ethical standards. When using tape recorders during the qualitative study, consent was first sought from the respondents before recording. Before the interview, the purpose of the research was explained to respondents and the respondents were told that the interviews would be anonymous. For the quantitative study, the purpose of the research was explained to the respondents, and they were asked whether they had time to answer the questions. All the names and contacts of the respondents remained anonymous during the analysis of the data and all the data obtained.

Since the PhD program had to be attached to a research institution in a developing country and also to have a co-supervisor in the same institution, I did not need to apply for a research permit from the Kenyan government. The research institution to which I was attached was the World Agroforestry Centre (ICRAF). Together with my principal supervisor, I established the collaboration with one of the scientists, who helped me to make contact with TechnoServe. Before

obtaining permission to talk to the field staff and use the farmer lists, I had to sign a confidentiality agreement. The information obtained was only to be used for research purposes. The thesis was supported by the Agricultural Transformation by Innovation (AGTRAIN) Erasmus Mundus Joint Doctoral Program, funded by the European, Audiovisual and Culture Executive Agency (EACEA) of the European Commission and the University of Copenhagen (SCIENCE).

5. Overview of the thesis articles

The thesis is based on four articles. Each article addresses one of the four specific research questions outlined in Chapter 1 and sections 5.1 to 5.4 below provide a summary of the four resulting scientific journal articles.

5.1 Article 1: Price Satisfaction and Producer Loyalty: The Role of Mediators in Business to Business Relationships in Kenyan Mango Supply Chain.

Abstract

The purpose of this paper was to investigate which dimensions of price satisfaction influence producers' trust in buyers and assess the mediating role of trust in the relationship between price satisfaction and producer loyalty in fresh fruit supply chains. A cross-sectional study design using both semi-structured interviews and structured questionnaires was used. The study was conducted in the eastern part of Kenya and included 600 smallholders. Data were analysed using structural equation modelling. The results show that price fairness, price reliability, and relative price are dimensions of price satisfaction that affect the producers' trust in the buyers. Moreover, trust between the producer and the buyer is found to be a strong mediator between price satisfaction and producer loyalty. The age of the producer affects the producers' perception about price satisfaction and loyalty. The findings support recent studies about trust and its mediating role in supply chain relations. The paper is based on a cross-sectional study design, limiting the causal inferences which can be drawn. Producers' preferences change with time and future studies should be based on longitudinal designs. This paper shows the relationship between the multi-dimensional nature of price satisfaction and producer loyalty with trust as a mediating variable in the business-to-business (B2B) context. Although B2B relationships have been shown to be of great importance for smallholders in enhancing business performance with their buyers, little attention has been given to the role of trust as a mediator. This study offers interesting insights into how trust plays a mediating role between price satisfaction and loyalty in a developing country context.

5.2 Article 2: Relational Factors and Performance of Agrifood Chains in Kenya

Abstract

The purpose of this study was to investigate the direct effect of fairness, closeness, communication quality and trust, and evaluate the moderating effect of trust on the financial performance of producers in the Kenyan mango sector. A cross sectional study design was used and both semi-structured interviews and structured questionnaires were employed. The study was conducted in the

eastern part of Kenya and included 562 farmers. Data were analyzed using factor analysis and ordinary least squares regression. The results show that trust, fairness and closeness have a direct positive and significant effect on producer financial performance. Fairness is identified as the most important factor followed by trust and closeness. Moreover, trust was found to moderate the relationship between fairness and financial performance. The study shows that trust does not only have a direct effect on performance, but can also function as a catalyst to improve the relationship between fairness and performance. Trust, therefore, becomes central for increasing performance in in agrifood chains occurring in business environments with institutional voids and imperfect markets. This study is the first to investigate the effect of the four relational factors in a single context in an agrifood supply chain.

5.3 Article 3: The Effect of Collective action on Smallholder income and Asset Holdings in Kenya

Abstract

Collective action through rural producer marketing organizations can be significant for improving smallholder welfare thus contributing to rural economic growth and poverty reduction. The purpose of this paper was to examine the impact of group membership on smallholder welfare and poverty. The study compared farmers in producer-marketing farmer organizations and non-members involved in growing mango from the eastern part of Kenya. The propensity score matching method was used to estimate the average treatment effect of group membership on smallholder welfare and poverty. The heterogeneity across propensity score and farm size for the estimated impact were also determined using the smoothing difference method. A total of 600 households were interviewed comprising 400 non-members and 200 members. The study shows that group membership significantly improves smallholder total household income and asset holdings and reduces poverty. This effect is significant for medium-scale farmers participating in collective action compared to poor small-scale and large scale farmers. Important factors determine smallholder participation in collective action including human capital (age and education level of the household head), market access (distance to the nearest paved road), natural and physical capital (total farm size and number of other crops grown). This study expands on the literature about the effect of collective action on smallholder welfare by investigating the impact on asset holdings and poverty in addition to total household income.

5.4 Article 4: Factors that Influence the Intensity of Smallholders' Participation in Rural Producer Organizations: Evidence from Kenya's Mango Sector

Abstract

Rural development necessitates sustained market access for smallholders and successful performance of producer organizations can be an important means to achieve inclusion in modern value chains. Collective action through producer organizations assist smallholders in overcoming challenges associated with accessing markets for their products. However, there is mixed evidence about the effectiveness and sustainability of producer organizations in facilitating smallholder farmer access to markets. In this article, we analyze the factors that determine smallholders' participation in collective sale and group governance in the mango value chain in Kenya. I used a mixed methods approach based on a household survey including 200 respondents and 10 in-depth interviews. Data were analyzed using probit and negative binomial regression models. I find that more educated farmers with high mango production capacity are more likely to participate actively in collective marketing. The group size is an important aspect for collective marketing, but it negatively affects group governance. Trust in other members is critical for the increased participation in collective marketing, but does not affect participation in governance. On the other hand, trust in the leader and age of the group member significantly affects intensity of participation in group governance. We find also that social networks in terms of number of contacts with the processors and social participation are important for group governance. In general, more resourceful farmers seem to opt out of collective action. The research highlights the importance of designing interventions for supporting and developing rural producer organizations in ways that ensures incentives for wealthier and more resourceful farmers to actively engage in collective action.

5.5 Discussion

This section discusses the main findings of the thesis in relation to previous literature. The detailed discussions for the specific research questions are found in Article 1-4. The aim of the PhD research was to investigate the antecedents and implications of horizontal and vertical collaboration on smallholder farmer performance in the agrifood chain. In the first section, I discuss the dimensions of price satisfaction and their influence on the relationship between trust and producer loyalty, and the mediating role of trust. In the second section, I discuss the effect of fairness, trust and closeness on producers' financial performance, and the moderating role of trust. The third section discusses the impact of collective action on smallholder income, asset-holdings and poverty.

In the last section, I discuss the determinants of the intensity of smallholder participation in collective marketing and group governance.

5.5.1 Price satisfaction and producer loyalty: the role of mediators in business to business relationships in Kenyan mango supply chain.

Price satisfaction is a multidimensional concept comprising price fairness, price reliability, relative price, price transparency and price quality ratio. We find that only three dimensions of price satisfaction, i.e., price fairness, price reliability and relative price are important dimensions that influence producers' trust in the buyers. Trust mediates the relationship between price satisfaction and producer loyalty. Price fairness builds producer satisfaction by creating a sense of equality, for example, when all farmers are offered a reasonable price for the same quality of product. Second, if the buyers act in an open and honest manner, trust is produced which leads to producer loyalty, thereby contributing to the building of long-term relationships. Somogyi and Gyau (2009) found that producers felt unfairly treated when processors gave different prices for the same milk quality. I find that mango producers also feel unfairly treated when the middlemen offer them different prices for mangoes of the same quality. This happens during peak season and especially if the producer's farm is located far from the main roads. Distant producers cannot sell their mangoes on a price per piece basis, but have to sell in bags or crates, resulting in lower prices. This creates distrust in the buyers and increases the incentive for farmers to sell to an alternative buyer, even after having received a pre-harvest deposit from a buyer, if a second buyer offers a better price than agreed on with the first buyer. The producer behavior depends on their satisfaction with the buyer. Producer loyalty can be achieved if both economic and non-economic outcomes are achieved (Lambe et al., 2001). In this case, offering a fair price affects the satisfaction which in turn leads to the building of trust and loyalty.

The findings show that price reliability affects producers' trust in the buyers. Farmers indicate that the mango price does not vary unless there is a reduction in mango supply in a given season. Buyers who keep their promises regarding the price and buy mangoes on a regular basis are more trusted than those who offer higher prices, but rarely appear and take small quantities. According to interviewees, buyers often discourage farmers' price expectations by arguing that "there is no market for the mangoes" as a strategy to convince farmers to accept lower prices. To a certain extent, this makes the price information appear to be arbitrary and unreliable, thus creating dissatisfaction and distrust in the buyers. As pointed out by Gyau et al. (2011) and Matzler et al.

(2006), high price reliability builds trust and promotes long-term relationships and price reliability exists if the buyers keep their promises regarding the price, if no hidden costs occur, and when price changes are communicated properly and in a timely manner. The low prices do not actually reflect the market price, but institutional and structural constraints allow buyers to strategically provide price information that they may misuse to their own advantage.

Relative price results from comparing prices offered by different buyers. In the mango case, it seems that local traders provide consistent, although low price estimates compared to alternative buyers, such as exporters, supermarket chain, and processors, who are rare or absent in most places. The producers have to accept the price offered by buyers or risk their mangoes being wasted due to limited demand from alternative buyers. This leaves the producers in a state of dissatisfaction due to the low obtainable market price.

I found that trust is a mediator between price satisfaction and producer loyalty. Trust may influence the similarity in social values between the producer and the buyer, which in turn can result in increased buyer embeddedness in the relationship, which enhances reciprocity and development of the long-term relationships. This study lends support to the findings of Osman and Sentosa (2013), who showed that trust is a mediator between customer satisfaction and loyalty. However, in this study, I consider it from the suppliers' perspective. This implies that building long-term relationships based on price satisfaction alone is insufficient. Producers with high trust in the buyers are more loyal and committed to the buyers (Boniface, 2012).

Lambe et al. (2001) points out that the exchange partner will be loyal or committed to a given exchange if the relationship is rewarding in terms of both economic and non-economic benefits compared to the alternative. Satisfaction over time creates trust and commitment to maintain the relationship. Based on the three dimensions of price satisfaction, I identified key important factors to be considered in order to build long-term relationships between the producers and the buyers. These include the buyers keeping their promises, buying regularly, being consistent in the price offered, offering a reasonable price compared to the product quality and being sincere and honest with the producer in terms of the price offered. This will improve the trust in the buyer and increase producer loyalty. In this way, side-selling and mistrust can be reduced in exchange relationships.

5.5.2 Relational factors and performance of agrifood chains in Kenya

I found that three important factors affect supplier financial performance. These include fairness, trust and closeness. Fairness of buyer to supplier or producer increases supplier financial

performance. Two kinds of fairness were considered, i.e., procedural fairness and distributive fairness. The results show that distributive fairness significantly affects supplier financial performance. Distributive fairness relates to the producers' perception of outcomes of the relationship with their buyer, for example, profits earned (Patterson et al., 2006; Yi & Gong, 2008). If fairness is present, increased interactions will take place, which contribute to understanding of each other's needs. Consequently, exchange norms such as increased loyalty and commitment are developed, which leads to the reduction of transaction costs and increased efficiency. As a result, the supplier's financial performance is improved (Kumar et al., 1995; Zaefarian et al., 2016). For example, if the producers are treated fairly by offering a fair price which is commensurate to the effort put in the production and crop management, the fruits are bought on time, and there is no wastage due to delayed deliveries, the producer will reciprocate by providing quality fruit and they will be committed to the particular buyer, thereby increasing efficiency and reducing opportunistic behavior. This study is consistent with Zaefarian et al. (2016) who show that when suppliers perceive buyers to be fair, sales are affected positively. The positive growth in profits is commensurate to the relative effort or inputs invested in the production and management process (Brown et al., 2006; Griffith et al., 2006; Kumar et al., 1995).

Trust increases supplier financial performance. Since there is limited use of formal means of exchange such as formal contracts, most of the exchanges are based on socially built bonds between the buyers and producers. The buyers are able to entrust their money with the producers by paying a deposit and later collecting the fruits on the agreed dates. At the same time, some producers can entrust their produce to the buyers without paying a deposit and the buyers pay later. In these two circumstances, trust plays an important role as a safeguard mechanism against opportunistic behavior (Claro et al., 2003). The existence of trust also reduces uncertainty, thereby facilitating the easy flow of resources between the exchange partners (Schiefer and Hartmann, 2008). The information assists the producer to improve their production capabilities leading to the production of better quality fruit. Good quality fruit attracts a good price, which increases the income obtained from the sale of the fruit. These findings are consistent with previous studies. For example, Masuku and Kirsten (2004) and Lobo et al. (2013) indicate that suppliers in trusting relationships gained more profits. The profits are the result of reduced wastage, improved product quality and reduced opportunistic behavior. In contrast to this finding, Lu et al. (2008) concluded that trust does not affect the producer's profitability, which indicates that the effect of trust on supplier financial

performance could be context specific and could be influenced by other factors such as the existing institutions and other factors that have been discussed in prior literature.

Closeness between supply chain partners increases supplier financial performance. This is achieved through increased interactions that might lead to improved information exchange between the partners. Transparency between the exchange partners is created, perceived risk is reduced and commitment is increased (Barnes, 1997). In most cases, the buyers are well known by the producers and they have built a good rapport, which reduces uncertainty in the exchange relation. Their repeated transactions create social bonds and business becomes based on friendship and trust. This in turn reduces the search and bargaining costs of the supplier and promotes long-term relationships, which improve performance (Dyer and Chu, 2003). Similarly, buyers have built networks within the local community. For example, local contacts assist the buyers in sourcing high quality mangoes. Hence, closeness is based on established trust and extended local buyer-seller networks. This finding is consistent with previous studies that showed that closeness increases financial performance (e.g., Ferguson et al., 2005).

The interaction between fairness and trust had a significant and positive effect on financial performance. This finding may be explained by the fact that both trust and fairness increase information sharing and reduce opportunistic behavior between the supply chain actors which in turn leads to improved production, reduction of supply chain inefficiencies and better profitability. Farmers with low level of trust and fairness had low levels of financial performance. This is because trust plays a catalytic role in speeding up transaction processes. This is achieved through reducing conflict and destructive behavior, encouraging information flows that positively influence satisfaction and performance of the relationship (Cohen-Charash and Spector, 2001; Krishan et al., 2006; Sindhav et al., 2006).

5.5.3 Effect of collective action on smallholder income, asset holdings and poverty

The results reveal that smallholder participation in collective action led to an increase in total household income and asset-holdings. This finding is consistent with previous studies that found that group membership had a significant effect on smallholders' income (Fischer & Qaim, 2012; Ma & Abdhulai, 2016), but they did not determine the effect on asset holdings. The increase in total household income is attributed to a number of factors. First, members had increased access to technical knowledge. This was attained through the training that was offered by TechnoServe. The group members were trained in aspects of management of the fruit trees, for example, agronomic

practices such as pruning and weeding. The farmers were also trained on aspects of pest and disease management, which is a key problem associated with growing improved mangoes, especially, the control of fruit flies, mango weevil and anthracnose. These improved the productivity and reduced post-harvest losses leading to improved yields.

Some groups sold to exporters that offered a better price compared to the local traders. The local traders offer a low price which ranges between one to five Kenya Shillings whereas the exporters offer eight Kenya shillings and above per fruit. The other explanation for increased income was attributed to the application of knowledge obtained from being members to grow other crops. This implies that collective action plays a significant role in improving agricultural productivity and raising smallholders' income. This is achieved through lowering the costs of information, negotiation and coordination, which is a key challenge for smallholders (Poulton et al., 2010).

The increase in asset-holdings was mainly attributed to access to credit through the producer groups. Some groups had local credit and saving schemes referred to as 'merry-go-round' schemes. Each member of the group was supposed to save a certain amount of income in the group on either a weekly or monthly basis and at the end of a given month, the amount would be given to one member. Secondly, the amount saved from the sale of mangoes was used as investment capital to buy the assets. Participation in collective action provides access to resources (Scoones, 1998) and one type of resources may be used to build other resources (Bebbington, 1999), for example, when access to credit through the cooperative leads to the accumulation of physical and natural assets (Donovan & Poole, 2014). Mujawamariya et al. (2013) showed that farmers in cooperatives invested the income obtained from the sale of coffee into the purchase of plots of land. The previous studies were mainly descriptive; therefore, our study confirms the effect of collective action on smallholder asset-holdings econometrically. However, we focused only on household, transport and farm equipment, which can be categorized as physical assets.

Participation of smallholders in collective action led to a reduction in poverty. This was attributed to the increased income as a result of participation in the group. The study findings are consistent with Verhofstadt & Maertens (2015) who showed that participation in collective action reduces poverty. However, the effect was limited for some groups due to the challenges that were encountered during the implementation of the project. These included extreme weather conditions as a result of prolonged drought that affected the yield of the mangoes in some areas of the study.

The other reason was associated with limited or unassured markets for some groups that led to resorting to individual selling.

The results also show that medium-scale farmers benefit most in collective action compared to poor small-scale and larger scale farmers. This is explained by the fact that the poor small-scale farmers may lack the resources to participate in collective action while the large-scale farmers find it less beneficial. Access to resources limits the farmers' participation in a given marketing channel (Alene et al., 2008). Studies investigating the relationship between poverty reduction and access to higher value markets suggest that the poorest often have few assets to effectively participate in markets (Stoian et al., 2012). Our findings are in contrast to the previous findings that show that poor small-scale farmers (Fischer and Qaim, 2012; Ito et al., 2012; Ma & Abdhulai, 2016) and large-scale farmers are most likely to benefit from collective action (Verhofstadt and Maertens, 2015). This is attributed to the selection criteria that were used for eligibility to participate in the group marketing. One of the criteria was that the farmers should have at least 0.5 acres of trees either pure or mixed stand in order to be part of the marketing group. This might have eliminated some of the farmers.

5.5.4 Factors that influence the intensity of smallholders' participation in rural producer organizations

The intensity of smallholder participation in rural producer organizations (RPOs) was investigated based on participation in collective marketing and group governance. Different factors were found to affect the intensity of smallholder participation in collective sale and group governance. The important factors that influenced the level of smallholder participation in collective marketing were trust in group members, education level and number of trees owned. The level of trust among the group members increased the level of smallholder participation in collective marketing. Trust is an important factor in connection with collective action because trust in other RPO members creates bonding social capital (Woolcock, 2001) that provides a foundation for mutual cooperation and increases the intensity of participation. Trust provides a basis of cooperation for individuals to work together (Ostrom, 2007; Vanni, 2014). Trust reduces transaction costs by reducing monitoring costs (Vanni, 2014). These findings are consistent with Megyesi et al. (2011), who showed that both bonding and linking social capital increase the level of participation in collective marketing. Lack of trust among the members reduces cohesion which negatively

affects the collective action activities leading to disintegration of the groups (Masakure & Henson, 2005).

Education level of the household head was found to significantly increase smallholders' commitment to collective marketing. Each additional year of education increased participation by 1.5 percentage points. This is because farmers with higher education are better at recognizing and comprehending opportunities such as the potential benefits associated with collective marketing. Since collective marketing involves negotiation with buyers, higher education enables the members to understand, negotiate, and reach a better contract with the buyers. It increases their capability to comprehend information concerning market prices. In general, education enhances farmers' ability to engage in discussion, debate, negotiate – competencies highly needed for ensuring proper internal governance practices and external relationship management in RPOs. Education increases the tendency of individuals to cooperate with other people and participate in group activities (Enete & Igbokwe, 2009). This finding is consistent with Wiebe (2000) and Fischer and Qaim (2014) who showed that education level positively affects engagement in collective activities.

The number of mango trees owned by the farmer increases the likelihood of being committed to selling through the RPO. This is because the fruits are highly perishable; a farmer with more mangoes is likely to incur higher financial losses if the mangoes are not sold in time. As a result of the high level of uncertainty associated with trading on the open market, farmers aim to minimize risk and uncertainty by actively participating in collective marketing. Markelova et al. (2009) explain that the type of product which relates to the product characteristics affects the success of collective action. For example, high value products, such as fruits, are more likely to have success in collective marketing arrangement compared to grains.

The intensity of smallholder participation in the governance of group activities was influenced mainly by the age of household head, the total number of trees owned, trust in the group leaders and contact with processors. The study revealed that the age of the household head has a positive and significant effect on number of meetings attended. Older farmers are more likely to attend group meetings compared to young farmers. This is because old farmers have more time available for farming and group activities and can invest more in group activities. This is consistent with previous studies that show that older people are more committed to collective activities because they tend to have invested more in the RPO, both financially and socially and, therefore, feel more attached to these groups (Staatz, 1989). Another reason could be that age is an indicator of

experience, i.e., the older members have more knowledge and skills in running the farming business and attach value to collective action activities. I find that trust in the leaders positively influences the number of meetings attended by members. The increase in the level of trust in the leader increases the likelihood of attending meetings by 1.3 percentage points. This implies that the more trusted the leader is, the higher the number of members attending the meetings. Trusted leaders motivate members to participate in collective action activities (Markelova et al., 2009). This relates to the management style, commitment and transparency. The members are more likely to attend meetings due to the respect they have for the leader. The number of meetings attended was also influenced by the amount of contact with processors, which points to the better linking capital. In this regard, the higher the number of contacts with the processors, the more likely that market access for the producer organizations will be improved.

In general, the performance of smallholders was affected by collective action through producer organizations and the building of long-term relationships with the buyers. Farmer participation in producer organizations improves their welfare through improving income and asset holdings, thus contributing to the reduction of poverty. At the same time, fairness, trust and closeness with the buyers improves the financial performance of the producer through the building of long-term relationships, which implies that these two mechanisms are important for better functioning of the chain. This is because collective action improves horizontal coordination, which reduces the costs involved in the transaction, e.g., search, negotiation, and screening costs. It also assists organizing farmers to overcome the coordination and transport costs. This improves the farmer's bargaining power and improves the economies by enabling better prices to be obtained.

Building long-term relationships strengthens the link between the buyers and farmers so that the farmers produce the right quality and quantity demanded by the consumers. This can be achieved through building trust on the side of the buyer that can be achieved through price satisfaction of the producer. Fairness of the buyer is moderated by producer's trust in the buyer, which influences the financial performance. The producer's trust in the buyer mediates the relationship between price satisfaction and producer loyalty. Therefore, trust plays a central role between fairness, price satisfaction, producer loyalty and financial performance. Closeness between the producer and buyers enhances the financial performance of the producer. All the five factors work together to improve the farmer-buyer relationship, which affects the performance of the chain. The performance of collective action depends on the active participation of the members, which can be achieved through active participation in collective marketing activities and group governance.

Active participation in collective marketing is affected by the education level, trust in the members and the farmer's production capacity. Participation in group governance is also affected by trust in the leaders, social networks and the age of the farmer.

6. Main conclusions, implications and future research

This chapter presents the main conclusions, contributions of the thesis research, managerial and policy implications, points out limitations of the presented work, and outlines directions for future research.

6.1 Main conclusions

The rapid transformation of the agrifood system has led to rapid changes in agrifood supply chain structures requiring both horizontal and vertical coordination mechanisms for the chain actors. The extant literature shows that there has been increasing research in Africa about horizontal and vertical coordination. However, existing coordination mechanisms are faced with mistrust and side-selling which affects the effectiveness and sustainability of these mechanisms in linking smallholders to markets as well as improving chain efficiency. Despite the importance of other coordination mechanisms, such as the building of long-term relationships, few studies have investigated the role of relationship factors in improving the performance of the agrifood supply chains in Africa. Furthermore, studies focusing on horizontal coordination using collective action still lack a systematic investigation of the effect of collective action on poverty and the performance of rural producer organizations. Therefore, the study investigated the influence of the dimensions of price satisfaction on trust and producer loyalty, how the different relational factors affect supplier financial performance; the mediating and moderating role of trust; the effect of collective action on smallholder welfare and poverty, and the factors that affect the intensity of smallholder participation in rural producer organizations in the Kenyan mango value chain.

We draw the following key conclusions from the study: The improved performance of smallholders requires both effective horizontal coordination through producer organizations and increased vertical coordination through building long-term relationships. More specifically, we found that long-term relationships are important as a means of reducing high transaction costs associated with market imperfections and weak institutions in Africa. Price satisfaction is important for building long-term relationships and it is a multidimensional construct. Three important dimensions of price satisfaction were found to significantly influence producers' level of trust, i.e., price fairness, price reliability and relative price. These dimensions are important for building trust in the buyer. This can be achieved by the buyer keeping their promises, buying regularly, offering a price which is reasonable and consistent with the product quality, and being sincere and honest with

the producer in terms of the price offered. This leads to producer loyalty and the building of long-term relationships with producers.

Producer's trust in a buyer plays a mediating role between price satisfaction and producer loyalty in building long-term relationships. Trust may influence the similarity in social values between the producer and the buyer, which in turn can result in increased buyer embeddedness in the relationship, enhancing reciprocity and development of the long-term relationships. In addition, trust increases commitment that leads to the building of long-term relationships. Trust acts as a safeguard mechanism against opportunistic behavior.

I found that fairness, trust and closeness significantly influenced the producers' financial performance. Trust plays a moderating role between fairness and producer financial performance. A low level of trust reduces the level of fairness, which in turn lowers performance. This is because fairness increases information sharing and commitment of the exchange partner. The increased financial performance is attributed to increased interactions, which may lead to the exchange of resources, which improves the producers' production and management capabilities. This results in improved producer loyalty and commitment, which reduces searching, negotiation, coordination and monitoring costs. The shared information improves the producers' production capabilities which consequently lead to production of right quality and quantity of fruit which attracts good price increasing the profits earned. The wastages are reduced in addition to improved yield which influences the financial performance.

Trust acts as a safeguard mechanism against opportunistic behavior of the exchange partner, which reduces the transaction costs and improves the overall chain efficiency because exchange partners can easily rely on each other. Trust influences producer loyalty and commitment leading to the building of long-term relationships. When there is trust, producers and buyers are able to entrust each other with their resources without any formal contracts. For example, when buyers take the producers products on credit and pay at a later date. In a trusting relationship opportunistic behavior is reduced which improves efficiency.

Closeness increases the interactions between the exchange partners which leads to understanding of needs and quickens the conflict resolution process whenever conflicts arise. Therefore, improved financial performance of smallholders requires the building of long-term relationships through trust, fairness and closeness. This promotes increased information sharing, improved production capabilities leading production of the right quality and quantity which increases the efficiency and

effectiveness of the value chain. On the other hand, when the producers are dispersed, this may increase the coordination cost and, therefore, farmers mobilize themselves into farmer organizations in order to reduce transaction costs, increase the chain efficiency and improve smallholder livelihoods.

Smallholders benefit from collective action by increasing their incomes; this is achieved through increased human capital attained through training which improves their production capabilities and management of the trees thus reducing post-harvest losses and increasing available yield for sale. The acquired knowledge is further, used in production of other crops increasing the total household income. The increased income is also attributed to higher prices obtained especially for producers selling to exporters due to better coordination. Furthermore, farmers increased their physical assets especially household assets, farm equipment and transport. The farmer organization acted as a source of financial capital for investment in the form of access to credit and savings from the sale of agricultural produce. Participation in collective action led to reduction of poverty this was result of increased income and asset holdings though to a limited extent this is explained by challenges of both extreme weather and limited assured markets through the producer organizations.

Finally, trust between members is a critical factor for successful collective marketing and influences the level of participation in producer organizations. This is because it increases cooperation thus reducing side-selling and this reduces the monitoring costs, which improves the performance of the producer organization. Furthermore, human capital in terms of farmer's education and natural and physical capital in terms of numbers of trees owned by the farmer increases the level of participation in collective marketing. Human capital enables farmers to easily recognize and comprehend the benefits associated with collective marketing such as getting a better price. Natural and physical assets in form of trees reveals high investment in production of fruits, due to the high risk and uncertainty associated with spot markets, farmers are focused to be committed to collective marketing. The level of participation in group governance is influenced by the farmer's age, social networks and trust in the leader. Old farmers commit to group governance because they are attached to the organization due to both financial and social investment in the farmer organization. Trust in the leader increases commitment to governance because it acts as motivation for other members to cooperate. Social networks increase access to markets. In general, social, natural, and physical capital influences the level of the farmer's intensity of participation in producer organizations.

In general, collective action through producer organization improves smallholder livelihoods. This is achieved through increased incomes, asset holdings and reduction in poverty. However, for the above benefits to be enhanced and sustained, there is need for the active involvement of members in both collective sale and group governance. This will improve the performance of the groups and ensure relatively high profits are obtained by the members. Different factors affect collective sale and group governance, and these should be taken into consideration, for example, smallholder active involvement in collective sale is affected by the level of trust among group members, human capital, natural and physical capital. Group governance is affected by social and human capital. The sustainability of collective action and improved performance of the whole chain is important. This is attained through building long-term relationships among supply chain partners. The significant factors are price satisfaction, which is important in building trust which influences producer loyalty. When loyalty exists among producers and there is fairness, closeness, and trust among the buyers, supplier financial performance is improved. Trust is of great importance in the functioning of the supply chain because it influences the supplier's financial performance, moderates the relationship between fairness and supplier financial performance, and also mediates the relationship between price satisfaction and producer loyalty.

6.2 Contributions of the study

This research contributes to the growing literature on smallholder farmer participation in emerging markets by analyzing the antecedents and implications of effective collaboration and coordination in agrifood value chains in the African agribusiness context. This is achieved through analyzing both the building of long-term relationships and collective action as governance means of overcoming the high transaction costs faced by smallholder farmers. Specifically, this research contributes to the following research streams.

First, this work contributes to the agrifood and supply chain management literature by providing a better understanding of the importance of relationships in the functioning of the supply chains to improve supply chain coordination from a developing country perspective. Specifically, this thesis provides new insight in the mediating role of trust between price satisfaction, multidimensionality of price satisfaction and producer loyalty, which had not been addressed by the previous literature on agrifood chains.

Second, this research expands on the growing literature on agrifood chain performance by providing new evidence that fairness, closeness and trust are important factors that affect the

financial performance of smallholder producers. These three factors have not been investigated in a single context, or from the producer's perspective - more specifically smallholders in a developing country context. Furthermore, fairness and closeness had been overlooked in the prior literature on agrifood chains. The study also provides new insight into the mediating role of trust between fairness and producer financial performance.

Thirdly, this thesis contributes to development literature and the growing literature on the impact of collective action on smallholder performance which is important not only for the functioning of the agrifood chain, but also for the improvement of smallholder livelihoods. This research provides a broad perspective on the impact of collective action on smallholder welfare and poverty. Previous studies have only focused on income. We simultaneously investigated different indicators of poverty including household income, consumption and asset holdings. This research confirms the impact of participation in collective action on increase in asset-holdings of smallholders as previous studies were more descriptive. This aspect had been overlooked in previous impact studies. The research provides a clear understanding of the production and marketing of mango and how it impacts smallholder income and poverty as a livelihood strategy for smallholders in dryland area supported by a non-governmental organization.

Finally, the research clearly identifies the key factors that influence the intensity of smallholders' participation in RPOs. Collective marketing and group governance are, of course, influenced by different factors; some overlap such as human capital and social capital. This study clearly differentiates between the importance of member trust and trust in the leaders and their effect on collective marketing and group governance, which had not been clearly investigated in previous studies.

Generally, agrifood chains in developing countries can work effectively if collection action is combined with other governance mechanisms such as the building of long-term relationships with the buyers. Producer organizations can improve their performance by improving trust between the members and the leaders at the same time building long-term relationships with the buyers.

6.3 Managerial and policy implications

The following managerial and policy implications can be drawn from this study in order to enhance the performance of the supply chain and improve the livelihoods of the smallholder farmers in sub-Saharan Africa.

In the context of high uncertainty, such as the African business environment, trust is a key factor in building long-term relationships with the buyers and other chain partners as it reduces transaction costs and improves business performance. Therefore, companies aiming to enhance their relationships with RPOs and individual producers should not only consider the buying price *per se*, but should also address psychological aspects, such as price fairness, relative price, and price reliability when aiming to build a strong producer or supplier network. In the study context, promise keeping and reliability seem to be key factors. Especially for the remote farmer, it seems more important to secure a (possibly sub-optimal) income than risk no income at all due to opportunistic behaviour on the behalf of the buyer.

Companies and buyers trading with producer organizations and individual producers and aiming to improve their supply chain performance can build trusting relationships that will improve transparency in the transactions with the producers. Furthermore, producers can be treated fairly which will create an environment of satisfaction in the exchange, leading to a greater exchange of resources between the supply chain partners, thereby enhancing efficiency. Strong networks should be built and maintained between buyers and producers as this ensures the reliability of the information shared.

In terms of practical implications, the findings show that in a buyer's market and in a context where both the buyer and producer can act opportunistically without any consequences due to institutional voids, both parties need to be flexible so that agreements or contracts can accommodate actual price fluctuations. This can be achieved through having contracts with variable output prices (Abebe et al., 2013) linked with access to impartial market information, for example, disseminated through Short Message Service (SMS). This can contribute to the more equal sharing of margins between producers and buyers as it facilitates more equal risk-sharing.

Producer groups also provide an avenue for reducing transaction costs and improving the bargaining power of producers (Roy and Thorat, 2008). However, such groups do not solve the fundamental problem of a lack of bargaining power in a bulk market without significant demand for quality. Therefore, this emphasizes the need to strengthen the producer group's ability to attract buyers.

The non-governmental organizations should support the organizations by building strong linkages with the processors and other buyers both domestically, regionally and internationally to promote an assured market. Farmers face the problem of sustained markets and, therefore, building

linkages supported by the existing institutions will strengthen the performance of rural producer organizations and enhance the performance of the value chains. Performance is influenced by who joins the cooperative. It is, therefore, important to ensure that RPOs have the capability to retain resourceful farmers with a high level of social and human capital that can be activated to contribute to achieving commercial success.

This research indicates that RPOs will be more attractive to farmers if facilitating access to credit is part of their function. Since access to credit is a significant challenge for smallholders in sub-Saharan Africa, it is important that initiatives that empower smallholders to organize and manage financial arrangements, such as ‘merry-go-round’ schemes are strengthened as they can enhance the sustainability of RPOs.

6.4 Limitations and outlook for future research/prospects

This research has some limitations despite the contributions and managerial implications. In investigating the relationship between price satisfaction, trust and producer loyalty, our model explains only 45 per cent of the variation in trust and producer loyalty and, therefore, other factors than those addressed in this study also influence the investigated relationships. Therefore, future research should consider factors, such as buyer reputation, buying conditions, frequency of buying, communication and information exchange, which have been found to affect the relationship between trust and producer loyalty in other contexts in prior literature. In addition, future studies should include the buyer’s perspective in order to better capture the dynamics of the producer-buyer relationship.

The perceptions of supply chain partners change over time due to external factors such as the business environment. In this study, I used a cross-sectional design, which has some limitations, for example, changes in the production, market condition and other factors in the business environment may affect the farmer’s perception. I recommend that future research consider using a longitudinal study design to provide a comprehensive understanding of the relational factors and their implications on supplier financial performance.

I identify fairness and closeness as important factors which affect the supplier financial performance. I did not investigate which factors may influence fairness and closeness in this context. Our study is limited to the commercial success of a particular farmer-buyer relationship in a fruit supply chain. We did not assess the business performance of the entire supply chain. The performance of the different nodes of the value chain may be different. Further, other aspects of

business performance, such as non-financial performance measures, were not taken into consideration due to the high multi-collinearity between trust and overall satisfaction encountered during the analysis. Future research should consider the determinants of fairness and closeness in this context. Factors which affect business performance and use both financial and non-financial measures for performance for the entire chain, this will broaden our knowledge on performance of supply chains. This can be extended to study business relationships in other sectors in the agrifood chain.

For the study of the impact of collective action on smallholder income, consumption, asset holdings and poverty, I use cross-sectional data. This is because there were no data before the intervention that would have allowed us to directly determine the effects of group participation on smallholder welfare and poverty yielding estimates with a high degree of internal validity. The fact that the indicators used in our analysis change with time, for example, the income obtained from mango sale was affected by drought, affected the poverty estimates. Future research should use panel data to provide a better understanding of the effects of collective action on smallholder welfare and poverty. Since most developing countries are promoting collective action to increase smallholder participation in higher value markets, a multiple country comparative study would be very informative for policy development. Future research should consider the impacts of group membership on poverty, and an interesting question is how the impacts vary across men and women participating in collective processing and marketing.

The study focused only on farmers who were involved in growing and marketing of improved mango varieties and covered only the eastern part of the country. The varieties grown in the coastal region are different and target the processing market. This may, to some extent, affect the generalizability of the results of this study. A comparative study that covers both eastern and coastal regions would provide a better understanding of the relationship aspects and collective action which would help to improve the performance of the mango value chain. Future research should aim to replicate these findings using panel data to ensure that the determinants of the intensity of smallholder participation are observed over time, which would provide a richer understanding of, for example, the influence of perceptions of trust and the RPO's performance. Due to the small sample size of farmers involved in collective processing, I did not divide the sample to show the effects on collecting marketing and processing separately. Future studies could explore the specific determinants of active participation in collective processing and marketing among smallholders. Future research should address the design of mechanisms that ensure incentives for different types

of farmer to join RPOs as this was not addressed in this research. It seems crucial to focus on value generation by applying a business-oriented perspective that emphasizes improved market access, value addition strategies, and value chain organization

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7. Appendix A: Articles

7.1 Article 1: Price Satisfaction and Producer Loyalty: The Role of Mediators in Business to Business Relationships in Kenyan Mango Supply Chain

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Abstract

Purpose: The purpose of this paper is to investigate which dimensions of price satisfaction influence producers' trust in buyers and to assess the mediating role of trust in the relationship between price satisfaction and producer loyalty in fresh fruit supply chains.

Design/methodology/approach: A cross-sectional study design using both semi-structured interviews and structured questionnaires was used. The study was conducted in the eastern part of Kenya and included 600 smallholders. Data was analyzed using structural equation modeling.

Findings: The results show that price fairness, price reliability, and relative price are dimensions of price satisfaction that affect the producers' trust in the buyers. Moreover, trust between the producer and the buyer is found to be a strong mediator between price satisfaction and producer loyalty. The age of the producer affects the producers' perception about price satisfaction and loyalty. The findings support recent studies about trust and its mediating role in supply chain relations.

Limitations/implications: The paper is based on a cross-sectional study design, which limits the causal inferences which can be drawn. Producers' preferences change with time and future studies should be based on longitudinal designs.

Originality/value: This paper shows the relationship between the multi-dimensional nature of price satisfaction and producer loyalty with trust as a mediating variable in the business-to-business (B2B) context. Although B2B relationships have been shown to be of great importance for smallholders in enhancing business performance with their buyers, little attention has been given to the role of trust as a mediator. This study offers interesting insights into how trust plays a mediating role between price satisfaction and loyalty in a developing country context.

Key words: Kenya, Price satisfaction, Producer loyalty, Trust, Long-term relationships, Supply chain.

Paper type: Research paper

1. Introduction

Rapid transformations in the agrifood sector have led to significant changes in supply chain structures (Reardon et al., 2009). Moreover, today's business environment is highly competitive with changing consumer needs and preferences (IFAD, 2008). This requires buyers to increase coordination and collaboration with their suppliers (Claro et al., 2006; Ha et al., 2011), for example, by establishing and maintaining long-term relationships because long-term relationships ensure reliability of supply (Rajendran et al., 2012), enhance customer retention and repurchase intentions (Athanasopoulou, 2009), and ensure a high level of supplier loyalty (Rauyruen and Miller, 2007).

In Kenya, mango is mainly grown by smallholder farmers and it provides an important source of income (Kehlenbeck et al., 2012). The Kenyan mango supply chain is largely informal and relational factors, such as low levels of trust, constitute a challenge to collaboration between the chain partners. This is reinforced by the lack of clear price and quality standards or market information systems, which lead to high transaction costs. Buyers often display opportunistic behavior and exploit farmers who, in turn, do not consider the buyers trustworthy, which in general leads to producer dissatisfaction and poor relations between buyers and producers.

Despite the importance of long-term relationships in business-to-business (B2B), limited research has addressed them, especially in terms of the mediating role of trust between actors. Research has mainly focused on contractual arrangements between producers and buyers (Narro et al., 2009) and horizontal coordination through producer groups (Rao and Qaim, 2011; Fischer and Qaim, 2012) to enhance vertical coordination. However, some studies have reported that contractual arrangements and producer groups have been unsuccessful in linking producers to markets due to side-selling and lack of trust (Mujawamariya et al., 2013; Trebbin, 2014). Therefore, it is important to understand how relational factors are associated with the performance of supply chains, notably the relationship between price satisfaction, trust, and producer loyalty.

In general, issues of price satisfaction from the supplier's perspective have been inadequately addressed in the literature. Previous studies on the relationship between price satisfaction and producer loyalty have focused on the relationships between producers and processors from a buyer behavior perspective (e.g., Gyau and Spiller, 2007). Particular products and contexts have been studied such as the dairy sector in Germany and Malaysia (Gyau et al., 2011; Boniface et al., 2012) and the wine industry in Australia (Somogyi and Gyau, 2009). Price satisfaction, as a single dimension, was studied by Boniface et al. (2010) and Gyau et al. (2011). Boniface et al. (2012)

studied the multi-dimensional nature of price satisfaction and its influence on relationship business performance through producer loyalty in the dairy industry in Malaysia. However, as emphasized by Fritz and Fischer (2007), the findings may not be generalizable to other products and supply chains as each has its own distinct characteristics and different requirements. To our knowledge, limited empirical research has tested the relationship between producer price satisfaction and producer loyalty to buyers (traders) in fresh produce markets. Therefore, in this study, we address this gap in the literature by studying what dimensions of price satisfaction influence the relationship between trust and producer loyalty in the Kenyan mango supply chain.

This issue is particularly relevant in the African agribusiness sector. The sector is developing rapidly and has a huge growth potential, both in terms of local, regional, and international trade (World Bank, 2012). On the other hand, the African business environment is challenged by weak institutions, market failures and imperfections, and infrastructural problems (Jayne et al., 2010; IFAD, 2011) exacerbating the challenges of building effective and efficiently performing supply chains, which are necessary for tapping into the growing market opportunities. These challenges are very apparent in the Kenyan mango supply chain. The institutional voids (Khanna and Palepu, 2005) characterizing the business environment in developing countries provide a study context where relationship aspects of producer-buyer interactions are highly influential on chain performance. Against this backdrop, we chose to conduct this study in the Kenyan mango industry because it is an example of a perishable product supplied in significant quantities by large numbers of smallholders (Msabeni et al., 2010) and is, therefore, representative of a large number of agrifood supply chains.

The mango sector in Kenya

Mango is the second most important fruit in terms of area, production, and value in Kenya's horticultural sector and most mangoes are traded domestically (98 per cent) (Kehlenbeck et al., 2012). The economic importance of mango is growing and its potential has not yet been fully exploited (Kehlenbeck et al., 2012). Farm gate prices range from US\$ 0.02 to US\$0.09 per piece. Crates and bags carrying 70-600 pieces of mangoes are sold at US\$ 1.5-7.0 per crate or bag, respectively. The wholesale prices and retail prices in Nairobi range on average from US\$ 0.23-0.28 and US\$0.34-0.40 per piece, respectively (Sarah Mutonyi, March 2014).

Traditionally, the sector has been characterized by spot market exchange, little hybridization and an absence of hierarchical governance structures. The buyers are middlemen, local traders, processors,

and exporters. Typically, the buyers and sellers enter informal contractual relations where the buyers pay a deposit prior to the harvest season and then pay the balance at the time of fruit collection. There is no standardized grading or pricing systems and prices received by farmers depend on the type of buyer, distance to roads, season, size, and mango variety. Without objective exchange standards, the producers' perceptions regarding aspects such as price-quality ratio, relative prices and whether they are being treated fairly by the buyers are likely to become important for the evaluation of the trustworthiness of a potential buyer. Moreover, in many cases, and despite contractual obligations, farmers sell to a different buyer in order to obtain a more favorable price at the time of harvest. Thus, producer loyalty is an important issue in the mango value chain. Likewise, buyers also often disregard the agreed upon conditions due to changes in market conditions. Against this backdrop, enhancing our understanding of the relationships between producers' perception of price satisfaction, loyalty, and trust in buyers is a significant aspect influencing B2B transactions in the Kenyan mango value chain. A better understanding of these relationships is an important prerequisite for the prospects of the ongoing and future efforts to increase value chain integration.

2. Price satisfaction, loyalty, and trust

Price satisfaction and loyalty are important concepts extensively studied in the marketing literature (e.g., Matzler et al., 2007; Munnukka, 2008) and they are increasingly employed in other fields, for example, the agrifood sector (Batt, 2003; Boniface et al., 2012; Sahara and Gyau, 2014). The mediating role of trust between customer price satisfaction and customer loyalty is also recognized in business-to-customer (B2C) studies (Osman and Sentosa, 2013; Jiménez and San Martín, 2014). Satisfaction can be achieved through economic and non-economic factors. Obtaining a good and reasonable price fulfils the economic reward, while the feeling of one's effort being appreciated and the perception of being treated fairly contributes to non-economic satisfaction (Geyskens et al., 1998). Even if farmers are given a satisfactory price, not satisfying the non-economic element may lead to failure in building long-term relationships.

Producer loyalty refers to “the motivation of producers to repetitively sell their product and engage in long-term relationships with the buyers” (Boniface et al. 2010, p. 70). This leads to improved chain performance as a result of reduced transaction costs as well as reduced opportunistic behavior among producers and buyers. Producer loyalty is influenced by a number of factors in B2B relationships such as trust and satisfaction (Sahara and Gyau, 2014). Three categories of loyalty have been identified in the marketing literature: behavioral loyalty (Jacoby and

Chestnut, 1978), attitudinal loyalty (Bennett and Rundle-Thiele, 2002) and composite loyalty (Baldinger and Robinson, 1996; Rauyruen and Miller, 2007). Previous research has shown that to gain a comprehensive understanding of the loyalty construct, both behavioral and attitudinal loyalty should be considered (Boniface et al., 2012).

Price satisfaction is defined as “the psychological result of a difference between price expectation and price perception” (Matzler et al., 2006). Price satisfaction is an important factor in building long-term relationships (Boniface et al., 2012) because it positively influences the level of trust (Gyau and Spiller, 2007; Munnukka, 2008). The reason is that it builds confidence and reliability between the producers and buyers. Price is important as an incentive for producers to join high-value markets such as supermarket chains (Sahara and Gyau, 2014). However, price *per se* may not be important in fostering long-term relationships or produce loyalty (Gyau et al., 2011).

Trust is defined as “a willingness to rely on an exchange partner in whom one has confidence” (Moorman et al., 1992, p. 315). Trust exists when one party has confidence in an exchange partner’s reliability and integrity (Morgan and Hunt, 1994; Caceres and Paparoidamis, 2007). Trust fosters long-term relationships (Ganesan, 1994), reduces opportunistic behavior (Morgan and Hunt, 1994; Fischer and Reynolds, 2010), increases competitiveness, and reduces transaction costs (Noordewier et al., 1990; Sartorius and Kirsten, 2007). Long-term relationships based on trust can act as substitutes for vertical integration and contracts (Dyer, 1997; Lui and Ngo, 2004). Trust can be operationalized into three sub-dimensional constructs: honesty (integrity), benevolence, and competence (Kumar et al., 1995; Mayer et al., 1995; Kwon and Suh, 2005; Philip et al., 2010).

Trust in a business partner is influenced by positive past collaboration and effective communication; however, existence of personal bonds is important when dealing with farmers (Fischer, 2013). Other factors that affect trust include: partners’ asset specificity, behavioral uncertainty, communication and information sharing (Batt, 2003; Kwon and Suh, 2005), satisfaction and goal compatibility (Batt, 2003), buyer reputation, and mutuality (Batt et al., 2010; Philip et al., 2010).

3. Conceptual framework and hypothesis development

In market exchange relationships, price plays a central role as a purchasing determinant (Lui and Ngo, 2004; Matzler et al., 2006). Price satisfaction influences a consumer’s buying intention (Campbell, 1999; Diller, 2000; Munnukka, 2008) and creates long-term customer loyalty (Diller,

2000; Espejel et al., 2008). According to Gyau and Spiller (2007), price satisfaction positively influences the level of trust between buyers and sellers. Previous studies have investigated price satisfaction as a one-dimensional construct (Boniface et al., 2010; Gyau et al., 2011), however, research in relationship marketing shows that price satisfaction is a multi-dimensional construct comprised of five components: price fairness, price transparency, price reliability, price-quality ratio, and relative price (Matzler et al., 2006; Boniface et al., 2012). Here, we apply the multi-dimensional approach which provides greater diagnosticity with respect to the effect of price satisfaction on trust.

Among the five dimensions of price satisfaction, price fairness has been widely studied in B2C markets. Price fairness refers to the “consumers’ perception of whether the difference between the socially accepted price and another comparative party is reasonable, acceptable, or justifiable” (Matzler et al., 2007, p. 222). It is evaluated based upon a quoted price by making comparisons with other references, but also by taking into consideration situational circumstances (Beldona and Namasivayam, 2006). Price unfairness leads to dissatisfaction and lower repurchase intentions (Campbell, 1999) because it strongly influences the overall price satisfaction (Matzler et al., 2007), while price fairness increases customer satisfaction and loyalty (Estalami et al., 2007).

Suppliers charging different prices for essentially the same product or services evoke concerns about fairness and trust when such strategies are evaluated from the buyer’s perspective (Grewal et al., 2004). Similarly, suppliers feel unfairly treated if they experience that a buyer offers different prices to different suppliers (Somogyi and Gyau, 2009). Based on this, we hypothesize that:

H1. Price fairness is positively associated with the producer’s trust in the buyer.

Moreover, honest, open, and complete information on prices is highly effective in increasing satisfaction and trust (Urban, 2003; Matzler et al., 2007). This is because high price transparency reduces search and evaluation costs (Matzler et al., 2007). Price transparency exists when the customer has access to a clear, comprehensive, current, and effortless overview of a firm’s quoted prices (Diller, 1997). Thus, higher levels of price transparency may influence supplier loyalty which prolongs business relationships (Somogyi and Gyau, 2009; Boniface et al., 2010), while lack of price transparency leads to mistrust (Philip et al., 2010). Therefore, we hypothesize that:

H2. Price transparency is positively associated with the producer’s trust in the buyer.

Price reliability includes the notion of price confidence, consistency, and favorability. Diller (1997) argues that customers will experience high price reliability if there are no hidden costs and prices do not change unexpectedly. If prices change, customers must be informed properly and in a timely manner to build trust and maintain a long-term relationship (Matzler et al., 2006). From a supplier's perspective, offering reliable prices may encourage sustainable and long-term business relationships between exchange partners (Gyau et al., 2011; Boniface et al., 2012). Therefore, we hypothesize that:

H3. Price reliability is positively associated with the producer's trust in the buyer.

Price-quality ratio relates to the relationship between price value or monetary costs and the quality of the product. The higher the benefits associated with a given product quality as perceived by a buyer compared to the product price, the higher the buyer's perceived value (Matzler et al., 2007). When the price-quality-ratio is favorable, the buyers will be satisfied with the price because of the higher buyer value. In B2B relationships, providing a satisfying price-quality ratio may improve supplier's satisfaction and loyalty (Diller, 2000). Therefore, we hypothesize that:

H4. Price-quality ratio as perceived by the producer is positively associated with the producer's trust in the buyer.

Relative price is identified when the consumer compares the price of a product or services with a comparable offer provided by a competitor (Matzler et al., 2007). The producer will be satisfied if the preferred buyer offers a comparable price to the ones offered by competing buyers. If the price is low, the producer will feel the preferred buyer no longer represents her interests (Batt et al., 2010). The act of comparing prices may influence perceptions of price (Compeau and Grewal, 1994). If consumers consider the price offered to be better than that of the competitor, they will be satisfied, feeling they are being treated fairly. Therefore, we hypothesize that:

H5. Relative price is positively associated with the producer's trust in the buyer.

If exchange partners that are highly satisfied with economic rewards that flow from the relationship generally perceive their exchange partner to be trustworthy (Batt, 2010), satisfaction with the exchange will affect an exchange partner's morale and their incentive to participate in collaborative activities. Trust enhances each partner's commitment to the relationship (Kwon and Suh, 2005). When a satisfied customer has trust in a firm, it affects loyalty positively (Kassim and Asiah Abdullah, 2010). Thus, trust is seen as a mediator between customer satisfaction and loyalty, although little is known from the B2B context. We, therefore, hypothesize that:

H6. Trust is positively associated with producer loyalty.

H7. Trust mediates the relationship between price satisfaction and producer loyalty.

The main concepts and the relationship hypothesized are outlined in Figure 7.1

Figure 7.1. Conceptual model of price satisfaction, trust and producer loyalty

4. Methodology

4.1 Survey design

We conducted the study in Kenya in the Eastern province in the districts of Embu, Mbeere, Mwala, and Kagundo. The districts were purposively selected as we were interested in areas involved in growing improved mango varieties. Individual farmers were randomly sampled. Only farmers who had at least 10 trees, and had marketed mangoes for at least two seasons were interviewed. Face-to-face interviews were conducted during August and September 2013 and February and March 2014. Six hundred farmers were interviewed.

4.2 Procedure

The research applied the procedure followed by previous studies in agrifood and marketing (Espejel et al., 2008; Zhang and Hu, 2011; Spadoni et al., 2013). During the first phase, key informants were selected based on insights from the literature and the district mango consultant. Semi-structured interviews were conducted with key informants, including ten mango producers, five traders, two brokers, three small-scale processors, and one input supplier to understand the determinants and

consequences of relationship quality and the dynamics of chain interactions. These interviews confirmed the relevance of the theoretical constructs introduced in the conceptual framework.

In the second phase, a questionnaire was developed based on the agribusiness and relationship marketing literature and insights from key informant interviews. A two-step pre-test procedure was followed. First, three agribusiness and marketing specialists reviewed the questionnaire and provided input to the design of the survey instrument. Second, the questionnaire was further revised based on the input of five farmer group chairpersons. To check the validity of the developed measures, the final questionnaire was pre-tested with a sample of 30 farmers, who were representative of the study population. Some questions were modified following this pre-test. Finally, the 600 farmers were interviewed by six trained enumerators using face-to-face interviews. To enhance validity, the enumerators work was regularly monitored during the field work and obtained questionnaires were checked on a daily basis to learn from experience and correct mistakes.

4.3 Operationalization of constructs

The constructs were developed based on the agribusiness and relationship marketing literature and modified to suit the Kenyan context. Questions on price satisfaction were developed based on Matzler et al. (2007) and Boniface et al. (2010); trust questions were based on Batt (2003) and; producer loyalty questions were based on Rauyruen and Miller (2007) and Boniface (2012). A five point Likert-scale with questions ranging from 1 = 'strongly disagree' to 5 = 'strongly agree' was used to measure the latent constructs of price satisfaction, trust, and producer loyalty.

4.4 Statistical analysis

The data were analyzed using a two-step approach as suggested by Anderson and Gerbing (1988) and Hulland (1999) to measure the inner and the outer models using the SmartPLS software, which is a software application for partial least squares (PLS) structural equation modeling (SEM) (Williams and Seminerio, 1985). The PLS approach to SEM was used to test the model shown in Figure 7.1. It is a 'soft' modeling approach without any assumptions about data distribution (Vinzi et al., 2010). PLS-SEM is a preferred method for both exploratory and confirmatory studies and in cases where data is not normally distributed compared to covariance-based SEM (Lowry and Gaskin, 2014). PLS showed the differences in price satisfaction dimensions, however, to test for mediation and multi-group analysis, covariance-based SEM was also applied due to its ability to test for measurement invariance.

PLS focuses on the analysis of variance (Wong, 2013). PLS iteratively estimates the parameters of latent variables using the least squares method. There are two forms of variables, namely latent and manifest. Manifest variables that make no significant contribution to the respective latent variables are progressively removed and the analysis is repeated until all the manifest variables are significant. Moreover, an SEM has two sub-models; the inner model that specifies the relationship between the independent and dependent latent variables, whereas the outer model specifies the relationship between the latent variables and their observed indicators (Wong, 2013).

4.5 Testing the measurement model

Outer model: The fit of the measurement model was evaluated by examining the inner and outer models. The factor loadings for the individual items (indicator reliability), internal consistency, and convergent validity were examined. The indicator reliability, i.e., the factor loadings of the latent variables should be ≥ 0.4 , but the preferred value is ≥ 0.7 (Hulland, 1999).

The internal consistency reliability of the model was assessed using composite reliability that should be ≥ 0.7 (Bagozzi and Yi, 1988). Our results show that the composite reliability values exceeded 0.7 (see Table 7.2). The convergent validity was examined based on average variance extracted (AVE) (Wong, 2013). This indicates whether the construct variance can be explained from the chosen indicators (Fornell and Larcker, 1981). It is recommended that the AVE value should be ≥ 0.5 (Bagozzi and Yi, 1988), which indicates that the indicators account for at least 50 per cent of the variance (see column III in Table 7.2).

Inner model: The inner model was evaluated based on discriminant validity by comparing the latent variable correlations and the square root of AVE (Wong, 2013). Fornell and Larcker (1981) suggest that the square root of AVE of each latent variable should be greater than the correlations among the latent variables. Table 7.4 shows that this condition was met. We bootstrapped (Wong, 2013) to test for the significance of the paths. Lastly, we tested whether there was reverse causality between trust and price satisfaction. PLS path modelling lacks a well identified global optimization criterion so that there is no global fitting function to assess the goodness of the model. It is variance based strongly oriented to prediction. Thus model validation mainly focuses on the model predictive capability. According to PLS-PM structure each part of the model needs to be validated: the measurement model and the structural model (Henseler and Sarstedt, 2013).

4.6 Multi-group analysis

Comparison between groups was performed using covariance-based SEM because it includes direct tests of both structural and measurement invariance before group comparison. This feature makes it a more reliable method than the PLS-SEM group comparison. As result of a sample above 500 and a path coefficient ≥ 0.25 , this method was suitable for comparison despite the fact that the dependent variable was not normally distributed (Qureshi and Compeau, 2009). Three groups were created: a) men and women; b) young and old farmers, and; c) farmers with low education versus high education. These were compared across the relationship quality variables, i.e., loyalty, price satisfaction, and trust. We used the critical ratios method (Mojo et al., 2015) to check whether the different groups were significantly different in terms of relationship quality variables.

5. Results

The sample comprised farmers with an average farm size of approximately 4.5 acres. Most of the farmers were in the age range of 54-71 years of age (42.8 per cent) and 58.2 and 42.0 per cent males and females, respectively, were interviewed. Table 7.1 provides further information about the sample characteristics.

Table 7.1: Demographic characteristics of respondents

Demographic characteristics	Frequency <i>n</i> =600	Per cent
<i>Age of respondents (years)</i>		
18-35	84	14.0
36-53	212	35.3
54-71	254	42.3
72 and above	50	8.3
<i>Sex of respondents</i>		
Male	349	58.2
Female	251	41.8
<i>Education level</i>		
No schooling	38	6.3
Primary (1-7 grade)	184	30.7
Standard 8 (1-8 grade)	113	18.8
Secondary (1-4 grade)	192	32.0
Tertiary institutions	73	12.2

Source: Survey data

The minimum factor loadings for items of the outer model were set at 0.5. Items with lower values were excluded. Column I in **Error! Reference source not found.**Table 7.2 shows the factor loadings for the items and shows that these conformed to this criterion.

Table 7.2: Factor loadings, composite reliability, AVEs, and R2 of the constructs

Latent variables and indicators	I Factor loadings	II Composite reliability	III AVE	IV R ²
<i>Producer loyalty</i>		0.8794	0.6470	0.3183
I will be happy to recommend my buyer to other mango producers	0.8437			
I will ask other mango producers to seek assistance from my buyer	0.8697			
I will continue to do more business with my current buyer next year	0.7685			
I am loyal to my buyer	0.7273			
<i>Price fairness</i>		0.7738	0.5371	
My buyer does not take advantage of me	0.5987			
My buyer is always consistence with the same pricing formulae	0.7509			
The buyer offers me a fair and reasonable price	0.8300			
<i>Price reliability</i>		0.8272	0.7065	
Mango price changes are communicated properly	0.7771			
My buyer keeps all promises regarding the mango price	0.8994			
<i>Price transparency</i>		0.9271	0.8092	
The mango price information is complete, correct, and frank	0.8719			
The mango price information is understandable and comprehensive	0.9235			
My buyer's mango price is clear, comprehensive, and understandable	0.9025			
<i>Relative price</i>		0.8273	0.6224	
Terms and conditions of my buyer are better tailored to my needs than those of other buyers	0.8723			
I am convinced that my buyer is the best choice	0.8779			
I do not believe other buyers will have the same or even better mango price offers	0.5792			
<i>Price-quality ratio</i>				
I get a good price-quality ratio	0.8846	0.8899	0.7298	
I have the impression that I know what I am being paid for	0.7999			
I agree with the mango price and grading system	0.8757			
<i>Trust</i>		0.8333	0.5057	0.4492
I have confidence that my main mango buyer will buy my mangoes	0.5452			
My buyer does not make false claims	0.6136			
I believe in the information provided by my buyer (price, quality, quantity)	0.8390			
My buyer always keeps his promises	0.7460			
My buyer cares about my welfare	0.7711			

Source: Survey data

Coefficient of determination R^2 was found to be 0.32 for producer loyalty, which indicates that price satisfaction with trust as a mediating variable explains 32.0 per cent of the variance in producer loyalty. Coefficient of determination R^2 was 0.45 for trust and price satisfaction, which indicates that price satisfaction, explains 45.0 per cent of the variance in trust (Table 7.2, column IV). This implied that other factors than price satisfaction contributed to explaining both the variance in trust and producer loyalty. It should be noted that the general low levels of trust between producers and buyers found in the study environment have contributed to this small variance. Furthermore, “bootstrapping” was used to test for structural path significance level by calculating the *t*-statistics with 5,000 iterations. Four of the seven proposed hypotheses were significant (Table 7.3). The *t*-statistic for the outer model loadings showed that all indicators were significant at the 5 per cent significance level. We examined the total effect of trust on producer loyalty since we were interested in the mediating effect of trust between price satisfaction and producer loyalty. The results showed that trust had the highest effect compared to other latent variables on producer loyalty and the *t*-test also showed that it was significant (Table 7.5). As shown in Table 7.3, hypotheses *H1*, *H3*, *H5*, and *H6* were supported.

Table 7.3: T-statistics of path coefficients (inner model)

Hypotheses: construct	Sample mean(M)	STDEV	t-statistics	Decision
<i>H1</i> : Price Fairness → Trust	0.2199	0.0527	4.0960**	Accepted
<i>H2</i> : Price Transparency → Trust	0.0140	0.0469	1.5968	Not accepted
<i>H3</i> : Price Reliability → Trust	0.2523	0.0576	4.4384**	Accepted
<i>H4</i> : Price Quality Ratio → Trust	0.0733	0.0591	0.1851	Not accepted
<i>H5</i> : Relative Price → Trust	0.2514	0.0614	4.2165**	Accepted
<i>H6</i> : Trust → Loyalty	0.5662	0.0457	16.9893**	Accepted

Note: ** $p < 0.05$

The square roots of the AVE values are listed in the diagonal in Table 7.4. The values were higher than the latent variable correlation. This implied that the constructs were significantly different from each other and it conformed to the Fornell-Lacker criterion for checking discriminant validity.

Table 7.4: Discriminant validity through the square root of AVE (on the diagonal)

Constructs	Loyalty	Price fairness	Price-quality ratio	Price reliability	Price transparency	Relative price	Trust
Loyalty	<i>0.8044</i>						
Price fairness	0.5505	<i>0.7329</i>					
Price-quality ratio	0.4893	0.6154	<i>0.8543</i>				
Price reliability	0.5093	0.5250	0.6555	<i>0.8405</i>			
Price transparency	0.4517	0.4784	0.6693	0.5687	<i>0.8996</i>		
Relative price	0.5712	0.6227	0.6273	0.5810	0.5445	<i>0.7889</i>	
Trust	0.5642	0.5497	0.5185	0.5627	0.4668	0.5824	<i>0.7111</i>

To check for total effect of trust as a mediating variable, we compared the estimates and p-values with mediator and without mediator. The introduction of a mediator significantly lowered the coefficient of price satisfaction as well as the p-value (Table 7.5). This indicates that for building long-term relationships, trust is a key factor in the relationship between price satisfaction and producer loyalty.

Table 7.5: Mediation test for price satisfaction, trust, and loyalty

Relationship	Direct without mediator	Direct with a mediator
Loyalty (Trust) Price Satisfaction	0.25(0.00)***	0.087(0.05)**

Note: ***p<0.001, ** p<0.05

The relationship quality variables were compared across different groups of socio-demographic characteristics, i.e., men and women, young and old, and low and high education levels to scrutinize their perception concerning the buyers. Except for price satisfaction-loyalty, all the paths for the measurement models were significant at a 95 per cent confidence level. We further compared the groups using critical ratios instead of chi-square test and only price satisfaction and loyalty in the age group were significant (Table 7.6).

Table 7.6: Multi-group model for trust, loyalty, price satisfaction and socio-demographic characteristics

Socio-demographic characteristics								
Sex			Men			Women		
			Estimate	SE	<i>p</i>	Estimate	SE	<i>p</i>
Trust	<---	Price satisfaction	0.198	0.035	0.000***	0.211	0.050	0.000***
Loyalty	<---	Price satisfaction	0.073	0.055	0.185	0.101	0.075	0.175
Loyalty	<---	Trust	0.861	0.083	0.000***	0.735	0.094	0.000***
Age			Young			Old		
Trust	<---	Price satisfaction	0.250	0.045	0.000***	0.169	0.037	0.000***
Loyalty	<---	Price satisfaction	0.187	0.067	0.006	0.004	0.059	0.947
Loyalty	<---	Trust	0.713	0.083	0.000***	0.895	0.096	0.000***
Education			Low			High		
Trust	<---	Price satisfaction	0.222	0.041	0.000***	0.185	0.042	0.000***
Loyalty	<---	Price satisfaction	0.073	0.065	0.265	0.095	0.061	0.122
Loyalty	<---	Trust	0.862	0.088	0.000***	0.740	0.087	0.000***

Note: *** $p < 0.001$,

6. Discussion

Expanding on previous research that has conceptualized price satisfaction as a single dimensional construct that influences suppliers' trust, this study identified three out of five dimensions of price satisfaction as having a significant influence on producers' perception of trust in their buyers: price fairness, price reliability, and relative price. Price transparency and price-quality ratio, on the other hand, did not significantly influence producers' trust in buyers.

Price fairness builds producer satisfaction and trust leading to loyalty, thus contributing to building long-term relationships. In line with the findings of Somogyi and Gyau (2009), the mango producers feel unfairly treated when the middlemen offer them different prices for mangoes of the same quality. This happens during peak season and especially if the producer's farm is located far from the main roads. Distant producers cannot sell their mangoes on a price per piece basis, but instead have to sell in bags or crates, resulting in lower prices. This creates distrust in the buyers and increases the incentive for farmers to sell to an alternative buyer, even after having received a pre-harvest deposit from a buyer, if a second buyer offers a better price than agreed on with the first buyer.

The findings show that price reliability affects producers' trust in the buyers. Farmers indicate that the mango price does not vary unless there is a reduction in mango supply in a given season. Buyers who keep their promises regarding the price and buy mangoes on a regular basis are more trusted than those who offer higher prices, but rarely appear and take small quantities. According to

the interviewees, buyers often discourage farmers' price expectations by arguing that "there is no market for the mangoes" as a strategy to convince farmers to accept lower prices. To a certain extent this makes the price information appear to be arbitrary and unreliable, thus creating dissatisfaction and distrust in the buyers. As pointed out by Gyau et al. (2011) and Matzler et al. (2006), high price reliability builds trust and promotes long-term relationships and price reliability exists if the buyers keep their promises regarding the price, if no hidden costs occur, and when price changes are communicated properly and in a timely manner. The low prices do not actually reflect the market price, but institutional and structural constraints allow buyers to strategically provide price information that they may misuse to their own advantage.

Relative price results from comparing prices offered by different buyers. In the mango case, it seems that local traders provide consistent although low price estimates compared to alternative buyers such as exporters, supermarket chain, and processors, who are rare or absent in most places. The producers have to accept the price offered by buyers or risk their mangoes being wasted due to limited demand from alternative buyers. This leaves the producers in a state of dissatisfaction due to the low obtainable market price.

Price transparency did not significantly influence producers' trust in buyers. In the mango production setting, price negotiations are limited as the price is unilaterally determined by the buyer. Lack of price transparency leads to mistrust (Philip et al., 2010). Knowing a 'theoretical' market price does not equip farmers with negotiation power in markets with supply surplus. This supports the argument by Matzler et al. (2007) that the information about price should be open, honest, and complete in order to increase satisfaction and trust. This correlation seems to be more relevant in a market with more balanced negotiation power. As a result of opportunistic behavior, there is often no clear communication about the price set by the mango buyers, which may be culturally acceptable to farmers as being 'the rules of the game', which is why trust-building is based on other relational aspects.

The price-quality ratio also did not influence trust building. Since no clear grading system exists, and with mangoes in excess supply, it is difficult to obtain a price premium based on quality. Sales prices vary from buyer to buyer with exporters offering a premium price, although they take very limited amounts. For the large majority of producers, the mango price is based on fruit size, variety, and the farms' distance from the main road.

We found that trust is a mediator between price satisfaction and producer loyalty. Trust may influence the similarity in social values between the producer and the buyer, which in turn can result in increased buyer embeddedness in the relationship, enhancing reciprocity and the development of long-term relationships. This study lends support to the findings of Osman and Sentosa (2013), who showed that trust is a mediator between customer satisfaction and loyalty. However, in this study, we consider it from the suppliers' perspective. This implies that building long-term relationships based on price satisfaction alone is insufficient. Producers with high trust in the buyers are more loyal and committed to the buyers (Boniface, 2012). The mango value chain producers are sensitive to price fairness, reliability, and transparency, whereas price transparency and price-quality ratio do not influence trust. This seems to be an effect of a system characterized by a lack of clear price and grading systems and the fact that price information is not expected to be openly exchanged between the buyers and producers.

Producers with a low education level are more trusting and loyal to their buyers compared to more highly educated producers. Moreover, farmers with lower education are more satisfied with the prices offered by the buyers compared to more highly educated farmers. This is because the more highly educated farmers have wider networks and can obtain better prices and trade-related information. Better social connections also make it easier for more highly educated farmers to switch to alternative buyers.

Older farmers are more trusting and loyal compared to the younger farmers. On the other hand, the young farmers are more affected by price perception. A change in price satisfaction will significantly affect their trust in the buyer and thus impact their loyalty. Women are more satisfied with the price compared to men and they are also more trusting and loyal than men. Men are more trusting compared to woman, but less satisfied about the price. This may be due to the fact that male farmers are often more exposed to price information than women farmers, so they can more easily determine whether a buyer's price offer is fair or not, and their trust in the buyer, compared to women, may be more related to factors other than price satisfaction.

7. Conclusion and managerial implications

This study contributes to the growing literature on agrifood supply chains that considers the importance of price satisfaction as a factor influencing long-term producer-buyer relationships. Long-term relationships are important as a means of reducing high transaction costs associated with market imperfections and weak institutions in Africa. Three dimensions of price satisfaction were

found to significantly impact suppliers' level of trust: price fairness, price reliability, and relative price. Moreover, trust was found to play a strong mediating role between price satisfaction and producer loyalty. In this context, other dimensions of price satisfaction, such as price-quality ratio and transparency, were not significant. The findings indicate that in the context of marketing perishable produce in an uncertain institutional context, producers' perception of price satisfaction is less anchored in objective measures such as quality and external price information. Rather, it seems to be based on socially embedded factors, such as fairness and reliability, and the producers' comparison with other obtainable sales prices. In a more competitive and regulated market, price transparency and price-quality ratio are expected to play a more prominent role as a foundation for trust-building and price satisfaction.

Companies aiming to enhance their relationships with producer organizations and producers should not only consider the buying price per se, but should also address psychological aspects such as price fairness, relative price, and price reliability when aiming to build loyal producer or supplier networks. In a high uncertainty context, such as the African business environment, trust is a mediating factor between price satisfaction and loyalty and buyers need to build trust with producers in order to reduce transaction costs and improve business performance. In the study context, promise keeping and reliability seem to be key factors. Especially for the remote farmer, it seems more important to secure a (maybe sub-optimal) income than risk no income at all. Low bargaining power makes reference to quality standards and list prices less relevant for this producer segment.

In terms of practical implications, our findings show that in a buyer's market and in a context where both buyer and producer can act opportunistically without any consequences due to institutional voids, both parties need to be flexible such that agreements or contracts can accommodate actual price fluctuations. This can be achieved through having contracts with variable output prices (Abebe et al., 2013) linked with access to impartial market information, for example, disseminated through Short Message Service (SMS). This can contribute to a more equal sharing of margins between producers and buyers as it facilitates more equal risk-sharing. Producer business groups also provide an avenue for reducing transaction costs and improving bargaining power for the producers (Roy and Thorat, 2008), but such groups do not solve the fundamental problem of a lack of bargaining power in a bulk market without significant demand for quality.

Despite its contributions and managerial implications, this study has some limitations. We applied a cross sectional design, but supply chain actors' perceptions change over time. We, therefore, recommend future research to rely on a longitudinal design. Our model explains only 45 per cent of the variation in trust and producer loyalty and, therefore, other factors than those addressed in this study also influence the investigated relationships. Therefore, future research should consider factors, such as buyer reputation, buying conditions, frequency of buying, communication and information exchange, which are phenomena that prior research has found affect the relationship between trust and producer loyalty in other contexts. In addition, future studies should include the buyer's perspective in order to better capture the dynamics of the producer-buyer relationship. Finally, future research in the developing country context should also contribute to a better understanding of the impact of producer-buyer relationship quality on business success or performance.

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7.2 Article 2: Relational Factors and Performance of Agrifood Chains in Kenya

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Abstract

Purpose: The purpose of this study is to investigate the direct effect of fairness, closeness, communication quality and trust, and evaluate the moderating effect of trust on the financial performance of producers in the Kenyan mango sector.

Design/Methodology/Approach: A cross sectional study design was used and both semi-structured interviews and structured questionnaires were employed. The study was conducted in the eastern part of Kenya and included 562 farmers. Data were analyzed using factor analysis and ordinary least squares regression.

Findings: The results show that trust, fairness and closeness have a direct positive and significant effect on producer financial performance. Fairness is identified as the most important factor followed by trust and closeness. Moreover, trust was found to moderate the relationship between fairness and financial performance.

Research implications: The study shows that trust does not only have a direct effect on performance, but can also function as a catalyst to improve the relationship between fairness and performance. Trust, therefore, becomes central to increasing performance in agrifood chains occurring in business environments with institutional voids and imperfect markets.

Practical implications: The findings of this paper show that efforts to improve the performance of supply chains in environments characterized by informal contracts and institutional voids need primarily to rely on mechanisms that support trust building to ensure relationship building and that enhancing communication may only have a limited effect.

Originality/value: This study is the first to investigate the effect of the four relational factors in a single context in an agrifood supply chain.

Keywords: Fairness, Closeness, Communication quality, Trust, Supply chain performance, Mango, Kenya

Paper type: Research type

1. Introduction

There is an increasing emphasis on the importance of relational factors for the performance of agrifood supply chains in the literature as well as in practice. This is a result of changes in agrifood supply chains associated with globalization and demand for food quality and safety regulations that require increased supply chain integration (Swinnen and Maertens, 2007; Hartmann et al., 2010). Supply chain integration ensures that whole chains are linked and coordinated to reduce chain inefficiencies, and increase productivity and profitability. Moreover, integration also contributes to business partners' mutual satisfaction and the competitiveness of the supply chain (Zailani and Rajagopal, 2005). As a consequence of increasing integration in the global value chains, the concept of supply chain integration has also been widely promoted in developing countries, both to reduce problems of chain inefficiencies and to promote producers' market access (Webber and Labaste, 2010).

Previous research shows that relationship factors including trust and communication quality are important in improving supply chain performance (Kwon and Suh, 2005; Ghosh and Fedorowicz, 2008; Zaefarian et al., 2016). Trust is defined as the willingness to rely on an exchange partner (Moorman et al., 1992). Trust between business partners contributes to the establishment of long-term relationships (Geyskens et al., 1998) and is a prerequisite for achieving the benefits of such relationships (Villena et al., 2011). Moreover, trust is found to foster cooperation and, thereby, reduce transaction costs (Claro et al., 2003; Palmatier et al., 2006), thus improving business performance. However, a review of the literature shows mixed findings about the role of trust in improving business performance. Recent studies have shown that trust can have a positive impact on financial performance (Lobo et al., 2013; Masuku and Kirsten, 2004). Moreover, Gundlach and Cannon (2010) find that the effect of trust on supply chain performance depends on the level of trust in the relationship, whereas Lu et al., (2008) show that the level of trust has no direct impact on producer profitability. Other studies indicate that trust alone may not lead to improved supply chain performance (Palmatier et al., 2006; Kale and Singh, 2009; Smets et al., 2013). This implies that trust needs to be combined with other factors and that the role of trust in supply relationships might be to moderate the effect of other factors. The mixed evidence about the relationship between trust and performance suggests that there is a need to better understand the role of trust and how the interaction between trust and other relationship variables influence performance outcomes.

Prior research emphasizes communication, fairness and closeness as three additional relational factors besides trust that influence supply chain performance. First, communication enhances supply chain performance by increasing the coordination of activities between supply chain partners. It reduces conflicts, uncertainty and opportunistic behavior. Communication between the supply chain partners should be effective, i.e., timely, accurate, complete, reliable and suitable to achieve the effective flow of information and products (Fischer, 2013). Second, extant research shows that perceptions of fairness influence business performance (Hornibrook et al., 2009). Perceptions of fairness can have a significant impact on supply chain performance (Hornibrook et al., 2009; Liu et al., 2012; Wu and Niederhoff, 2014) because fairness affects information exchange between supply chain partners and reduces opportunistic behavior and conflict (Samaha et al., 2011). Third, closeness is found to lower the buyers' perception of risks and improve the credibility of the supplier (Bennett and Gabriel, 2001), thus affecting performance outcomes. Closeness refers to the degree to which person-to-person contact and close personal and working relationships have been established in a given supplier-buyer relationship (Nielson, 1998). Despite the importance of closeness and fairness in supply chain relationships, these variables have been overlooked in most studies of agrifood chains that have mainly focused on communication quality, relationship quality and competitiveness (Gracia et al., 2010). Tallontire and Vorley (2005) provide one of the few studies addressing agrifood supply chain buyer-supplier relationships and they show that fairness play a positive role in achieving just and sustainable agrifood systems.

The effects of fairness, closeness, communication and trust on supplier performance have been tested separately (Ferguson et al., 2005; Griffith et al., 2006; Paulraf et al., 2008; Liu et al., 2012; Lobo et al., 2013) in different contexts, but comparing the effects of these constructs across a common setting is lacking. Such comparison is needed because it enables us to understand the relative importance of the different factors in a given context. Moreover, the investigation of the combined effect of these relational variables can provide a more in-depth understanding of how each factor contributes to the relationship quality and their effect on performance. Therefore, the aim of this study is to investigate the direct effect of trust and other relationship factors (communication, fairness and closeness), and the moderating effect of trust on the financial performance of producers. Against this backdrop, we address two research questions: What is the effect of fairness, closeness, communication quality and trust on supplier's financial performance? Does trust have a moderating effect on the relationships between supplier's performance and fairness, closeness and communication quality, respectively?

Our study addresses these research questions in the Kenyan mango supply chain. This context is particularly interesting because the majority of the transactions in this sector are based on informal contracts and promises. The mango case is ideal for studying relational factors and their effect on producer supplier performance because these factors are more salient here than in supply chain contexts where formal contracts can be applied.

In the subsequent sections, we present the conceptual framework that describes the different constructs and develop hypotheses to investigate the relationships. We then describe the research context, the survey instrument and data collection from the Kenya mango sector followed by factor analysis, and ordinary least squares regression. Next, we present the results followed by a discussion. Finally, we draw conclusions and identify managerial implications and propose suggestions for future research.

2. Conceptual framework and hypothesis

The essence of the framework for this study is that successful business performance is influenced by the degree of fairness, closeness, communication quality and trust in the exchange relationships between the supply chain partners (Figure 7.2). We base the explanation of these relationships on different theoretical perspectives. Exchange relationships involve transactions. According to transaction cost economics (TCE) (Williamson, 1985), transactions are considered as discrete events regulated by governance structures based on the nature of the exchange partners investments and their opportunistic behavior. In contrast to this view, relational contracting theory (Macneil, 1980) argues that transactions are not just discrete events and expands on TCE's notion of classical and neoclassical contracts by introducing a concept of contracts as including the relationships between people who share norms and values. These norms include distributive justice and procedural justice (hereafter referred to as fairness), information sharing and trust. Relational exchanges have also been explained based on both social exchange theory (Blau, 1964; Lambe et al., 2001) and equity theory (Adams, 1965). These theories provide insights into the mechanisms that influence the relationships between fairness, closeness, communication and trust and the financial performance of suppliers in supply chain relationships.

Business relationship performance can be categorized into financial and non-financial performance (O'Toole and Donaldson, 2000; O'Toole and Donaldson, 2002). In this study, we measure business performance based on financial performance, which refers to economic rewards attained from a relationship (Geyskens et al., 1999). It is a composite measure of sales and profit

growth and overall profitability obtained from a relationship (Beugelsdijk et al., 2006; Palmatier et al., 2007).

Figure 7.2. Conceptual model of relational factors and supplier financial performance

2.1 Factors that influence business performance in supply chain relationships

2.1.1 Perceived fairness

Fairness is important in achieving superior performance in supply chain relationships (Griffith et al., 2006; Liu et al., 2012). Fairness in business relationships entails many facets with distributive and procedural fairness being two examples (Duffy et al., 2013; Narasimhan et al., 2013; Zaefarian et al., 2016). *Distributive fairness* refers to the supplier's perception of the fairness of the level of earnings and other outcomes that are obtained from the relationship with the buyer (Patterson et al., 2006; Yi and Gong, 2008). *Procedural fairness* refers to the supplier's perception of the fairness of the procedures and processes influencing how the outcome is achieved (Kumar et al., 1995).

Fairness improves supply chain performance by positively influencing commitment and expectations to continue the relationship (Kumar et al., 1995; Zaefarian et al., 2016), for example, by reducing opportunism in the exchange relationship (Dwyer et al., 1987; Anderson and Weitz, 1989; Frazier et al., 1989; Samaha et al., 2011). This in turn reduces conflicts between supply chain partners and increases information sharing (Koza and Dant, 2007), which leads to the development and maintenance of the partners' satisfaction and increased financial outcomes (Yilmaz et al., 2004; Wu and Niederhoff, 2014). Therefore, we hypothesize that:

- H1.* The supplier's perception of the fairness of the buyer in the business relationship is positively associated with the supplier's financial performance.

2.1.2 Closeness

Closeness is a somewhat elusive concept. Nielson (1998) defines it as the degree to which person-to-person contact and close personal and working relationships have been established in a supplier-buyer relationship. Closeness characterizes the relational environment or atmosphere (Woo and Ennew, 2004) and involves the building of social emotional bonds and positive affective ties between the supply chain partners, which enhance their mutual commitment in the supply chain relationship (Barnes, 1997). Closeness can have a significant influence on performance (Ferguson et al., 2005) as it increases information sharing, which leads to increased transparency and mutual understanding of difficulties. This, in turn, leads to a better understanding of exchange partners' needs, engagement in joint problem solving and conflict resolution and reduction of search costs (Bennett and Gabriel, 2001). Moreover, closeness leads to a reduction in uncertainty and reduces the buyer's perceived risk and, thus, improves the credibility of the supplier (Mojo et al., 2015). Consequently, closeness contributes to building and engendering long-term relationships and improvement of performance. Hence, we hypothesize that:

H2. The supplier's perception of closeness with the buyer is positively associated with the supplier's financial performance.

2.1.3 Communication quality

Communication is defined as "the formal as well as informal sharing of meaningful and timely information between firms" (Anderson and Narus, 1990, p. 44). Supply chain performance is enhanced when chain activities are coordinated in a highly integrated information-sharing environment (da Silveira and Cagliano, 2006; Ghosh and Fedorowicz, 2008). Communication quality, or effectiveness, is a function that includes aspects such as: timeliness, accuracy, completeness, reliability and suitability (Mohr and Sohi, 1996; Fischer, 2013).

A lack of relevant information for supply chain partners may create uncertainty among the trading partners and can lead to attempts to take advantage of each other (Kwon and Suh, 2005). Information sharing leads to effective management of the collaboration, which enhances the competitive advantage and supply chain performance by lowering the transaction costs. Further, information sharing improves transparency as well as signals the desire to cooperate and collaborate (Batt, 2003). Moreover, information sharing helps to reduce slack, stock outs, safety stocks, and inventory levels in the supply chain, which contributes to maximizing, supply chain profitability (Lee et al., 1997; Yang et al., 2005). Therefore, we hypothesize that:

H3. The supplier's perception of the quality of the communication with the buyer is positively associated with the supplier's financial performance.

2.1.4 Trust

Trust plays an important role in the building and maintenance of supply chain relationships and influences cooperative behaviors (Geyskens et al., 1998). Trust is defined as “the willingness to rely on an exchange partner in whom one has confidence” (Moorman et al., 1992, p. 315). Trust is associated with the willingness to endure the risk and uncertainty involved in entering business relationships (Mayer et al., 1995). Generally, the strength and quality of a relationship rely on the level of trust; the higher the trust level, the stronger the relationship will be. According to Macneil's relational exchange theory, trust is most widely recognized as the social norm for managing and coordinating inter-organizational exchange (Jap, 2001).

Development of a fully functioning supply chain arrangement requires trust among the partners (Leat and Revoredo-Giha, 2008). This is because trust counterbalances the need for costly safeguard mechanisms against opportunism and because the buyers and seller's words or written statements can be relied on (Claro et al., 2003). Trust reduces search and monitoring costs, which positively affects the relationship outcomes. The existence of trust between exchange partners reduces uncertainty and facilitates the flow of crucial resources such as information and product flows (Schiefer and Hartmann, 2008). This type of information influences suppliers' production capabilities and their ability to meet the customer demands. Therefore, trust has a direct impact on the suppliers' financial performance (Kim, 2013; Zaefarian et al., 2016) and, thus, we hypothesize that:

H4. The supplier's trust in the buyer is positively associated with the supplier's financial performance.

2.1.5 Trust as a moderating factor

Moderating role of trust on the effect of fairness on business performance

Perceived fairness influences the relationship performance by reducing opportunistic behavior and conflict (Samaha et al., 2011). The perception of a buyer's fairness affects a supplier's behavior, especially, because the buyer is often the more powerful partner (Kumar et al., 1995). In situations where an exchange partner is unable to rely on traditional safeguard mechanisms against opportunism, such as vertical integration or contract protection, they will have to depend on the powerful partner's sense of fairness (Heide and John, 1988; Anderson and Weitz, 1992).

Previous research has considered fairness as a determinant of trust in supply chain relationships (Kumar et al., 1995). We propose that the level of trust in supply chain relationships affects the effect of fairness on supply chain performance. This is because trust brings good faith in the intent, reliability and integrity of a partner's behavior and, therefore, it reduces the potential for conflict and destructive behaviors and encourages steady information flows, which positively influences satisfaction and the performance of buyer-supplier relationships (Cohen-Charash and Spector, 2001; Krishan et al., 2006; Sindhav et al., 2006). Thus, trust plays a catalytic role in speeding up transaction processes. Therefore, we hypothesize that:

H5. Trust positively moderates the relationship between fairness and financial performance. For a given level of fairness of the buyer, as perceived by the supplier, an increase in the level of trust will lead to an increase in financial performance.

Moderating role of trust on the effect of closeness on business performance

Previous research has not examined the moderating effect of trust on the relationship between closeness and financial performance. We propose that trust moderates the relationship between closeness and financial performance in supply chain relationships. In a relationship where there is closeness, there will be increased information exchange, joint problem solving and general cooperation (Bennett and Gabriel, 2001). Previous research shows that trust is a determinant of closeness in an exchange relationship (Bennett and Gabriel, 2001). The lack of trust will be detrimental to information sharing and will diminish the effectiveness of joint problem solving and decision making (Nielson, 1998). Trust generates feelings of security and credibility and, hence, reduces the buyer's risk perception (Selles, 1998). In addition, trust may also reduce search costs, economize on information costs and encourage flexible adjustment to change (Lorenz, 1991). Therefore, low levels of trust in an exchange relationship will lower the closeness between the supply chain partners, which will affect the business performance, whereas a higher level of trust will increase the closeness between the exchange partners. Therefore, we hypothesize that:

H6. Trust positively moderates the relationship between closeness and financial performance. For a given level of closeness between exchange partners, an increase in the level of trust will lead to an increase in financial performance.

The moderating role of trust on the effect of communication on business performance

Previous research suggests that effective communication provides relevant information to suppliers helping them to assess what buyers do, thus increasing transparency and reducing information

asymmetry (Heide and Miner, 1992; Fischer, 2013) which, in turn, affects business outcomes. Continuous and open (honest) communication will minimize uncertainty and/or misunderstandings between supply chain partners (Moorman et al., 1992). Open and honest communication is not a privilege in supply chains; rather it is an essential requirement in a competitive market (Kwon and Suh, 2005). Therefore, information sharing assists in creating superior supply chain performance as it allows supply chain partners to work as an entity (Li et al., 2005). Trust increases information sharing between the business partners because it breaks the barriers of risk and uncertainty. In order for information sharing to occur, a firm needs to be confident in its partner's behavior (Das and Teng, 1998). Trust between supply chain partners, therefore, becomes a vital component for them to be comfortable in sharing sensitive information. Therefore, we hypothesize that:

H7. Trust positively moderates the relationship between communication and financial performance. For a given level of communication between the exchange partners, an increase in the level of trust will lead to an increase in financial performance.

3. The mango sector in Kenya

During the last decade, mango production has grown and is now the second largest fruit sector in terms of area, production and value in Kenya's horticultural industry. The economic importance of the mango sector is still growing; however, its potential has not been fully exploited (Kehlenbeck et al., 2012). There has been a significant expansion in mango production as evidenced by the establishment of about 1.5 million trees in the past five years. According to FAO STATs (2016), in 2013, the annual production of mango was about 589,907 tonnes. The mango sector supports over 200,000 smallholders for their livelihoods at the production stage of the value chain (USAID-KAVEs, 2015). The remainder of the population is involved in trading, processing, grading, logistics and part of the chain. There has been a growing demand for mango on domestic, regional and international markets. This demand is expected to rise. The projected demand for fresh fruit is expected to increase to 621,000 MT, for processed fruit to 125,000 MT and for exports to 22,600 MT by 2017 (USAID-KAVEs, 2015).

Domestically, demand is being driven by a growing middle-class that are demanding both fresh fruits and processed products. The main actors along the mango chain include nursery operators, agro-chemical providers, other input suppliers, farmers, middlemen, traders, processors, exporters, retailers and consumers. Most of the mango produced, 98 per cent, is sold on the domestic markets and 2 percent is sold on the export market (Msabeni et al., 2010). Mango exports contributed

approximately 120 million USD in terms of gross domestic product (GDP) in 2013 (FAO STATs, 2016).

Previously, the trade was characterized by spot markets, little hybridization and no hierarchical governance structure, but due to the changes in agrifood chains, this situation is changing towards more hybrid governance structures. The tendency of farmers to organize themselves into farmer organizations is mainly attributed to the need to increase their bargaining power in order to overcome the challenge of middlemen who tend to manipulate and control the price in the marketing system. Mango is sold in local markets, wholesale markets, kiosks, roadside markets, roadside vendors and supermarkets. Farmers can market their fruits through various ways; sale through the middlemen, directly to traders or consumers in the local or urban markets, exporters or processors or through the producer organizations. The buyers are middlemen, local traders, supermarkets, processors and exporters. There is no standardized grading or pricing systems and prices received by farmers depend on the type of buyer, distance to roads, season, size and variety. The existing farmer organizations and individual farmers face the challenge of accessing markets due to problems of vertical coordination and, as a result, they generally receive low prices for their products. Most transactions are based on informal contracts and promises with limited contracts. Thus, the case provides an interesting context where relationship factors and their effect on producer supplier performance are amplified compared to more contract-based exchange environments.

4. Methodology

4.1 Research approach

The study was based on a multi-methodology approach (Teddlie and Tashakkori, 2009) combining a household survey and semi-structured interviews (Bryman, 2015). We conducted the study in Kenya in the eastern province in the districts of Embu, Mbeere, Mwala, and Kangundo. The districts were purposively selected as we were interested in areas where improved mango varieties were being grown and which were, therefore, more likely to be engaged in commercial and international value chains. A total of 600 farmers were randomly sampled based on lists of mango producers in the study area provided by the international non-governmental organization, TechnoServe. The semi-structured interviews were conducted in August and September 2013 and the survey was administered from February to April 2014.

4.2 Development of survey instrument and data collection

In this research, we applied the procedure followed by previous studies in agrifood and marketing (Espejel et al., 2008; Zhang and Hu, 2011; Spadoni et al., 2013). The data collection process was conducted in three phases. During the first phase, key informants were selected based on insights from the literature and district mango consultants. Semi-structured interviews were conducted with key informants, including ten mango producers, five traders, two brokers, three small-scale processors, and one input supplier. The purpose of the interviews was to deepen our understanding of the effects of the determinants and consequences of relationship quality and dynamics of supply chain interactions. In addition, consultations were carried out with agribusiness marketing researchers at the World Agroforestry Centre (ICRAF) in Nairobi and TechnoServe employees supporting mango farmer producer groups in the districts. The sample was expanded to ensure coverage of all relevant stakeholder categories in the mango value chain.

In the second phase, a questionnaire was developed based on the agribusiness and relationship marketing literature and insights from key informant interviews. A two-step pre-test procedure was followed. First, three agribusiness and marketing specialists reviewed the questionnaire and provided input on the design of the survey instrument. Second, the questionnaire was further revised based on input from five farmer group chairpersons. To check the face validity of the developed measures, the final questionnaire was pre-tested with a sample of 30 farmers, representative of the study population. Some questions were modified following this pre-test. Finally, 600 farmers were interviewed by six trained enumerators using face-to-face interviews. This allowed the questions to be asked in the local language, which enhanced study reliability. Furthermore, this methodology was appropriate because most respondents could not be reached by post or mobile phone. The enumerators were monitored by one of the authors, and completed questionnaires controlled on a daily basis. Despite this effort, 38 questionnaires had to be subsequently removed from the data set due to missing data and, therefore, the final sample included 562 farmers.

4.3 Operationalization of constructs

The constructs were developed based on the literature and modified to suit the Kenyan context. Survey questions on supplier financial performance questions were based on Rauyruen and Miller (2007) and Boniface et al. (2012); fairness questions were based on Kumar et al. (1995 and Jambulingam et al. (2011); closeness questions were based on Guenzi and Pelloni (2004); communication quality questions were based on Mohr and Spekman (1994) and Swaid and Wigand (2009); and questions on trust were based on Batt (2003). A five point Likert-scale with questions

ranging from 1 = 'strongly disagree' to 5 = 'strongly agree' was used to measure the latent constructs of trust, business performance, communication quality and closeness.

4.4 Factors that influence business performance in supply chain relationships

Factor analysis was conducted using varimax rotation (Abdi, 2003) to generate the factors which were used in estimating the econometric model. All factors with eigenvalues above 1 were extracted. Since the explanatory variables were latent variables, factor analysis was conducted to predict the factor scores, which were later used in the regression model. The factor loadings for the latent variables (financial performance, fairness, closeness, communication quality and trust) were above 0.50; these were above the 0.40 cut-off suggested to represent practical significance by Hair et al. (1995), although the preferred value is ≥ 0.6 (Bagozzi et al., 1991). We tested for the appropriateness of the factor analysis scale using the Kaiser-Meiyer-Olkin (KMO) measure of sampling adequacy (Kaiser, 1970), which was above 0.7 for all the variables. The recommended value is above 0.5 for factor analysis (Hair et al., 1995). We then tested for reliability of the measurement scale using the Cronbach alpha and the values were above the recommended threshold of 0.7 (Nunnally, 1978).

4.5 Model estimation

Fairness, closeness and communication quality were hypothesized to positively influence suppliers' financial performance. We specified equation (1) which included both the direct effects of relational factors and the interaction effects on supplier financial performance. We estimated this relationship using ordinary least squares (OLS) regression following Samaha et al. (2011). In the first part, we estimated the direct effects of the relational variables on financial performance and in the second we analyzed the interaction effects between trust and fairness, trust and closeness, and trust and communication quality on financial performance. We tested for the moderation effect of trust by including the product of independent variables, i.e., fairness, closeness and communication quality and the moderator, i.e., trust as an additional predictor in the model (Equation 1). A moderator variable influences the nature (e.g., magnitude and/direction) of the effect of the antecedent on an outcome variable (Aguinis et al., 2016; Hayes & Matthes, 2009).

We tested the robustness of the model by comparing with a Tobit model due to the skewness of the dependent variable and we obtained the same results. Due to the high correlation between the independent variables, the presence of multicollinearity was a possibility. Multicollinearity occurs when the independent variables are highly correlated with each other such that the dependent variable does not explain much variation, which leads to biased estimates. Multicollinearity is easily

detected in multiple linear regressions using variance inflated factor (VIF). We checked for multicollinearity between the independent variables and the variance inflated factors (VIF) and the values were below 2.45. It is recommended that the model should be investigated further if the VIFs are 4.0 and if the VIFs exceed 10, which indicates the presence of serious multicollinearity, in which case the model needs to be corrected (Neter et al., 2004). To ensure that there was no specification bias, different variables were added to the model until a stable model was obtained.

We tested for endogeneity by conducting two-stage least squares (2SLS) regression and no endogeneity was detected. Endogeneity occurs when one of the independent variables is correlated with the model error term. The use of instrumental variables is useful for correcting detected endogeneity in the model. An instrumental variable is a variable which is correlated with the endogenous predictor, but is not correlated with the error term by assumption or construction. Finally, other methods, such as structural equation modelling (SEM) using partial least squares and covariance based-SEM (AMOS), may be suitable in the estimation of relationships between latent variables and for multi-group analysis (Lowry and Gaskin, 2014). However, our model was simple and did not require complex modeling. Second, using SEM to test for moderations may be problematic (Cortina et al., 2001) and conducting interactions with the product of the sum of indicators is more appropriate than partial least squares with product indicators (the strength of relationships is over-estimated and their significance is underestimated in partial least squares (Goodhue et al., 2007)). Multiple regressions are suitable for analysis moderation involving a continuous moderator variable (Aguinis et al., 2016 & Baron & Kenny, 1986).

We controlled for the number of trees (which was used as a proxy for farm size), mango variety and education and the producer's experience in mango growing. Previous research suggested that performance might vary by supplier size and experience (Stern et al., 1996; Narasimhan et al., 2013). Therefore, we include demographic characteristics, such as the education of the supplier, in the model.

$$Y_i = \beta_0 + \beta_1 T_i + \beta_2 F_i + \beta_3 CLO_i + \beta_4 COM_i + \beta_5 T * F + \beta_6 T * COM_i + \beta_7 T * CLO_i + \beta_8 T * F_i + \varepsilon_i \quad (1)$$

Where Y_i = financial performance of individual i , T = trust, F = fairness, CLO = closeness, COM = communication quality. Interactions: $T*COM$ = trust*communication, $T*F$ = trust*fairness, $T*CLO$ = trust*closeness, and ε_i = error term or controls.

5. Results

Descriptive statistics

Table 7.7 shows the means and the correlations for the variables used in the regression model. The Cronbach's alpha value was above 0.7 for the relational variables trust, financial performance, fairness, communication, closeness and trust. The KMO values were above 0.7 and the factor loadings for the indicators for the latent variables were above 0.5 (Appendix 2). Appendices 1 and 2 present sample characteristics and additional details on factor loadings for the latent variables, respectively.

Most of the producers interviewed were in the age range 51-71 years (49 per cent). The producers had substantial experience in growing mangoes. About 93 per cent of the farmers had been growing mangoes for 6 years or more.

Table 7.7: Descriptive statistics and correlations

Variables	M	SD	Min	Max	α	Correlations									
						1	2	3	4	5	6	7	8	9	10
1. Performance	1.79	1.00	1.00	5.00	0.83	1.00									
2. Closeness	1.76	1.00	1.00	5.00	0.88	0.41	1.00								
3. Trust	1.79	1.00	1.00	5.00	0.84	0.58	0.46	1.00							
4. Fairness	1.56	1.00	1.00	5.00	0.75	0.62	0.55	0.59	1.00						
5. COM	1.61	1.00	1.00	5.00	0.78	0.46	0.47	0.53	0.68	1.00					
6. Experience	22.87	9.78	5.00	60.00	0.00	-0.06	0.04	0.08	-0.02	-0.03	1.00				
7. Education	9.84	4.34	0.00	18.00	0.00	-0.01	0.04	0.03	-0.01	0.06	0.04	1.00			
8. Log of trees	4.32	1.00	1.09	8.85	0.00	-0.06	0.09	0.01	0.00	-0.00	0.16	0.18	1.00		
9. Mango variety	2.35	1.42	1.00	4.00	0.00	0.23	-0.06	0.06	0.19	0.13	-0.17	-0.09	-0.24	1.00	
10. Grpparticipat*	0.33	0.47	0.00	1.00	0.00	0.00	-0.03	0.02	0.06	0.04	0.06	0.02	0.09	0.01	1.00

Source: Own calculation based on survey data

Note * membership of organization

Effect of relational factors on financial performance

Five nested models were estimated in order to investigate the effect of relational factors on supplier financial performance. Table II presents the OLS estimates. The first model only shows the controls of farmers experience, education, number of trees and mango variety grown by the farmer. Among the controls, the results show that financial performance is influenced by the mango variety grown by farmers. In the next 4 models, we introduce fairness, closeness, communication quality and trust,

respectively. In model 5, we present the full model that includes both the controls and the relational variables.

The direct effect of trust, fairness and closeness is statistically significant in model 5. The R-squared for model 5 was 48 per cent, i.e., fairness, trust and closeness explained only 48 percent variance in supplier financial performance. Further examination of the coefficients shows that fairness was the most important factor in determining financial performance followed by trust and closeness to the business partner. However, we find no statistical significance between communication quality and financial performance of the producers. In the presence of trust, fairness and closeness, communication quality does not have a direct influence on financial performance. Of the four hypotheses that were investigated, the relationship between relational factors and supplier financial performance, H1, H2 & H4 were supported, but H3 was not supported (Table 7.8).

Table 7.8: Ordinary least squares (OLS) regression using financial performance as a dependent variable

	Model 1 b/se	Model 2 b/se	Model 3 b/se	Model 4 b/se	Model 5 b/se
Mango variety	0.159*** [0.031]	0.074*** [0.026]	0.088*** [0.026]	0.088*** [0.026]	0.096*** [0.024]
Log of number of trees	-0.002 [0.043]	-0.031 [0.035]	-0.037 [0.035]	-0.036 [0.035]	-0.034 [0.032]
Education (years)	0.004 [0.009]	0.004 [0.008]	0.003 [0.008]	0.002 [0.008]	0.001 [0.007]
Experience (years)	-0.002 [0.004]	-0.003 [0.003]	-0.003 [0.003]	-0.003 [0.003]	0.000 [0.003]
Membership of organization	0.002 [0.090]	-0.061 [0.070]	-0.042 [0.069]	-0.043 [0.069]	-0.046 [0.065]
Fairness		0.606*** [0.041]	0.529*** [0.046]	0.511*** [0.059]	0.395*** [0.058]
Closeness			0.134*** [0.039]	0.129*** [0.040]	0.077** [0.038]
Communication quality				0.03 [0.057]	-0.037 [0.054]
Trust					0.316*** [0.041]
<i>Constant</i>	-0.345 [0.226]	0.007 [0.185]	0.006 [0.182]	0.007 [0.181]	-0.068 [0.170]
<i>No of Observations</i>	562	562	562	562	562
<i>R-squared</i>	0.054	0.406	0.408	0.419	0.477
<i>Adjusted R²</i>	0.045	0.399	0.412	0.410	0.468

Notes: Significance levels are reported as follows: *** 1%; ** 5%; * 10%

Source: Own calculation based on survey data

Effect of interactions on financial performance

We included three interactions, i.e., trust and fairness, trust and communication, and trust and closeness (Table 7.9). The results indicate that the interaction between trust and fairness, closeness and communication, respectively, is positive and statistically significant at the 1 per cent significance level when only one factor is introduced at a time in the model (model 1, 2, 3).

Table 7.9: OLS regression estimate for the effect of interactions on financial performance

	Model 1 b/se	Model 2 b/se	Model 3 b/se	Model 4 b/se
Log of number of trees	-0.03 [0.031]	-0.032 [0.032]	-0.029 [0.031]	-0.031 [0.031]
Mango variety	0.095*** [0.025]	0.092*** [0.025]	0.095*** [0.025]	0.094*** [0.025]
Membership of organization	-0.045 [0.065]	-0.035 [0.065]	-0.032 [0.065]	-0.048 [0.064]
Log of fairness	0.250*** [0.032]	0.245*** [0.032]	0.251*** [0.032]	0.245*** [0.031]
Closeness	0.069* [0.039]	0.085** [0.038]	0.097** [0.040]	0.068* [0.038]
Communication quality	-0.038 [0.051]	-0.002 [0.052]	-0.037 [0.050]	-0.024 [0.048]
Trust	0.308*** [0.039]	0.312*** [0.040]	0.330*** [0.040]	0.310*** [0.040]
Experience (years)	-0.001 [0.003]	0.000 [0.003]	0.000 [0.003]	-0.001 [0.003]
Trust X Fairness	0.127*** [0.024]			0.154*** [0.040]
Trust X Closeness		0.096*** [0.023]		-0.004 [0.031]
Trust X Communication			0.084*** [0.024]	-0.033 [0.038]
<i>Constant</i>	0.009 [0.175]	0.04 [0.178]	0.018 [0.173]	0.022 [0.176]
<i>No of Observation</i>	562	562	562	562
<i>R-squared</i>	0.483	0.467	0.466	0.484
<i>Adjusted R²</i>	0.475	0.458	0.458	0.474

Notes: Significance levels are reported as follows: *** 1%; ** 5%; * 10%

Source: Own calculation based on survey data

When all three factors were introduced simultaneously in model 4, only the interaction between trust and fairness remained statistically significant (1 per cent significant level). Therefore, only hypothesis H5 was supported, whereas H6 and H7 were rejected.

6. Discussion

6.1 Trust and financial performance

Previous studies have shown mixed findings about the relationship between trust and supply chain performance. We show that trust plays a significant role in influencing supplier's financial performance. We find a direct linkage between trust and financial performance. This can be attributed to the social bonds which are developed between the supply chain partners in the chain, and since there are no formal contracts, transactions are often based on verbal contracts or promises which rely on trusting relationships. In most cases, and based on an informal agreement, the buyers pay a deposit in good time before the date of collection and then pay the balance when they collect the fruits. To a certain extent, some farmers allow particular buyers to obtain their fruits on credit, with the payments made at a later time. In these cases, trust plays a major role as a transaction cost reducing mechanism that reduces the trading partners' need for transaction specific investments and contributes to building mutual commitment. Trust reduces uncertainty and facilitates the easy flow of resources between exchange partners (Schiefer and Hartmann, 2008). Trust reduces search and negotiation costs, which in turn reduces inefficiency, thereby increasing profits. At the same time, the exchanged information helps to improve the production capabilities of the producers, which leads to the production of quality fruit. Good quality fruit attracts a higher price, which increases the income obtained from the sale of the fruits.

Our findings are consistent with previous studies. For example, Masuku & Kirsten (2004) and Lobo et al.(2013) indicated that suppliers in trusting relationships achieved higher profit. In contrast to this finding, Lu et al.(2008) concluded that trust does not affect the producer's profitability. This indicates that the effect of trust on the supplier's financial performance may be context specific and may be influenced by other factors such as the existing institutions and other factors that have been discussed in the prior literature. Institutions affect how resources and information flow between the supply chain partners (Mojo et al., 2015).

6.2 Fairness and financial performance

We find that there is a positive relationship between fairness and financial performance. This may be because fair treatment builds reciprocity. This implies that once the supplier feels that he has been treated fairly by the buyer, he will be inclined to reciprocate, for example, by providing quality fruits. This may involve providing a fair price for the mangoes which is perceived by the farmer to be proportionate with the effort made in the production and crop management. Distributive fairness matters in this case as farmers feel cheated when they are offered what they consider to be a poor price for their product. Moreover, efficient information exchange between the partners will ensure that the right products are produced and the correct quantities are delivered, which increases supply chain efficiency. Furthermore, problems that arise can be more easily resolved. This also reduces the production costs, which increases the profits earned. This study is consistent with Zaefarian et al. (2016) who show that when suppliers perceive buyers to be fair it affects sales growth positively. On the other hand, lack of fairness leads to disloyalty and a lack of commitment, which negatively affects financial performance.

6.3 Closeness and financial performance

Closeness positively affects financial performance. Closeness increases interactions between the supplier chain partners, which leads to improved information exchange between the exchange partners. Transparency between the exchange partners is increased, perceived risk is reduced and commitment is enhanced. In most cases, the buyers are well known by the producers and they have built a good rapport, thus reducing uncertainty in the exchange relationship. Their repeated transactions create social bonds and business becomes based on friendship and trust. This in turn reduces the supplier's search and bargaining costs and promotes long-term relationships, which improve financial performance (Dyer and Chu, 2003). Similarly, buyers have built networks within the local community there is a possibility of getting the best fruit. This improves the price obtained, while it also ensures that the products are taken on time, thereby reducing wastage and, thus, contributing to financial success. At the same time, the local contacts assist the buyers in sourcing high quality mangoes. Hence, closeness is based upon established trust and extended local buyer-seller networks. This finding is consistent with previous studies that showed that closeness increases financial performance (e.g., Ferguson et al., 2005).

6.4 Communication quality and financial performance

Communication quality was not positively associated with financial performance. In the Kenyan context, the information provided by buyers is often inadequate. For instance, farmers were told that there was limited demand for mangoes and, therefore, they were offered a low price. Information exchange is often incomplete and too inaccurate to significantly affect the producers' financial performance. Prior research shows that information exchange should be timely, accurate, complete, reliable and suitable because this affects the whole exchange process (Fischer, 2013). Another probable explanation could be that the presence of trust, fairness and closeness suppresses the effect of communication quality. Therefore, there is a complementary effect between communication quality, fairness, closeness and trust.

6.5 Interaction effects

The interaction between trust and fairness had a significant and positive effect on financial performance. This finding may be explained by the fact that both trust and fairness increase information sharing and reduce opportunistic behavior between the supply chain actors, which in turn leads to improved production, a reduction in supply chain inefficiencies and increased profitability. Farmers with a low level of trust and fairness had a low level of financial performance.

Both the interactions between trust and closeness; trust and communication quality did not significantly influence the suppliers' financial performance. The latter result can be attributed to the levels of trust in the relationship. Relationships with low or moderate levels of trust are not affected by the interaction between trust and communication (Gundlach and Cannon, 2010).

7. Conclusion and managerial implications

Relational factors are becoming increasingly important for the performance of agrifood supply chains. We find that, fairness, closeness and trust affect the producers' financial performance and that trust moderates the relationship between fairness and financial performance. Previous studies have investigated the relationship between trust and supply chain performance resulting in mixed findings regarding the effect of trust on financial performance (Masuku and Kirsten, 2004; Lu et al., 2008; Lobo et al., 2013). Some studies have concluded that trust alone cannot lead to improved financial performance (Palmatier, 2006; Smets et al., 2013). In this article, we have investigated the direct effect of trust and other relational factors on producer financial performance and the moderating effect of trust on fairness, closeness and communication quality. We show that supplier financial performance is highly influenced by trust due to the social bonds built between the

producers and the buyers, which facilitate exchange between the partners. A farmer's financial performance can be improved if there is trust with their buyers because it reduces opportunistic behavior and reduces search and negotiation costs, which increase chain efficiency. Furthermore, distributive fairness, in terms of the price offered, significantly affects financial performance. A low level of fairness reduces the producers' financial performance because it affects information exchange that in turn affects the farmers' production capabilities. This affects the quality of fruit produced. On the other hand, fairness of the buyer produces reciprocity from the side of the producer that affects the fruit produced and income gained from the exchange. Moreover, closeness with the exchange partner affects the producers' financial performance positively. This is explained by local networks with the buyers. Closeness between the farmer and the buyers increases interactions, reduces perceived risk and uncertainty and improves the exchange process, positively influencing the financial outcome of the relationships. The study found that communication quality did not significantly influence financial performance. To a certain extent, the information shared was typically too inaccurate and incomplete to affect producer financial performance. Trust moderates the relationship between fairness and producer financial performance because it reduces potential conflict and destructive behavior between the supply chain partners, thus acting as a catalyst that speeds up the exchange processes, reduces inefficiencies and improves performance.

Managerial implications

In a business environment characterized by institutional voids and imperfect markets, the building of long-term relationships becomes very important. Therefore, buyers sourcing from producer organizations and individual producers and aiming to improve their supply chain performance should aim to establish trusting relations with their producers. Trusting relations emerge out of sustained interaction based on transparent behavior and the sharing of information. When the business-related communication from agents outside established relationships is, in general, not very trustworthy, trust becomes the main factor that may influence the supplier's transaction decisions and performance. This is a distinguishing feature of the study context compared to more information-rich, transparent and formally regulated institutional business environments. This implies that strong farmer-buyer links and networks are key elements in strategies for enhancing producer performance in developing country agrifood supply chains.

Our study contributes to the theoretical discussion of supply chain management by developing a new model that links different relational concepts to suppliers' business performance. It is clear that

supply chain partners should invest in developing fairness, closeness and trust as this is vital for successful coordination of the supply chains. This is specifically important in this empirical case and other agrifood chains in an environment with institutional voids. We believe that the theoretical framework can also be applied to other industries to help us further refine our understanding of how to enhance the performance of the supply chains in general. To reduce supply chain inefficiencies, the supply chain partners should build trust in each other as the building of a trust-based supply chain network is vital for the establishment of a safe and secure supply chain (Fischer, 2013).

Despite the contributions of the study, it has some limitations. Measuring the relational factors between partners was based on perceptions, but these can change with the changes in the business environment. Therefore, future research could consider conducting a longitudinal study to analyze the changes in perceptions as a consequence of environmental changes. Future investigations could also consider conducting research in a different country as well as considering other factors which may improve the supply chain performance. The effect of relational factors on business performance may change based on gender perceptions, which could be an interesting area for future research. Future research should also consider these factors and their effect on business performance from the buyers' perspective.

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Appendix 1: Demographic characteristics

Table 7.10: Demographic characteristics of respondents

Demographic characteristics	Frequency <i>n</i> =562	Per cent
<i>Sex of respondents</i>		
Male	328	58.36
Female	234	41.64
<i>Age of respondents (years)</i>		
0-18	3	0.53
19-30	42	7.47
31-50	197	35.05
51-70	275	48.93
71-90	45	8.01
<i>Education level</i>		
No schooling	31	5.52
Primary (1-7 grade)	173	30.78
Standard 8 (1-8 grade)	106	18.86
Secondary (1-4 grade)	177	31.49
Tertiary institutions	75	13.35
<i>Farmer experience (years)</i>		
0-5	39	6.94
6-20	420	74.73
21-40	96	17.08
41-60	7	1.25
<i>Membership to producer groups</i>		
Yes	185	32.92

Source: Survey data

Appendix 2: Factor loadings

Table 7.11: Factor loadings for relationship variables

Latent variables & indicators	Factor loadings
<i>Financial performance (KMO=0.79, $\alpha=0.83$)</i>	
My relationship with the buyer has been a financial success	0.82
I have been able to achieve 100 per cent of my goals by selling to my current buyer	0.71
I gain steady income and financial security from this relationship	0.76
Return on investment is higher in this relationship	0.68
<i>Communication quality (KMO=0.82, $\alpha=0.88$)</i>	
I receive regular feedback from the buyer about the quality of my product	0.81
I receive regular feedback from the buyer about market developments	0.78
I receive information on how my production compares with others (e.g. on quality, price ...)	0.82
The information received from my buyer is useful for production and marketing of mangoes	0.89
<i>Fairness (KMO=0.80, $\alpha=0.84$)</i>	
We have bilateral and frequent communication with my buyer	0.84
A high level of two-way communication exists between me and the buyer	0.84
We have agreed rules and terms in our business with the buyer concerning quality, quantity and price	0.51
The price paid by my buyer is better than what others buyers would offer	0.50
Sometimes when the buyer changes his objectives I alter my standards of production in response	0.52
<i>Trust (KMO=0.75, $\alpha=0.75$)</i>	
My buyer does not make false claims	0.50
I believe in the information provided by my buyer (prices, quality, quantity)	0.72
My buyer always keeps his promises	0.67
My buyer cares about my welfare	0.67
<i>Closeness (KMO=0.75, $\alpha=0.78$)</i>	
We seem to find plenty to talk about	0.85
This buyer knows a lot about me	0.43
We have developed a good rapport	0.74
There is friendship between us	0.73

Source: Survey data

7.3 Article 3: The Effect of Collective Action on Smallholder Income and Asset Holdings in Kenya

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Abstract

Collective action through rural producer marketing organizations can be significant for improving smallholder welfare thus contributing to rural economic growth and poverty reduction. The purpose of this paper was to examine the impact of group membership on smallholder welfare and poverty. The study compared farmers in producer-marketing farmer organizations and non-members involved in growing mango from eastern part of Kenya. Propensity score matching method was used to estimate the average treatment effect of group membership on smallholder welfare and poverty. The heterogeneity across propensity score and farm size for the estimated impact were also determined using smoothing differencing method. A total of 600 households were interviewed comprising of 400 non-members and 200 members. The study shows that group membership significantly improves smallholder total household income and asset holdings and reduces poverty. This effect is significant for medium-scale farmers participating in collective action as compared to poor small-scale and large scale farmers. There are important factors which determine smallholder participation in collective action these include human capital (age and education level of the household head), market access (distance to the nearest paved road), natural and physical capital (total farm size and number of other crops grown). This study expands on the literature about the effect of collective action on smallholder welfare by investigating the impact on asset holdings and poverty in addition to the total household income.

Key words: Smallholder, Poverty reduction, Producer organizations, Impact evaluation, Africa.

1. Introduction

Domestic food markets are growing in developing countries. This is as a result of the increase of middle class households (Reardon et al., 2015; Reardon, 2015) that demand for higher value agricultural produce (Reardon et al., 2013; Reardon et al., 2015; Wiggins, 2014). This is evident in Africa and Asian countries (Reardon, 2015; Tschirley et al., 2015). The rapid increase in urban incomes as a result of urbanization and associated diet diversification attributed to the rise of the middle-class provide an opportunity for rural economic growth and poverty alleviation (Reardon et al., 2013; Reardon et al., 2015). Similarly, a “quiet revolution” is noted in some sectors such as horticultural, dairy, poultry, tubers and grains which has occurred in some countries in Africa, such as, Kenya, Ethiopia, Zambia, Zimbabwe, Nigeria, Senegal, South Africa, Mozambique and Ghana (Reardon et al., 2013). This has manifested itself in rapid transformation in processing, wholesale and logistics in the midstream segments of the value chain through small to medium-sized enterprises (Reardon et al., 2013) and this development provides increasing market opportunities for smallholders (Reardon et al., 2015).

Despite the changes, smallholders in rural Africa face high levels of poverty (Barret et al., 2015; Radeny et al., 2012) as result of limited access to market opportunities (Barret, Carter & Little, 2008; Poulton et al., 2010) which is attributed to high transaction costs and imperfect markets (Barrett, 2008; Jayne, Key, Sadoulet, & De Janvry, 2000; Markelova & Mwangi, 2010; Mather, & Mghenyi, 2010; Ortmann & King, 2010; Poulton, Dorward, & Kydd, 2010; Shiferaw et al., 2009). There is an increased support through non-governmental organizations (NGOs), donor agencies and government through collective action in producer marketing groups to encourage smallholder participation in the emerging markets. However, research has only to a limited extent systematically analyzed the effect of collective action through producer marketing organizations on poverty among smallholders in rural Africa, especially regarding dry land crops. With the exceptions of Bernard, Taffesse, & Gabre-Madhin (2008), Bernard et al. (2009) and Shiferaw et al. (2009) that examined the legumes and cereals in Ethiopia and Kenya respectively, little is known about other drylands crops.

Recent studies have shown that collective action through producer organizations can help smallholders to access domestic urban markets as well as international markets through increased economies of scale, increased bargaining power and ability to negotiate better prices, and facilitates certification and labeling (Markelova, Meinzen-Dick, Hellin, & Dohrn, 2009; Markelova &

Mwangi, 2010; Okello, Narrod, & Roy, 2007). Farmer groups can increase member productivity through access to resources, such as credit, technical assistance, transport and information, new technology and management skills that would be difficult to attain individually (Abebaw & Haile, 2013; Bernard & Spielman, 2009; Chiputwa, Spielman, & Qaim, 2015; Fischer & Qaim, 2012; Liverpool-Tasie, 2014).

Available evidence, therefore, suggests that smallholders' can consequently improve their livelihoods through participation in producer organizations thus contributing to reduction of poverty. However, only a few studies have analyzed the impact of collective action on smallholders' income and poverty. Most studies focus on treatment effects with little focus, for example, on distribution effects (Chagwiza, Muradian, & Ruben, 2016; Fischer & Qaim, 2012; Ma & Abdhulai, 2016; Verhofstadt & Maertens, 2014). To understand whether the programs are beneficial to the rural poor it is important to analyze the distribution effects. In previous studies, only income is used as an indicator for poverty and potential indirect effects such as household consumption linkages have been given limited attention (Maertens et al., 2012). It is important to note that since most of these studies are done in rural areas, there is a risk of under reporting the income levels (Jan, Chishti, & Eberli, 2008). Estimation of poverty based on income reports only transient poverty due to the variations in the income (Carter and Barret, 2006). Basing the analysis on income alone may therefore not be comprehensive. Consumption per household is a more accurately reported estimate of poverty because it includes smoothing through, for example, asset change and accounts for fluctuations in the income (Coudouel et al., 2002). Previous studies have not considered asset accumulation; however, asset accumulation is a better measure of poverty than income or consumption (Barret, 2008; Carter and Barret, 2006).

Therefore, the aim of this study is to investigate the impact of collective action on rural farmers' livelihood by including simultaneously measures of household income, consumption and asset holdings. We conduct the study among smallholder farmers in the mango value chain of Kenya. Mango provides an interesting case in which to investigate welfare effects. First, mango is one of the most important horticulture crops in Kenya as it supports a large number of smallholder farmers as a source of food and main income in semi-arid areas (Kehlenbeck, Rohde, Njuguna, & Jamnadass, 2012). Second, the case helps to understand the livelihood strategies for smallholders living in resource constrained semi-arid areas who have limited opportunities to improve their livelihood. The mango value chain has been changing with increased use of improved mango varieties which requires significant amounts of fertilizers and pesticides. Mango is largely traded on

the domestic market 98% (Msabeni et al., 2010) which provides a good case to understand impact of collective action as an institutional mechanism in domestic value chains.

This article contributes to existing literature on the impacts of producer group membership on smallholder welfare and poverty. This is achieved by adding a new perspective on linkages between group membership, consumption, asset holdings and poverty. In sub-Saharan Africa, a number of organizations have invested in development of producer groups to enable smallholders' access high value markets as a specific strategy for poverty-reduction. This study increases our understanding about the effect of this value chain intervention on smallholder livelihoods.

The rest of this paper is organized as follows. The next section reviews the existing evidence on the importance of collective action in assisting smallholders' to access input and output markets, and its effect on smallholder welfare. The transaction cost economics theory and determinants of collective action and a brief background of collective action marketing initiative in Kenya are presented. The methodology section outlines data collection and the econometric approach applied to estimate the impact of producer organization membership on smallholder income, consumption and asset holdings. Next, the results are presented and discussed. Lastly, the main findings are summarized; policy implications are drawn and potential further research discussed.

2. Literature review

Family farms, including smallholder farms comprise about 53% of agricultural land in the world. Management of family farms is therefore important for the world's food production (Graeub et al., 2016). In many sub-Saharan Africa and other low-income countries smallholder agriculture contributes 70% of the food production (ETC Group, 2009). Smallholder participation in domestic markets is important as a mechanism to help poverty reduction and contribute to overall economic growth and development (Markelova & Mwangi, 2010). Most of the smallholders are dependent on farming as their main livelihood strategy and smallholder agriculture has been highlighted as a foundation for achieving the development of rural economies (World Bank, 2007). Evidence from the Asian green and white revolutions has shown that agricultural development can act as a mechanism for ensuring rural development and reducing poverty (Wiggins et al., 2010). There is a promising "quiet revolution" in some countries in Africa (Reardon et al., 2013; Reardon et al., 2014; Reardon et al., 2015). This is characterized by a rapid rise of small-medium-scale enterprises in the mid-segment of the chain (Reardon et al., 2014). To promote this transition and assist smallholders to overcome challenges of high transaction costs and imperfect markets, collective

action through producer organizations has been identified as an institutional innovation which can support agricultural development processes by allowing smallholders to more efficiently access both input and output markets (Reardon et al., 2013).

Effects of collective action on smallholder welfare

Conceptual model

Collective action through marketing farmer organizations improves smallholder welfare by acting as an institutional innovation that reduces high transaction costs and improves market coordination thus overcoming the problems of imperfect markets and transaction failures (Kherallah & Kirsten, 2002; Shiferaw et al., 2009). In Figure 7.3: a conceptual model is presented that illustrates the linkages between the enabling or disabling factors for smallholders, collective action and welfare.

Figure 7.3. Determinants and effects of collective action on smallholder welfare

Collective action as an institutional mechanism enables the smallholders to access input and output markets which lead to improvement of household income, asset holdings and poverty reduction. Smallholders require resources which are encompassed in household characteristics to enable them to participate in collective action. These resources are referred to as the five ‘capitals’ according to sustainable rural livelihood framework (Bebbington et al., 1999; Scoones, 1998). The five capitals include human, financial, social, natural and physical capitals. The geographical characteristics affect the market access due the transportation costs. This happens in a more or less supporting institutional and business environment.

Effect of collective action on household income, consumption and asset holdings

Smallholder farmers typically face high transaction costs including search cost for getting a buyer or market for the products, negotiation cost due to imperfect information, screening cost due asymmetry of information, and enforcement cost incurred when the buyer fails to pay and transport costs due to remoteness of some areas (Escobal & Cavero, 2012; Key et al., 2000; Renkow et al., 2004; Vanni, 2014). They also lack proper coordination that limits their bargaining power and affect their ability to exploit the economies of scale (Markelova et al., 2009). From a transaction cost economics perspective, a firm is likely to select a governance mechanism which reduces its transaction costs (Williamson, 1985; 1991). The choice of a governance mechanism is based on transaction cost characteristics, i.e., frequency, uncertainty and asset specificity (Williamson, 1996; Ménard, 2007). Transaction cost economics defines a continuum of governance mechanisms from market to hierarchy. Collective action follows under the hybrid form of governance. Because of high marketing costs associated with market governance and high investment cost involved in hierarchical governance. Smallholder farmers are likely to organize themselves in farmer organizations to enable them to overcome the high transaction costs.

Recent evidence has shown that producer organizations can act as vehicles for smallholders to access farm inputs and adoption of new technologies. Markelova et al. (2009) emphasizes that most of the transaction costs incurred by the smallholders can be overcome through collective action. Being a group member improves access to farm inputs, such as fertilizers and seed (Abebaw & Haile, 2013; Hellin, Lundy, & Meijer, 2009; Liverpool-Tasie, 2014); machinery and tools (Kruijssen et al., 2009), and promote adoption of new technologies and innovations (Abebaw & Haile, 2013; Fischer & Qaim, 2012). In some cases, producer organizations can also increase farmers’ access to physical resources, such as land (Verhofstadt and Mintens, 2014b).

Producer organizations are important vehicles that enable smallholders to access higher value domestic markets (Kaganzi et al., 2009). Producer organizations facilitate and increase smallholder farmers' access to new domestic markets as a result of better market arrangements (Bernard & Spielman, 2009; Markelova et al., 2009; Poole & de Frece, 2010). Producer groups can shorten extended marketing chains by directly connecting smallholders to markets bypassing various marketing intermediaries and negotiating better terms of trade, as well as lowering vertical and horizontal coordination costs (Barrett, 2008; Bernard & Spielman, 2009; Shiferaw, Hellin, & Muricho, 2011). Producer groups play an important role in offering training to members thus increasing information access and improving their human capital (Bernard & Spielman, 2009; Markelova et al., 2009). Moreover, producer group increase the cognitive social capital as well as commitment and satisfaction of their members (Mojo et al., 2015). Finally, they can also promote social inclusion for women and enable them participate in decision making process (Kruijssen et al., 2009; Mwangi et al., 2012). Consequently, this leads to improve livelihoods due to increased income, consumption and accumulation of asset holdings.

In general, collective action promotes increased efficiency through reduction of high transaction costs; improve marketing coordination, access to market information, improved quality and quantity of produced and better economies of scale which leads to attainment of better prices, and thus improved incomes. For example, Bernard, Collion, De Janvry, Rondot, & Sadoulet (2008), Kaganzi et al.(2009) and Shiferaw et al. (2009) showed that involvement in collective action led to gaining a better price. Other studies which have investigated the impact of group membership on smallholder income and profits, include Wollni and Zeller (2007), showed that membership of producer groups allowed farmers in Costa Rica to participate in coffee specialty markets and earn higher prices. Similarly, Mujawamariya, D'Haese, & Speelman, (2013) showed that Rwanda coffee farmers earned higher prices. Fischer & Qaim (2012) compared banana farmers groups in Kenya with farmers who sold individually and found price differences to be very small although it led to increased household incomes. Ito et al. (2012) found that cooperative membership raised farm incomes for watermelon farmers in China by twice as much for small farms compared to larger farms; Vandeplas, Minten, and Swinnen (2013) which showed that cooperative dairy farmers earned more profits compared to farmers who supplied to traditional channels in India and Chagwiza et al. (2016) showed that dairy farmers in cooperatives increased their income in Ethiopia. While Ma & Abdhulai (2016) indicated that apple farmers who sold through cooperatives increased their incomes in China. Finally, Verhofstadt and Maertens (2015) found that cooperative

membership increased the members farm incomes and reduced poverty. With the exception of Verhofstadt and Maertens (2015) there are limited studies that analyze the effect of group membership on smallholder poverty.

Previous studies have mainly investigated the linkages between collective action and household income. Collective action leads to increased household consumption due to the increased household income. The generated financial capital can also be used for investment, for example, purchase of farm equipment, buildings, purchase of livestock, land and other household asset. A few studies analyze these effects. For example, a study by Shiferaw et al. (2009) showed that smallholders involved in marketing of pigeon peas and green grams were able to increase their assets in some of the sampled villages in eastern Kenya. Mujawamariya et al. (2013) showed that farmers involved in coffee cooperatives in Rwanda used savings to purchase plots of land.

Determinants of smallholder participation in producer organizations

The farmer's decision to join collective action is dependent on resources, for example, human, natural, financial, social and physical capital. Geographical characteristics constraint market access as they affect the transport costs. These factors could be constraining or enabling a given farmer to join specific agricultural producer organizations (Mwangi et al., 2012; Shiferaw et al., 2012). The farmers' incentive to join agricultural producer organizations with a marketing focus will be influenced by human, natural, financial, social and transport costs:

Human capital of the farmer increases "the ability to perceive, interpret, and respond to new events" (Schultz, 1982). Group membership has been shown to depend on education, including farming experience, age and family size of the farmer (Bernard & Spielman, 2009; Fischer & Qaim, 2012; Verhofstadt & Maertens, 2015; Wollni & Zeller, 2007). Family size has been used as a proxy for availability of labor for both agricultural and collective action activities and increases the likelihood of being a group member (Bernard & Spielman, 2009).

Gender can also influence a farmer's choice to participate in groups. Women may have different opportunities, motivation, and capabilities than men to engage in collective action (Pandolfelli, Meinzen-Dick, & Dohrn, 2007). In some countries, women face specific limitations to participating in collective action activities (Mayoux, 1999; Quisumbing & Pandolfelli, 2010).

Natural capital such as access to resources, for instance, land is a key determinant of group participation (Bernard & Spielman, 2009). Farmers with large and small landholdings are more likely to join groups as compared to those with middle sized farms (Bernard & Spielman, 2009; Fischer & Qaim, 2012; Meier zu Selhausen, 2015). Physical assets such as ownership of livestock

and farm equipment have a direct relationship with the probability of cooperative membership (Bernard et al., 2008; Bernard & Spielman, 2009; Fischer & Qaim, 2012; Francesconi & Heerink, 2011). However, these assets may be endogenous to group participation. Agricultural production is a capital intensive venture. In an environment where the financial institutions cannot offer credit to smallholder farmers due to lack of collateral such as property title, producer groups become an important source of credit. There is a high likelihood that smallholders join the groups to access credit (Bernard et al., 2008; Fischer & Qaim, 2012).

The distance to the nearest paved road influences transportation costs and has been used as a proxy for market access (Bernard & Spielman, 2009). Previous research suggest that distance to the nearest paved road has a curvilinear effect on the probability of group membership (Fischer & Qaim, 2012; Verhofstadt & Maertens, 2014). This implies that farmers located near to a paved road have better access to markets, and may therefore be less dependent on group activities, especially collective marketing. In contrast, farmers with greater difficulties in accessing road infrastructure may expect higher returns from group membership and are hence more likely to join.

3. Collective processing and marketing of mango in Kenya

Producer marketing organizations are widely promoted in Kenya (Fischer & Qaim, 2014; Shiferaw et al., 2009). These organizations provide services to smallholders including access to farm inputs, technology and innovation, information, credit, processing as well as linking farmers to markets (Fischer & Qaim, 2012; Wanyama, 2009). There are a wide range of agricultural producer organizations ranging from cooperatives to farmer associations. Cooperatives are prevalent in certain commodities such as coffee, tea, dairy and Soya bean (Wanyama, 2009) while other forms of producer organizations exist in other commodities including mango. With the exception of Malindi farmers' cooperative society, most of the producer groups targeting mango production and marketing are still at association level. Producer organizations can be key players in horizontal coordination in domestic value chains (Fischer & Qaim, 2012). Producer organizations are formed voluntarily, with support from the government or NGOs.

The producer organizations included in this study are the results of an intervention, the project Nurture, headed by the international NGO TechnoServe, funded by Bill and Melinda Gates Foundation and the Coca-Cola Company, TechnoServe established producer business groups in Kenya and Uganda with the goal of improving the production and marketing of mango and passion fruit. The aim of the project was to empower smallholder farmers involved in mango and passion

fruit growing to increase their income by improving production and marketing capabilities. The project had a duration of four years from 2010-2014. At the start of the project, a baseline value chain analysis was conducted to clearly understand the different actors, the constraints, and opportunities along the mango value chain. This assisted the project in addressing the key areas along the chain that needed improvement. The outcome of the initial analysis identified a need for organizing farmers in groups, including training and establishment of market linkages with downstream actors.

The selection of individual farmers into the producer business groups was done based on three criteria: the farmer should have at least 0.5 acres of land under mango production either as pure stand or mixed; the farmer should be willing to be trained; and the farmer should be willing to sell their products collectively. The groups were formed with a clear organization structure that comprised of a chairperson, secretary, treasurer and two additional management committee members.

Once the groups were officially registered, the following activities were done: Members were trained on different aspects of production, crop management and marketing. The training included agronomic practices and post-harvest handling in order to enable farmers to produce quality fruit and reduce post-harvest losses. Moreover, training in negotiation, record keeping and marketing skills to enable farmer organizations to enter into favorable business contracts with the buyers. The producer groups were then linked to buyers' such as local traders, exporters and processors. The local traders and exporters met the farmers directly and for the processors, the farmer group leaders visited the processing facilities and interacted with the processors.

Marketing arrangements with the buyers were negotiated based on whether it was the sale of fresh fruits or the processed products. Most of the groups were involved in the sale of fresh fruits. At the pre-maturity stage of the fruits, the group leader contacted the buyer who inspected the mangoes and agreed on terms of payment such as the price per fruit, quantity, quality and the date of collection. In the first marketing arrangement, the mangoes were delivered to the buyer a central location by the farmers; or buyers could collect from individual farmer's fields depending on their preferences. Buyers were either the local traders or exporters to the Middle East. This type of arrangement was organized for all the marketing groups; however some groups faced challenges with buyers defaulting on agreements leading to wastage of the mangoes.

The second type of marketing arrangement involved farmers transporting the mangoes to the processing facility after contacting the factory. This arrangement turned out to be expensive for the farmers due to the transportation cost. Lastly, the farmers themselves got involved in value-added activities through processing mangoes into mango puree and dried mangoes. These products were sold to processing factories, hotels and schools. The farmers preferred value addition as they were able to obtain higher prices. The value-addition activities were mainly in Embu and Mbeere districts.

4. Methodology

Household survey

The data for this study were collected using a household survey conducted in the districts of Mwala, Kangundo, Mbeere and Embu between February and April 2014. These districts are located in the counties of Machakos and Embu in the eastern region of Kenya. This region is one of the main areas of mango production in Kenya (ABD, 2011; USAID-KAVES, 2015). The districts were selected purposively from the list provided by the project Nurture staff. These counties were selected due to their large production of improved mango varieties and their fairly good infrastructure and market access possibilities (Gor, Agong, Achieng, Akuno, & Andika, 2012; Griesbach, 2003; Kehlenbeck et al., 2012; Msabeni, Muchai, Masinde, Mato, & Gathara, 2010).

In the next step, sub-locations that participated in project Nurture's value chain intervention were randomly selected from the provided project participants lists. Within the identified sub-locations, farmer marketing groups were then randomly selected. Overall, from the initial list of 95 mango farmer groups, 25 groups were selected. Within each group eight members were then randomly selected. Since the interest was to determine the impact of group participation on smallholder welfare, adjacent sub-locations that were not involved in collective action were also selected. These were selected based on observable characteristics as similar as possible to sub-locations that received the value chain interventions to enable comparison. The individual households to be included in the sample were randomly selected. This was to enable us to carry out proper matching of participants and non-participants and determine the impact of group membership on smallholders' welfare.

Face-to-face interviews with the heads of the household were conducted using pre-tested structured questionnaires. The questionnaire was developed based on a literature review,

consultations with experts, and insights from semi-structured interviews with key-informants along the value chain. A total of 600 households were interviewed; 200 households belonging to producer groups and 400 households (control) from non-participating adjacent sub-locations.

Data were collected on number explanatory variables (covariates) (Table 1). In addition, data were collected about the dependent variables; total household income, consumption per household and asset holdings. The consumption per household was measured by estimating the amount used on different items which are used in calculating the rural poverty line, for example, food expenditure per month and these were multiplied by 12 months, medical bills, fuel, transport, clothing and school fees were estimated for the last 12 months for each household. Likewise, the current value of assets was estimated for different asset categories owned by the household. During the analysis seven members and eight non-members were excluded as outliers resulting in a total sample of 585 respondents.

Econometric estimation

Estimation of the impact of group membership on smallholder welfare, referred to as the average treatment effect on the treated (ATT), can be obtained as a difference between the expected household income if the individual was a member and the expected household income of the same individual if the individual was not a group member. For example, if Y_i^1 is the expected household income for individual i if that individual is a group member and Y_i^0 is expected household income for the same individual i if the individual was not a group member. Then, $ATT = \Delta = Y_i^1 - Y_i^0$

$$\begin{aligned} ATT &= E(\Delta | X, P = 1) \\ &= E(Y_i^1 - Y_i^0 | X, P = 1) \\ &= E(Y_i^1 | X, P = 1) - E(Y_i^0 | X, P = 1) \end{aligned} \quad (1)$$

Where ATT = average treatment effect on the treated, P = group membership, ($P = 1$, if group member and $P = 0$, if not group member); Y^1 represents the outcome (e.g., income) of a group member, and Y^0 is the same group member income if she or he were not a group member. X is the vector of the control variable.

From equation (1), the element $E(Y_i^0 | X, P = 1)$ cannot be observed because the same individual cannot be a member and non-member at the same time. This results in missing data. The problem is to identify a suitable control group among farmers who were not members, referred to as the

counterfactual. The best way to estimate the ATT would be through randomized controlled experiments but in this study we have no control over the design.

Observational studies differ from randomized experiments as group membership may be affected by both observed and unobserved characteristics due to potential selection bias of non-random self-selection of the members. Therefore, we cannot compare directly the outcomes of members and non-members. There are two potential sources of bias. The first category, where members and non-members differ based on observed characteristics such as age and education. The second is a result of unobserved characteristics such as attitudes, for example, trust. Other sources of the unobserved characteristics could be geographical locations but we controlled for this during data collection by collecting data from the same agro-ecological zone. The first category of bias can be controlled using propensity score matching.

Propensity score matching (PSM) is a quasi-experimental method which constructs a suitable comparison group with members and non-members that are as similar as possible based on observable characteristics expected to affect membership and the outcomes (Khandker et al., 2010). To estimate the ATT using propensity score matching, the effect of group membership can be modelled in two steps.

Step 1: Regression on the propensity score

In the first step, we generate the propensity scores $P(X)$ from the logit model, which indicate the probability of a farmer to be a group member or not (Table 2). Then, we construct a control group by matching group members to non-members according to the propensity score. Members for whom an appropriate match cannot be found, and non-members not used as matches, are dropped from the further analysis.

Step 2: Estimation of the ATT

In the second step, we calculate the ATT of group membership on outcome variable Y using matched observations of members and non-members (Table 3). The PSM estimator of the ATT is the mean difference in outcomes between treatment and control groups appropriately matched by the propensity score (Smith and Todd, 2001). Following Caliendo and Kopeining (2008), the PSM estimator will be

$$\tau_{ATT}^{PSM} = E_{Pr(X)|P=1} \{E[Y(1)|P=1, Pr(X)] - E[Y(0)|P=0, Pr(X)]\} \quad (2)$$

Three matching algorithms were used to compute the *ATT*: nearest neighbor, radius matching and kernel matching estimators. This was done to ensure robustness of the estimated *ATT*.

Checking for robustness of the estimated ATT

PSM depends on the common support assumption and conditional mean independence assumption (CIA) (Caliendo and Kopeinig, 2008). The common support condition ensures that any combination of characteristics observed in the treatment group can also be observed among the control group, meaning there is a reasonable overlap between the treatment and control group (Bryson et al., 2002). The propensity score distribution was plotted using kernel density plot and a *psgraph* and both showed that there was a significant overlap between members and non-members. To check for the matching quality, *pstest* was performed after estimation of *ATT*. This shows whether the matching procedure was able to balance the distribution of the explanatory variables between the control and treatment group (Dehejia & Wahba, 2002). The procedure tests whether there are no statistically significant differences in the means of the explanatory variables to be used in the logit model between the matched groups of the project participants and non-participants.

The conditional independence assumption (CIA) states that a given set of observable covariates and potential outcomes are independent of the treatment assignment (Imbens, 2004). Based on DiPrete & Gangl (2004), we calculated Rosenbaum bounds to check for hidden bias. The results were robust to the failure of conditional independence assumption. We tested for heterogeneity across the estimated *ATT* using the smoothing differencing method as proposed by Xie et al. (2012).

Lastly, we analyzed the effect of collection marketing on poverty. This was estimated using the total head count and poverty gap index using income or consumption following Chiputwa et al. (2015), Foster, Greer & Thorbecke (1984) and Radeny et al. (2012). Head count is defined as the percentage of individuals living below the poverty line. This provides information about the proportion of population lying below the poverty line. The poverty gap index is the average of the gaps between income or consumption expenditure of the poor and the poverty line, expressed as a percentage of the poverty line (Foster, Greer & Thorbecke, 1984).

5. Results

Descriptive statistics

Table 7.12 shows the descriptive statistics of the sampled households. The mean age for the non-members is statistically different from members, with non-members being younger than group members. The distance from the nearest paved road is significantly different between members and non-member with members having a distance of 6.83 km compared to non-members' 5.58 km distance to the road. Further, the number of mango trees owned and other crops grown by members is statistically different from non-members. Members have more mango trees and other crops such as maize, beans, bananas, oranges and pigeon peas compared to non-members. The total household income of members is statistically different from non-members. The group members have a larger income compared to the non-members. Moreover; the group members have better access to credit than non-members. The poverty incidence for the members is slightly lower than that of non-members based on consumption. They are below the national poverty incidence level for rural areas which at 49%.

Table 7.12: Farmer characteristics

Variable	Members		Non-members		P-value
	Mean	SD	Mean	SD	
Gender	0.66	0.47	0.54	0.49	0.004
Age of household head (years)	57.29	12.08	50.95	14.62	0.000
Education (years)	8.99	3.39	8.81	3.71	0.563
Household size (persons)	4.42	1.88	4.31	1.81	0.481
Distance to the paved road (km)	6.83	6.29	5.58	5.55	0.015
Total farm size (acres)	4.50	2.46	4.49	3.15	0.987
Contacts with neighbors (persons)	11.17	12.17	10.31	13.48	0.453
Log of number of trees	4.39	0.913	4.16	0.89	0.004
Number of other crops	2.43	0.628	2.25	0.678	0.002
Income from mango sales (KShs)	33,040	49,729	27,631	42,191	0.170
Income from other crop sales (KShs)	51,326	69,320	46,055	62,506	0.356
Total household income (KShs)	84,366	85,969	73,687	81,439	0.144
Total consumption (KShs)	117,651	110,952	116,744	124,801	0.923
Total household value of Assets (KShs)	25,829	29,829	22,504	23,187	0.136
Head count ratio	0.39	0.49	0.40	0.49	0.83
Number of observations	193		392		

Note: Statistical differences calculated based on *t-test* and poverty gap index was calculated based on the national poverty line of 18,744 KShs/year for rural areas.

Consumption per household was not significantly different between members and non-member. This was further divided into three categories to represent different middle class categories as suggested by Ncube et al. (2011); vulnerable middle class: 2-4 USD/day; lower middle class: 4-19 USD/day; and upper middle class: 10-20 USD/day. Tschirley et al. (2015) showed that in southern and east Africa, the middle class are both in the cities and rural areas. The results show that 71 per cent are in the vulnerable middle, i.e., those that have just moved out of poverty and are more likely to slip back, 24 per cent are in the lower middle class and 5 per cent are in the upper middle class. The estimates are based on 1 USD is equivalent to 87 KShs.

Figure 7.4. Accumulation of assets by members and non-members

Figure 7.4 presents accumulation of assets by members and non-members. Members have more assets such as television, beds and spray pumps, while non-members possess more mobile phones. For other assets, both members and non-members have approximately the same value.

Estimation of determinants of group membership

Table 7.13 shows the results from estimating the logit model for determinants of group membership. The results show that age of household head, distance to road, total farm size, and

numbers of other crops grown are key variables which determine a farmer's decision to join the group. The age of the household head is positive and significant; increase in age by one year increases the likelihood of being a group member by 2.5 percentage points. The results also indicate that the relationship between age and group membership is an inverted U-shaped relation. This implies that the probability of being group membership increases with age up to 64 years and then reduces thereafter.

Table 7.13: Logit estimates for determinants of group membership

Variable	Coefficient	SE	P> z	Marginal effects
Gender	0.333	0.203	0.101	0.066*
Age of household head (years)	0.128	0.049	0.010	0.025***
Age of household head squared	-0.001	0.000	0.054	-0.000**
Education (years)	0.033	0.000	0.246	0.007
Household size (persons)	0.047	0.512	0.369	0.009
Distance to the paved road (km)	0.051	0.017	0.002	0.010***
Total farm size (acres)	0.234	0.119	0.049	0.046**
Total farm size squared (acres)	-0.020	0.009	0.021	-0.004**
Number of other crops grown by the household	0.475	0.149	0.001	0.094***
Off-farm employment	-0.014	0.191	0.938	-0.003
Contacts with neighbors (persons)	0.001	0.007	0.924	0.000
Constant	-7.605	1.387	0.000	
<i>Pseudo R-squared</i>	0.087			
Observations	585			

Note: ***Significance level at 1%,

**Significance level at 5%,

*Significance level at 10%.

Furthermore, distance to nearest paved road has positive and significant effect on the probability of being a group member. The increase in distance by 1 km increases the likelihood of being a group member by 1 percentage point. An increase in the total farm size by one acre also increases the likelihood of being a group member by 4.5 percentage points, however, only up to 5.85 acres as shown by the farm size squared. The number of crops grown by a farmers increases the likelihood of being a group member, for every additional crop, the likelihood of being a group member increases by 9.4 percentage points. Other variables such as number of contacts with neighbors,

household size, off-farm employment and the education level of the household head do not have significant effect on group membership.

Impact of group membership on household income, consumption, asset holdings and poverty

The PSM was used to estimate the impact of group membership on amount of income from mango, total household income, total household consumption, total asset holdings and poverty (Table 7.14). Using three matching algorithms including kernel matching, nearest neighbor, and radius matching the impact of group membership was estimated on mango income, total household income, total household consumption and total asset holdings. The results show that ATT for mango income is significantly positive using the radius matching method but marginally significant with other two methods. The ATT for total household income was significantly positive and equal in magnitude across all the methods thereby indicating the robustness of the estimated ATT. Mango income contributed a share 39% of the total household incomes, other incomes were obtained from sale of crops such as oranges, maize, beans and bananas and off-farm employment. The results show that group membership increases the total household income by 24 % to 35 %. Given the mean total household income in the area is 77,300 KShs, the average income effect of group membership is between 18,530 KShs to 27,023 KShs. The ATT for total household consumption was not statistically different between members and non-members. Whereas ATT for total asset holdings or value of assets was significantly different at 1% significance level while using kernel matching and nearest neighbor it was significant at 5% significance level. The estimated effect of group membership on asset is between 19 % to 33 % which gives an effect of 4,484 KShs to 7,788 KShs given the average asset value is 23,601 KShs. Participation in collective processing and marketing significantly reduced poverty among the members as shown by the poverty gap index calculated based on total household income. The group membership reduces poverty by 3 % to 4 % given average poverty incidence in the area of 34 %.

Table 7.14: Average treatment effect on the treated (ATT) of group membership

Dependent variables	Matching algorithm		
	Kernel matching (normal)	Nearest neighbor matching (3)	Radius matching (0.006)
Log (mango income)	0.27*	0.22*	0.24**
Log (total household income)	0.35***	0.27***	0.24***
Log (total household consumption)	0.06	0.02	0.00
Log (total value of assets)	0.33**	0.19**	0.29***
Poverty gap index ^b	-0.11***	-0.09***	-0.08***
Observations on support	580	580	577

Note: ***Significance level at 1%,

**Significance level at 5%,

*Significance level at 10%.

^b Poverty gap index based on total household income

Testing for robustness of ATT results

In evaluating the reliability of the estimated results, we carried out a balancing test using kernel matching to check whether the common support condition was satisfied for the explanatory variables. Table 7.15 shows that our data satisfied this condition. Furthermore, the results show that the matched means of all covariates for members and non-members had no significant differences as compared to the unmatched characteristics. Figure 7.9 (Appendix1) confirm that there is a reasonable overlap between the members and non-members confirming the robustness of the results to the common support assumption.

Table 7.15: Balancing test using Kernel matching

Variable	Sample	Mean		% bias	% reduction bias	t-test P> z
		Treated	Control			
Gender	Unmatched	0.66	0.54	25.2		0.005
	Matched	0.66	0.67	-1.1	95.7	0.914
Age of household head (years)	Unmatched	57.29	51.00	46.7		0.000
	Matched	57.29	57.22	0.5	98.9	0.957
Age of household head squared	Unmatched	3429.20	2815.60	42.4		0.000
	Matched	3429.20	3436.00	-0.5	98.9	0.963
Education (years)	Unmatched	8.96	8.77	5.5		0.540
	Matched	8.96	8.69	7.7	-39.8	0.451
Household size (persons)	Unmatched	4.44	4.31	7.4		0.399
	Matched	4.45	4.52	-4.0	46.3	0.699
Distance to the paved road (km)	Unmatched	6.89	5.59	21.8		0.012
	Matched	6.89	7.28	-6.6	69.7	0.535
Total farm size squared (acres)	Unmatched	26.19	29.91	-8.8		0.357
	Matched	26.19	26.35	-0.4	95.7	0.968
Number of other crops grown by the household	Unmatched	2.44	2.24	30.2		0.001
	Matched	2.44	2.43	0.0	100	1.00
Contacts with neighbors (persons)	Unmatched	11.22	10.32	7.0		0.439
	Matched	11.22	12.32	-8.6	-23.9	0.490

Sensitivity analysis was conducted using the Rosenbaum bounds to test for any hidden bias of the estimated ATT. Table 7.16 shows that the results are insensitive to hidden bias that could be caused by unobserved characteristics.

Table 7.16: Sensitivity analysis for verifying the conditional independence assumption

Matching algorithms	Rosenbaum bounds Γ		
	ATT mango income	ATT total household income	Matched pairs (N)
Kernel matching	1.20	1.20	191
Nearest neighbor (3)	1.50	1.50	191
Radius matching	1.20	1.45	188

Note: ATT results are robust at the above values of gamma

Variation of the estimated ATT on mango income, total household income, assets, consumption and poverty across the propensity score distribution

Figure 7.5 shows the variation of estimated ATT for mango income across the spectrum of propensity scores. The ATT on mango income increases up to a propensity of approximately 0.6 but subsequently declines as the propensity score approaches one. The ATT on mango income is positive and increases between 0.3 to 0.7 and outside this zone there is a negative effect.

Figure 7.5. ATT on mango income and propensity score

Figure 7.6. ATT on Total household, poverty and propensity score

The same trend is observed for the estimated effect on household income and asset holdings (Figure 7.6). There is a steady rise from the propensity score of 0.3 to 0.6. However, above the propensity score of 0.6 there is a significant drop in the estimated income and asset effect. The individuals who

select into the producer organizations are more likely to improve their income and asset holdings. We find that the poverty reducing effect is also significant within the same range of 0.3 to 0.6 of the propensity score distribution. In general, the estimated effects across propensity score indicate that the individuals in the mid propensity score benefit compared to lower and higher end of propensity score distribution. On the contrary, there is no effect on consumption across the propensity distribution (Figure 7.7).

Figure 7.7. ATT on Asset holdings, consumption and propensity score

The effect on household income and poverty follows an opposite trend with farm size (Figure 7.8). The income effect increases to approximately 6 acres and thereafter reduces while poverty effect reduces within the same area of farm size and thereafter increases. This is because the probability of being a group member increases to approximately 5.52 acres (Table 7:12) beyond this the effect of total farm size of income reduces.

Figure 7.8. ATT household income, poverty and farm size

6. Discussion

Determinants of group membership

We found that the age of the household head had a significant effect on the probability of being a group member. The older farmers were more likely to join the groups than young farmers. The young farmers have other opportunities than farming and prefer to migrate to urban areas where they find off-farm employment leaving the old people to practice farming. This is consistent with earlier findings (Abebaw & Haile, 2013; Fischer & Qaim, 2012). However in some cases age has been found to be negatively related with group membership (Ito et al., 2012). This study confirms the earlier findings.

Distance to road had positive and significant on the likelihood of being a group member. Distance to the market is an indicator of marketing costs. This implies that farmers far away from the paved road have a higher likelihood of being a group member compared to those near the paved road. This finding is in line with previous findings (Abebaw & Haile, 2013; Fischer & Qaim, 2012) which show that the increase in the distance increases the possibility of the farmer to be a group member. This is because the bulkiness and the high perishability of fruits increases marketing costs and farmers join groups to economize on these costs. Total farm size had significantly positive effect on the probability of group membership but only up to 5.52 acres. This is probably because they can utilize their land for other farming options which take a shorter time to bring income compared to growing mangoes. Farmers prefer to diversify to overcome shocks. The findings of this study are in line with previous studies which concluded that total landholding positively influences group membership (Bernard & Spielman, 2009; Fischer & Qaim, 2012; Ma & Abdulai, 2016). Moreover, the number of other crops grown and number of trees grown had a positive significant effect on the likelihood of being a group member. This is probably because being in a group increases their opportunities to find market for their produce.

Education, household size, off-farm employment and number of contacts with neighbors did not influence farmers' likelihood to join the group. Some studies show that the education level affects the likelihood of joining groups (Bernard & Spielman, 2009; Verhofstadt & Maertens, 2015) while others show that it does not affect the likelihood of being a group member (Fischer & Qaim, 2012). This is because education is associated with better off-farm employment instead of being dependent on group marketing. Off-employment reduces the likelihood of being a group member because of the limited time available for group activities. Lastly, the number of contacts was found to be

insignificant, this can be explained by the fact that contacts with neighbors does influence the marketing choice made by a given household. Other studies also show that the farmers' number of contacts did not influence their decision to be a group member (Fischer & Qaim, 2012).

Impact of group membership on smallholder welfare and poverty

We find that participation in collective marketing and processing increased the household income. Group membership increased the farmer's access to information that helped in improving the productivity. The farmers were able to reduce post-harvest losses caused by pests such as fruit fly in some areas of the study. The information obtained in general assisted in better production and management of the fruits which accounted for better sales. Collective marketing facilitated market linkages with exporters and local traders in some groups, this contributed to obtaining a better price and to increased income from mango sales. Mango sales contributed up to 39% of the total household income of members. This increased and diversified the smallholders' income by adding an addition income source. Another explanation for the increased income is probably that the knowledge obtained through collective action had a spill-over effect on the production efficiency of other crop thus increasing the total household income. This study is in line with previous studied that have investigated the impact of collective action on smallholder income involved in horticultural crops (Fischer & Qaim, 2012; Ma & Abdhulai, 2016). The effect of total household income is only significant for medium-scale farmers with total farm size of 6 acres meaning the farmer organizations are beneficial this category of farmers. The limited participation of poor small-scale farmers is as result of limited access to resources for example, the financial capital to purchase the seedlings, fertilizers and agro-chemicals.

The results show that group membership has positive effect on asset holdings. Collective action increases the general household income by providing opportunities for investment. The increment in assets is attributed to the diversified forms of income thus increases the ability to save and make investments. Further, the ability of farmer being able to access credit through merry go-round credit and saving scheme increased their capital for investment. The findings are consistent with Shiferaw et al. (2009) who showed that in some villages in eastern Kenya the farmers involved in group marketing of maize and pigeon peas increased their assets. The ATT for household consumption was not significant. This is because the increment in household income was converted to savings and investment as shown by the significant effect on ATT total asset holdings.

Participation in collective action reduces the poverty as most of the members were above the poverty line. The results shows that the poverty gap index was significantly different based on total household income, but not on the total household expenditure or consumption. This is consistent with Verhofstadt and Maertens (2015) who estimated poverty based on total household income. However, the poverty effect is not significant using total house consumption; this implies that the effect of collective action on poverty reduction is limited. This could be explained by the short duration of the project as well as some challenges that were encountered during the course of the project such as limited market access for some groups resorting to individual selling and the shocks from weather extremes which affected fruit production. Income poverty is transitional in that there are times when farmers have increases in income due to high crop yields or prices that affects the income at a given period (Radeny et al., 2012).

7. Conclusions

Collective action can be significant in improving smallholder welfare thus contributing to poverty reduction and economic growth. However, previous studies on impact of group membership on poverty used only income as an indicator to measure poverty effects. In this study we extend this by incorporating consumption per household and asset holdings as indicators of poverty. The results show that group membership has a statistically significant and positive impact on household income and asset holdings among the members. Therefore, participation in collective processing and marketing improves smallholder welfare by increasing total household income and assets in rural areas. However, there is limited evidence of the impact of collective action on total household consumption. Most of the households belong to the vulnerable middle class that implies they are most likely to move back into poverty. The effect on poverty reduction is limited because of the challenges that faced some groups during project implementation such as limited market access and extreme weather conditions. There are important factors such as human, natural, physical and geographical capitals that enable smallholder participation in collective marketing and processing.

This study contributes to limited knowledge of impact studies of producer marketing group membership to smallholder welfare and poverty. Therefore, policy should be strengthened by putting more efforts geared towards organizing farmers in groups this will promote increased market access which in turn contributes to poverty reduction. More support is needed from the non-governmental organizations in terms infrastructure and strengthening value addition for perishable products this will improve the price obtained by smallholders. The NGOs should support the

organizations by building strong linkages with the processors and other buyers both domestically, regionally and internationally to promote assured market.

Despite the contribution, we acknowledge that the study had some limitations, we focused on only improved mango varieties and we covered only the eastern part of the country. Therefore, more studies are needed on impacts of group membership on poverty effects and interesting question could be how the impacts vary across men and women participating in collective processing and marketing. Since this study considers a typical year 2013 and in this period farmers experienced drought that might have affected the yields, future studies should consider the effect of group membership on smallholder welfare based on several surveys to compare with the current results.

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Appendices

Appendix 1: Common support assumption

Figure 7.9. Kernel density and histogram using radius matching

7.4 Article 4: Factors that Influence the Intensity of Smallholders' Participation in Rural Producer Organizations: Evidence from the Kenyan Mango Sector

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Abstract

Rural development necessitates sustained market access for smallholders and successful performance of producer organizations can be an important means to achieve inclusion in modern value chains. Collective action through producer organizations assists smallholders in overcoming challenges associated with accessing markets for their products. However, there is mixed evidence about the effectiveness and sustainability of producer organizations in facilitating smallholder farmers' access to markets. In this article, we analyze the factors that determine smallholders' participation in collective sale and group governance in the mango value chain in Kenya. We used a mixed methods approach based on a household survey including 200 respondents and 10 in-depth interviews. Data were analyzed using probit and negative binomial regression models. We find that more educated farmers with high mango production capacity are more likely to participate actively in collective marketing. The group size is an important aspect for collective marketing but negatively affects group governance. Trust in other group members is critical for the increased participation in collective marketing but has no effect on farmers' participation in governance activities. On the other hand, trust in the producer group leaders and age of the group member significantly affects intensity of participation in group governance. We also find that social networks in terms of number of contacts with processors and social participation are important for group governance. In general, more resourceful farmers seem to opt out of collective action. The research highlights the importance of designing interventions for supporting and developing rural producer organizations in ways that ensures incentives for wealthier and more resourceful farmers to actively engage in collective action.

Keywords: *Rural producer organizations, collective action, participation intensity, smallholders, mango, Kenya.*

JEL classifications:

1. Introduction

Smallholder agriculture is pre-dominant in sub-Saharan Africa, and contributes up to 90% of food production in some countries (Wiggins and Keats, 2013). The development of smallholder agriculture is widely recognized as fundamental for rural development and poverty reduction (Wiggins *et al.*, 2010). This can be achieved through improved access to output markets in order to incentivize smallholder productivity and income generation. However, small-scale farmers face high transaction costs (Wiggins *et al.*, 2010) in accessing both input and output markets. Collective action through rural producer organizations (RPOs) can assist in overcoming these challenges (Jayne *et al.*, 2010; Poulton *et al.*, 2010).

In many developing countries, studies show that smallholder farmers are increasingly participating in RPOs (Bernard *et al.*, 2008; Bernard and Spielman, 2009; Fischer and Qaim, 2012; Mujawamariya *et al.*, 2013; Liverpool-Tasie, 2014; Verhofstadt and Maertens, 2014; Wollni and Fischer, 2014). The growing interest in RPOs is a result of the widespread recognition of the importance of collective action for linking smallholders to higher value markets for their produce as well as to input markets (Markelova *et al.*, 2009; Bouamra-Mechemache and Zago, 2015).

However, recent studies have shown mixed evidence of the effectiveness and sustainability of producer organizations to facilitate smallholder farmer access to markets. Some studies have shown evidence of RPOs' ability to link smallholders to input and output markets (Roy and Thorat, 2008; Markelova *et al.*, 2009; Fischer and Qaim, 2012; Abebaw and Haile, 2013; Poole *et al.*, 2013; Liver-Tasie, 2014; Bouamra-Mechemache and Zago, 2015); whereas other studies have shown that producer organizations have failed to enhance market linkages (cf. Poulton *et al.*, 2010; Shiferaw *et al.*, 2011; Trebbin, 2014). Overall, there seem to be limited understanding about why some RPOs fail while others are successful.

The success of producer organizations hinges upon the active participation of their members (Fulton and Adamowicz, 1993; Österberg and Nilsson, 2009; Barraud-Didier *et al.*, 2012). Producer group performance is a result of successful collective action (Verhofstadt and Maertens, 2014). Therefore, understanding how successful collective action can be achieved becomes critical when aiming at improving smallholders' livelihood through support to participation in producer organizations.

At the individual farmer level, there are three important stages in engaging in collective action: a) the decision to join a group, b) the decision to commit to the organization through collective

sales, and c) the decision to participate in the group governance activities (Mensah *et al.*, 2012). Most studies have addressed the first stage of collective action (see, e.g., Bernard and Spielman, 2009; Bernard *et al.*, 2008) but less attention has been focused on the most crucial aspect: the collective action which affects effectiveness and sustainability of the producer marketing groups.

Previous studies addressing aspects of collective action have explored determinants of intensity of smallholders' participation in RPO activities with frequency of group meeting attendance and collective sale, or member deliveries as indicators of commitment to, or patronage of, collective action (Mensah *et al.*, 2012; Fischer and Qaim, 2014). A number of factors have been found to influence members' commitment to cooperatives. Key factors include financial benefits, farm size, group size, distance to market, and farmers' trust. Trust has also been identified as an important factor in group performance (Mujawamariya *et al.*, 2013; Latynskiy and Berger, 2016); however, most studies fail to systematically address the influence of smallholders' trust in organizational leaders and other group members on their participation in collective action (Fischer and Qaim, 2014; Wollni and Fischer, 2014). Few exceptions exist. Hansen *et al.* (2002) showed that trust has an effect on performance in grain and cotton marketing cooperatives in the U.S; and Morfi *et al.* (2015) found that Finnish farmers with high level of trust were more loyal to cooperatives compared to those with lower trust levels.

A study by Fischer and Qaim (2014) found that participation intensity in group marketing was influenced by group size, crop diversification, size of production area and yield, household size, and education. In this study, a household's membership to self-help groups was used as a proxy for the level of trust. Wollni and Fischer (2014) showed that collective marketing of coffee in Costa Rica was affected by member attachment, personal values, farm size, and patronage refunds. In this study, trust was measured as a member's decision to sell to the producer organization. Thus, the operationalization of trust in relation to farmers' participation in RPOs has been addressed in an indirect manner and from an overall perspective, for example, without differentiating between trust in the RPO management and trust in the other group members. Therefore, we aim to address this gap in the literature by analyzing both trust in organizational management and trust in other members as well as other factors that affect smallholders' participation in RPO activities. Against this backdrop, we address the following research question: what are the factors that affect the intensity of smallholders' participation in collective sale and group governance in rural producer organizations?

Based on a study of RPOs involved in processing and marketing of mango in Kenya, this article contributes to producer organization literature in two ways: First, we add to an overlooked perspective in the existing literature on RPO performance by explicitly analyzing the different types of trust as one of the factors that influence farmers' active participation in collective processing and marketing. Second, we investigate factors influencing smallholders' engagement in group governance. This provides insights into the social dynamics and sustainability of RPOs. Understanding these mechanisms is important because they can explain the success or failure of farmers' collective action, whether driven by internal efforts or external interventions.

This article is organized as follows. In the next section, we provide a literature review identifying the determinants of participation intensity. In section three we introduce the context of the Kenyan mango sector. In sections four and five we describe the research methodology and estimation of the statistical models, respectively. In section six, we present the results and discussion; and finally, in section seven we provide conclusions and the policy implications from our findings as well as directions for future research.

2. Background

Definition of intensity of farmers' participation in collective action

Participation intensity refers to members' behavior and actions towards their producer organization. In the literature, such behavior has been explored using different theoretical lenses. One literature stream focuses on member's loyalty (Morfi *et al.*, 2015). This research shows that loyalty is positively linked to RPO performance (Lang and Fulton, 2004). Loyalty is defined as an expression of individuals' behavior in the form of repeated action (Morfi *et al.*, 2015). A second literature stream views participation intensity as an expression of member's commitment and patronage (Fulton and Adamowicz, 1993; Bhuyan, 2007; Fulton, 1999; Jiménez *et al.*, 2010). Commitment is defined as RPO member's preference to patronize a cooperative even when the cooperative's price or service is not as beneficial as what is offered by competing private enterprises (Fulton, 1999). A third stream of literature defines member's participation intensity based on actual actions such as member deliveries for collective sale, their attendance to meetings and participation in the cooperative's decision making processes (Birchall and Simmons, 2004; Fischer and Qaim, 2014; Wollni and Fischer, 2014).

Members of RPOs decide to participate actively in collective action activities based on the associated costs and benefits (Fulton and Adamowicz, 1993; Fischer and Qaim, 2014; Wollni and Fischer, 2014). This line of research has modelled the decision to actively participate based on the random utility framework (McFadden, 1974) or as a portfolio type problem (Woldie, 2010). In RPOs, fixed costs and benefits include membership fees; services pursued or provided by the organization, access to information about production and management, trainings and prices, and reduced costs on inputs. These costs and benefits do not vary with participation intensity and every member has access to them (Fischer and Qaim, 2014). However, participation intensity is affected by marginal costs such as time used to participate in group activities and transportation costs incurred when traveling to collection centers. While marginal benefits may include subsidized input prices and output prices, patronage refunds will vary with participation intensity.

According to the random utility framework, individuals make choices between two alternatives based on the perceived utility obtained by the preferred choice compared to the alternative. Furthermore, the farmer will decide to commit a certain amount of their produce either to a producer organization or to a private buyer in order to maximize their benefits. The choice is affected by characteristics and factors associated with individual choice making (Fulton and Adamowicz, 1993). We extend this and include trust as a key factor in building relationships and engaging in collective action (Hansen *et al.*, 2002). The quality of interpersonal relationships between the members will influence internal coordination and resource allocation. The better interpersonal relationships are developed, the more flexible and smooth the processes of communication, coordination, and collective decision making (Valentinov, 2004). Next, we explore the different factors that affect members' intensity of participation. We draw on concepts from different theoretical perspectives, including human and social capital (Coleman, 1988; Putnam *et al.*, 1993; Sen, 1997; Woolcock, 2001), asset based/capitals (Bebbington, 1999; Scoones, 1998), and collective action (Olson, 1965; Wade, 1987; Ostrom, 1990).

Determinants of participation intensity in producer organizations

The financial return from participating in RPOs is related to the price obtained and potential dividends in more well-established groups (Klein *et al.*, 1997). Financial returns affect farmers' commitment to the producer organization (Fulton and Giannakas, 2001; Österberg and Nilsson, 2009). If marginal benefits are higher than the costs, farmers will choose to remain in the group and sale their produce through the group. In a situation where the obtainable prices are not different

from what is offered by other buyers, the farmer will often prefer to sell at farm gate in order to avoid additional transaction costs (Fischer and Qaim, 2014). Therefore, the price obtained from collective sale is positively associated with the farmers' willingness to remain engaged in collective action.

Previous studies have pointed out individual household characteristics such as age, education, and gender as important factors that affect intensity of participation in collective action (Fulton and Adamowicz, 1993). Education will affect the level of participation in RPOs (Wiebe, 2000). Education enables smallholders to articulate the benefits and costs associated with their membership in the RPO. Educated farmers, especially women, have a greater long-term investment horizon (Meier zu Selhausen, 2016). Furthermore, education increases the tendency of individuals to cooperate with other people and participate in group activities (Enete and Igbokwe, 2009).

Age is one of the parameters that may explain differences in behavior among the members (Richards *et al.*, 1998). Younger members may be more committed to collective activities because they consider high expected future benefits from organizational membership (Klein *et al.*, 1997; Fulton, 1999), whereas older farmers may prefer obtaining immediate cash payment rather than having to wait for patronage refunds as their time horizon may be shorter (Fulton and Adamowicz, 1993; Fahlbeck, 2007). However, Staatz (1989) showed that older farmers are more loyal and committed to collective activities due to lower levels of debt allowing them to apply reduced discount rates compared to younger members.

Gender is associated with access to resources and type of responsibilities (Behrman *et al.*, 2012; Nabanoga, 2005). In societies, where resources, notably agricultural land, are owned by men, women are constrained in their participation in collective action if land ownership is a requirement for active participation in group activities (Mayoux, 1999). This may present a challenge mainly in patriarchal societies, where women have limited ownership to resources (Quisumbing and Pandolfelli, 2010). The level participation of women and men in producer organizations will differ based on the nature of the activity. It is expected that men are more active in marketing activities while women are more engaged in activities that lead to building of household welfare and assets (Kariuki and Place, 2005).

Different studies have shown that farm size may or may not affect the farmer's commitment to producer organization. For example, Burt and Wirth (1990) found that farm size does not influence significantly farmers' attitude and behavior towards cooperatives. Contrary to this, Klein *et al.*

(1997) found that medium-sized farmers are more committed to producer organizations. On the other hand, Wollni and Fischer (2014) found that small-scale farmers lack bargaining power to negotiate favorable conditions with buyers, and therefore have a higher propensity to deliver a larger share of their produce to the cooperative. Wollni and Fischer (2014) also found a U-shaped relationship between farm size and farmers commitment with middle-sized farmers less likely to be committed to marketing of their produce through the RPO. The larger farmers get involved because there is a countervailing effect of patronage refunds paid at the end of the season due to lower discount rate in regard to future payments (Hazell, 2000; Wollni and Fischer, 2014). Therefore, the farm size is assumed to be positively associated with commitment to the group activities.

Asset holdings such as livestock and farm equipment are important for smallholder livelihoods and influence the farmer's marketing choices (Boughton *et al.*, 2007). Farmers with few assets are less likely to commit to collective action because assets are necessary for smallholders to participate in emerging market opportunities (Boughton *et al.*, 2007). In general, poorer farmers may have limited time to attend to meetings or learning new skills which do not lead to immediate profits, because they are more concerned with meeting short-term subsistence needs. This makes them less willing to risk their time and resources and it limits their active participation in collective action (Wiebe, 2000). On the other hand, farmers with more assets are also more likely to commit to collective sale, because they typically also have increased access to other community resources and more diverse sources of income (Barrett and Dorosh, 1996). Moreover, farmers with more than one crop are more likely to be committed to collective sale compared to farmers depending on one particular crop. This is because multiple crop farming provides a more continues cash flow whereas mono crop farmers may lack the flexibility allowing them to wait for the revenue from collective sales (Barrett, Little, & Carter, 2013). The more access to assets the individual farmer associates with participation in the group (e.g., access to common land or farm equipment as result of participating in the RPO), the more likely they will be committed to producer group activities.

The distance from the farm to the nearest regular road is associated with transport and marketing costs and has been used as a proxy for market access (Barham and Chitemi, 2009). Farmers far from the road are more likely to be committed to the producer organization because joint marketing reduces transport costs (Fischer and Qaim, 2014). Close geographical proximity increases face-to-face interactions with the potential buyers (Renkow *et al.*, 2004). Farmers close to the road are less likely to commit to collective action due to richer opportunities to access alternative buyers. On the other hand, an increase in the distance to roads and population centers decreases the level of the

farmer's bridging social capital which reduces the intensity of participation (Megyesi *et al.*, 2011). Bridging social capital is defined as individual's connections with more distant individuals or groups, either horizontally or vertically, through which external resources can be mobilized (Woolcock and Narayan, 2000; Woolcock, 2001).

The structural composition of the group affects the individuals' level of participation in collective activities. Small groups will have stronger bonding capital defined as the networks build on strong ties within the group which facilitate cooperation and coordination among the members (Warren *et al.*, 2001). An appropriate group size is the one that optimizes social relationships within the members (Vanni, 2014). According to collective action theory, small groups are better at performing because they reduce the free rider problem (Poteete and Ostrom, 2004). Small producer groups are easier to manage and have higher cohesion which reduces the monitoring costs (Coulter *et al.*, 1999). On the other hand, larger groups can benefit from economies of scale and reduced transaction costs due to access to larger quantities of produce. Moreover, larger groups have higher bargaining power leading to increased revenues; however they may be harder to monitor which may increase the possibility of the members being less committed (Stringfellow *et al.*, 1997; Wollni and Fischer, 2014). Therefore, group size is negatively associated with the farmer's propensity to actively participate in collection activities.

In the cooperatives literature, trust is considered an important variable in explaining members' behavior and commitment (James and Sykuta, 2005; Morfi *et al.*, 2015). Trust is a cognitive form of social capital (Barham and Chitemi, 2009). Trust provides a basis for cooperation and is essential for people to join collective action and for them to work together for mutual goals (Lasley and Baumel, 1996; Ostrom, 2007; Vanni, 2014). Trust reduces transaction costs by lowering the monitoring costs (Vanni, 2014). Producer organizations that emerge from pre-existing social groups have an advantage because they build on existing trust and established norms (Markelova *et al.*, 2009). It is also important that cooperative leaders are trusted as this will motivate members to participate in group activities (Markelova *et al.*, 2009). When members trust their leaders, it facilitates efficient communication which helps in problem solving within the group, which in turn affects the response of the members to other group activities. High levels of trust in the leaders can lead to cooperative success (Jones, 2004; Megyesi *et al.*, 2011). In a study conducted by Birchall and Simmons (2004) they showed that if there is trust among the members, they may still commit to the producer organization even when prices are less favorable. Moreover, low levels of trust among producer group members promote free rider behavior which is a barrier to the success of collective

action (Vanni, 2014). Therefore, trust in the leadership and members will, in general, be positively associated with commitment to collective marketing and participation in group governance. Finally, linking capital, i.e., the extent to which individuals build relationships with institutions and individuals who have relative power over them (Woolcock, 2001) and trust in strangers, for example, in buyers, are also expected to be factors influence performance of RPOs.

3. Collective action in the Kenyan mango sector

The cooperative movement was introduced in Kenya in 1908 (Gatuguta et al., 2014) and remained as largely state-owned enterprises into the 1990s when the system was reformed due to inefficient performance. New cooperative policies and legislation encouraging liberalization of cooperatives were introduced in 1997. The current promotion of collective action through RPOs is a result of a changing business environment that requires increased value chain organization and governance to ensure competitiveness (Wanyama, 2009). A number of non-governmental organizations have supported smallholders in order to enable them to enhance their competitiveness and market access, and producer organizations have emerged in different sectors (Fischer and Qaim, 2012).

Our study focuses on producer groups involved in processing and marketing of mango in the eastern part of Kenya. We investigate an initiative started by TechnoServe, a non-governmental organization funded by Bill and Melinda Gates Foundation and The Coca-Cola Company to improve the production and marketing of mango in Kenya through the project Nurture. This project started in 2010 and lasted for four years. The objective was to double the income of smallholders involved in growing improved mango and passion fruits varieties in Uganda and Kenya. We focused our research on Kenya because the producer groups in Uganda were not as established as in Kenya.

The TechnoServe project's criteria for including farmers in the RPOs were that the farmer should have at least 0.5 acres of land with mango production in pure or mixed stands; that the farmer was willing to be trained; and that the farmer could transport the mangoes to a collection center. The group formation was done by the members themselves. Each group agreed on a constitution and bylaws, appointed a committee consisting of a chairperson, a secretary, a treasurer, a 'mobilizer' (a person in charge of mobilizing other members), and selected leaders in charge of organizing group activities. All the groups were registered as farmer organizations. After group formation the farmers were trained by TechnoServe in group governance, mango production including all the necessary management techniques from planting and cultivation to harvesting and

post-harvest handling. Farmers were also trained in record keeping and financial literacy, business skills, for example, sales negotiations with buyers. Collectively managed activities in the RPOs included training, group processing, group marketing and ‘merry go round’ saving and credit schemes.

Some RPOs engaged in value addition, mainly in the form of production of mango puree. The puree was packaged and branded by the RPO and sold to hotels, individual traders and processors. The group bought mangoes from members and non-members at a prices premium compared to prices offered by alternative buyers. Although this activity was not very lucrative due to lack of certification by the Kenyan Bureau of Standards, the farmer groups increased their income compared to selling fresh mangoes. A second value adding activity was production of sun dried mangoes. At the time of data collection we did not encounter any sundried mango production due to the season, but sun drying had been successful and was an expanding activity with new sun drying plants being constructed by the producers.

TechnoServe facilitated links between RPOs and potential buyers and connected RPO leaders with processing plants. Market arrangements for the RPOs’ marketing of mango were organized by the leaders who were supposed to contact buyers and connect them to the group prior to the harvest. During the harvest, the buyers could collect the mangoes from the collection centers’ or directly from the farmer. The farmers preferred group marketing because the buyers would buy all the mangoes as compared to middlemen who typically would only purchase high quality mangoes.

As a response to the inability to access credits through the formal financial sector, farmers established local ‘merry go round’ credit and saving schemes, i.e., rotating credit and saving associations (Bouman, 1995; Gugerty, 2007). In these arrangements each member contributes a certain monthly amount to a common pool. By contribution to the scheme, members of the producer group become entitled to obtain at a later stage a loan from the ‘merry go round’. This type of initiative has been implemented by a number of different producer groups in Kenya as a means of meeting their members’ immediate demands for operating capital (Kariuki and Place, 2005; Gugerty, 2007). This arrangement was introduced by the project Nurture to ensure that producer groups could remain sustainable after project exit.

4. Methodology and Data

Household survey

The data used in this study were collected between February and April 2014 from the eastern part of Kenya in the districts of Embu, Mbeere, Mwala, and Kangundo. These districts are located in the counties of Embu and Machakos. First, the counties were purposively selected because they are areas where improved mango varieties are grown and because they have infrastructure that provides a fairly good market access (Griesbach, 2003; Msabeni *et al.*, 2010; Gor *et al.*, 2012; Kehlenbeck *et al.*, 2012). Second, the selection of RPOs was based on the project Nurture's participant lists provided by TechnoServe. These lists contained general information about the producer groups, their location, and the members of each group. We identified 95 farmer groups of which 25 groups were randomly selected. Third, in each selected group, eight member households were randomly selected resulting in a sample of 200 group members.

We conducted the survey through face-to-face interviews with the head of the household using a pre-tested structured questionnaire. The questionnaire was developed based on a literature review, consultations with experts, and insights from semi-structured interviews with key-informants in the value chain. To enhance validity, the final questionnaire was pretested on a sample of 30 farmers, representative of the study population. Some questions were modified following this pre-test. Finally, 600 farmers, 200 RPO members and a control group of 400 non-RPO members were interviewed by six experienced enumerators. The questionnaire was administered in the local languages of the farmers. The enumerators were monitored continuously during the data collection. The questionnaire responses were checked on a daily basis to ensure reliability of the data. For this article we only rely on the survey data from the 200 RPO members since we are interested in group members' commitment to collective sale and participation in group governance. Table 1 shows the main dependent and independent variables. In addition to the household survey, in depth interviews were held with group members and the leaders for triangulation purposes.

5. Model specification

We are concerned with what determines producers' decision to actively engage in the group activities, i.e., collective action, once they have decided to join a RPO. In order to investigate the determinants of participation intensity we used a probit model for analyzing commitment to

collective sale and a negative binomial model for analyzing the participation in producer group governance.

Estimation of member commitment in collective processing and marketing

We modelled farmer's commitment to collective activities using the random utility framework. Utility, U is influenced by a set of farm, individual, and group characteristics, x , which affect the farmer's ability and willingness to commit themselves to collective activities. The farmer is assumed to maximize utility:

$$MAX U = f(x) \quad (1)$$

We assume that mango farmer i will commit to collective activity j if the utility U_{ij} derived is greater than the utility U_{im} that results from selling individually m . This relationship can be represented by latent variable y^* as:

$$y^* = U_{ij} > U_{im} \forall m \neq j \quad (2)$$

Where y^* is representing the benefits of participating in collective marketing and processing j as opposed to individual selling m . While y^* itself is unobserved, we can observe the type of marketing channel in which the farmer participates. The probability that a farmer commits to collective marketing and/or processing j can be denoted by $P(y^* = 1)$. If the farmer does not commit to collective activities, y^* takes the value of zero.

The discrete decision of whether to continue selling as part of the group or to sell individually can be modelled using a probit model (Katchova and Miranda, 2004; Wooldridge, 2013). Therefore, we estimated the following probit model:

$$y_i^* = \begin{cases} 1 & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \leq 0 \end{cases} \quad (3)$$

$$P(y^* = 1 | x) = \Phi(\beta_0 + x\beta) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x\beta} e^{-\frac{(x\beta)^2}{2}} dx \quad (4)$$

Where $x = x_{1i}, x_{2i}, \dots, x_{ki}$, $\beta = \beta_0, \beta_1, \dots, \beta_k$ and Φ is standard normal cumulative distribution function. The empirical model for commitment to collective sale (y^*) for each individual i , was specified as:

$$P(y_i^* = 1 | x) = \Phi(\beta_0 + \beta_1 age + \beta_2 gender + \dots + \beta_{Inccrop}) \quad (5)$$

Estimation of determinants of farmers' participation in group governance

The members' decision to participate in group governance is represented by the number of meetings attended by the farmer $y = 0, 1, 2, 3, \dots, k^{\text{th}}$ which are discrete events. Since the number of meetings attended is a count variable, the intensity of participation in the meeting could be estimated using Poisson models which assumes that the variance of distribution (var) of y is equal to the mean (μ), i.e., $var(y) = \mu$.

However, the data did not satisfy this assumption. In a situation where the variance is greater than the mean, the standard Poisson model can be replaced by the negative binomial model which relaxes the assumption for the Poisson model (Land *et al.*, 1996; Maldonado and González-Vega, 2008; Salmon and Tanguy, 2016). The negative binomial model is used with count data where there is over dispersion in the data. Therefore, since the variance is not equal to the mean (μ), the variance is given by:

$$var(y/x) = \mu + \alpha\mu^2 \quad (8)$$

The negative binomial model also estimates the over-dispersion parameter α . The negative binomial relaxes the restrictive property of the Poisson distribution.

The probability that the farmer attends a number of meetings y is then given by:

$$P(X = x/p, r) = \binom{r+x-1}{x} p^r (1-p)^x, \quad (9)$$

Where r = failure to attend meetings and x = number of meetings attended.

6. Results and Discussion

Descriptive statistics

Table 7.17 shows the descriptive statistics for the producer group members. Growing mango requires a large area and the average farm size was 4.79 acres. On average the group members had 132 trees. Thirty two percent of the farmers had less than 50 trees, 27% had between 51 and 100 trees and 42% had more than 100 trees. The average household size was approximately four persons which is in line with the national census from 2009. The average annual income from mango sales was 35,522 Kenyan Shillings (KShs), equivalent to approximately 400 US\$. The average income from other crops, mainly oranges, bananas, maize, and beans was 49,299 KShs.

Table 7.17: Farmer characteristics (N=165)

Variable	Description	Mean	SD	Min.	Max.
Collective selling	The household sells through a group (yes = 1, no = 0)	0.15	0.35	0	1
No. of meetings	Number of meetings attended in the last 12 months by household head	13.61	16.47	0	52
Age of household head	Age of household head in years	56.51	11.83	26	85
Education	Number of years of education of household head	9.86	3.84	0	18
Gender	Sex of household head (0 = Female, 1 = Male)	0.66	0.47	0	1
Household size	Numbers of individuals living in the household	4.44	1.87	1	9
Total farm size	Total land owned by the household in acres	4.79	2.76	1	20.5
No. of mango trees	Total number of mango trees owned by the household	131.67	122.47	10	800
Log of number trees	Log to number of mango trees owned by the household	4.49	0.92	2.30	6.68
Income from other crops	Income from sale of bananas, maize, beans, and orange in KShs	49,299	84,391	0	596,700
No. of livestock	Total number of cows and goats owned	5.40	4.46	0	21
Distance to paved road	Distance to the nearest paved road in km	6.14	6.28	0	40
Group size	Numbers of members in the producer group	25.08	9.13	10	60
Trust in the group members	The level of the farmer's trust in group members on a scale from 1 to 5	3.80	0.81	1	5
Trust in the group leaders	The level of the farmer's trust in the group leaders on a scale from 1 to 5	3.70	0.81	1	5
Trust in strangers	The level of the farmer's trust in the strangers, e.g., buyers on a scale from 1 to 5	3.77	0.94	1	5
Trust in the government	The level of the farmer's trust in the government on a scale from 1 to 5	3.73	1.11	1	5
Total no. of contacts	Number of contacts that the farmer has	13.38	14.44	0	97
Contacts with processors	Number of contacts with processors	0.12	0.46	0	3
Contacts with middlemen	Number of contacts with the middlemen	1.06	1.55	0	5
Social participation	Number of other organization in which the farmer is a member	1.87	1.23	0	8
Access to credit (dummy)	Whether the individual has access to credit (yes = 1, no = 0)	0.22	0.41	0	1

The farmers had an average level of trust in other RPO members at a value of 3.8 based on a 1-5 Likert scale. The average value of farmers' trust in the RPO leadership was 3.7. Producer group size ranged from 10 to 60 members with an average group size of 25 members. Furthermore, 35% of the group members had attained at least 12 years of education and only 3% were illiterate. In general, the group members had on average 10 years of education. Regarding RPO meetings attendance, on average members attended 14 meetings annually. Only 15% of the farmers were selling through the producer organizations.

The main reasons for the farmers' limited participation in the collective marketing activities are presented in Figure 7.10. The most important factor was the inability of the RPOs to attract sufficient buyers (25%). This is a result of buyers preferring to trade with individual farmers because it provides them with more flexibility. In addition, some RPO members acted as middlemen or "brokers" which disorganized the group arrangement. The RPOs also faced strong competition from middlemen who already had established networks with the farmers. Lack of cooperation among the members was also an important factor; 14% of the members mention the lack of cooperation among the members as the main reason for not participating in collective marketing. This was often attributed to mistrust in the RPO arrangement and poor leadership by the group leaders who failed to manage collective marketing activities, offer proper guidelines to the farmers, and ensure transparent procedures in collective marketing. The collective marketing arrangement was also affected by poor coordination.

Figure 7.10. RPO members' reason for limited participation in collective marketing

Determinants of member commitment to collective marketing

The factors that influence member's decision to continue to sell through the RPO were analyzed using a probit model. The resulting estimation is shown in Figure 7.10. Four factors increase the likelihood of the farmers' commitment to collective marketing: education level of the household head, number of trees owned, group size, and trust in the other producer group members. Education level of the household head has a positive and significant effect on the probability of being committed to sell collectively. This is because farmers with higher education are better at recognizing and comprehending opportunities such as the potential benefits associated with collective marketing. They are also more likely to have a better capability to comprehend information concerning, for example, trading terms and market prices. Collective marketing involves negotiation with buyers, and higher education enables the members to understand, negotiate, and reach a better contract with the buyers. In general, education enhances farmers' ability to engage in discussion, debate, negotiate – competencies highly needed for ensuring proper internal governance practices and external relationship management in RPOs. This finding is

consistent with Wiebe (2000) and Fischer and Qaim (2014) who showed that education level positively associated with engagement in collective activities.

An increasing number of mango trees owned by the farmer increases the likelihood of being committed to selling through the RPO. This is mainly explained by the fact that fruits are highly perishable; a farmer with more mangoes is likely to incur higher financial losses if the mangoes are not sold at the right time. As a result of the high level of uncertainty associated with trading on the open market, farmers aim to minimize the risk and uncertainty by actively participating in collective marketing. On the other hand, due the high perishability of the produce, these farmers are also likely to decide to side-sell to avoid losses in the case where the RPO is not efficient in attracting buyers. Therefore, the group's ability to have stable and reliable buyer relationships becomes very important for success of collective action with perishable products.

Other production factors such as total land holdings, number of livestock owned and income from other crops may not influence farmers' commitment to collective marketing. Although not significant, there is a negative relationship between asset holdings, other income sources and collective marketing. This indicates that resourceful RPO members with other forms of income and for whom the mango business is a relatively less important part of the farm economy, may be less likely to participate actively in collective marketing activities. This contrasts with findings of Fischer and Qaim (2012) who found that group members who joined banana farmer organizations were wealthier. However, we find that although this farmer segment joins the RPO they are less likely to commit to collective sale, unless the producer group ensures efficient marketing. This has significant implications for the functionality of RPOs. Wealthier and diversifying farmers are important players in the development and management of RPOs due to their wider networks and the potential use of the resulting bridging social capital (Megyesi et al., 2011) for recognizing and developing the RPO's business opportunities.

The findings also showed that an increase in group size increases the likelihood of commitment to collective marketing. This is contrary to the finding that a smaller group size promotes members' active participation in marketing (Wollni and Fischer, 2014). When interpreting our results, it is important to observe that the studied groups were in general relatively small with an average group size of 25 members. This means increase in group size would increase the economies of scale reducing the high transaction costs of organizing and attracting better buyers. We also show that the level of member's trust positively increases commitment to collective sale. Trust in other RPO

members creates bonding social capital (Woolcock, 2001) that provides a foundation for mutual cooperation and increases the intensity of participation. This is in line with findings by Megyesi et al. (2011) who showed that both bonding and linking social capital increase participation in collective marketing. The level of trust in strangers, e.g., new buyers, negatively influences member active participation to collective marketing. This implies that farmers that do not trust strangers, for example, middlemen are more inclined to sell through the RPO.

Table 7.18: Probit estimates for determinants of farmers' propensity to sell their produce through rural producer organizations

Variable	Coefficient	SE ^a	P> z	ME
Age of household head (years)	0.020	0.013	0.115	0.003
Education (years)	0.090	0.037	0.015	0.015***
Gender	0.352	0.325	0.279	0.054
Household size (members)	-0.096	0.066	0.145	-0.016
Total farm size (acres)	-0.028	0.062	0.648	-0.005
Log of numbers of trees	0.317	0.173	0.067	0.053**
Income from other crops (KShs)	-2.16x10 ⁻⁶	1.92x10 ⁻⁶	0.263	-3.61x10 ⁻⁷
No. of livestock	-0.053	0.036	0.140	0.009
Distance to paved road (km)	0.014	0.046	0.765	0.002
Distance to paved road squared (km ²)	0.002	0.001	0.283	0.000
Group size (persons)	0.032	0.016	0.041	0.005***
Trust in the group members	0.326	0.183	0.075	0.055***
Trust in the group leaders	0.127	0.179	0.477	0.021
Trust in the strangers, e.g., buyers	-0.346	0.179	0.053	-0.057***
Trust in the government	0.044	0.124	0.720	0.007
Total contacts	-0.005	0.011	0.645	0.001
Social participation	0.055	0.124	0.652	0.009
Constant	-5.660	1.550	0.000	
Pseudo R-squared	0.204			
Number of observations	164			

** Denotes significance at the 5% level.

*** Denotes significance at the 1% level.

^a Robust standard errors.

The members' trust in the RPO's leadership did not influence members' participation in collective marketing. This is contrary to previous findings that showed that trusted leaders contribute to collective action because trust lowers transaction costs and binds the members together which, in turn, fosters successful group performance (Markelova et al., 2009). The unexpected missing relationship between trust and collective marketing may have different explanations. Some key-informants and farmers indicated that the initial selection of some of the RPOs' management committees was not as democratic as envisioned in the intervention design and that selection of group leaders was in some cases done by a minority of the group members and influenced by external parties. Thus, the established the RPO leadership lacked legitimacy among members and trust in these leaders was limited from the outset. Previous research has found that establishing RPOs based on existing social structures can lead to cooperative success, but our findings show that this may also lead to negative outcomes.

A different explanation to the lack of trust in the leadership emphasized by several interviewees, was that despite that many farmers initially did trust group leaders, this trust was lost when it became evident that it was difficult, or in many cases even impossible, for the RPO leaders to manage collective marketing successfully. The relatively limited number of farmers who are marketing collectively seems to be doing so regardless of whether they have trust in the RPOs' management or not and an explanation may be that they have no better option.

Gender of the group member did not affect commitment to collective sale. Previous research suggests that women and men can be involved in similar group activities but participation intensity differs based upon the purpose of joining collective action. In the Kenyan context it seems that men and woman have similar attitudes towards participating in collective marketing activities.

Determinants of participation in group governance

We estimated the determinants of participation in group governance using a negative binomial model. The number of meetings that farmers participate in is used as a proxy for participation in group governance. The distribution of the number of meetings per year attended by RPO members is shown in Figure 7.11. Table 7.19 shows the determinants of group governance in the estimated model. The study reveals that age of the household head has positive and significant effect on the number of meetings attended. Each additional year increases the likelihood of that farmer's attendance of RPO meetings. Each additional year increases the likelihood of attendance of

meetings. This implies that older farmers are likely to attend meetings compared to young farmers 2.4 percentages points.

Figure 7.11. Number of meetings attended by farmers over a 12 months period

This is consistent with previous studies that showed that older people are more committed to collective activities because they tend to have invested more in the RPO, both financially and socially, and therefore feel more attached to these groups (Staatz, 1989).

The number of trees owned by the farmer had a significant negative effect on the farmers' probability of participating in group governance activities. The reduced participation in meetings may be caused by the fact that as the production increases the demand for labor and management rises which is why the farmer's time becomes a scarce resource. The observed negative relationship between increased number of livestock and meeting attendance may support this explanation. In general, this indicates that larger and wealthier farmers may be reluctant to invest their limited time in governance activities.

The increase in group size negatively influences farmers' participation in meetings. This may be because an increase in group size reduces group cohesion. Since using time on meetings implies an opportunity cost for the farmers, they are more likely to attend meetings where they can expect to gain immediate benefits and where they can influence decisions. For instance during the interviews, farmers indicated that they could be motivated to attend meetings if benefits such as production inputs, like pesticides and fertilizers were being provided through the RPOs since getting such inputs was a significant problem in the study area.

Trust in the leaders had a positive and significant effect on participation in meetings. The increase in the level of trust in the leader increases the likelihood of attendance of meeting by 1.3

percentage points. This relates to the management style, commitment, and transparency of the leaders. If the leaders are trusted, the members are more likely to attend meetings due the respect they have for the leader. Contacts with processors also had a positive and significant effect on the probability of participating in group meetings. This implies that increase of contacts with processors increases the activeness of the members due to the possibility of assured markets.

Table 7.19: Determinants of farmers' participation in rural producer organization governance (negative binomial regression)

Variable	Coefficient	SE ^a	P> z	ME
Age of household head (years)	0.020	0.007	0.003	0.238***
Gender	-0.422	0.223	0.059	-5.295*
Total farm size (acres)	0.062	0.044	0.159	0.723
Log of numbers of trees	-0.461	0.116	0.000	-5.363***
Livestock	-0.013	0.025	0.589	-0.156
Access to credit	0.301	0.241	0.211	3.821
Group size (persons)	-0.020	0.010	0.049	-0.238**
Trust in the group members	0.112	0.099	0.255	1.308
Trust in the group leaders	0.234	0.118	0.047	2.729**
Social participation	0.130	0.075	0.084	1.517*
Contacts with processors	0.583	0.181	0.001	6.791***
Contacts with middlemen	0.035	0.022	0.106	0.408
Constant	2.203	0.904	0.015	
Alpha	1.431	0.155	1.77	
Number of observations	165			

* Denotes significance at the 10% level.

** Denotes significance at the 5% level.

*** Denotes significance at the 1% level.

^a Robust standard errors.

Social participation had a marginal positive and significant effect on the likelihood of farmers' participation in group meeting. This is explained by the fact that farmers with high participation in other groups are more likely to actively be involved in the member group activities as they understand the benefits from groups. Gender had a marginal negative and significant relationship with participation in group meetings, which implies that meetings are less likely to be attended by

female members. This is likely to be explained by the high gender responsibilities played by women in the study area.

Total farm size, trust in the members, access to credit, and contacts with middlemen did not significantly relate to group governance. This is consistent with the findings by Fischer and Qaim (2014) who showed that farm size did not have a significant effect on participation in meetings. Further, Burt and Wirth (1990) concluded that farm size did not explain farmers' attitude and behavior towards cooperatives and our results support this conclusion.

We expected that RPO member's trust in other group members would be positively influence the number of meetings attended because a high level of participation is assumed to enhance communication that, in turn, facilitates trust building. However, this assumption was not supported by the data. This may be explained by the fact that trust in other members is an important factor in making the initial decision to join a producer organization, but once engaged in the group, trust may be reduced if the member's expectations are not met. According to key-informants and interviewed farmers, at the time of the interview, in some groups farmers were not active due to disappointment with processors and buyers. In several cases, the farmers' were informed that buyers were contacted, but these dishonored the agreements with the result that farmers lost both produce and time. The inability of the RPO leadership to ensure effective sales agreements led to mistrust among members. Previous studies showed that members in producer organizations left the groups due to unattained benefits (Bernard *et al.*, 2008; Masakure and Henson, 2005; Poulton *et al.*, 2010; Titeca and Vervisch, 2008). This moreover point to the notion of reciprocity where past actions affects the future returns. In Putnam's (1995) analysis of dilemmas in collective action he concludes that the presence of social trust and norms of reciprocity explain why some communities engage in successful collective action, whereas others who lack such norms, fail.

7. Conclusions and policy implications

Conclusions

Producer members' active involvement is important for the success and sustainability of RPOs. In this article we analyzed factors that influence RPO members' commitment to collective sale and participation in group governance in the Kenyan mango sector. Specifically, we explored the effect of trust and other individual, group, and farm characteristics on farmers' involvement in RPO activities. The result showed that farmers' trust in other group members significantly influences

commitment to collective sale but does not affect farmers' participation in governance activities. On the other hand, farmers' trust in the RPO leaders significantly influences participation in governance but has no effect on commitment to collective sale. The insignificant relationship between trust in the RPO leaders and collective marketing is explained by lack of legitimacy by the leaders and the unattained benefits by the members from the RPOs. The above factors contribute to the relatively low number of group members participating in the collective marketing. The farmers who participated are characterized by having a relatively large portion of their assets invested in mango production. They sell through the collective arrangement despite the lack of trust in the leaders, probably because of lack of alternative sales channels and a high level of uncertainty associated with the perishability of the fruits. Moreover, members with higher education are more likely to commit their produce to collective marketing, most likely because they are better at comprehending the potential benefits of collective marketing.

Growing RPO size increases commitment to participate in collective marketing because larger groups benefit from economies of scale and better bargaining power. This finding is consistent with findings by Fischer and Qaim (2014). On the other hand, an increase in group size was found to reduce the likelihood of farmers' engagement in RPO governance activities. This is in line with previous research which showed that an increase in group size of producer organization may lead to members becoming less involved and eventually losing trust (Nilsson *et al.*, 2012; Österberg and Nilsson, 2009). In our case, we argue that the loss of trust is not explained by group size but rather by unattained benefits for the members.

The result also showed that age of household head and contacts with processors positively influences participation in group governance in RPOs. This is because older farmer are socially and emotionally attached to the group due to high investments. Contacts with processors, is because of possibility of assured markets. The number of mango trees, i.e., the production capacity and income from other crops reduces participation in group governance. These two factors relate to the level of financial assets.

In general, it seems that the more resourceful farmers are more likely to opt out of the RPO's governance activities which in turn affect the quality of the cooperatives and their business performance. Wealthier farmers are more likely to be able to ensure the success of collective action activities for several reasons. They are likely to be better connected to potential customers and other resource providers because they hold more bridging and linking social capital. Moreover, they are

also able to wait for the outcome of collective sales because they have more capital and other sources of income and can better bear initial costs of collective action (Jones, 2004).

Policy implications

Producer groups are recognized as potential important vehicles for rural development. However, there are a number of factors that affect their effectiveness and sustainability. Our study showed that although being official members, only a relatively small number of farmers are actively engaged in the marketing activities of the RPO. Thus, an important implication of the study is that development agents responsible for interventions aimed at promoting RPOs need to understand which members use which services and why or why not? The establishment of RPOs should not be a success criterion in itself. Agencies and donors supporting RPOs need to pay attention to the conditions under which RPOs are established since this process influences the level of the farmers' trust in other farmers and the RPO leadership, which in turn influences their participation intensity.

Performance is influenced by who joins the cooperative. It is therefore important to ensure that RPOs have the capability to retain resourceful farmers with a high level of social and human capital that can be activated to contribute in achieving commercial success. Thus, for RPOs to contribute to rural development and poverty alleviation they should have a balanced composition that encompasses resourceful and wealthier as well as less resourceful farmers. Future research should address the design of mechanisms that ensure incentives for different types of farmers to join RPOs which was not addressed by this research. It seems crucial to focus on value generation by applying a business-oriented perspective that emphasizes improved market access, value addition strategies, and value chain organization.

Despite the above contributions, this study has some limitations. First, we based our study on a cross-sectional data set. Future research should aim to replicate these findings using panel data to ensure that the determinants of smallholders' participation intensity are observed over time which will allow for a richer understanding of, for example, the influence that farmers' perceptions of trust may have on RPO performance. Second, due to small sample size of farmers involved in collective processing, we did not divide the sample to show the effects on collecting marketing and processing separately. Future studies could explore the specific determinants for active participation in collective processing and marketing among smallholders.

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7.5 Appendix II: Data collection tools

7.5.1 Appendix IIA: Household survey questionnaire

DET NATUR- OG BIOVIDENSKABELIGE FAKULTET
KØBENHAVNS UNIVERSITET

Household Survey Questionnaire

Introduction

Dear sir/madam,

The study on the impact of collective action on chain performance and smallholder livelihoods is being conducted to understand how participation in producer business groups and other farmer groups have impacted on household income, asset holdings and productivity of smallholders in Eastern Kenya. Further this study analyses determinants of the relationships between the producers and buyers and how this impacts on the chain performance.

Your participation in this survey will help us to better understand the performance of the mango value chain as well as the factors which affect relationship quality between the buyers and producers. In addition, how the collective action has improved the livelihoods of smallholders and this will assist us to advise policy on the appropriate value chain interventions to improve marketing of mangoes at the same time contribute to reduction of poverty.

The responses given during this survey will remain confidential and shall not be shared with the public. Therefore, we request you to provide honest and thoughtful responses to the questions.

We appreciate your cooperation!

Interviewer	
Date	
Interview time	From..... To.....

Section A: General household Information

1.1. Respondent's information. *Please fill in the table below:*

Name	Age (yrs.)	Sex 1. Male 2. Female	Formal level of education (yrs.)	Farmer group	Contact	Village	Sub-location	Location

1.2 What is your main source of income (*Tick where appropriate*)

(1). Mango production (2). Livestock production (3). Crop production (4). Both farming & livestock production (5). Retail business (6). Salary (7). Wage (8). Others *specify*-----

1.3 Have you accessed any loan over the last 12 months? (1) Yes, (2) No

b. *If yes*, from where? (1). Friend, (2). Farmer Group, (3). Microfinance, (4). Others *specify*-----

1.4 How many loans have you accessed over the last 12 months? -----

	Type of loan	Source	Reason	Amount (KES)
1.				
2.				
3.				

1.5 How much land do you own under the following categories? *If mixed cropping get the total area owned only and price*

	Category	a.What is the total size of the area? (Ha)	b. How much of the.....belongs to your household	c. How much of the.....is rented	d. How much of theborrowed	e. What is the current market price of this plot?
F1.	Mango production					
F2.	Crops & other fruits					
F3.	Livestock production					
F4.	Residential land [land utilized for private residences or dwellings]					
F5.	Total farm size					

	(Ha)					
--	------	--	--	--	--	--

1.6. How far is it from the farm to the nearest paved road? -----Km

Section B: Mango production & marketing

2.1 When did you start growing mangoes? -----Year

2.2 How many mango trees do you own? ----- (Number)

2.3 How has this changed over the past 5 years? ----- (Number)

2.4. Main mango varieties grown (1). Tommy (2). Kent (3). Vandyke (4). Apple (5). *Others*-----

2.5. What is the main source of labor? (1). Family, (2). Hired. (3). Both. *If hired how many?* -----

	Labor availability	Number of individuals
a.	How many people from your household work full time on the mango farm?	
b.	How many people from your household work part-time?	
c.	How many non- family members are employed full time on your farm?	
d.	How many seasonal part-time workers do you hire on the farm?	
e	How much do you pay workers (per/day, per/month)	
1.	Full-time	
2	Part-time	
3	Payment in kind/non-cash	

2.6. In the past 12 months, have you sold the mangoes produced? (1). Yes, (2). No

2.7. Who is the main buyer for your mangoes? (1). Middlemen (2). Local traders (3). Processors (4). Exporters (5). *Others specify*-----

2.8	When do you receive the payments?	Middleman	Local trader	Processor	Exporter
1.	Beforehand				
2.	On the same day of sale				
2.	Deposit and pay all the amount on the day of mango counting				
3.	1-15 days after sale				
4.	16-30 days after sale				
5.	1-6 months after sale				

2.9. a. Have you experienced any changes in your mango production and income since 2009?

(1). Yes

(2). No.

b. How has the performance been changing over the past 5 years?

1). No Change 2). Slight Change 3). Neutral 4). Moderate Change 5). Significant Change

2.8. Total yield per season in tonnes and amount of income earned and cost of production. *Please fill in the table below:*

Year	Yield (Kg/ Tonnes)	Quantity sold per variety (pieces, crates & bags) P=Pieces, C=Crates & B=Bags									Price (per piece/crate/bag) P1=price/piece, P2=price/crate & P3=price/bag									Total amount
		Tommy (T)			Vandyke (V)			Kent (K)			T	T	T	V	V	V	K	K	K	
	<i>1st season</i>	<i>P</i>	<i>C</i>	<i>B</i>	<i>P</i>	<i>C</i>	<i>B</i>	<i>P</i>	<i>C</i>	<i>B</i>	<i>P1</i>	<i>P 2</i>	<i>P3</i>	<i>P</i> <i>1</i>	<i>P</i> <i>2</i>	<i>P</i> <i>3</i>	<i>P1</i>	<i>P2</i>	<i>P3</i>	
2011																				
Domestic fresh market																				
-Middlemen																				
-Supermarkets																				
-Open markets																				
- Kiosks/roadside markets																				
Processors																				
Export																				
2012																				
Domestic fresh market																				
Processors																				
Export																				
2013																				

Domestic fresh market																				
Processors																				
Export																				

2.8b. How much did you spend on the following production inputs used in mango production per Ha?

Year	Fertilizers		Labor			Pesticides/fungicides		Seedlings		Insect traps	
	Quantity	price	Quantity	Man - days	price	Quantity	price	Quantity	price	Quantity	price
2011											
2012											
2013											
Total											

2.9 How satisfied are you with the time taken to receive payment (*tick where appropriate*)

		Middleman	Local trader	Processor	Exporter
1.	Very dissatisfied				
2.	Dissatisfied				
3.	Neither				
4.	Satisfied				
5.	Very satisfied				
2.10 Why did you decide to sell to this buyer?					
1.	Closest				
2.	Higher price				
3.	Guaranteed sales				
4.	Non alternative				
5.	Trustworthy				

2.11. Apart from mango production what other agricultural crops or animals do you grow or rear? b.

How much of the agricultural produce did you sell over the last **12 months** and cost of production?

Crops	Acreage	Yield (kg)/bunches	Quantity sold	Price/kg/bunch	Total Amount (KES)
1. Maize					
2. Beans					
3. Cow peas					
4. Bananas					

5. Passion fruits					
6.					
Inputs	Quantity	Man-days	-	Price/kg /head	Total amount
1. Labor (hired)					
2. Seed					
3. Pesticides					
4. Fungicides					
5. Fertilizers					
Total					
	Quantity owned	Quantity sold	Price/head (If sold)	Price/head(if you were to sell)	Total amount
Livestock					
1. Cattle					
2. Goats					
3. Sheep					
4. Poultry					
5. Pig					
6. Bee keeping					
Total					
Inputs	Quantity	Price/kg			Total amount
1. Feeds					
2. Vaccines & drugs					
3. Veterinary services					
4. Shed construction					
5. Others specify-----					

2.12. Have you had any other sources of income over the last **12 months** and how much time is allocated to each activity/month?

Income activity	When started?	Time allocation	Amount earned in KES
------------------------	----------------------	------------------------	-----------------------------

		(hours/month)	
1. Formal employment			
2. Self-employment			
3. Retailing business			
4. Pension			
5. Gifts /remittances			

2.13. Do you get any support in marketing mangoes? (1) Yes (2) No

If yes, *specify*-----

Section C: Relationship Quality and its determinants between producers and traders

The questions below measure your perceptions of relationship quality with your buyer. Evaluate the following statements using a measurement scale of *1=strongly disagree, 2= disagree, partly agree/disagree, 4=agree and 5=strongly agree.*

Variable	Statements	Scale				
		1	2	3	4	5
X1	I have confidence in my main mango buyer that he will buy the mangoes (<i>trust</i>)					
X2	My buyer does not make false claims					
X3	I believe in the information provided by my buyer (prices, quality, quantity)					
X4	The buyer is not transparent, he sometimes withholds the information that useful to me					
X5	My buyer always keeps his promises					
X6	I don't feel the buyer has been on our side					
X7	The buyer is not always honesty with me he cheats me					
X8	My buyer cares about my welfare					
X9	My buyer does not have the skill and expertise in the business					
X10	In general, we are satisfied with our dealings with buyer (<i>Overall satisfaction</i>)					

X11	I would discontinue selling to the current buyer if I could					
X12	The current buyer is good trader to do business with					
X13	If I had to sell again, I would not sell to this buyer					
X14	On the whole, we are satisfied with the buyer's service					
X15	My buyer often meets my expectations					
X16	My buyer treats me fairly and equitably					
X17	My buyer is not quick to handle complaints					
X18	I receive regular feedback from the buyer about the quality of my product (<i>Communication quality</i>)					
X19	I receive regular feedback from the buyer about market developments					
X20	I receive information on how my production compares with others (e.g. on quality, price ...)					
X21	I am not in frequent contact with my buyer					
X22	The information received from my buyer is useful for production and marketing of mangoes					
X23	I don't think the buyer provides timely and trustworthy information					
X24	The information provided by the buyer is accurate					
X25	This buyer openly shares confidential information with us					
Variables	Statements	1	2	3	4	5
X26	My buyer does not take advantage of me (<i>price fairness</i>)					
X27	My buyer always consistence with the same pricing formulas					
X28	The buyer offers me fair and reasonable price					
X30	My buyer's mango price is flexible (<i>Price flexibility</i>)					
X31	I can argue with my buyer and get a good reasonable mango price					
X32	My buyer controls all the marketing information					
X33	I cannot find a buyer to buy my mangoes					
X34	The mango price information is complete, correct and frank (<i>price transparency</i>)					
X35	Mango price information is understandable and comprehensive					
X36	My buyer mango price is clear, comprehensive and understandable					

X37	Terms & conditions of my buyer are better tailored to my needs than those of other buyers (<i>Relative price</i>)					
X38	I am convinced that the buyer is the best choice					
X39	I do not believe other buyer will have the same or even better mango price offer					
X40	I get a good price-quality ratio(<i>price quality ratio</i>)					
X41	I have the impression that I know what I am being paid for					
X42	I agree with the mango price and grading system					
X43	Mango prices changes are communicated properly(<i>Price reliability</i>)					
X44	I don't think the mango price changes are communicated timely					
X45	My buyer keeps all promise regarding mango price					
X46	The price paid by my main buyer is equivalent to the effort and investment I have put in mango production and management (<i>Distributive & procedural fairness</i>)					
X47	The price paid by my buyer is better than what others buyers would offer					
X48	We have bilateral and frequent communication with my buyer					
X49	A high level of two-way communication exists between me and the buyer					
X50	The buyer does not discriminate me, he treats us equally					
X51	We have agreed rules and terms in our business with the buyer concerning quality, quantity and price					
X52	Sometimes when the buyer changes his objectives I alter my standards of production in response					
X53	The buyer seriously consider our objections to his policies and programs					
X54	The buyer does not seldom explain their decisions to me					
X55	The buyer provides valid reasons for any changes in policies that affect our business					
Variables	Statements	1	2	3	4	5
X56	The buyer is knowledgeable about the local situations that we face					
X57	The buyer take pains to learn the local conditions under which we operate					
X58	I don't think the buyer treats me with respect					
X59	The buyer is polite and well mannered					

X60	This buyer knows a lot about me (<i>Closeness</i>)					
X61	We have developed a good rapport					
X62	There is friendship between us					
X63	We seem to find plenty to talk about					
X64	I will be happy to recommend my buyer to other mango producers (<i>Producer Loyalty</i>)					
X65	I will ask other mango producers to seek assistance from my buyer					
X66	I will continue to do more business with my current buyer next year					
X67	I am loyal to my buyer					
X68	If I had other alternative buyers, I prefer to sell to this buyer					
X69	There is frequent information exchange on quality improvement between the farmer and the farmer organization					

Section D: Collective Action and Household Involvement

4.1 Are you or any of your family members a member of any farmer organization?

(1) Yes,

(2) No

b. If yes, when did you join the group? -----

c. When was the group formed? -----

d. How many people are in the group? -----

4.2. How did you join the group? (1). Self-organization (2). Proposed by the government (3). Coerced by NGOs (4). Other *specify*-----

b. How many organizations/associations do you belong to? -----

c. Do you or the household member hold any position in the group? (1). Yes (2). No

4.3. Have you participated in collective marketing or processing? (1). Yes (2). No

b. If yes, which collective action are you involved in?

(1). None (2). Group marketing (3). Grouping processing (4). Both

4.4. Have you or members of your family members participated in other activities of collective action for the last 12 months? (1) Yes, (2) No

4.5. How many meetings have you attended in the last 12 months? -----

4.6. What activities have you been involved in since you joined the group and frequency for each?

Activities	Week	Freq.	Month	Freq.	Season	Freq.	Year	Freq.
Group selling								
Group processing								
Trainings (e.g.								

GAP, record keeping, price negotiation)								
Group meetings								
Access to credit								
Access of on-farm inputs e.g., fertilizers, seedlings,								
Purchase of Processing equipment								
Merry-go round								

4.7. Mention any four major reasons that led you to join the group

1. To search for market

2. To increase my bargaining power

3. To sell collectively

4. *Others Specify*-----

4.8. Do you think you have benefited from joining this farmer group? 1= Yes, 0=No

b. *If yes, how have you benefited? Give only four major benefits and please rank them*

Benefits	Rank	Since when? (year)	Reason
Increased mango Production (yield)			
Increased Income			
Access to credit			
Access to on-farm inputs e.g. pesticides, fertilizers, insect traps			
Access to market information			
Access to other extension services			
Access to trainings e.g., GAP, Record keeping			
Increased contacts with buyers			

1-No Change, 2-moderate change 3-significant change 4-very significant change

4.9 Do you still sell as a group? (1). Yes (2). No.

b). *If No*. Why?

4.10 What were the main barriers faced in implementing your collective action activities?

1.

2.

4.11 Do you plan to join any collection action activities and why? (1). Yes (2) No.

b). *If yes*, why?

Section E: Household expenditures, non-land asset holdings and shocks

5.1 How much has your household spent money on the following items over the period from 2012 to 2013?

Table I: Expenditure in household consumption per year in Kenya Shillings

	Expenditure type	Amount of expenditure per year (KES)					
		2012			2013		
		Amount spent /month or per year	Freq.	Total	Amount/ Month	Freq.	Total
1	Food & drinks						
2	Clothing & foot wear						
3	Medical bills						
4	Transport (<i>Matatu, boda boda & special hire</i>)						
5	Fuel, kerosene & gas						
6	Kitchen equipment (cups, forks, plates.....)						
7	Communication (Airtime.....)						
8	Education (school fees, tuition)						
9	Furnishings , building, household equipment, routine maintenance						
10	Seedlings, Farm tools, pesticides & fungicides						
11	Utilities (electricity, water.....)						
	Non-consumption expenditures						
13	Remittances (contributions to weddings, church, burial, friends..						
14	Taxes						

15	Membership fees						
16	Savings in unions or banks						
17	Others <i>specify</i>						

5.2 Has your household owned any of the assets below between the periods from 2009 to 2013?

Table II: Value of household Non-land Asset holdings

	Asset type	Year of purchase	Quantity	Cost (KES)	Current price (KES)
1	Farm machinery, equipment & tools				
a.	<i>Tractor</i>				
b.	<i>Ox-plough</i>				
c.	<i>Hoes</i>				
d.	<i>Pangas</i>				
e.	<i>Axes</i>				
f.	<i>Slashers & Rakes</i>				
g.	<i>Pruning saws</i>				
h.	<i>Spray pumps</i>				
i	<i>Bow saw</i>				
j	<i>Wheelbarrow</i>				
2	Furniture				
a.	<i>Tables</i>				
b.	<i>Sofas</i>				
c.	<i>Beds</i>				
d.	<i>Chairs</i>				
3	Fridge				
4	Lantern				
5	Pressure lamp				
6	Stove				
7	Solar				
8	Car				
9	Motorcycle				
10	Bicycle				
11	Oxen Cart				

12	Television or decoder				
13	Radio				
14	Mobile phone				
15	Permanent houses				

5.3. Household dwelling

<i>5.3 Observe and tick</i>	
a. What type of dwelling does the respondent live in?	1. Mud house
	2. Thatched (straw) house
	3. Permanent structure
	4. Iron sheet
b. Is the dwelling you currently live.....?	1. owned by you/ your household head
	2. Rented
c. In case it is rented, how much do you pay per month?	

5.4 Has your family experienced any of the following natural disaster and shocks before and after the project?

	Natural disaster	Year	Magnitude (1=high 2=Medium 3=Low)	Perceived effects on household income
1.	Drought			
2.	Pests			
3.	Disease			
4.	Death			
5.	Chronic sickness			
6.	Other <i>specify...</i>			

Section F: Marketing performance

6.1 In your opinion evaluate the following performance indicators based on your involvement in the farmer organization activities using a 5-point Likert scale where 1=strongly Disagree 2=Disagree 3=partly agree/disagree 4=Agree 5=strongly agree

Variable	Statements	Scale				
		1	2	3	4	5
	Chain performance indicators					
	<i>Financial performance</i>					
F1	My relationship with the buyer has been a financial success					
F2	I have been able to achieve 100% of my goals by selling to my current buyer					
F3	I gain steady income and financial security from this					

	relationship					
F4	Return on investment is higher in this contract/relationship					
	<i>Non-Financial Performance</i>					
F5	My buyer is able to solve my problems adequately					
F6	One of the main advantages of this relationship is its stability					
F8	We are happy with this relationship					

Section G: Trust in members in the community and networks

7.1 In Your opinion evaluate the extent of trust you have in the following categories of individuals based on using a 5-point Likert scale where 1=strongly Disagree 2=Disagree 3=partly agree/disagree 4=Agree 5=strongly agree

Variable	Statements	Scale				
		1	2	3	4	5
Trust	How much do you have trust people in the category?					
a.	Government officials					
b.	Strangers e.g. buyers					
c.	Group leaders e.g. Chairperson, Secretary, Treasurer					
d.	Group members					
e.	Neighbors					

7.2 How many contacts do you have with following categories? Please fill in the table below

	Category	Numbers of contacts
1.	Close relatives	
2.	Neighbors	
3.	Middlemen	
4.	Local traders	
5.	Processors	
6.	Exporters	

List of family members by first and surname (staying within the household)	Age (Yrs.)	Sex: 1. Male 2. Female	Relationship to the household head 1.Head 2. Wife/husband 3.Father/mother 4.Sister/brother 5.Others	Marital status 1.Married 2.Single 3.divorced 4.widow 5.Sepearated	Work status: 1.Emloyed 2.Emloyed on farm 3.Household 4.Unemplyed 5. Others specify	Years of schooling	Highest grade attained 1.None 2. Primary 3.ordinary level 4. Tertiary 5. University
--	------------	------------------------------	--	--	---	--------------------	--

1 .								
2 .								
3 .								
4 .								
5 .								
6 .								
7 .								

SECTION H

8.1 How many people stay in your household?.....*Please fill the table below:*

8.2 What future plans do you have to improve the marketing of your mangoes?

--

Thank you for participating in the survey!

7.5.2 *Appendix IIB: Semi-structured interview guides*

List of key informant interviews

1. Exporters
2. Processors (small-medium size)
3. Traders (middlemen)
4. Input suppliers (agro-chemicals, tree nursery operators)
5. Producer business group leaders
6. District Agricultural Officers
7. District Horticultural Officers
8. Farmers
9. Researchers-KARI & ICRAF
10. NGOs
11. Ministry of Agriculture officials

Guides for qualitative interviews

Farmers

1. What mango varieties do you produce?
2. When did you start growing mangoes?
3. What costs do you incur in mango production and marketing? (labor, pesticides, seedlings, fertilizers, pruning, transport, bulking,)
4. How much mango do you produce each season?
5. How much do you obtain from mango production each season? Price, total income, any other sources of income
6. Where do you sell your mangoes? (Brokers, processors, local markets, exporters.....)
7. How do you get the buyers for your mangoes (contract, through friends, personal contacts, group officials.....)
8. How do you evaluate your relationship with the buyers? Middlemen, buyers, exporters, processors
9. What would you call a good relationship with the buyer?
10. What factors determine good relationships with the buyer?
11. How do good relationships with buyers affect your mango business?
12. Do you face any challenges in production and marketing mangoes?
13. How have you overcome these challenges?
14. Reasons for joining producer groups, benefits, disadvantages
15. What activities of the producer business group are you involved in?
16. How has the involvement in these activities improved your livelihoods?
17. Have you experienced any changes in income, assets ever since you joined the producer business group? If yes explain
18. Do you think being in the group has helped to increase your contacts with buyers, other farmers, family members, and friends? How?
19. How many contacts do you have with close relatives, neighbors, buyers and friends
20. How many of the family members or friends help you in the mango business?
21. Has it increased your trust in the buyers, group leaders, governmental officials and neighbors?
22. Group size, age, leadership, cohesion

23. Being part of the producer business group has it improved the Profitability of the mango business? If yes how?
24. Are you able to supply the required quality and quantity demanded by the buyers?
25. How is the relationship quality between you and buyers? Trust, commitment, satisfaction: price flexibility, communication, information flows
26. According to a scale of -5 to 5 rank your relationship quality with the buyer
27. Have experienced any reduction in costs in production and marketing of mangoes?
28. Performance
29. Are the buyers trustworthy, do they keep their word?
30. Are you satisfied with price offered by the buyers?
31. How committed are the buyers? Are they the only buyers that you have?
32. Have you experienced in any changes in market share growth and sales growth?
33. Do you think the current regulations or policies have supported the program?
34. Determinants of marketing performance-what determines the profits, sales, and revenues generated from the mango business?

Producer business group leaders

1. What is the role of the producer business group in production and marketing of mangoes?
2. What are the main activities in the producer business group?
3. Do you think group attributes such as Group size, age, cohesion, and leadership have any impact on the marketing performance of mango value chain?
4. Reasons for group marketing, benefits and challenges
5. How business is conducted i.e., how do you get the inputs and buyers for the mangoes?
6. Any role played by NGO
7. How have the producer business groups improved livelihoods of farmers?
8. Do you think the producer business group has helped farmers in terms of increasing income, social networks, trust, and assets? If yes how?
9. How has the producer business group improved the marketing performance?

Traders

1. Where do you source the mangoes and where are they sold?

2. Challenges faced in accessing the mango
3. Do you have any traders' organization?
4. Have you heard about the producer business groups?
5. Of what benefit has it been to you in accessing the mangoes?
6. Arrangements in accessing the mangoes (contracts, personal contacts)
7. Any challenges faced in obtaining the produce from the farmers?
8. Do you think these business groups have helped you in accessing the mangoes? If yes how?
9. Do you think the producer business groups have helped in increasing the efficiency, profitability, response to demand, quality of mangoes produced?
10. How have these the groups improved your trust, commitment and satisfaction with the producers?

Processors

1. Main activities, products, employees, outlets for the products, prices
2. Where do you source the mangoes and what varieties?
3. How do you choose the suppliers of raw materials? Do price, quality, quantity, location of the supplier matter?
4. Who are the main suppliers? Individuals or groups or own farm
5. Effect of producer business groups on quality, appearance, volume supplied
6. Has it improved the sales and profits of the mango business?
7. Is there improvement in cost reduction?
8. Has it helped you to improve your business networks?
9. Challenges faced in dealing with organized farmers compared to individuals?

Exporters

1. Where do you source the mangoes and which varieties?
2. Do you source from individuals or groups?
3. Challenges faced in sourcing the mangoes either from groups or individuals
4. What is the effect of the groups in improving quality, quantity, sales, and profitability of the mango business?
5. Any infrastructure, tax, standards constraints
- 6.

District agricultural and/or Horticultural Officials

1. How is the mango production in this area?
2. What are the main challenges in the mango business?
3. The main marketing channels of mango in your district
4. Total income obtained from mango production compared to other crops
5. Have you had about producer business groups?
6. Do you think they have improved farmers' livelihoods?
7. Looking at the mango value chain, have they improved its performance in terms of efficiency and profitability?
8. How many producer groups are in your district and how are they organized?

Researchers

1. In general, is there any improvement in mango production and marketing as a result of producer groups?
2. What is there effect on smallholder income, assets and social capital?
3. Do you think they have improved the value chain performance in terms its sales, profitability, customer satisfaction, volume and mix flexibility, gender empowerment
4. What group characteristics could be attributing to this; group size, maturity, organizational form, group cohesion?

NGOs

1. What is your main role in producer business groups?
2. Do you think these groups have improved the production and marketing of mangos?
3. What are the main services offered by your organization to the groups?
4. Have they improved the smallholder livelihoods?

Ministry of Agriculture

1. What is your role in mango industry?
2. How has your role changed over the past 5 years? If yes how?
3. How has the total level of mango exports changed over time?
4. What are the main markets for mangoes? How have they changed over time? And what are these changes
5. What role do you play in producer business groups?

6. Do you think these groups have improved the production and marketing of mangos?
7. Has the level of production and marketing of mangoes improved over the last 5 years?
8. What could be the challenges in facilitating the producer business groups?
9. How best can they operate in future?
10. What is the contribution of producer business groups to smallholder income, asset holdings and social networks and trust