

Supply Chain Financing in Developing Countries

by

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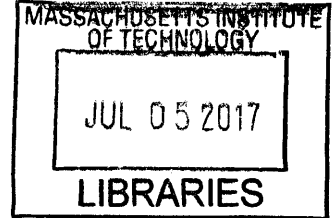
Submitted to the Institute for Data, Systems, and Society
in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy in Engineering Systems

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

May 2017 [June 2017]



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Submitted to the Institute for Data, Systems, and Society
on March 10, 2017, in partial fulfillment of the
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Abstract

There is no definitive blueprint for ending poverty and increasing prosperity across the globe, but the World Bank argues that inclusive economic growth is critical to achieving global development goals. This thesis focuses on supply chain financing, and its potential to make a positive and lasting impact on people and businesses in resource-constrained environments. It seeks to develop a better understanding of how supply chain and finance structures impact profits, sales growth and risk. The two-phased research design seeks to address the gap in the supply chain and development literature on supply chain finance in small and medium sized firms in developing countries.

The first phase consists of exploratory, semi-structured interviews with stakeholders in international development, financing and supply chain management. The exploratory interviews were used to develop an understanding of how relevant stakeholders think about and make supply chain finance decisions. Additionally, the interviews were used to identify a company and supply chain for a multiple case study upon which the second phase of research is based. The company is a clean energy product distributor that has partnered with one of the largest banks in Kenya to provide consumer financing for clean energy products. The case analysis includes an in-depth examination of the company's financial performance by sales channel, drawing upon sales records and accounting documents. Interviews were conducted with the company's management, suppliers, sales force, retailers and bank lending agents.

The mixed methods case study is used to extend hypotheses developed during the exploratory interviews and further develop theory on the role of financing in developing country supply chains. The exploratory interviews and case study are used to develop a framework of how stakeholders in consumer durable goods markets think about scale in developing countries. The World Bank's Logistics Performance Index (LPI) and Doing Business Report (DBR) data sets are used to demonstrate how organizations can base supply chain decisions on infrastructure, logistics and governance structures within a country. This research can be used by for-profit and not-for-profit entities when making resource allocation and supply chain design decisions in developing markets.

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Acknowledgments

I would like to first and foremost thank my advisor, John Carroll, for his support and guidance. His willingness to become my advisor was critical to my ability to successfully complete the PhD, and I will be forever grateful. John's advice on how to overcome obstacles made difficult problems seem easy. I would also like to offer my sincerest gratitude to the other members of my committee: Yossi Sheffi, Jarrod Goentzel and Lisa D'Ambrosio. Yossi's ability to help me see the big picture and address the heart of the research problem led to a more interesting and impactful research outcome. Jarrod is one of the main reasons that I decided to focus my work on supply chain finance in the development context. His passion for humanitarian logistics and his supply chain knowledge made him an ideal supervisor and collaborator. Lisa was an ally when I needed one most, and I am greatly appreciative.

This research would not have been possible without the willingness of the many interview respondents who graciously shared their time and knowledge. I hope I have been able to contribute something of value to supply chain finance and international development. Though I cannot name the company I have been working with, I am extremely grateful to their leadership for opening their doors to me and sharing the work they do in East Africa and Asia. Their business model has the potential to leave a lasting impact on the world.

I want to thank my friends and peers in ESD and now IDSS. Your friendship made the program enjoyable, and your feedback and constructive comments always enhanced my work. Thank you to the ESD and IDSS leadership for your support and willingness to work with military students. I especially want to thank Joe Sussman and Beth Milnes.

The Air Force Institute of Technology (AFIT) sponsored me in the PhD program and made this possible. I especially want to express my gratitude to Lt Col (retired) Sharon Heilmann for encouraging me to apply for an AFIT position. Finally, I want to thank my parents for their constant love and support and cannot conclude without thanking my wife Valerie. Val, you have been with me through every step of this process and have been my biggest supporter and best friend. Thank you.

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Chapter 1 – Introduction

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Chapter 1 - Introduction

A. Lagging Development

One of the World Bank Millennium Development Goals is to reduce extreme poverty to less than three percent of the global population by 2030. The World Bank and IMF's *Global Monitoring Report* argues that the Official Development Assistance (ODA) required to achieve this goal would be roughly \$150 billion annually, as measured by 2005's \$1.25 per day extreme poverty standard. The cost jumps to \$600 billion if raising the requirement to \$2.00 per day. In 2013 the international community contributed \$134.8 billion in ODA (Global, 2015).

While is not a prohibitively high gap as a percentage of global economic output, it is highly unlikely that ODA will be increasing by any substantial amount in the near future. Furthermore, the \$150 billion and \$600 billion estimates are based on 2005 purchasing levels. The 2016 extreme poverty line is \$1.90 per day, or almost 1.5 times higher than the 2005 level (Global, 2016). The gap is even larger than the international development agencies report.

The consensus among development agencies is that economic growth will have to be the main driver of poverty elimination. The World Bank estimates that growth across developing countries needs to be four percent annually to reach its poverty reduction targets (Global, 2015). The foreign aid shortfall is one of the reasons for this stance, but it is also due to the belief that economic growth has been the main driver of poverty reduction and improved living standards over the last two decades.

In 1990 over 1.9 billion people lived in extreme poverty. The 2015 estimate is just over 700 million (Global, 2016). However, the improvements have not been shared equally across the globe. Figure 1 - Global and Regional Poverty Breakdowns (Global, 2016) illustrates this point with data going back to 1990. The graph on the left shows the percentage of global poverty that each region accounts for, with the three main contributors being South Asia, East Asia and Pacific, and Sub-Saharan Africa. The graph on the right shows

the percentage of a region's population in extreme poverty. It is still over 30% of the population across Sub-Saharan Africa.

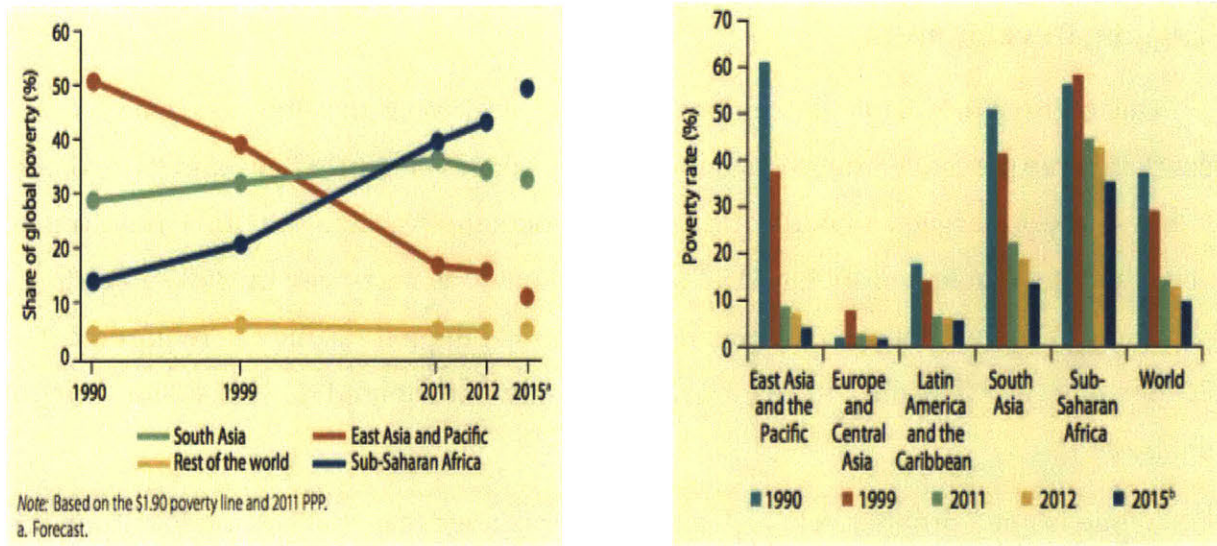


Figure 1 - Global and Regional Poverty Breakdowns (Global, 2016)

Sub-Saharan Africa accounts for the largest share of the world's extreme poor and also has the highest percentage of its population living in extreme poverty. Coupled with high population growth and relatively low GDP growth, the actual number of extreme poor in Sub-Saharan Africa has increased by over 65 million people since 1990. Sub-Saharan Africa is the only region in the world where this is the case. The next worst off is South Asia. Though decreasing by over 50% since a peak of 575 million people in 1990, there are still an estimated 230 million people living in extreme poverty in South Asia (Global, 2016). An examination of GDP and population growth rates support the World Bank's and development agencies' hypothesis that economic growth and poverty reduction are directly related.

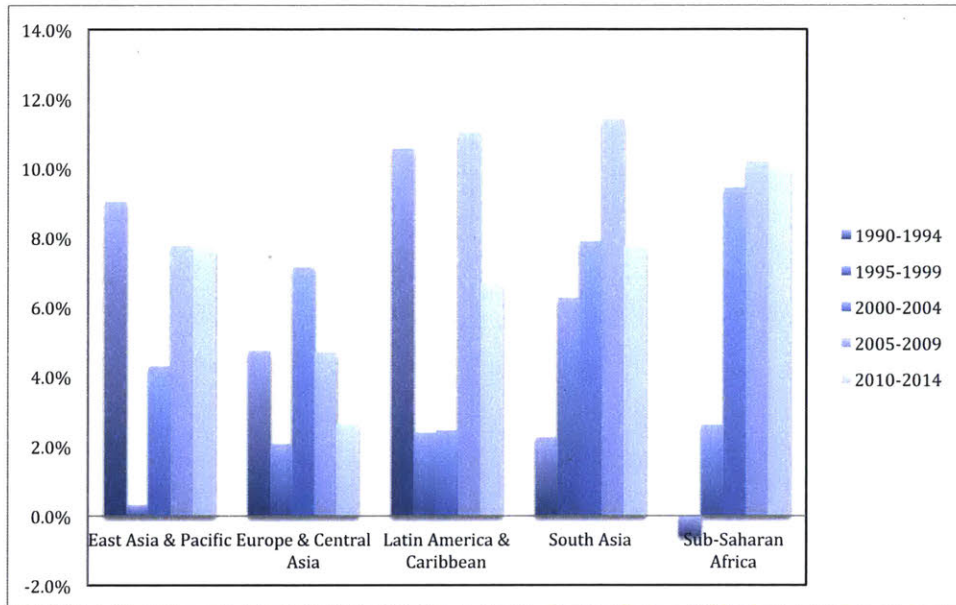


Figure 2 - Average % GDP Growth year-by-year (GDP Growth, 2016)

Using World Bank data since 1990, Figure 2 - Average % GDP Growth year-by-year (GDP Growth, 2016) shows year-by-year average percentage growth in GDP over five year periods for the regions in Figure 1. Since 1995 for South Asia, and 2000 for Sub-Saharan Africa, annual percentage GDP growth are actually above the World Bank's four percent growth objective. The trend is positive but does not explain the growth in the actual number of poor people in Sub-Saharan Africa. Figure 3 - Average Annual Population Growth by Region (Population, 2016) shows the percentage of population growth for each of the regions.

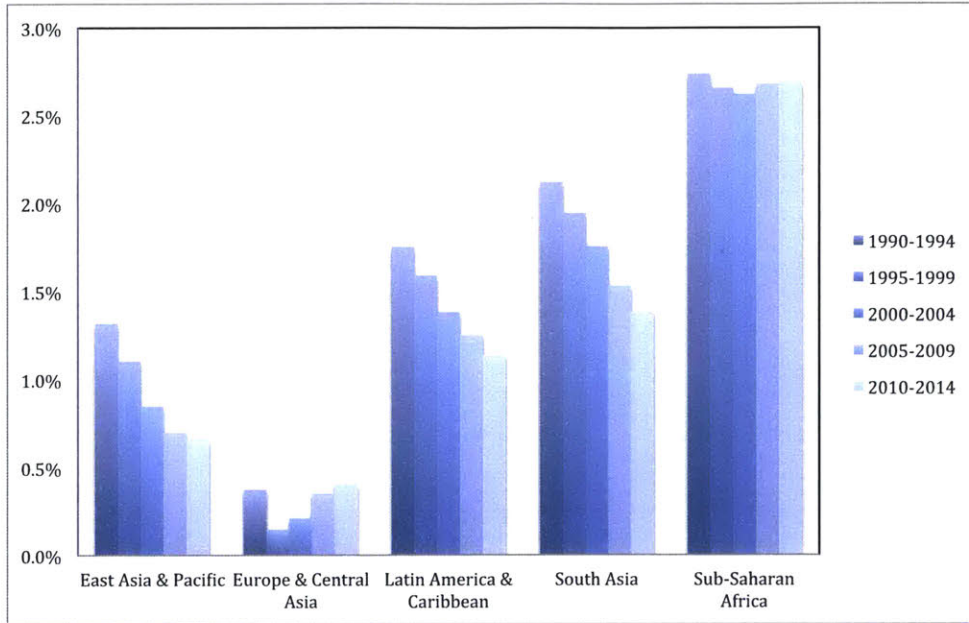


Figure 3 - Average Annual Population Growth by Region (Population, 2016)

The year-by-year population growth for Sub-Saharan Africa started and remained substantially higher than all of the other regions. It was actually higher, on average, from 2010-2014 than from 2000-2004. The annual growth in GDP may be relatively high as a percentage, but it has not been enough to balance the growth in population. (Also, using regional data means that relatively successful countries like Nigeria and South Africa are included with the rest of the region.)

Additionally, Kanbur and Sumner (2012) make the point that growth is not equally shared across the population. In developing countries, the “rich” become better off from growth while the poor remain poor. Because average incomes are used in classifications, when a country transitions from low to middle income, it does not necessarily mean that extreme poor are no longer extremely poor. There is no better evidence for this than the fact that 60% of the world’s extreme poor live in Bangladesh, China, the Democratic Republic of the Congo, India and Nigeria. India, China and Nigeria are middle-income countries (Kanbur and Sumner, 2012).

While Figures 2 and 3 showed growth (GDP and population) percentages that were roughly the same levels, Figure 4 - Average Region GDP in Trillions (GDP Growth, 2016)

shows each region’s average GDP in trillions over the same five-year period. They begin from a very different starting place. The disparity is quite stark and drives home the point that even though growth rates are relatively similar across the region, a small increase in growth rates cannot make up the difference. Combining this with population growth, it is clear that additional growth that benefits large segments of the population is absolutely necessary. The key question is how can growth be supported where it has lagged, and what can be done to ensure the benefits of growth are shared across populations?

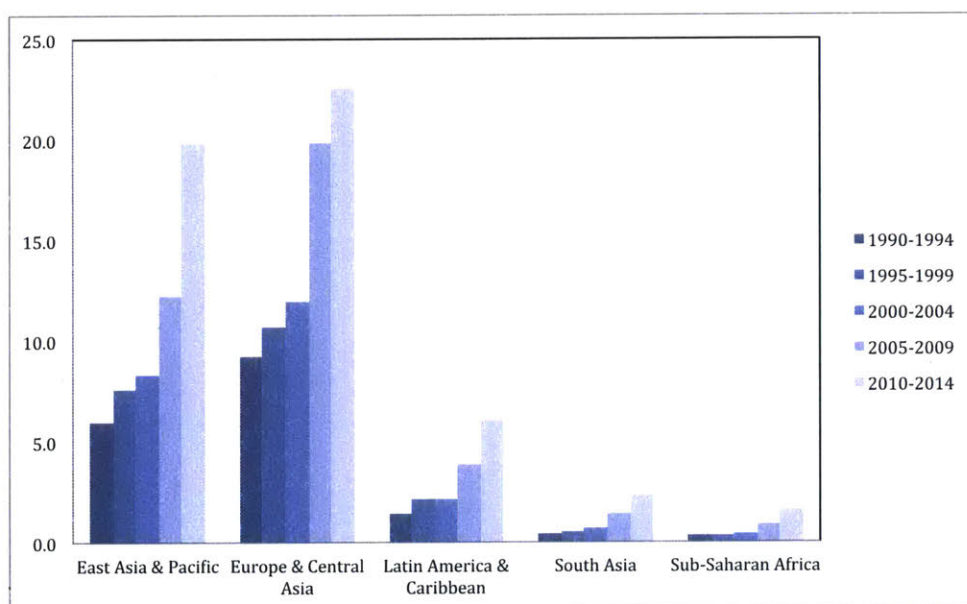


Figure 4 - Average Region GDP in Trillions (GDP Growth, 2016)

There is no definitive blueprint for ending poverty and increasing prosperity across the globe, but the World Bank argues that “economic growth, its inclusiveness and its sustainability are the rudimentary elements of any conceptual framework used to achieve the World Bank Group’s development goals” (World Bank, 2015). However, businesses in the developing world face many barriers not seen by their developed world counterparts, and lack of access to financial capital has an especially detrimental effect (London and Hart, 2004). One of the goals of this research is to examine supply chain solutions that enable organizations to function without the need for ongoing financial or material support from outside agencies. This research focuses on supply chain financing, and its potential to make

a positive and lasting impact on people and businesses in resource constrained environments. Financing is not a magic bullet that can alleviate the numerous problems facing the developing world, but it can help accelerate growth and remove barriers facing small firms (Claessens, 2006).

B. Supply Chain Finance Motivation

1. Background research

The initial insight to focus on supply chain finance in developing countries came as the result of my work with MIT's Comprehensive Initiative on Technology Evaluation (CITE). CITE is a "program dedicated to developing methods for product evaluation in global development" (About CITE, 2016). The interdisciplinary team has developed a "3-S" methodology that looks at: 1) Suitability, 2) Scalability, and 3) Sustainability. Suitability asks if a product performs its intended purpose. Scalability asks whether the supply chain can effectively reach customers. Sustainability asks if the product will be used correctly, consistently and continuously over time. Ultimately, CITE "seeks to integrate these criteria to develop an understanding of what makes products successful in emerging markets" (About CITE, 2016).

I was a scalability team research assistant and co-author on CITE's first two reports that examined solar lanterns in Uganda and household water filters in India. Scalability was defined as the ability of an original equipment manufacturer's (OEM) supply chain to increase production, distribution and after-market support to meet demand at the lowest possible cost. The CITE work was unique in the development space because of its examination of the end to end supply chain—in addition to a focus on product functionality and consumers. The two evaluations revealed that access to financing was a primary driver of successful supply chain operations, working capital management and sales growth. A primary takeaway was that appropriate financing structures often separate success from failure.

2. Solar lantern study

One of the main solar lantern sales channels in Uganda were micro entrepreneurs who functioned as independent salespeople for a manufacturer or brand (Solar Lantern,

2015). The micro entrepreneurs operated under a business model similar to an “Avon lady” who sells products for a commission and generally uses the employment as supplementary income. The lanterns were often sold to friends, family and other members of the local community. A major problem with this business model was that when the micro-entrepreneurs received the product on credit, repayment rates were extremely low.

In Uganda the CITE team found that the micro entrepreneur repayment rate to one NGO-distributor, Solar Sister, was only about 20%. Not surprisingly, this had a substantial impact on Solar Sister’s capital requirement. In response, the business model was changed from a model in which micro entrepreneurs were provided an initial stock of six lanterns on credit to one in which up-front payment was required for all products.

One of the solar lantern OEMs, Barefoot Power, had similarly low repayment rates and took a different route to address the issue. Barefoot became quite conservative with its micro entrepreneur sales force and discontinued credit—even though that was the sales agents’ preference. It is difficult to establish a causal link, but Barefoot also reported a very high micro entrepreneur turnover rate, losing roughly two-thirds of those trained each year. Small loans were available from local micro-financing institutions, but people were averse to this strategy due to high interest rates.

Ultimately, Barefoot Power had success when partnering with locally owned savings and credit cooperatives (SACCO) to finance solar lighting projects in villages. The sales force works with the village leadership to secure funding from the SACCO, the manufacturer receives immediate payment upon installation, the village receives much-needed lighting, and the SACCOs generate profits. Because of the SACCO’s community tie-in, repayment issues were in large part mitigated (Solar Lantern, 2015).

3. Household water filters

The household water filter market in Ahmedabad, India, differed from the solar lantern market in Uganda in that there was less NGO involvement on a large scale and the market was more organized. The OEMs selling the filters are based in India, and the primary sales channels are appliance retailers as well as small, owner-operated water filter retailers

who also function as service technicians (Household Water, 2015). Additionally, the Indian market had a more organized financing structure than Uganda.

Bajaj Financing is an India-based company that functions as a third-party financing organization. OEMs enter into agreements with Bajaj, which then offers financing to consumers who meet its background criteria. The criteria are similar to a credit check, and include factors such as previous loan payments, employment, and whether the individual has a checking account. The individual pays an up-front fee to Bajaj and then makes monthly payments. The OEM's contract with Bajaj outlines the lender's profit margin, and Bajaj assumes the risk while the OEM increases sales.

Bajaj financing, though low cost for consumers, was limited to high end products manufactured by OEMs that had agreements with Bajaj. This meant that financing was not available for locally manufactured, unbranded products that are actually affordable to large segments of the population. These unbranded products performed quite similarly in lab functionality tests while the upfront cost was 55-66% lower. (The unbranded products were about 36-45% less expensive in terms of the total cost of ownership.) Only about 50% of the unbranded product sellers provided credit to customers (Household Water, 2015).

4. Supply chain finance takeaways

The two CITE studies examined different products in two different countries. In each study financing issues arose at different points in the supply chain. The barriers in the solar lantern and water filter market are different, but a major similarity is that access to life-changing products for a large segment of the population is limited by product availability and resource constraints across the supply chain. Both studies highlight that capital allocation must be considered over the entire system—as opposed to solely focusing on one tier or segment.

Another very important lesson from the CITE research was the methodological challenge of doing comparative product analysis. Unlike the products we were studying, the supply chains could not be brought back to campus and tested in a lab. They spanned multiple countries and consisted of many stakeholders with competing interests. This was especially the case with the OEMs whose products were in direct competition for market

share. Given the purpose of the CITE reports was to compare the different products and brands, companies were very hesitant to share sales, cost and profitability data—the information that was crucial to the analysis. It was therefore important to craft a study that would help to build an understanding of how supply chain finance impacts organizations across the developing world, while overcoming the methodological barriers faced in the CITE research. The next section outlines how this was accomplished.

C. Addressing the Gap in the Supply Chain and Development Literature

1. Research framework

The CITE work made clear that there was something interesting about financing supply chains in developing countries. The two studies on different products and in different countries led to conclusions that financing is playing a role in supply chains—albeit different roles depending on local factors such as the product market, local lending structures and the customers' socioeconomic status. The literature will be discussed at length in the next chapter, but a gap exists as to the role that financing does or does not play in developing countries. The current literature recognizes that financing is important, but it does not actually examine what may or may not work in different contexts and why. Additionally, it focuses mostly on multinational corporations or micro entrepreneurs at the base of the pyramid. There is gap in research that looks across the entire supply chain and at small and medium sized businesses.

Figure 5 - Research Progression shows the progression of the research that seeks to address this gap (Pedraza-Martinez et al., 2011). The process began with the initial CITE scalability studies, continued with a two-phase approach and concludes with overall findings and research contributions.

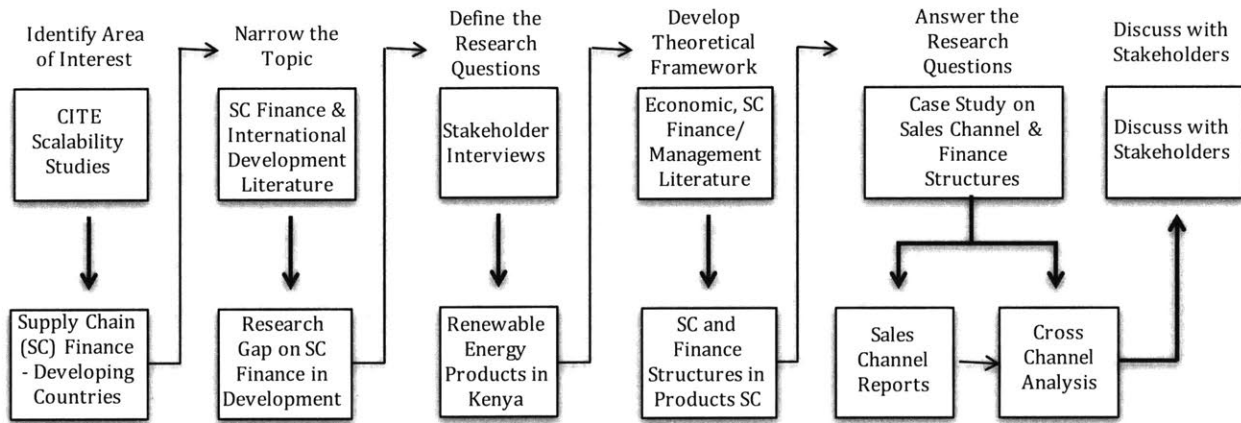


Figure 5 - Research Progression

2. Phase 1 – Exploratory interviews with stakeholders

Phase 1 consists of exploratory interviews with stakeholders in the international development and international development supply chains. Over the course of 3 months, I conducted 31 interviews with stakeholders from organizations in the following groups: product manufacturers, distributors, NGOs, government and government-backed financial agencies, and private financiers. To my knowledge, this is the first attempt to draw upon stakeholders from across the globe and from different sectors to develop a deeper understanding of how supply chain financing decisions are thought about and made in developing countries. The research questions used to guide the stakeholder interviews were:

- 1) How do stakeholders think about and make supply chain financing decisions in developing countries?
- 2) How do the decisions and context affect profit, sales growth and risk?
- 3) What are the key factors that impact a supply chain’s success in developing countries?

3. Phase 2 – Case Study

Phase 2 is a case study on a clean energy product distribution supply chain in Kenya. The distributor I worked with partners with one of the largest banks in Kenya to provide affordable consumer financing for solar lanterns and cookstoves. The case study uses a mixed methods approach that draws on qualitative data collected from interviews with the

company's management and sales force, its suppliers, retailers and bank lending agents. Sales and financial analysis are done using quantitative data pulled from the company's sales and accounting records. I am not aware of other attempts to do an in-depth supply chain financial analysis on a consumer goods company in a developing country using actual accounting, sales and interview data. The research questions the case study seeks to answer are:

- 1) How do the supply chain and financing structure affect profits and sales growth for a renewable energy product distribution network in Kenya?
- 2) What are the major financial risks of the structures and how can these risks be mitigated?

D. Chapter by Chapter Overview

The remaining of this thesis is structured as follows: Chapter 2 is a literature review that first examines the research on economic development, supply chain management, micro finance and barriers to growth in developing countries. It then transitions to an overview of supply chain finance research and the use of financial metrics to analyze supply chain operations. The supply chain finance section closes with a discussion of the small amount of supply chain finance research in developing countries. The literature review ends with an examination of research that looks at the use of World Bank datasets to assess a country's logistics capabilities.

Chapter 3 begins Phase 1 of this research and consists of exploratory interviews with stakeholders in the development and supply chain finance space. The chapter opens with the purpose of the interviews, the academic literature supporting the use of qualitative interviews to develop theory and the interview methodology. The majority of the chapter looks at interview data and is broken down by insights within stakeholder groups, across emergent themes and overall Phase 1 findings.

Chapter 4 begins Phase 2, which is a case study on a clean energy product distributor in Kenya. The chapter opens with a discussion on the use of case research to generate, extend and test theory. The case is used to extend hypotheses developed during the exploratory interviews and further develop theory on the role of financing in developing country supply

chains. The company background and the research design—case framework, data collection and method of analysis—make up the remainder of Chapter 4. Chapter 5 contains the case analysis. The analysis is comprised of three sales channel reports and a cross channel report that discusses the overall case findings and conclusions.

Chapter 6 is the final chapter and begins with a discussion of the overall research findings and contributions. The contribution section also includes a discussion of the methodological contributions of this research. Additionally, the limitations are addressed and opportunities for future work that could address these limitations are identified. These suggestions are centered primarily on extending the research to other consumer durable goods products in Kenya and other countries in East Africa.

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Chapter 2 – Literature Review

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Chapter 2 - Literature Review

A. International Development and Supply Chain Management Literature

1. Barriers in developing countries

Whether it is an overall lack of starting capital, burdensome regulations or political instability, individuals and businesses in developing countries face obstacles not seen by those in western, wealthy countries. The barriers faced by small and medium sized enterprises (SMEs) in developing countries that are far greater than in developed countries include lack of access to raw materials, financing and production resources (London et al., 2010). Additionally, governance and cultural issues must be considered when examining strategies for growth. This research focuses on supply chain finance, but the finance gap is just one of the many interwoven challenges facing developing countries.

a) Governance

The overall business environment of entry and exit, sound property rights, and contract enforcement are major factors that influence economic growth (Claessens, 2006). Finance, while not necessarily a driver of growth, can help to accelerate it. This is especially the case for small firms that have more difficulty accessing finance. Claessens (2006, p. 210) argues that financing “helps to level the playing field for firms and countries.” Additionally, small and new firms are especially vulnerable to systemic risks such as macroeconomic volatility, financial crises, government defaults and arbitrary taxation (Claessens, 2006).

Claessens (2006) draws two over-arching conclusions relevant to this research. First, credit extension programs for SMEs have been implemented in both industrial and developing countries. However, it appears that many of the benefits flow to well-connected individuals and businesses as opposed to the intended targets. This speaks to the gap between the haves and the have-nots. Second, access to finance has increased more on the consumer side than for SMEs. Increased financing access for consumers will be further discussed in the micro finance section.

Claessens (2006) distinguishes between access to finance and use of financial services. Access is “the availability of a supply of reasonable quality financial services at

reasonable costs, where reasonable quality and cost have to be defined relative to some objective standard” (Claessens, 2006, p. 210). The differentiation is important. Use of financial services is self-explanatory, but just because financial services are not used, it does not mean they are not available. The difficult part is separating the two. Some people and businesses with access may choose not to use it because it is too expensive, works only with cash or they want to keep their records off of official books. It can be extremely difficult to tell, but it is important to delineate between how financing is acquired and how it is used.

Acemoglu and Robinson (2012) argue in *Why Nations Fail* that at the country level, the determining factor of country-level success is whether the political and economic institutions are inclusive or exclusive. Political institutions are the ruling bodies, and the question is whether they are democratic, dictatorial, monarchies, etc. The inclusiveness of a country’s economic institutions often flows from the nature of the political institutions. A main point of *Why Nations Fail* is that the inclusiveness of the economic institutions in large part determines the ability for individuals and firms to fairly do business. Inclusiveness plays a major role in whether people have the incentive to innovate and capture the gains of their hard work.

Based on their theory of inclusive versus exclusive institutions, Acemoglu and Robinson (2012) offer insights that are applicable to international development and foreign aid. First, in regards to development, growth under extractive institutions will most likely continue but will not transition to inclusive, sustained growth. Similarly, do not expect that growth under authoritarian regimes will lead to democracy or inclusive institutions. It is not a natural progression. Authoritarian growth is neither desirable nor viable in the long run. In these countries, the GDP lag seen in the Chapter 1 graphs will continue.

Though arguing that foreign aid is not an effective strategy for dealing with countries that have failed, Acemoglu and Robinson (2012) do offer suggestions as to how inclusive growth can be supported. If aid is given, it should be to promote inclusive economic and political institutions. They add that contingent aid, i.e., aid given with strings attached, is also not effective. Rather, it should be used to bring groups into the system that otherwise would not be included.

b) Reluctant entrepreneurs

Banerjee and Duflo (2011) agree with Acemoglu and Robinson (2012) that in the face of corrupt institutions, allocating resources based on inclusive practices can improve people's lives. Banerjee and Duflo conclude that we do not know exactly what will lead to large-scale, sustainable growth, but *Poor Economics* (2011) calls for "changes at the margins" in developing countries. They promote the use of randomized control trials (RCTs) to determine what development interventions actually work and in what environments. The key is that there is not a one-size fits all approach, and the important thing is to measure, in a systematic manner, what is effective in a specific context. The insights of Banerjee and Duflo are relevant across many aspects of development work, but their findings on small businesses and micro entrepreneurs are particularly relevant to this research.

Poor Economics argues that the poor are often "reluctant entrepreneurs." Though it is commonly seen as a good thing that the poor frequently own small businesses or farms, it may not actually be as positive as one would expect. Rather, it is possible, and maybe likely, that people become micro entrepreneurs out of necessity as opposed to because they want to run their own businesses. They need to make money somehow, but there are few if any jobs. A major downside of running your own business is an increase in risk and uncertainty in environments where there is already plenty to go around. Additionally, there is a great deal of competition—from people doing the exact same thing—and scaling is difficult without resources. The result is that little effort is put into the operations and little output occurs. People would prefer stable, decent paying jobs. Banerjee and Duflo (2011) suggest that counter-intuitively, a better course of action may be to spread resources around less and invest in people with businesses that actually want to be there and provide jobs.

The work of Claessens (2006), Banerjee and Duflo (2011) and Acemoglu and Robinson (2012) are three sources out of a large field of development finance and economics research. They were selected because they are particularly insightful, and because they do an excellent job of emphasizing how the context of governance, social and other local factors differ in developing versus industrialized nations. The next section examines supply chain research in international development in light of these insights.

2. Supply chain management and development

The supply chain literature identifies two main strategies to help overcome barriers in developing countries. The first is a top-down approach in which multinational companies (MNCs) support growth at the base of the pyramid (BoP) while also helping their own bottom line. The second is a bottom-up approach that calls for direct support for people and businesses at the BoP.

a) Top-down solution

Prahalad and Hammond (2002) argue that MNCs can serve as a driver of global growth and prosperity when investing in emerging markets. By acting in their own self-interest, i.e., growing revenues, they can provide the necessary products and services, while driving economic growth. However, most for-profit MNCs focus on the wealthy segments of the population in developing countries (London and Hart, 2004). Not surprisingly, for-profit MNCs gear their products and services to customers who can afford to pay. Considering that the BoP comprises over four billion people across the globe, a strategy of buying from and selling to this base should be pursued (London and Hart, 2004).

The argument is that companies are missing a huge opportunity to profit and make an impact. Though the buying power of poor individuals may be low, the community buying power is quite large. And, there is a latent demand for low-priced, high quality goods (Prahalad and Hammond, 2002). Additionally, if local infrastructure and governments do not provide what the developed world takes for granted, products sold by for-profit ventures can fill the void. There can be mutual value creation and synergistic relationships between business strategy and poverty alleviation (London et al., 2010).

London and Hart (2004) argue that this strategy requires non-traditional partnerships, especially non-traditional partnerships between for-profits and non-profits. Existing and local institutions should be leveraged, and firms with social embeddedness are more likely to be successful. The 2015 Global Monitoring Report supports this type of integrated effort. It goes as far as to say, "Donors should focus on supporting economic growth that is more equitable; ensuring policies and programs are coherent, encouraging new types of and source of finance, innovative financing such as public-private partnerships

(PPPs) and risk sharing to unlock private funding; and exchanging knowledge and experience on poverty reduction” (Global, 2015, p. 187). The 2016 Global Monitoring Report points out that Foreign Direct Investment (FDI) in 2014 was roughly \$735 billion. This is five times more than ODA. One of the reasons the World Bank, IMF and the development agencies seemingly push for leveraging private sources is because this is where the resources are.

There are challenges when MNCs implement these strategies, however. Parmigiani and Rivera-Santos (2015) seek to analyze how MNC’s can overcome institutional challenges in developing markets when constructing supply chains. They argue that companies need to consider the institutional challenges at two different levels: the stage and overall supply chain. The stage, essentially each echelon in the supply chain, means that different contexts and environments will have different voids—or challenges that must be overcome at different levels. Companies need to honestly and accurately assess whether a void at a certain echelon can actually be overcome. For example, in a subsistence market it may not be possible to meet the labor needs of a complex manufacturing operation if basic literacy rates are very low. It may be an area well-suited for running randomized control trials (RCTs) and pilot experiments called for by Banerjee and Duflo (2011).

Once these voids are identified, steps to overcome the void should be put in place. At the supply chain level, companies must also consider the interconnectedness of the voids. Two strategies are identified to handle supply chain-wide voids: agency and corporate responses. A corporate response means the MNC takes on the responsibility itself, which may mean undertaking some of the work in neighboring countries or developing its own internal, narrowly focused solution to the challenge. Agency responses speak to partnerships with NGOs, government bodies, or non-profit agencies that have the resources and willingness to fill the institutional gaps (Parmigiani and Rivera-Santos, 2015). If large, resource-rich organizations must take extra precaution to deal with the challenges of developing countries, it is clear that individuals and small businesses will face even more difficulties.

b) Bottom-up solution

When the size of FDI and the resource base of large MNCs are considered, it would seem that the strategy with the highest likelihood of success is the top-down approach.

However, it is estimated that across the globe, there are nearly nine trillion dollars in unregistered and hidden assets (London and Hart, 2004). Because of the bureaucratic barriers in place across much of the developing world, a huge portion of business is conducted in the informal, unregulated sector. Even if this is a high estimate and the assets/transactions are not all done in the BoP segment, it belies the point that a large opportunity exists to support bottom-up initiatives that can help small businesses succeed and improve lives. Supporting job creation is associated with a higher standard of living, and better all-around access to safe food and water, health services and education (Sodhi and Tang, 2011).

A key point that London et al. (2010) make is that the focus needs to shift from simply serving the needs to actually working with the BoP. Meeting basic needs is critical in certain instances (disaster, famine, etc.), but it does not address the core issue of systematically helping to raise people out of poverty. Sodhi and Tang (2011) argue that additional research and focus should be placed on integrating people at the BoP into the supply chain. A major question is what activities and strategies can be employed to best support small and medium sized businesses? Similarly, what can be done to help eliminate the barriers faced by resource-constrained businesses?

Sodhi and Tang (2011) point out that small businesses and micro entrepreneurs face particular challenges with financial flows. They need financing to run their businesses, but the financial institutions do not think they are qualified borrowers. They often have no financial record, lack collateral and have little documented experience running a business (Sodhi and Tang, 2011). One of the strategies that has recently received public and academic attention is micro finance. The benefits and limits of micro finance are discussed in the next section.

3. Micro finance

The role of micro finance institutions (MFIs) is to provide financial services to people the commercial banking sector ignores. This may be due to the individuals being poor or living in difficult to reach and rural areas. Often it is a combination of the two. A core aspect of micro finance is the complementary nature of financial viability and a social or

developmental purpose (Churchill, 1999). MFIs have a two-fold mission: To do good by increasing social out-reach; and to do well, i.e., become financially sustainable (Hudon and Sandberg, 2013). The mission of MFIs is to fill the savings and financing gap for people not served by banks.

There have been instances where these two purposes have come into conflict, and these instances serve as a source of recent criticism for MFIs. Hudon and Sandberg (2013) outline an infamous case where a Mexican MFI was found to be charging 100% annual interest rates in the midst of a successful stock offering. Bayar (2013) believes these practices, for some lenders at least, were caused by a shift from the core mission of bringing finance to the poor to an aggressive focus on profits and commercialization. Compounding the problem, when the financial crisis hit in 2007-2009 and credit markets tightened, MFIs found themselves overextended and in a very bad financial situation. Where growth in the MFI market had once been in the 40% range, it dropped to the 15% range.

a) Client-focused, individual, and group lending

The shift to a greater focus on profitability for the institutions directly conflicted with a key concept outlined by Churchill (1999): client focused lending. In client-focused lending, the credit service is tailored to the needs of the borrower. This means the loan product should be designed to suit the loan purpose, determining the amount, terms, and repayment structure (Churchill, 1999). Client-focused lending requires more work on the part of loan agents and therefore entails more costs, which reduces the financial incentive for the lender. The argument is that what is lost in efficiency is gained in successful repayment. Still, MFIs are often inflexible on payment terms and timelines (Banerjee and Duflo, 2011). If the lender is flexible but charges higher interest rates to offset the increased cost, the incentive for borrowers to take out loans is reduced.

One way for the lenders to decrease costs is to use group lending. There are many forms of group lending, but the basic principle is that a group of borrowers joins together to guarantee each other's loans. If a member defaults, the other members choose to payback the individual's loan or lose borrowing privileges with the MFI. It is then up to the group whether or not to retain the member. For example, if an unforeseen event negatively affected

an otherwise “good” group member, he or she would probably be retained. For the lending institution, economies of scale are achieved, and some of the risk of default is transferred to the group. The individuals get lower priced loans and are able to borrow with little (or no) credit history and without collateral. Group lending is like having “financial training wheels” (Churchill, 1999).

A major downside of the group lending model is that it is difficult to scale lending within the groups (Churchill, 1999) (Banerjee and Duflo, 2011). This is not necessarily a problem for individuals when borrowing for specific assets, but it is critical for lending to small and medium sized businesses. As opposed to building a credit history of on-time payments and borrowing amounts that can grow over time, the group as a whole limits what any one individual can borrow. This contrasts with client-focused lending that looks at the individual’s and business’s situation and tailors the borrowing terms and repayment timeline to a particular need.

b) Impact of micro lending

McKenzie and Woodruff (2008) used a randomized experiment to measure capital returns in Mexican micro enterprises. Firms in the sample—all in the retail sector—were randomly selected to receive either cash or equipment inputs. The inputs were provided as grants because loan acceptance may be affected by factors such as risk aversion and past experience with debt. The goal was to determine whether access to capital impacted returns. The McKenzie and Woodruff (2008) study found that returns are much higher than interest rates offered by banks and MFIs, and that the smallest firms saw the highest increase in returns. The more capital constrained the firm was, the more it benefited.

Karlan and Zinman (2009) found that expanding access to credit improves peoples’ welfare, and on the whole, business loans were profitable. While profitable, the loans did add an element of stress to people’s lives. Results of a follow-on 2011 study on micro lending in the Philippines reached a similar conclusion that borrowers’ emotional well-being was lower due to the stress of borrowing. However, businesses were better able to manage risk because of the liquidity that borrowing provided. When examining growth, Karlan and Zinman’s (2011) study concluded that micro credit did not generate business growth. This only

occurred when the borrowing was tied to business planning exercises and close monitoring on behalf of the lender.

The importance of training accompanying borrowing is supported Berge et al.'s (2015) field and lab study with Tanzanian micro entrepreneurs. Specifically, combining small grants along with business training had a larger effect on sales and profits than either training or grants alone. Interestingly, they found that men were happier as micro entrepreneurs than women. The level of happiness also impacted an individual's willingness to take on a risk, i.e., loans. Ultimately, Berge et al. (2015) conclude that finance is a long-term constraint for small businesses, but that training is an absolutely necessary component if the financing is to be successful.

c) Micro finance conclusion

Ultimately, over two hundred million people have used and will continue to use micro finance (Banerjee and Duflo, 2011), (Bayer, 2013). It is not a miracle solution, but it is certainly not a failure to the people who have used the service. Academic research shows that it can help reduce the vulnerability of individuals and small businesses. Stories of incredibly high interest rates have garnered media attention, but they are bad examples and not the norm. Average lending rates are closer to 30%, which is not unreasonable given the small loan size and high operating cost (Hudon and Sandberg, 2013).

While the benefits of micro finance are real, it is a limited solution when considering the growth in profits and scale of small and medium sized businesses. Client-focused lending and the flexibility required to ensure loans are paid is expensive. Furthermore, it is unlikely that MFIs have the resources or desire to provide business training for their borrowers. The default is more often group lending that is appropriate for one-off purchases. This means there is a missing middle ground of lending that does not exist for SMEs (Banerjee and Duflo, 2011). MFIs are appropriate for very small businesses, and corporations have access to commercial lending. More attention is needed on this gap in the middle that has been largely ignored but could have a substantial impact on economic growth, jobs and people's well-being.

B. Supply Chain Finance

The academic literature recognizes that businesses in developing countries face an array of unique challenges. However, the majority of supply chain management and supply chain finance research—as we will see in the next section, focuses on the developed world. London and Hart (2004) argue that traditional strategies of engaging this market segment may not be effective, but that there is very little empirical research as to what may be. An opportunity exists to use proven techniques and apply them to businesses and supply chains in developing countries.

1. Supply Chain Finance

The Council of Supply Chain Management Professionals (CSCMP) defines supply chain management as “the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. ... In essence, supply chain management integrates supply and demand management within and across companies” (CSCMP, 2016). A bit more succinctly and without using the term “management” quite as often, Lambert et al. (1998, p. 1) argue that supply chain management “is the integration of key business processes from the end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders.” It focuses on the flow of information and resources for the purpose of delivering something of value.

Supply chain finance is concerned with how management and operational decisions impact financial performance. Silvestro and Lustrato (2014, p. 306) define it as “the funding of each step in the commercial cycle from manufacturing, inventory management, and handling goods in transit through to invoice.” There are two key aspects of supply chain finance. The first is how businesses are acquiring and using resources. Because of lags in payments and deliveries across the supply chain, financing is often critical to maintaining buyers’ and suppliers’ cash and liquidity (Silvestro and Lustrato, 2014). The second is analyzing how well the supply chain and businesses are performing. It asks if stakeholders have made good decisions when allocating and using resources.

The academic literature is in agreement that a company's supply chain management practices and financial outcomes are related. D'Avanzo et al. (2003) found a strong connection between superior supply chain performance and financial success. Analyzing the financial statements of top supply chain management companies from 2004 – 2007, Swink et al. (2010) found that leading companies outperform their peers in most financial measures. In Shi and Yu's (2013, p. 1310) survey of 49 articles examining the relationship between supply chain management and business level performance, the authors conclude that the supply chain management literature shows "a great potential to enhance a firm's key financial outcomes." Shi and Yu break down the articles into two different categories of financial analysis: accounting and market-based. Accounting metrics focus on asset capitalization, profitability, cash flow and risk. Market-based metrics examine stock values and market returns. This research looks primarily at SMEs in developing countries, i.e., not publicly traded, so accounting metrics serve as the basis of financial analysis in the case study, i.e., how well companies are utilizing resources.

a) Performance ratios

The purpose of the analysis is to tie financial performance to operational decisions made by management. "The most important source of information for evaluating the financial health of a company is its financial statements, consisting principally of a balance sheet, an income statement, and a cash flow statement" (Higgins, 2012, p. 6). The starting point is ratio analysis. The key ratios and whether they are geared towards profitability, asset management and liquidity are compiled from Higgins (2012) and shown in Table 1.

Table 1 - Ratios for Financial Analysis (Higgins, 2012)

	Ratio	Formula
Profitability Ratios	Return on Equity (ROE)	$\frac{\text{Net Income}}{\text{Shareholder's Equity}}$
	Return on Assets (ROA)	$\frac{\text{Net Income}}{\text{Assets}}$
	Return on Invested Capital (ROIC)	$\frac{(\text{EBIT} * (1 - \text{Tax Rate}))}{\text{Interest - bearing Debt} + \text{Shareholder Equity}}$
	Profit Margin	$\frac{\text{Net Income}}{\text{Sales}}$
	Gross Margin	$\frac{\text{Gross Profit}}{\text{Sales}}$
	Price-to-Earnings	$\frac{\text{Price per share}}{\text{Earnings per Share}}$
Turnover- Control Ratios	Asset Turnover	$\frac{\text{Sales}}{\text{Assets}}$
	Fixed-Asset Turnover	$\frac{\text{Sales}}{\text{PPE}}$
	Inventory Turnover	$\frac{\text{COGS}}{\text{Avg Ending Inventory}}$
	Collection Period	$\frac{\text{Accounts Receivable}}{\text{Credit Sales per Day}}$
	Days' Sales in Cash	$\frac{\text{Cash and securities}}{\text{Sales per Day}}$
	Payables Period	$\frac{\text{Accounts Payable}}{\text{Credit Purchase per Day}}$
Leverage and Liquidity Ratios	Assets to Equity (also called Financial Leverage)	$\frac{\text{Assets}}{\text{Shareholder's Equity}}$
	Debt to Assets	$\frac{\text{Total Liabilities}}{\text{Assets}}$
	Debt to Equity	$\frac{\text{Total Liabilities}}{\text{Shareholder's Equity}}$
	Times Interest Earned	$\frac{\text{EBIT}}{\text{Interest Expense}}$
	Times burden covered	$\frac{\text{EBIT}}{\text{Interest Exp} + \text{Princ per yr} * (1 - \text{Tax Rate})}$

	Debts to Assets	$\frac{\text{Total Liabilities}}{\text{Equity Shares} * \text{Price} + \text{Total Liabilities}}$
	Debt to Equity (market value)	$\frac{\text{Total Liabilities}}{\text{Equity Shares} * \text{Price}}$
	Current Ratio	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$
	Acid Test	$\frac{\text{Current Assets} - \text{Inventory}}{\text{Current Liabilities}}$

Ratio analysis is an appropriate starting point when analyzing a company’s financial records, but Higgins (2012) notes that a few relatively simple ratios cannot tell the entire story of a complex company in the real world. Rather, the ratios are “clues in a detective story” (Higgins, 2012, p. 60). Additionally, the ratios do not have correct values, so unless they are compared to past performance, industry competitors or standards, they may not add much insight to the analysis.

The supply chain finance literature validates the relationship between the ratios and firm performance. D’Vanzo et al. (2003) used inventory turns, cost of goods sold (COGS) as a percent of revenue, and ROA to assess 636 firms over two, three-year time periods. They found that companies that improved their supply chain performance experienced higher growth rates than industry averages. Gaur et al. (2005) concluded that in addition to inventory turnover, the financial analysis of a firm should also include gross margin, capital intensity and surprise sales. The authors develop a metric for adjusted inventory turnover, which is a log-linear model that compares that compares inventory productivity across firms and years by controlling for differences in gross margins, capital intensity and surprise sales (Gaur et al., 2005).

Adjusted inventory turnover is a useful metric when comparing retail sales across companies, but it requires detailed information from multiple companies for a useful comparison. Gaur et al. (2005) use the metric to argue that retailers pursue two main strategies: a “profit path” or a “turnover path.” The profit path means earning a high profit with each sale, and the turnover path means earning a smaller profit with each sale but selling products quickly. Companies pursuing the turnover path need to turn over their

inventory more quickly, which aptly describes the consumer product companies focused on in the case study outlined in Chapter 4.

b) Working capital and cash flow

Craighead et al. (2009) measured ROA from archival data and used manager surveys to conclude that supply innovation strategy and performance are linked. Specifically, supply chain innovation strategy is linked to higher ROA. In addition to ROA, the key metrics identified by Swink et al. (2010) were “selling, general and administrative expenses” (SG&A) divided by sales, Days of Inventory (DOI), working capital divided by sales, and Days of Accounts Payable. They found that the top companies managed working capital better than their peers. The Swink et al. findings are supported by results of the *2015 Working Capital Survey*, which stated “Improvements in the cash conversion cycle (CCC) reduces the amount of time each dollar is tied up in the buying, production and sales process before it is converted into cash through sales to customers. The lower the CCC the better” (Cash, 2015, p. 3). The CCC is: *Days of Accounts Payable + Days of Inventory – Days of Accounts Receivable*.

Ellinger et al. (2011) use Delphi-based opinion data and Altman’s Z-score to assess the relationship between supply chain performance and financial success. They conclude that supply chain management “plays a major role in creating (or destroying) shareholder value by influencing three major drivers of a firm’s financial performance: revenue, operating costs, and working capital” (Ellinger et al., 2011, p. 214).

Trade credit also has important balance sheet and working capital implications. Yang and Birge (2011) find that it is an important source of external financing. It is an item under accounts receivable on the seller’s side, and under accounts payable on the buyer’s side. The Yang and Birge results are relevant to this research because they show that trade credit allows the retailer to share risk with the supplier, thus incentivizing the often smaller and more capital constrained retailer to order in larger quantities. If trade credit is not available, the supplier is forced to lower prices, thus suffering from the retailer’s lack of buying power. Trade credit serves to help the retailer and supplier share risk and limit the mismatch in financial positions of companies in the supply chain (Yang and Birge, 2011).

Cash flow is also a critical concern. “Cash—and the timely conversion of cash into inventories, accounts receivable, and back into cash—is the lifeblood of any company. If this cash flow is severed or significantly interrupted, insolvency can occur” (Higgins, 2012, p. 4). Cash is necessary for all businesses but is a particular concern for SMEs in developing countries, i.e., where financing is difficult to come by. Free Cash Flow (FCF) comprises all of a company’s relevant cash flow. It is defined as the “the annual cash flow available for distribution to owners and creditors after funding all worthwhile investment activities” (Higgins, 2012, p. 22). The formula provided by Higgins is:

$$FCF = EBIT * (1 - Tax Rate) + Depreciation - Capital Expenditures - Working Capital Investments$$

An alternative calculation of FCF by Greenwood and Scharfstein (2010) is:

$$FCF = EBIT * (1 - Tax Rate) - Change in Net Assets$$

The benefit of the condensed formula is that if the firm does not have large capital expenditures and few assets to depreciate (as is the case with the company in the case study), it uses the change in total net assets as a substitute.

c) DuPont ratios and EVA

Adding to the metrics and ratios discussed thus far, the DuPont identities offer a different take on ROE and ROA calculations. Developed by the DuPont Corporation almost a century ago, they are used to assess a company’s profitability and how well assets are utilized (Lietz and Maranville, 2008). The DuPont identities are especially appropriate for evaluating the financial health of small businesses because they are simple for managers to calculate and provide a comprehensive measure of performance. The DuPont Identities are:

$$Equity Multiplier, ie. financial leverage = \frac{Total Assets}{Equity}$$

$$DuPont ROA = Net Margin * Asset Turnover$$

$$DuPont ROE = Profit Margin * Asset Turnover * Equity Multiplier$$

There have also been modifications to the standard DuPont metrics. The value added by the modifications is that the components of ROA and ROE are broken out, allowing additional

insight into the factors impacting the overall metrics. Fisher et al.'s (2002) DuPont modification breaks out the components of ROA:

$$\text{Operating Margin (OM)} = \frac{\text{EBITDA}}{\text{Sales}}$$

$$\text{Total Asset Turns (TAT)} = \frac{\text{Sales}}{\text{Total Assets}}$$

$$\text{ROA} = \text{OM} * \text{TAT}$$

$$\text{GMROI} = \text{Gross Margin (GM)} * \text{Inventory Turnover (IT)}$$

$$\text{ROA} = \text{GM} * \left(1 - \frac{\text{SGA}}{\text{Gross Profit}}\right) * \frac{\text{Inventory}}{\text{Total Assets}} * \text{IT}$$

$$\text{ROA} = \text{GMROI} * \left(1 - \frac{\text{SGA}}{\text{Gross Profit}}\right) * \frac{\text{Inventory}}{\text{Total Assets}}$$

Lietz and Maranville's (2011) modification breaks out the components of ROE:

$$\text{Operating Profit Margin (OPM)} = \frac{\text{EBIT}}{\text{Sales}}$$

$$\text{Capital Turnover (CT)} = \frac{\text{Sales}}{\text{Invested Capital}}$$

$$\text{Financial Cost Ratio (FCR)} = \frac{\text{EBT}}{\text{EBIT}}$$

$$\text{Financial Structure Ratio (FSR)} = \frac{\text{Invested Capital}}{\text{Equity}}$$

$$\text{Tax Effect Ratio (TER)} = \frac{\text{EAT}}{\text{EBT}}$$

$$\text{ROE} = \text{OPM} * \text{CT} * \text{FCR} * \text{FSR} * \text{TER}$$

A final commonly used method of financial analysis is Economic Value Added (EVA). EVA measures a firm's ability to generate profits in excess of the cost of capital used to create those profits (Desai and Ferri, 2006). Presutti and Mawhinney (2007, p. 33) used EVA to find "a clear and direct link between how effectively supply chain activities are executed and how the business performs." EVA is calculated using the net operating profit after taxes (NOPAT), the cost of capital and the total capital. Cost of capital is determined using the weighted average cost of capital (WACC). The equations below lay out the formulas, and r_{equity} is the return expected by equity investors. r_{debt} is the interest rate on debt.

$$EVA = NOPAT - (Cost\ of\ Capital * Capital)$$

$$NOPAT = EBIT * (1 - Tax\ Rate)$$

$$CoC = WACC = \frac{Debt}{Debt+Equity} * (1 - Tax\ Rate) * r_{Debt} + \frac{Equity}{Debt+Equity} * r_{Equity}$$

Desai and Ferri (2006) argue that while EVA is similar to RONA (Return on Net Assets), it is superior to RONA because it accounts for the return required by investors who provide the capital. One of the major difficulties of using EVA to assess other companies is estimating r_{equity} and r_{debt} . Internally, it is not a problem because a firm should know what interest rates it is paying and what its investors expect to earn. This is generally not the case when analyzing outside companies however.

d) Trust, collaboration and financial performance

Cao and Zhang (2011) tie supply chain and firm collaboration to financial performance. “Collaboration can mean multiple organizations working together towards common goals, or the establishment of close, long-term partnerships where SC members work together to share information, resources and risk to accomplish mutual objectives” (Cao and Zhang, 2011, p. 166). Financial performance is measured as the effect on sales growth, profit margin on sales, ROI, and growth in ROI. The authors found that collaboration positively impacts financial performance.

Silvestro and Lustrato (2014) examined the role that banks play in supporting trust, collaboration, coordination and information sharing. They found that banks can play an active role in mediating between supply chain partners and helping integration. As trusted mediators in the supply chain, banks can help to reduce credit risk across the supply chain. Another important role of banks is supporting stakeholders with electronic payment systems. “Electronic payments and web-based technologies enable the banks to accelerate payment processing, simplify trade management and reduce process throughput times” (Silvestro and Lustrato, 2014, p. 316). Shi and Yu (2013) conclude that real financial performance benefits are realized when IT infrastructure and systems integration are aligned with overall business strategies.

e) SC finance conclusion

In their survey of the supply chain finance literature, Shi and Yu (2013) claim the research topic is “international” by pointing out that in addition to the articles looking at the U.S. and Europe, “many other countries or regions are covered by current literature” (Shi and Yu, 2013, p. 1288). These countries are Australia, New Zealand, China, Taiwan, Korea and Japan. Granted, the literature does look beyond the U.S. and Europe, but all of the countries are industrialized. Furthermore, current research draws primarily on large-scale analysis of supply chain metrics and financial ratios. As Higgins argues, the ratio analysis is a good starting point, but it rarely tells the entire story.

The supply chain finance literature is in general agreement that good supply chain management is linked to positive financial performance. At one point or another, researchers have tested all of the ratios in Table 2 and have found them to be good tests of firms’ supply chain management practices. Additionally, the relationship between “soft” factors such as trust and relationships, information sharing and integration are shown to impact financial performance. This may be especially critical in developing countries where a common issue is an inability to enforce contracts. What is missing from the literature is a focus on small and medium sized enterprises in developing countries that are not the poorest of the poor but also do not have good access to financing. The next section discusses the existing, though limited, research on supply chain finance in developing countries.

2. Supply chain finance in developing countries

a) Importance of credit and working capital

Arenas (2004) used system dynamics to model medium sized manufacturers in Central and South America. The study concluded that access to trade credit and bank financing were primary factors in business’s ability to survive and grow. For example, there was one manufacturer that had captured a third of the regional tire market but could not scale up because of lack of access to credit (Arenas, 2004). Padachi (2006) examined 58 small manufacturing firms in Mauritania. Using ROA as a measure of profitability, the study found that higher levels of inventory and accounts receivables led to lower profitability. Additionally, working capital levels and liquidity are primary concerns because the

businesses rely on owner funding, trade credit and short-term bank loans. Basically, all of the forms of financing available are of short-term nature. Combined with the fact that the small companies do not have much in terms of cash reserves, the ability to quickly convert assets into cash is critical. The firms are on the “turnover path.”

Sodhi and Tang (2014) build on their argument of integrating the poor into the supply chain by distinguishing between supporting the poor as suppliers versus distributors. As upstream suppliers, there are three models of helping the poor: reducing the number of middlemen so higher margins can be commanded, reducing the search cost of finding markets for their supply, and improving productivity. Downstream, the goal is to engage micro entrepreneurs as distributors, which can also help social enterprises and companies reduce costs. However, when supporting the poor, “Social enterprises and companies must find ways to finance the working capital” (Sodhi and Tang, 2014, p. 8).

Sodhi and Tang (2014) identify four primary means of working capital financing for the poor. The first is small, local support groups that the poor use for savings and borrowing. They can be an important source of savings and lending for people without access to commercial lending. The second is community banks that have begun to use group lending to engage the poor. The third is peer-to-peer, online-lending networks that allow people in developed countries to provide loans to individuals the network has screened. The fourth is micro finance institutions (MFIs). Sodhi and Tang are especially interested in the MFIs providing financing to the poor as suppliers or distributors and building trust through repeated business. By focusing on lending for business activities, they believe risk can be reduced, the approval process can be quicker, and borrowing limits can be increased.

b) Lessons from agricultural value chain finance

Drawing from their work with the UN’s Food and Agricultural Organization (FAO), Miller and Jones (2010) examine agriculture value chain finance in developing countries. They define value chain finance as “all of the financial services, products and support services flowing to and/or through a value chain to address the needs and constraints of those involved in that chain, be it a need to access finance, secure sales, procure products, reduce risk and/or improve the efficiency of the chain” (Miller and Jones, 2010, p. 2). The authors

point out that value chain finance is not new and that traders have been providing finance for millennia. However, a systematic viewpoint is new, and there is an opportunity to use value chain finance to help make markets more inclusive.

Using a value chain approach to finance can reduce cost and risk for smallholder farmers (Miller and Jones, 2010). To increase the likelihood of success, financial and other institutions need to look beyond the direct recipients of financing to understand the nature of the market as a whole. This will enable them to develop products and services that meet the needs of the entire value chain. Similar to Churchill's "client-based lending", Miller and Jones argue that financial products should be tailored to the needs of individuals. Agreeing with the findings of Cao and Zhang (2011), Silvestro and Lustrato (2014), and Shi and Yu (2013), Miller and Jones conclude that value chain linkages and familiarity can be used to mitigate risk. Because of its holistic approach, "It enables lenders to better evaluate creditworthiness of individuals or groups of businesses within the chain through identifying risks and analyzing the competitiveness of that chain" (Miller and Jones, 2010, p. 147).

Miller and Jones (2010) also argue that context and the business model are critical to the role that financing plays in the value chain. They stress that even if the value-chain is comprised of multiple enterprises, the business model is the process and linkages across the entire system. The business model influences the appropriate source and type of financing, and the value chain should be looked at as a single structure for the financing to be successful.

The enabling environment also heavily influences the value chain finance tools that can be employed. Similar to Claessens (2006), Miller and Jones (2010) make the point that a country's legal framework is more important than regional practices. Differences are seen at the country level within regions, so countries should be examined on an individual basis. For financial institutions, a major factor for success is intimately knowing the businesses and markets the institution is working with and in. Specialized market knowledge is critical to knowing, understanding and mitigating risk (Miller and Jones, 2010). This highlights the challenge of looking for solutions or business strategies that can apply across countries in a region. At first glance, the countries may appear quite similar. As some of the academic literature suggests however, it is not necessarily the case.

c) Supply chain finance conclusion

Arenas (2004) and Padachi (2006) examine the relationship between finance and firms' ability to grow and remain liquid. Sodhi and Tang (2014) focus on the importance of working capital finance when bringing the poor into the supply chain. (There is a disagreement there with the development literature—in terms of supporting the poor as entrepreneurs, which will be addressed in the exploratory interviews.) The Miller and Jones (2010) work addresses smallholder farmers and helping stakeholders in this space. However, their insights apply to non-agricultural supply chains. The relationship between the business model and financing source and type will be explored in the stakeholder interviews.

Most supply chain finance research focuses on firms in industrialized nations. This research seeks to add to the small supply chain finance literature in developing countries. A gap in the research exists as to how resources are acquired and utilized by actual companies across supply chains. Additionally, it will draw on proven metrics and financial ratios to assess actual performance and attempt to link resource acquisition, use and measurement. The final section of this chapter discusses literature that uses public data sets to assess supply chain and logistics capabilities at the country level.

C. Supply Chain and Country-level Performance

The supply chain literature up to this point has focused on supply chain management and financing at the firm or across-firm level. The international development literature stresses that there are fundamental differences between developed and developing countries. This section examines the broader relationship between context and supply chain management. This is done with data sets that reflect supply chain and logistics performance—such as infrastructure, costs, tariffs, and the ease of starting a business. The works cited in this section use a gravity model to estimate the effects of these factors. The gravity model assumes that trade between two countries is an increasing function of their GDP, and a decreasing function of the distance between them (Hausman et al., 2013). The main two data sets are the World Bank's Logistics Performance Index (LPI) and Doing Business Report (DBR).

This thesis does not compare exports and trade across countries. However, the previous academic work can be used to frame a country's context—i.e., its regulatory framework, infrastructure and logistics environment—when examining supply chain models and financing. The literature demonstrates that in addition to impacting firm level performance, supply chain management affects country level performance. The key factors are time and cost, regulatory quality, and transportation and communications infrastructure.

For developing countries, on-the-border costs and behind-the-border performance are especially important. Behind the border factors are things such as electricity and internet service (Iwanow and Kirkpatrick, 2007). Portugal-Perez and Wilson (2009) point out that Africa's share of world exports dropped from 2.9% in 1976 to 0.9% in 2006, and as measured by the LPI, "Transport prices in Africa are more expensive and provided at a lower quality" than in western countries (Portugal-Perez and Wilson, 2009, p. 393). Although tariff costs are sometimes blamed, the authors argued that poor infrastructure and weak institutions are more to blame for the high trade costs in Sub-Saharan Africa. Additionally, the 15 land-locked countries in Sub-Saharan Africa are particularly vulnerable to the infrastructure and stability of neighboring countries (Portugal-Perez and Wilson, 2009).

Hoekman and Nicita (2011) use the Tariff Trade Restrictiveness Index (TTRI), the Overall Trade Restrictiveness Index (OTRI), and the LPI to compare the effect of border barriers and other costs on international trade. The study found that the LPI score has the most critical effect and that trade costs "represent an important bottleneck for low income countries" (Hoekman and Nicita, 2011, p. 2077). Also, because of the importance of internal factors on a country's total trade, it is important to unpack the factors that contribute to the performance within a country. It is important to examine the components that matter within a country.

The literature is used to select the thematic areas to focus on during the exploratory interviews as well as the variables and parameters to focus on in the case study. The supply chain literature points to the explanatory power of the LPI, and the DBR represents the other

contextual factors identified by the economic development literature. Chapter 4 further examines the DBR and LPI.

D. Addressing the Literature Gap in Supply Chain Financing in Developing Countries

The international development literature argues that lack of financing is a barrier to growth and that risk and risk tolerance levels are especially affected by context. Attempts have been made to address the access to finance problem, but many of the resources have either flowed to well-connected firms, or the focus has been placed on consumers' access to finance. Lessons can be learned from micro finance, but it is clear that it is not a blanket solution for supply chains. Micro finance, though appropriate for consumer lending, is often not a viable or attractive solution for small businesses.

The supply chain development literature focuses mainly on either top down solutions driven by MNCs or bottom up solutions that include integrating the poor into the supply chain. However, MNCs do not face the same resource constraints as small and medium sized businesses, and the majority of research is already geared towards them. The limited supply chain finance literature in international development concludes that access to capital is key to success but not readily available to small and medium sized businesses.

The research on the bottom-up solution suggests integrating the poor into supply chains as producers and distributors. Specifically, there are calls to provide working capital support for micro entrepreneurs. However, it is possible—according to the economic development literature, that often times the poor become micro entrepreneurs out of necessity rather than by choice. The high turnover rate of the micro entrepreneurs in the CITE solar lantern studies lends support to this assertion. It may be a better use of resources to support small and medium sized businesses that can employ people.

What is missing from the literature is empirical research in developing countries that focuses on small and medium sized businesses in the “missing middle.” There are two core components of supply chain financing: 1) How resources are acquired and utilized, and 2) Connecting financial performance with operational decisions. Research is needed that takes a supply chain-wide view to link performance measurement with finance acquisition and

use. Proven supply chain finance tools and techniques used across wealthy countries have not been widely applied in developing countries, but it is a critical aspect of any thorough supply chain analysis. Additionally, data sets compiled by the World Bank can then be utilized to inform decisions given a country's regulatory framework, infrastructure and logistics capabilities.

The population of developing countries is over five billion people (Population, 2013). The potential for impact on both the individual level and the international economy makes it clear that additional research is needed on how supply chains are financed and the impact of these financing decisions. The following chapter draws on exploratory interviews with stakeholders from for-profit businesses, international finance organizations, and non-government organizations (NGOs). The goal is to better understand how supply chain finance decisions are thought about and made and examine the impact of those decisions.

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Chapter 3: Exploratory Interviews with Stakeholders

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Chapter 3 – Exploratory Interviews with Stakeholders

A. Introduction

The CITE fieldwork, academic literature and discussions with individuals in industry suggested that a framework that identified and codified relationships and financing structures across supply chains would serve as a useful tool for private businesses, publicly funded agencies and academics. This would especially be the case if insights could be developed that applied across multiple supply chains, industries and regions. Given the lack of prior focus in this area, empirical and interview-based exploratory research was ideally suited to address this need. The goal of this chapter is to inductively build such a framework through empirical research that goes beyond simply describing existing phenomena (Barratt et al., 2011).

This chapter uses exploratory interviews from multiple stakeholder groups to understand how supply chain and financing decisions are thought about and made by organizations and individuals working in developing countries. There are three primary objectives of this chapter. First, stakeholder insights are used to build a narrative of the current state of supply chain financing in developing countries. This has the important benefit of grounding the work within a real world scope. Interviewing was ideally suited for this as it “provided the access to the context of people’s behavior and thereby provides a way for researchers to understand the meaning of that behavior” (Seidman, 2006).

Second, the insights from the interviews are used to develop hypotheses that are tested during the case study phase of the research (see Chapters 4 and 5). Along with the hypotheses, findings from the exploratory interviews are used to begin developing a framework of how decisions are thought about and made, as well as the impact of these decisions. The academic literature strongly argues that qualitatively gathered data is ideal for forming hypotheses and producing theory based on details, evidence and examples from interviews (Rubin and Rubin, 1995). It is not simply a stepping-stone for developing theory using quantitative methods (Charmaz, 2006).

Eisenhardt (1989) says this process of developing theory consists of shaping “constructs” that are refined as evidence is built to measure the constructs. The coding

section outlines how these constructs—referred to in this work as themes—are shaped through the coding process. The themes are used to formulate hypotheses that are refined through an iterative process that compares data within stakeholder groups, across stakeholder group and across themes.

Finally, the interviews are used to identify a company whose supply chain was appropriate for a case study. The case study will test and refine the hypotheses, building in the requirement that testable hypotheses emerge in the first phase. The goal is to adhere to Eisenhardt's (1989, p. 548) requirement that "strong theory-building research yields good theory that is parsimonious, testable and logically coherent and emerges at the end, not the beginning of the study." The research questions used to meet these three objectives are:

- 1) How do stakeholders think about and make supply chain financing decisions in developing countries?
- 2) How do these decisions affect profit, sales growth and risk?
- 3) What are the key factors that impact a supply chain's success in developing countries?

Sections B and C provide detailed explanations of the interview methodology, including the academic literature used to construct the interview framework, how data is collected and how the interviews are coded. Section D contains the analysis of the interview data focusing on themes found within and across stakeholder groups. Section E proposes answers to the research questions, a framework of supply chain financing in the developing world and hypotheses to be answered in the case study introduced in Chapter 4. Finally, Section F introduces the case study.

B. Interview Literature and Data Collection

1. Interview overview and style

The goal of the interviews was to develop an understanding of how stakeholders are thinking about and making supply chain financing decisions in developing countries. The academic literature acknowledges that finance is important, but there is a gap as to what strategies are being employed, what may be effective and why. This gap is especially wide in

regards to small and medium sized businesses. The lack of understanding necessitates exploratory interviews that seek to draw meaning from the unique experiences and viewpoints of the respondents. Holstein and Gubrium (1995) call this an active interview process in which the researcher and respondent are both involved in the meaning-making of the work.

An active interview addresses not only the “what” of the topic but especially the “how.” This is important because it delves further than simply asking what an organization is currently doing or what it has done in the past. The “how” addresses why the organization made the choices it did. If those choices were made for them as a result of the context in which they are operating, an active interview will allow for these insights to come forth from the conversation. The “active” interviews were semi-structured, meaning the researcher introduces the topic and guides the discussion, but a categorical set of answers is not imposed.

Because the interviews are exploratory but also draw on existing supply chain and development literature, this research is intermediate in design (Edmondson and McManus, 2007). Additionally, it is topical and evaluative. The focus is broad and on understanding processes across many organizations, while also seeking to gauge whether those processes and supply chain financing strategies have been successful (Rubin and Rubin, 1995). Finally, the exploratory interview phase is inductive in that seeks to develop hypotheses of how supply chain financing decisions affect profits, sales growth, risk and overall business success in developing countries (Barratt et al., 2011).

2. Stakeholder groups

Following the decision to draw on interview data for the exploratory phase of the research, the next step was deciding on potential respondents. Individuals from stakeholder organizations were to be interviewed, but the key question was, which organizations? Mitchell et al. (1997) classify stakeholders by their “power” to influence a firm; the “legitimacy” of their relationship with the firm; and the “urgency” of their claim on the firm (Mitchell et al., 1997). The authors also allow for stakeholders that have potential and latent relationships. Drawing from the supply chain literature, Lambert et al. (1998) define supply

chain management as the integration of key business processes from end user through original suppliers that provide products, services, and information that add value for customers and other stakeholders. I will extend Mitchell et al.'s definition of stakeholder beyond the firm to include entities that have power, legitimacy and urgency, or a stake, in the supply chain.

Business and supply chains activities span the globe. Raw materials are sourced and shipped, products are manufactured and goods are distributed across the world. The ultimate focus of the research is on activities in developing countries, but the stakeholders making the decision may or may not be in these countries. Based on their role in the supply chain, stakeholders can have power, legitimacy and urgency from a distance. This is especially the case with multinational corporations, government bodies and international finance agencies. So, while it is obvious that in supply chain research manufacturers and distributors should be included as stakeholders, it is important when examining developing countries that government and international finance agencies are included as well.

Given the lack of financing in developing countries, it is necessary to include entities that serve as potential financing sources. Because of latent or potential relationships, entities that may desire to play a role in a supply chain are also included in the sample. This desire could be based on profit motivations—such as with manufacturers, distributors and private investment firms. It could also be based on development and more humanitarian desires, such as government development organizations and non-government organizations (NGOs). Regardless of the actual or potential role, stakeholder groups were constructed to include the different tiers of the supply chain. This was done to develop an understanding of how the stakeholders across supply chains impact resource requirements, utilization and outcomes.

I identified five stakeholder groups as sufficient for this study: manufacturers, distributors, government organizations and government-backed finance agencies, private financial agencies and micro-finance institutions (MFIs), and NGOs. I sought to strike a balance between covering all relevant processes and supply chain activities keeping the study tractable. While there are certainly other players, these five categories account for the major stakeholders across the value chain in developing countries: “the set of actors—private, public and service providers—and the sequence of value-adding activities involved

in bringing a product from production to the final consumer” (Miller and Jones, 2010, p. 11). In their work on agricultural value chains, Miller and Jones use broad stakeholder categories of financial services, value chain suppliers and supporting services. “Financial services” includes stakeholders such as banks, non-bank financial institutions, private investors and local MFIs. “Value chain suppliers” includes wholesalers, processors, local traders and farmers. “Supporting services” includes organizations providing technical and business training as well as government certifiers (Miller and Jones, 2010).

This detailed breakdown of stakeholder groups is useful conceptually to understand the types of entities within an agricultural value chain. The goal of this work however is to develop an understanding that accounts for both agricultural and non-agricultural value chains, so a more encompassing stakeholder classification is appropriate. A broad classification of stakeholder groups representing the supply chain and financing structures is a more tractable way to structure interview categories. Respondents within the stakeholder groups can then be sampled with the intent of ensuring diversity of experiences, viewpoints and responses.

The definition and logic for each stakeholder group is:

1. Product manufacturers: Representatives from small/medium sized as well as large, multi-national corporations. Major players in both upstream procurement and downstream sales to consumers.
2. Product distributors in developing countries: Distributors are a key stakeholder group as they represent the link from the manufacturer to the end consumer. Additionally, distributors serve as the in-country link to retailers and represent the on-the-ground (and more resource constrained) retailers.
3. Government and inter-government development and finance organizations: Includes US government agencies, international finance agencies such as the World Bank and regional, government-funded finance agencies.
4. Private banks, investment funds and micro finance institutions (MFIs): International banks often provide the capital that private companies require to finance production, inventory and transportation. The private investment firms are regional players and a

key component of financing companies in developing markets. It also includes MFIs which are primarily consumer lenders.

5. Non-governmental organizations (NGOs): Include development investment funds, government backed organizations, non-profit consultants, and product/service organizations.

3. Stakeholder sampling

Because of the broad research scope, focusing solely on one particular industry or supply chain and interviewing all of the stakeholders was not appropriate. Relying only on snowball sampling, while utilized, would not ensure that a point of “sufficiency” was reached. The requirement is rather that the sample should be across the range of participants that make up the population (Seidman, 2006).

Reaching the “saturation” point is critical in interview-based research. Seidman (2006) defines saturation as when the same information is being heard over and over again, and Rubin and Rubin (1995) argue that saturation is reached when “the iterative process leads to no new information.” The iterative process speaks to the researcher updating and refining his or her questions based on new, interesting and unexpected insights from the respondents. The point of “theoretical saturation” is reached when the interviewer has spoken with “enough” respondents that additional information is not necessary to build testable hypotheses (Rubin and Rubin, 1995). Critical to reaching theoretical saturation is sampling respondents for both similarity and dis-similarity.

Sampling for both similarity and dissimilarity adds variety both within and across stakeholder groups. Effort was made to contact individuals and organizations across a wide size and industry spectrum to ensure variability within responses. For example, within the manufacturer stakeholder group, it would not suffice to solely interview respondents from large multinational corporations. These organizations are generally in a stronger resource position and have a lower cost of capital, thus facing different challenges than medium or small manufacturers. The variability across stakeholders ensures different viewpoints as to how decisions are made within the organization and in relation to other actors in the supply

chain. This is important when developing generalizable hypotheses that can be applied across organizations and supply chains of different size and scope.

The ultimate goal is to reach a point of completeness from which there are enough interviews to understand a complex process (Rubin and Rubin, 1995). Prior to the start of the exploratory interview phase, a goal was set for the number of interviews to be conducted within each stakeholder group. Table 2 – Interviews by Stakeholder Group lists these goals as well as the total number of interviews actually completed within each group.

Table 2 – Interviews by Stakeholder Group

Stakeholder Group	Interview Goals	Number Completed
Manufacturers	8-10	7
Distributors	3-5	4
Governments and Government-backed Finance Agencies	3-5	10
Private Banks, Investment Firms & MFI	3-5	4
NGOs	8-10	6

The goals for the number of interviewees across the stakeholder categories vary. Additionally, the goals were met or exceeded in three of the categories and not met in two categories. This was due in part to the belief that certain stakeholder groups would be easier to access and be more willing to be interviewed than others. For example, manufacturing organizations within the MIT research network were initially the targets within that stakeholder group. However, despite multiple interview requests, only one multinational manufacturing organization contacted through the MIT network was a willing participant. Identifying willing and appropriate interview participants was challenging and for every successful interview, multiple email and phone requests went unanswered and/or actual interviews did not materialize.

Interview requests to stakeholders in the government and government-backed finance category were more successful than had been anticipated. One possible reason is that private businesses were more concerned about confidentiality, secrecy and not sharing strategic information with potential competitors. Government-backed organizations,

representing the public interest, may have had less concern about maintaining a competitive edge, and actually have an interest in publicizing the development work they do. Another possibility is that the individuals contacted were simply too busy or perhaps not the correct gatekeepers to the organization (Seidman, 2006).

Following a successful interview, the respondent was asked for contacts at organizations he or she was familiar with at different tiers in the supply chain. Contacts at different tiers helped to build in variation across respondents. For example, a manufacturer would make an introduction to a distributor—and vice versa. An international development bank set up a discussion with an NGO, and a distributor made the connection to an NGO who provided further contacts with a different distributor. There are multiple examples of these connections across supply chains and across industries that enhanced understanding of the complex supply chain linkages and relationships.

In addition to an opportunistic and snowball method that led to respondents, a key component of the sampling methodology was purposeful sampling. Just because a respondent was willing to be interviewed, it does not mean that he or she, or the organization, belonged in the stakeholder sample. There are two components to the logic of choosing respondents: the appropriateness of the organization as a whole as well as the appropriateness of the individual (Seidman, 2006). The interview would only be scheduled if a specific, appropriate respondent was identified.

The key component of reaching the saturation point—regardless of whether or not the initial interview goal in each category was met—was the quality of the interviews. The saturation point was the point at which the interviews in each category were discontinued as opposed to reaching the goals outlined in Table 1. The questionnaire and interview mechanics are discussed in the next section, but the quality was in large part determined by the appropriateness of the respondent. The researcher must “assign competence” to the respondent, whereby the quality of the respondent is based on his or her assigned competence in the field (Holstein and Gubrium, 1995). This is critical as a relatively small number of interviews were conducted and a statistically representative sample is not claimed. Competence was assigned first to the organization using website information, annual reports, news articles and other public sources. Individuals were assigned

competence using organization-published biographies, recommendations from other individuals, and email correspondence.

Ultimately, respondents were gathered through a hybrid approach of snowball, opportunistic and purposeful sampling. Previous research, government and local contacts were utilized to generate initial respondents who were in turn extremely important in cultivating further contacts. All were filtered for appropriateness, but in addition to choosing not to interview an individual on those grounds, it also went the other direction in that sometimes individuals had to be convinced they were appropriate and competent respondents. This was especially the case with smaller organizations that did not have specific supply chains or finance departments.

For example, a medium-sized manufacturer or distributor in India or East Africa most likely does not have an individual who thinks solely about supply chain financing. What they have is a regional manager or operations manager who focuses on relationships with upstream suppliers and down-stream customers. Financial arrangements are a crucial part of their operations, and this research is interested in how the mechanisms of that relationship affect profits, growth and risk. Even if the individual or the organization did not think about their operations from a supply chain financing standpoint, their input was interesting and highly relevant to this research.

4. Questionnaire by stakeholder group

The structure of the interviews was similar across all interviews, but a tailored questionnaire was developed for each stakeholder group based on position within the supply chain. Identical questions could not be asked to manufacturers, distributors or financing agencies that have different roles, activities and objectives throughout the supply chain. Stakeholder group-tailored questions enabled an understanding of the product, information and financial linkages across the entire supply chain. Different stakeholders have different stocks of knowledge and viewpoints based on their position within the supply chain (Holstein and Gubrium, 1995). This depends on both their role within the supply chain, i.e., manufacturer versus distributor, and also their importance and influence within a particular supply chain.

Because stakeholders have different roles in the supply chain, tailored questionnaires also allow for what Holstein and Gubrium (1995) call “multi-vocality,” meaning that respondents may take on different voices based on the specific role they are discussing. A social impact product distributor may seek to generate positive financial returns while focusing its business activities to support products that generate a “societal good.” Additionally, a distributor functions as both a customer to its upstream suppliers and a supplier to its downstream customers. Tailored questionnaires allow for the exploration of these important nuances. Following the first interview in each stakeholder group, the questionnaires were tailored based on lessons learned with the respondent. If a lesson was applicable across all of the stakeholder groups, the other questionnaires were changed as well.

The structure of the questionnaires was the same across all stakeholder groups, divided into three sections: Positioning, Focused and Strategic. A sample questionnaire for the manufacturers and international financier stakeholder groups can be found in the appendix. The interview opened with a brief description of the research purpose and interview focus, as well as the protections that would be offered to the respondent. The questions in each of the three sections consisted of main questions, follow-ups and probes. Topical interviews are structured around main questions, which get people talking and draw on the academic literature and previous fieldwork. They serve as the interview guide, but do not need to be followed rigidly (Rubin and Rubin, 1995). Follow-ups expand on responses to provide details and examples. Probes keep the respondent going and encourage the continuation of a particular point or topic.

The Positioning section sought to get the respondent to discuss her or his—as well as the organization’s—purpose, motivation and background. This served as both an introduction of the individual’s work and allowed the researcher to determine the direction of the interview. An example of a main question in the Positioning section is: “Can you tell me about your organization’s background and primary focus?” Examples of follow up questions to this main question are “What are the different activities your organization supports? Where do you operate – region or country? What is the overall budget and size of your operations?” The follow-ups were calibrated on what the respondent did or did not

share when initially answering the question and provided the researcher with an idea of how to transition to the focused section. Additionally, the Positioning section served as a warm-up period for the respondent. People are not interviewed every day, so beginning with questions that require descriptive responses on familiar topics are a good way to develop a rapport and build momentum before transitioning to deeper, and potentially more sensitive questions.

The Focused section was the core of the interview, and was constructed around concepts identified in the literature as the major areas of concern: financing availability and utilization, risk and risk mitigation, and context. I crafted the questions to understand the processes of the organizations and how both the individual and organization thought about these issues. When interviewing respondents from the international funder and government stakeholder group, an example of a main question was “What is the goal of your financing activities and how do you measure success?” Follow-ups to this main question included “Does it depend on: Profits for the organization or the company? Getting a certain amount of products or services to people in need? How do you measure social impact and what is the logic behind this strategy?” Probing questions are more difficult to structure beforehand but were used to further develop the meaning behind what the respondent was saying. Probes were especially useful when the respondent brought up unexpected or new concepts that the structured questions did not address (Rubin and Rubin, 1995).

The Strategic section was more open in that the respondent was asked to consider broader topics. For example, the first question in the Strategic section was, “What would you say is the biggest opportunity or challenge facing the developing world today?” This question is obviously quite broad and a follow up question to narrow the scope such as, “What is the biggest challenge (or opportunity) that your organization faces in the developing world and what role can/does financing play?” was often required. The question was left intentionally broad, so the respondent could take it where he or she desired. Multiple instances occurred when the open/strategic questions led to additional follow-ups and probes that produced previously unmentioned insights.

Early on in the process I experimented with asking the Strategic questions prior to the Focused questions, but it was difficult to get relevant responses without the framework

of the earlier discussion. So, even though the questions were left purposely vague, most respondents framed them in a way that tied in to the discussion on financing availability and utilization. Section 5 will address how the interviews were conducted and how questions were tailored to specific respondents based on background information collected prior to the interview.

5. Interview execution

Thirty-one interviews were conducted over a four-month period. Following an initial contact by email to determine willingness and schedule availability, an appointment was made and the mode of communication was agreed upon. The interviews were primarily conducted over the phone and Skype. Two of the respondents were local, so those interviews were conducted in person. In-person interviews would have been preferable, but Skype and phone conversations were the best available options due to the global distribution of the respondents. This type of exploratory work would not have been feasible without the ability to conduct the interviews from a distance. What was lost in inter-personal communication was made up for in the ability to cast a larger net of respondents.

The questionnaires in the appendix include the opening script, which highlights the purpose of the interview and the academic usage of the data. Assurances were provided that the information shared was confidential and all responses are aggregated as coming from a stakeholder group. Quotes and findings are not attributed to particular organizations or individuals. Permission was requested to record the interviews. All but one of the respondents granted permission to record. To protect the confidentiality of the respondents, the recordings are stored in encrypted, password-protected files.

The interviews were structured to last between 45 to 60 minutes in order to not monopolize too much of the respondents' time and because of the concern that lengthy conversations would cause a loss of interest. Using the tailored questionnaire as a guide, but not a strict regimen, the target length was mostly adhered to. Three of the interviews lasted only 30 minutes—one due to a time constraint on the part of the respondent, and the others due to the brevity of the responses to questions. When the respondent had the time

availability and was still actively engaged, a number of the interviews went well over an hour.

To accomplish the interview in the target time window, background research was conducted on the specific activities, programs and financial statements of the organization (Rubin and Rubin, 1995). This was especially relevant for interviews with stakeholders in the public realm—government and government-backed finance agencies, NGOs, and large corporations. Information was much easier to find on organizations with a requirement or a desire to disclose financial statements and programs.

The background research helped strengthen the respondents' confidence that the interview was a valuable use of her or his time. The opening script stressed that the information would only be used for academic purposes, and the research goal was to provide a benefit to stakeholders in the field, but the respondents perked up when questions were tailored to the specific programs outlined in annual reports or financial statements. Respondents engaged more deeply in the conversation and seemed to appreciate that background work was put in to understand the organization. Respondents are often more willing to share insights when the researcher conveys knowledge on the organization and topic at hand (Rubin and Rubin, 1995).

Additionally, background research increased the quality the interview through better follow-up and probing questions. More attention was placed on primary areas of interest such as how decisions are made, the goals of those decisions, and the outcomes of those decisions. The time was not consumed with basic descriptions of the organization and its work. Background knowledge enabled the interviewer to reach the “how” and “why” level of understanding (Yin, 2014).

Hand-written notes were made during each interview, and one to two pages of typed notes were completed after each interview. The notes focused on the quality of the interview in terms of how the interviewer performed and also the depth and clarity of the discussion. Early in the process, the notes focused on procedural improvements. As the quality of the interviews increased throughout the process, the notes began to reflect the themes that emerged as the stakeholder sample became larger. The interviews became more interesting

and insightful throughout the process—the respondents did not change a great deal, but the interviewer improved.

6. Transcription and validation

All of the successfully recorded interviews were transcribed. The researcher transcribed the first four, and the rest were done by a third-party transcription service. After receiving the transcriptions, the recordings were verified for accuracy. The validation process was important for a number of reasons. Much of the language used during the discussions was based on supply chain and financial concepts not well known to an outside observer—or transcriber. A number of the respondents were not native English speakers, and without the context of the conversation, it was difficult for the transcriber to understand portions of the discussion. Finally, a number of the words and especially names of products and companies were foreign names that were important to the conversation, but not clear unless one was familiar with the topic. If it was still unclear what the respondent had said during the interview, a note was made in the transcription.

There was one recorder failure, and it was noticed immediately following the interview. Equipment failure or sensitivity on the part of the respondent is not out of the ordinary (Lin, 2000). To address the lack of recordings in two instances, additional notes (four – five pages) were written up to describe and capture the major insights from the interviews. The data from the un-recorded interviews is used in the on-going analysis.

C. Interview Coding

1. Coding overview

When the saturation point was reached, the next step was coding the data. “Code” can have multiple definitions/uses in the context of interview research: masking or encrypting information, a tool for tagging and indexing text, or a value that indicates the amount of a particular characteristic. Codes can be based on single words, complete sentences or entire passages and documents (Kukartz, 2015). Rubin and Rubin’s (1995) description of coding as grouping interviewees’ responses into categories that bring together similar ideas, concepts, or themes discovered is the most relevant to this research. A code refers to a theme or sub-theme that is used to categorize a statement or passage spoken by a respondent.

Charmaz (2006), writing from a grounded theory perspective, defines coding as the pivotal link between collecting data and developing an emergent theory to explain the data. The coding process helps to define what is happening in the data and allows the researcher to “grapple with what it means.” Grounded theory methods are borrowed from, but this is not grounded theory research in that respondent selection, guiding questions and coding process are based on previous field and academic work. A crucial component of coding is ensuring a consistent process. Holstein and Gubrium (1995) argue that the meaning-making process must be empirically documented and that active interviews consist of simultaneous coding and knowledge construction.

2. Coding and identifying initial themes

Coding is the basis for the data analysis, and a key question is how to begin grouping, coding and summarizing the data? Rubin and Rubin (1995) suggest that the first step is to pull out all material that belongs in one thematic category, and then look for variations and nuances within the category to determine meaning. Specifically, the researcher should: 1) Re-read all the transcripts. 2) Group together responses that describe the same ideas or process and examine everything in the same category, i.e., the initial coding process. 3) After dividing the data into smaller categories, reassemble the information into themes and arguments. 4) Figure out the theoretical or policy implications of the data. 5) Go back and re-code the previously coded data with the new themes. A key point is that coding is an iterative process (Rubin and Rubin, 1995).

A hybrid deductive and inductive process was used to build the themes during pilot coding (Rubin and Rubin, 1995). Prior to the coding start, I established preliminary categories that I thought would capture what the interview respondents had shared. This was the deductive phase. Throughout the coding process then, I inductively added categories as I went along. This was done when ideas or concepts shared by respondents did not fit in an existing category or sub-category. The inductive part of the process is quite similar to open coding done in grounded theory (Charmaz, 2006) and (Kukartz, 2015).

3. Pilot coding

This research draws upon thematic categories from the stakeholders' input on how financing is used within organizations and supply chains. Thematic categories refer to specific content, topics and arguments (Rubin and Rubin, 1995). To begin the pilot coding phase, a representative interview was chosen from the five the stakeholder groups. The interviews were selected based on the "quality" of the interviews following a re-reading of all transcripts and notes. Five of the thirty-one interviews were used to pilot the coding process. An interview from each of the stakeholder groups helped to build in variation during pilot coding.

Nine coding themes were identified prior to beginning. Examples of these themes were "availability of financing," "risk and risk mitigation," and "government regulations, policies and taxes." The nine initial themes were based on the development and supply chain financing literature as well as the transcript reviews. Each of the themes was assigned a numeric code, and the numbered transcripts were reviewed on printed, paper copies during pilot coding. If the interviewee's response corresponded with one of the deductive codes, the beginning and end of the applicable portion of the response was highlighted and assigned the code. It was okay if a single text passage was assigned to multiple categories, and coded passages were allowed to overlap. Overlap of coded passages—especially across different respondents, often leads to interesting insights (Kukartz, 2015).

Frequently the interviewee's response did not fit a category outlined by the initial, deductive codes. The inductive portion of the coding was therefore critical to theme identification. When this occurred, an additional category was developed and assigned a numerical code. Each time a new code was developed, the transcript it originated from was noted. For example, in the first transcript reviewed, the very relevant themes of "the ability of a supply chain to scale" and "the role of the labor force and training" emerged. These two categories were assigned codes of "1-10" and "1-11" respectively, to note that the themes were the tenth and eleventh categories and they originated in the first interview. Because it was the first interview I did not have to go back and re-code previous transcripts. However, themes of "test and proof of concept prior to scale" and "target impact group" emerged in the second interview. These categories were noted as originating in the second interview,

meaning the first interview needed to be re-coded with the additional themes. This highlights the iterative nature of the coding process in the pilot phase. The transcripts coded during the pilot phase had to be re-coded multiple times as additional themes emerged. The total number of categories identified during the pilot-coding phase was 30. These were broken down into five over-arching themes.

4. Coding challenges and validation

Regardless of an inductive or deductive method, the categories should be disjunctive and exhaustive (Kukartz, 2015). The categories must represent different aspects of the phenomena as explained by the respondents and include all relevant, potential themes. Following the pilot coding phase, a validation effort was undertaken with the thesis committee. This effort included a review of the themes and categories developed during the deductive and inductive stages to ensure all potential themes and categories were accounted for. Additionally, a key dimension of coding is consistency and reliability. The comparison of coded interviews amongst the committee members sought to improve inter-rater reliability.

An un-coded transcript and the list of themes and categories were sent to three committee members. Once each of the committee members read and coded the transcripts, the transcripts were compared for consistency. The results of each individual's coding efforts were discussed, and while the results across each coder were similar, three issues emerged that were corrected prior to coding the full set of interviews. The first corrective action was a re-alignment of themes. Acquisition of capital and financing was aligned with the use of capital under one over-arching theme. This was important because it aligned the sub-categories associated with how stakeholders would acquire, provide and utilize financing with the supply chain flows of materials, information and money. Additionally, it delineated between acquisition and usage of capital versus why the organization made that decision. It is an important distinction between what organizations and supply chains are doing against why they function that way.

Second, coding validation identified the need for a realignment of categories and specific definitions of themes and categories. Coding is a balancing act as to the "correct" number of coding categories. Categories should be precise enough to adequately

differentiate between the concepts being explained by the respondents but also broad enough not to require an overly large number of codes. To alleviate minor points of confusion following the coding validity check, the first solution was to re-align the coding categories. In addition to delineating between capital acquisition and usage, the supply chain flows and data management were aligned under one theme and the effect of labor and training under another. The themes and categories were then defined. This was a crucial step because the definitions of each code were based on the interview data, and it provided consistent guidance during the full coding as to where the applicable response belonged. It was especially helpful in addressing the final issue identified during coding validation.

Passages should be coded based solely on what the respondent said. It may seem obvious but this was initially difficult given that themes were in part based on previous academic and empirical research as well as the overall knowledge of what the different respondents discussed during the interviews. There was a desire to interpret and analyze the data while coding, but the coding phase is not the “meaning-making” portion of the work. Codes should be applied based on the actual data as opposed to the researcher’s interpretation of how the response fits into the research framework and hypotheses. That is done in the analysis phase, but the initial coding should stick closely to the data (Charmaz, 2006). The validation sessions helped to identify this and ensure that the themes and categories were used to appropriately code the respondents’ own words. Precise definitions of each category helped to alleviate this issue.

5. Final Themes and Definitions

The codes show how data is selected, separated, and sorted prior to beginning an analytic accounting. It is “the pivotal link between collecting data and developing an emergent theory to explain these data” (Charmaz, 2006). Five over-arching themes emerged from the initial coding of the exploratory interviews.

The first is *Availability of financing, capital deployment and supply chain structure*. This theme represents financing source and use, the structure of the supply chain, and the corresponding financial, material and information flows. There are nine categories within this theme.

The second is *Objectives of financing activities: including profits, scale, access to products and people impacted*. This theme is geared to understanding “why” the organization made the decisions it did, including its guiding philosophy, strategy and aspirations. There are eight categories within the theme.

The third theme is *Risk and risk mitigation*. This represents the major risks the organization considers, the source of these risks and steps taken to mitigate the risks. There are seven categories under the risk theme.

The fourth category is *Contextual factors* such as local culture and norms, government regulations and corruption. There are six categories in this theme.

The final theme is *Long-term challenges and opportunities*. There are two categories in this theme, which were based on interviewee responses to the strategic questions at the end of the interview. The total number of categories outlined was 32, and the full list of themes, categories and definitions can be found in the appendix.

6. Qualitative data analysis software (QDA)

Recognizing that the refinement of codes could go on indefinitely, once satisfied that the themes, categories and definitions adequately represented what the respondents were communicating, the full data set was coded. NVivo, a qualitative data analysis (QDA) software, was used to code the interview transcripts. QDA software is widespread in qualitative research and offers tools such as cross-tabulation, the ability to easily organize and reorganize data, and statistical analysis (Kukartz, 2015).

The interview transcripts and notes for interviews without transcripts were transferred into NVivo and classified by stakeholder group. The themes, categories and definitions were then defined in NVivo. All interviews were re-coded using the finalized coding scheme. The interviews were coded one at a time by reading each transcript and using the software to annotate the sections that corresponded with a particular theme and/or category. It is appropriate to code data directly into categories, especially when working with large amounts of data (Kukartz, 2015). A benefit of QDA software is that the category to which a section is coded is automatically associated with its over-arching theme.

The length of the coded section was determined by what the respondent said. While specific words may have served as the trigger to code a response, multiple sentences and even paragraphs were included when the respondent was elaborating a relevant point. Coded sections also included the interviewer's question to grasp the relevant context of the data. Codes were allowed to overlap, and multiple codes could be applied to the same section. For example, it was often important to link the source with the type of the financing, or how certain contexts affected perceived risk. Both instances required multiple codes. The advantage using a QDA is that it is easy to code passages, but this can also be a drawback in that there is the potential for over-coding. However, over-coding would appear to be less of a problem than under-coding, and while it may make the analysis process more onerous, it is not a threat to validity.

7. Memos

Throughout the interview and coding process, it was important to document the findings and hypotheses that began to emerge. Memos should contain "thoughts, ideas, assumptions, or hypotheses," and may be short notes or reflective comments regarding the content that serves as the building blocks for the final report (Kukartz, 2015). Memos help bridge the gap between the coding and writing process (Charmaz, 2006). The memos focused on exploring what the respondents were saying, findings within and across stakeholder groups, and themes that began to emerge. The memos functioned as a crucial link between the research questions, the coding process and the data analysis discussed in the next section.

D. Interview Analysis

1. Analysis overview

The first step after coding the data was developing a plan of how the analysis would proceed (Brinkmann and Kvale, 2015). This was important given the quantity of coded data and to align the data analysis method with the desired research outcome. A thematic method was utilized to analyze the data. It is a common method in qualitative content analysis, and is well suited for problem-centered and focused interviews (Kukartz, 2015).

The themes that emerge from the analysis should help the reader understand how the research fits together (Rubin and Rubin, 1995). Based on the themes and categories, the coded data is used to put together an integrated explanation and answer the research questions. The data analysis weaves the themes and concepts together into broad explanations (Rubin and Rubin, 1995). The analysis should be guided by the research questions:

- 1) How do stakeholders think about and make supply chain financing decisions in developing countries?
- 2) How do these decisions affect profit, sales growth and risk?
- 3) What are the key factors that impact a supply chain's success in developing countries?

2. Matrix development

The researcher needs to determine how to effectively communicate the findings to a reader who is not as intimately familiar with the data. The next step then was placing the coded data into profile matrices aligned by respondent and category. Each stakeholder group had its own set of matrices. While enabling a more convenient management of the data, it also allows the researcher to ask questions and look for phenomena such as: are the examples uniform? Is there a nuance that was missed? Should categories be further broken down? Do contradictions exist that have not been fully explored? (Rubin and Rubin, 1995).

The profile matrix is key to qualitative text analysis and organizes the interpretation of the data (Kukartz, 2015). The matrices are thematic matrices, i.e., they are organized by theme. An example matrix is illustrated in Table 3 – Distributor Coding Matrix: Risk. The matrix represents the Risk theme for the distributor stakeholder group for three of the seven risk categories. The categories within the theme are displayed in the top row, and the respondents (names kept anonymous) are in the first column. If a respondent has a coded response in a category, a summary note is made in the applicable category. If a respondent has multiple coded responses in a category, multiple entries are made in the matrix.

Table 3 – Distributor Coding Matrix: Risk

	C-1: Unrealized Demand & Capacity to Pay	C-2: Willingness to Pay, Relationships & Trust	C-3: Diligence and Local Familiarity
Respondent 1	- For their retailers, the items in the catalog are the most expensive and must sell relatively quickly	- When providing credit, often have to track down retailers for payments, which is costly and time-consuming.	- Retailers give informal credit offerings to trusted customers in their community. They know who their customers and it's much more affordable than MFIs..."They know will repay and who will not....the relationship is the verification process."
Respondent 2	- Forecasting demand was critical. Suppliers for construction-type materials couldn't commit to huge potential variation. Especially if it was one off or if there wasn't an organic, local market to take the excess capacity.	- Coaching the supplier and having a local operation on the ground is what enabled them to beat competitors consistently	- Also hired regional/local people who spoke the language and were familiar with the market. Strictly phone and email contact did not work...especially in the developing markets.
Respondent 3	- Risk of lending is mitigated by knowing the value that the product provides, i.e., daily/monthly savings on kerosene and charcoal	- Not a WTP issue. Customers don't want to lose financial services. People are grateful for the aspirational products and word of mouth has been a huge advertising aspect when people have a positive experience.	NA
Respondent 4	Some companies too eager to give credit means they have products that aren't moving quick enough. Other higher priced ones would be useful to have more credit.	- To mitigate risk w/ sales force, they turn in the products daily on consignment. Less than a 1% loss rate.	- A pilot interview round with 300 people led to the creation of their business model...that's how they focused on creating sales jobs as opposed to supporting micro entrepreneurs.

NVivo allows for easy sorting of coded passages by theme, category, stakeholder group and respondent, but the actual transfer process is a manual process. The responses must be shortened from the original, fully coded passage in order to make the matrix viewable in one location, making the analysis possible. The tables are constructed in Microsoft Excel and initially focus on within theme-within stakeholder group analysis. They can then be easily re-arranged and integrated to look across theme and across stakeholder group. A summary analysis is then produced for each data arrangement. This ensures the analysis for each section is framed within a coherent narrative guided by the research questions. The analysis sections are then used to generate testable hypotheses. Before transitioning to the analysis section, a brief discussion of coding statistics is included.

3. Coding statistics

The total number of passages coded throughout the interviews is 1,847. The breakdown of the number of codes by theme and stakeholder group is shown in Table 4 – Coding Statistics – Number of Codes & Percentage of Total Group Response.

Table 4 – Coding Statistics – Number of Codes & Percentage of Total Group Response

	Capital Availability & Use		Objectives & Measurement		Risk & Risk Mitigation		Context		Opportunities & Challenges	
	Total Codes	% of Group Responses	Total Codes	% of Group Responses	Total Codes	% of Group Responses	Total Codes	% of Group Responses	Total Codes	% of Group Responses
Manufacturers	202	44%	126	28%	66	15%	43	9%	18	4%
Distributors	120	41%	79	27%	41	14%	48	16%	7	2%
Govt & Int'l Finance Agencies	187	37%	156	31%	86	17%	62	12%	9	2%
Private Financiers	127	46%	53	19%	70	25%	25	9%	3	1%
NGOs	194	46%	127	30%	61	15%	26	6%	11	3%

The first column under each theme shows the total number of coded responses within the theme for each stakeholder group. The second column “% of Group Responses” is the percentage of codes within the theme against the total coded responses of the stakeholder group. The codes are more heavily weighted towards capital availability and use, then objectives and measurement, risk and risk mitigation, context, and opportunities and challenges. This trend does not hold in two instances. There are more codes in risk and risk mitigation than objectives and measurement for the private financier stakeholder group. Distributors had slightly more codes in context than in the risk theme.

The distribution of codes indicated in Table 3 is not surprising given the category numbers indicated in Section C-4. Themes with more categories had a higher percentage of codes. Stakeholders groups with more respondents also had a higher number of total codes. Coding statistics were produced for each stakeholder group by category but are not included in the analysis. Table 3 is included to provide an idea of the total number of coded responses and because many readers would expect to see such a breakdown.

The interviews were semi-structured and tailored to the stakeholder group and specific respondent. The statistics do not give an accurate picture of the quality of the interview. For example, detailed and longer responses in one theme or category may have meant time expired before another category could be addressed. The meaning-making and interesting insights are found in what the respondent said, not the number of codes addressed.

The following analysis sections are therefore qualitative, not a statistical breakdown of what topics the respondents discussed, and are used to generate findings and hypotheses. The analysis is divided into three sections: 1) Within theme and within stakeholder group—a narrative overview of the stakeholder group and the relevant points within each theme. 2) Within theme, across stakeholder group—consolidates connections across the themes from the different stakeholder groups. 3) Across theme and across stakeholder group—discusses the over-arching findings across the interviews.

4. Manufacturers – within theme

The manufacturer stakeholder group is comprised of seven respondents, five from small to mid-size companies that focus specifically on developing markets and two from a multinational corporation. The five smaller organizations are durable goods companies in the renewable energy sector. The multinational corporation has a wide range of consumer products and has sourcing and manufacturing operations across the globe. One individual works in manufacturing, the other in sourcing.

a) Capital availability and use

The businesses and supply chain activities revolve around traditional sales models, pay-as-you-go (PAYGO) services—in which the end user leases a product from the company,

and upstream sourcing activities. The size of the company plays a major role in how the manufacturers acquire, provide and use capital, both within their own businesses and across the supply chain.

Three companies (including the PAYGO) import finished goods from manufacturing operations in China, and two produce in East Africa. Due to lack of availability, the two companies that manufacture in East Africa import raw materials. The import lead-time, regardless of where the products are manufactured, has a working capital impact. The time from when orders are first placed to when the product is sold is usually between four and five months. The companies generally do not get favorable trade credit terms from suppliers, and payment installments are due when the product is ordered and shipped. There is a cash gap from when the costs are incurred to when revenues are generated. This may be standard across many industries, but because of the capital positions of the manufacturers in the sample, the downstream supply chain partners feel the ramifications. To cover import costs, the manufacturers secure short-term loans to finance their working capital.

The companies selling to downstream customers utilize multiple sales channels to move products to customers. This includes selling through local distributors, large retailers such as supermarkets, an independent sales force, and partnerships with large businesses and financial institutions. Reaching customers through multiple sales channels is a primary strategy, and the channels have different challenges and financing requirements.

The decision to provide credit terms to distributors is based on the relationship and trust with a distributor. Trust and relationships will be further discussed in the risk section. Supermarket and large retail chains require credit and often dictate the terms, or they will not carry the products. Manufacturers generally do not provide end consumer financing, but a growing sales channel is through partnerships with local MFIs, banks and corporations that provide asset financing to their customers and employees.

One of the stakeholders that imports finished goods has had recent success after opening larger warehouses in East Africa. Previously, its distributors were required to order a half or full container load of products. The manufacturer required partial payment up front and full payment upon shipment (the same as the arrangement above), which meant that

tens of thousands of dollars were tied up in working capital while the product was in transit. The order size requirement and payment terms did not change after the warehouses were opened, but the lead-times became weeks instead of months. The manufacturer incurred increased costs, but customer orders increased. The stakeholder said, “It looked like a logistics solution, but it was actually a financing solution.” The company was growing vertically by expanding its logistics presence in the market, which had the added benefit of lowering the working capital requirements of its partners. Another manufacturer has recognized a similar need and works with a development agency that established a revolving working capital fund for distributors.

In the PAYGO model a company leases a product to a customer, and the consumer pays for the service the product provides. This is becoming more prevalent in the solar lighting realm. Upon deciding to order the product, the customer works through a local sales agent and pays a small down payment that covers the logistics costs of getting the product to the customer. Using SMS mobile technology, the customer pre-pays daily, weekly or monthly. If the customer does not “top-up” for long enough, the sales agent collects the product and puts it back into the company’s inventory for redeployment to new customers. The benefit of PAYGO is that the down payment is small, and the customer is only required to pay in small increments for desired services. In terms of working capital, however, the products stay on the company’s books for an extended period of time, and the repayment period is lengthy given the low service charges.

The tracking of physical, financial and information flows is very important for the manufacturers. For the smaller ones especially, the timing of funding in-flows is very important. Multiple respondents received development grants that came in tranches, which in one case meant that only “half the factory could be built.” The tranches are seen as reducing the risk for the granting agency, but delayed funding flows have in impact when time is a concern. For end consumer financing, the speed of the loan application and approval process is critical.

b) Objective and measurement

All of the manufacturers are for-profit companies. The goals are profits and growth, but there is also an impact focus. The impact focus ultimately comes down to improving lives for the people they buy from and sell to, and the common denominator is creating impact through commercial activities. Whether it is providing financing for smallholder farmers or providing energy access for people not connected to the grid, the manufacturers see impact and financial sustainability/profits as inseparable. All of the stakeholders want to scale and the only way to achieve sustainable growth is through commercially successful ventures. Financing is viewed as a critical enabler of scale for all of the stakeholders,

Scaling requires investment in working capital, facilities, and hiring and training a labor force. For the product companies, the growth strategy is of course selling more products to consumers, but there are a couple of key points regarding this strategy. One respondent highlighted that within a particular channel, “sales hit a wall between 12 and 24 months.” One solution is to add new sales channels—partnerships with corporate and financial institutions were discussed in the previous section. Another path to scale is through expanded product offerings. As the brand gains a trusting customer base through high quality, lower-priced products, the goal is to sell the original customers different and more expensive products. For example, a solar company wants to sell a solar home system to the household that originally purchased a single solar lantern. The key to successfully doing this while capitalizing on economies of scale is building out and owning the distribution network. The manufacturers actually want a vertically integrated supply chain they control.

From a sales standpoint, the key to scale for manufacturers is demonstrating the value proposition of their product. International development agencies and NGOs are concerned about environmental effects and emissions, but for consumers, the key selling point is the cost savings. This is not to say that consumers do not also care about health effects of traditional, dirtier cookstoves for example, but this is not the point that manufacturers make when selling. The mantra of one manufacturer is, “Market, don’t educate.” Especially for relatively expensive products that may require a loan, the product must be something the consumer is willing to pay for. Pricing and subsidies were of particular concern to the manufacturers.

A challenge they face when growing their operations is overcoming “a culture of getting stuff for free.” One respondent put it not so lightly as, “Aid has ruined Africa.” He continued saying, “Aid is just -- it’s terrible, and there is this attitude with an organization that’s run by white people. It’s kind of like, well this is great. Why isn’t it free? And that’s not -- it’s just not sustainable to the solutions in Africa.” The organizations believe in a model in which commercial activities offer the best chance of lasting change. When products and prices are subsidized by grants, donations and giveaways, it is especially problematic and can destroy markets. For them, the value of for-profit business means that organizations will not have to go back year after year asking for handouts. The same respondent tempered his comments by saying, “The people on the giveaway side don’t have bad intentions, they just manage poorly.”

The multinational corporation (MNC) wants to ensure its future raw material supply base. This means the smallholder farmers it buys from need to be in business years down the road. Helping the small farmers reach the point where they are commercially bankable is key. The MNC’s strategy is for its suppliers to be a part of the scaling process. Because of the resource position of the MNC, it has the ability to invest with a longer time horizon in mind than the smaller product companies. The challenge is bringing other supply chain partners and financial institutions on board when there may not be an immediate payoff. The MNC has to take on additional costs, but because of its size and power in the supply chain, it can require that its supply chain partners implement the programs. In addition to onboarding its supply chain partners, training and educating on financial literacy and good agricultural practices is a key component of the program. The MNC also partners with international development organizations to fund these activities.

c) Risk and Mitigation

For the manufacturers, risk mitigation almost solely depended on relationships. The primary risk mitigation strategy is only doing business and providing credit to trusted supply chain partners. There is almost a complete lack of faith in the ability to use the courts or official channels to remediate contractual disputes in countries where the manufacturers operate. The companies use debt collectors and credit reference bureaus, but the systems in developing countries are not as advanced or effective as those in place in more developed

countries. Credit agreements are then scaled as partners, often distributors, prove trustworthy. If customers adhere to the original agreement, terms are expanded.

Every company seeks to avoid losses, but small and medium sized product companies are especially concerned about lack of payments because of how costly the losses can be. The margins are relatively small, and it takes a large amount of revenue to offset losses. For example, the margins for one manufacturer are 10% (this is not uncommon in the durable consumer goods market in developing markets). If a distributor refuses to pay a \$5,000 bill, it would take \$50,000 in sales revenue to make up for that loss.

In the PAYGO model, payment risk is mitigated by pre-payments. If customers do not pay, there is no access to the service. It is remotely shut off until the customer “re-ups”. A concern with the PAYGO model is that if enough customers do not pay, the company is not bringing in revenues. And, if the products have not been in place long enough (and used enough) to where the cost of the goods sold is covered, the company is re-paying the loan without revenue coming in. Additionally, there is a cost of re-deploying the product. The PAYGO respondent did not feel there was a serious threat of product tampering or theft.

Another key to building relationships is being present on the ground and hiring locals who are familiar with the market and can facilitate relationships. As one manufacturer described, “It needs to be a local selling to a local.” Manufacturers are not particularly concerned with payment uncertainty due to demand. If products do not sell through a particular channel, they can be shifted to other channels. This will entail a cost, but they do not see it as a threat to their businesses.

d) Context

On the product side, the largest contextual issues are taxes and import duties. Changing regulations and taxes are especially problematic. In Kenya a value-added tax (VAT) was added to solar products causing a large price change. As customers are quite price sensitive, demand dropped immediately. The VAT was eventually removed, but the manufactures incurred losses as a result, and arbitrary regulatory changes take a toll. Curiously, there is no VAT on solar lanterns, but there is one on energy efficient cookstoves. Customs issues also continually frustrate the manufacturers. Delays cost both time and

money, and one manufacturer attributes the delays to corruption saying, “Corruption is endemic here.” He illustrated this point with a personal story that is worth including. The respondent elaborated:

“Just today I got hit on my motorbike in Nairobi, wasn’t my fault. It was the taxi driver’s fault, but because the police officer and the taxi driver know each other, I’m told by the police officer it’s my fault, and when I tried arguing with him, he says, ‘right, you can go to court for dangerous driving.’ An hour and a half later I managed to pay him off with \$50. I’m not proud of that, by the way, but that’s just the reality of living in Kenya. There is no -- you can come here as a man with kind of morals and you think I’m going to uphold my morals and I’m not going to get sucked into corruption.”

That being said, the manufacturers seem to take a bit of corruption and a bit of instability as a cost of doing business. Poor governance is viewed as costly and often leads to arbitrary policies, but the respondents seemed almost resigned to it.

5. Distributors – within theme

Three of the distributors sell durable consumer goods—two in East Africa and one in India. The fourth is an international supply chain and logistics provider that primarily works with governments and multinational corporations. The supply chains and regions where the distributors operate cover a wide range, building in variation to the data collected.

a) Capital availability and allocation

The business models vary across the durable goods distributors: one supplies traditional retailers, one uses a door-to-door selling staff that works on consignment, and one partners with a bank that provides financing to end customers. Products are purchased directly from the manufacturers and from wholesalers/importers. The number of brands and products carried ranges from 5 brands and 10 products to dozens of brands and 60 products. As a sales channel, and often serving multiple sales channels and customer access points, they have an out-sized influence on the products selected. The fact that multiple brands and products—often competitors—are sold through the same channels is a key point when focusing on the role of distributors in the supply chain. They are not tied to specific

products and brands, having the flexibility of adding new, offering multiple types, and discontinuing products.

This is very different from the manufacturers who are solely focused on selling their own brand. Distributors do not care which product their customers prefer as long as they can be profitably sold. Their criteria are products that are of the right price, quality and service standards. Being in the social impact realm, respondents in this sample have additional considerations that: 1) It does not cause direct harm, i.e., no cigarettes or tobacco, and 2) It is in an area where they have expertise or some knowledge, such as solar lighting products.

Location and proximity to customers and suppliers are key for all of the stakeholders. With the durable goods distributors, the focus is proximity to customers. For the larger organization working with government agencies, a competitive advantage was basing operations near suppliers in the region where the products would eventually be consumed. (It may sound obvious to do this, but the program discussed in the interview was a successful exception to the rule). This had the added benefit of reducing the distance between the suppliers and end customer, decreasing transportation time and cost.

Immersion in the local market had a direct impact on the ability to gauge demand and better serve customers. The success of their business depends on it in large part because the distributors can be near enough to customers and retailers to more accurately gauge demand. The distributors in the sample also served as a proxy for retailers and other sales outlets they served. Interviewing retailers in developing countries was simply not feasible. In addition to focusing on their own financing needs and access, they were also asked about the financing needs and capacity of the retailers and the customers they work with and sell to.

Across the board, the lack of financing available for working capital purposes was an issue. Lenders, especially MFIs, are more familiar with one-time loans to businesses for equipment or infrastructure purposes. They are not as comfortable with and do not understand working capital financing that is required on a repeat basis. Additionally, they often do not understand the technology behind the products when it comes to asset-based

financing. As one respondent said, “The key to understanding asset financing is to understand the underlying asset.” Financial bodies often do not, but this is a key opportunity to capitalize on distributors—due to both their proximity to customers and product agnosticism.

An issue many of the distributors face is they are in a middle tier in regards to financing. The MFIs do not provide enough or will not lend for working capital purposes. The banks are too expensive, and the high costs cut into already small margins. Some manufacturers provide credit, some do not, and there are not effective working capital lending structures. This also means that it is difficult to pass credit further along, even though it would impact sales. Sub-optimally, inventory is often funded out of equity, and one of the distributors has had stockout issues because it holds very little inventory. On the positive side, this distributor has very low working capital needs.

Timing, tracking and transportation are also critical for the distributors. Mobile orders and payments are seen as potentially powerful tools, but the penetration is limited at this point. Tracking sales at the retail level and selling on credit adds complexity that creates management challenges. Out of the box supply chain software does not allow for tailored solutions that fit a business’s specific needs. Proprietary systems are too expensive for relatively small players. Along the same lines, the distributors in the sample are not the power players in the supply chain. Either they sell to large players or they’re buying from larger players. But, they have a key role in that they align customers, selling channels and manufacturers. They also play a useful role in aligning funding sources with different entry points in the supply chain.

b) Objectives and measurement

The objectives of the distributor stakeholders range from: “Make high quality and life improving technologies available to anyone no matter where they are from” to “Change the way energy products are financed for the household budget” to “Create jobs for youth and women in urban slums.” However, there is a common theme linking all of these goals: distributing products to create social impact. Although they target different segments of the

population based on their business model, they all want to be financially sustainable through sales. This is a core tenet of the respondents, and all see scale as being the key to profitability.

Growth is seen as the path to profitability because economies of scale will offset transportation and logistics costs. For one distributor, partnering with financial institutions that lend to end consumers is also a strategy for growth. The partnerships allow the distributor to capitalize on the huge customer base of the lending institution. Another motivation for these partnerships is that the distributors recognize the necessity of financing, but they do not want to—or cannot—be the ones lending. It is outside of their core competency and resource capacity.

The distributors in the renewable energy sector recognize that the value proposition of the products is the cost savings the products provide. The selling point of a solar lantern is the cost savings it provides over using kerosene for lighting or having to pay to charge a mobile phone at a kiosk. At the same time, “Consumers in the developing world are not different from the rest of the world.” They want modern convenience and to be connected to the electrical grid. But, full electrification is not going to happen soon, and fairly priced products that provide a substitute service—that basic infrastructure does not—can be successfully scaled.

Another prime function of the distributors is marketing and advertising. They are uniquely positioned to do so given their market proximity, and it goes along with a focus on training—retailers, the sales force, lenders and customers. The distributors have many touch-points across the supply chain, and are heavily involved in training and education. The proximity also enables them to gauge what the customers actually want. Included in this customer awareness is the role they play in regards to quality and warranty guarantees.

Developing countries have very few customer protections, and the often-poor consumers have little to no recourse through official channels if there are quality problems with products. The retailers are often small and disconnected from the manufacturers. The distributors are ideally suited to represent the customers and retailers while also having a relationship with the manufacturers. One respondent described her company’s belief (she is

a co-founder) touching on product availability, quality and being an important link in the supply chain:

“So, we took on this large basket of social impact technologies, or essential technologies is another term we throw around to describe the products, and there are, I guess these are just products that are improving lives at the household level, in whatever way, and the criteria for us is that they are currently not available in places where we currently work. So, that’s a big part of it. And, they’re not directly harmful. So, we’re not selling cigarettes or liquor or anything like that. ... They have really cheap stuff that’s imported from China and just kind of dumped in villages but it’s really cheap stuff. It’s stuff they, the customers know, it’ll break in a couple months but they have no other option. ... On a larger scale though, the role that I think we play in the ecosystem is that connecting piece between suppliers and retailers and end customers.”

Hence, distributors are a key link to ensuring availability, quality and adequate service if problems arise.

c) Risk and mitigation

The distributors in the sample provide very little credit, and therefore see a bigger risk from demand uncertainty than from payment uncertainty. The key for them is moving products quickly enough to generate cash flow and not tie up working capital. Demand and sales ensures that revenue covers the transportation, logistics and sales force costs. There have been issues with partners not paying, but this is seen as a cost of doing business and very little credit is provided—because of lack of faith in repayments and because of the cost of credit. One has had to track down retailers and another had months of repayment issues with a MFI.

Knowing their partners and building relationships is an important risk mitigation strategy. One of the distributors does not do credit at all and solely does consignment with its sales force, requiring daily check-outs and turn-ins. Another risk mitigation strategy of the distributors is their business model: they buy and sell multiple products and product

lines. They are not tied to a single customer or brand, and also have multiple supply chain partners—both upstream and downstream. Optionality is built into their business model.

Given the small margins of the distributors, currency fluctuations have been costly to the distributors. Prices move, but the end consumer prices cannot change or demand goes away. They are somewhat at the mercy of their suppliers and the manufacturers. For all of the distributors, small-scale experimentation and initial pilot programs were what led to the current business models. They are constantly tweaking, and continue to do so, but they all started smaller than they are currently and scaled up after initial pilots.

d) Context

Government regulations, tax and customs issues heavily impact the distributors. In East Africa the companies selling solar lanterns dealt with the solar lantern VAT changes discussed in the manufacturer section. It had a very negative affect on margins—a 16% cost change has a substantial impact on working capital requirements. An overnight price increase of 16% meant sales basically stopped. From an administrative perspective, it necessitated invoices and product listings, and then when the tax went away, the prices went back down and sales resumed. But, it required another round of invoice and price changes.

The distributor working with the US government had additional challenges in that they had to comply with laws in both countries. Where they were buying from, bribes were a serious concern, so compliance was constantly on their minds. Compliance with US and international law was a continual risk that the larger supply chain company was cognizant of. One of the small distributors described getting a shakedown from local tax authorities and said their response was, “We just stop doing stuff, and they can’t ask us for anything.”

6. Private financiers – within theme

The private financier stakeholder group is comprised of two medium sized venture capital-type investment funds in East Africa, one MFI investment / consulting organization, and one large international bank. All of the firms participate in supply chain financing, but the customer base and focus differs between the East African firms and the international bank. The insights from the private investment firms are extremely valuable because they

are intimately familiar with the manufacturers and distributors in the development space while also having visibility across multiple companies and supply chains.

a) Capital availability and allocation

The international bank participates in corporate supply chain finance activities at the behest of its current customers. While it does not focus on developing countries as do the other two members of the stakeholder group, it serves as a good proxy for supply chain finance work of commercial entities. If the client, often a large buying organization, is purchasing supply from sources in a developing country, the bank will set up a financing program there.

The program is initiated when a corporate customer wants to set up a supply chain finance program for its suppliers. For example, the buyer may want to increase its payment terms from 30 days to 60 days. However, it does not want to harm its suppliers by delaying cash flows. The buyer approaches the bank and requests that a financing program is established. If the bank agrees to the program, it on-boards the eligible and willing suppliers. The physical flow of goods does not change, but the financial and information flows are now under the program. Following the physical delivery of the product, the supplier invoices the buyer. When the buyer approves the invoice, the bank pays the supplier immediately.

The bank discounts the payment to the supplier—generally between 3-5%. The buyer then pays the bank after 60 days. The supplier has determined that it is better to collect a discounted payment immediately rather than the full invoiced amount at the end of the payables period. Additionally, because of the buyer's credit rating, this financing is often cheaper than would otherwise be available to the supplier. The buyer gets its desired payment terms, and the bank collects the spread between the full invoice and discount. The transaction is seen as low risk because it is backed by a large, corporate entity. This one example of corporate supply chain finance is more limited than the activities undertaken by the other two private financiers in this stakeholder group. It is included because it illustrates how western financial institutions and MNCs view supply chain financing.

The bank works primarily with firms purchasing raw material and other inputs that the firms will use in their own manufacturing or assembly processes. It is upstream-focused.

The two East Africa-based firms are primarily involved with downstream activities and financing working capital. Both firms currently focus on clean energy products, but their lessons are applicable to other durable consumer goods...especially those in which the end consumers receive a financial benefit from the products. Similar to the bank, when providing financing for inventory purchases, the private investment funds will route payments directly to suppliers.

Both private investment firms work with clean energy companies and provide medium to short term financing, primarily for working capital. Medium to short term encompasses six months to three years. The structure of the financing is generally debt for traditional sales models, but there is also an asset-backed structure in place for a PAYGO company. Both are exploring equity investments as well. Institutional investors back the funds. The majority of clean energy products are imported from China, and this financing fills the “cash gap” that a pre-payment, multiple month lead-times, and selling period entails. Some customers use this financing to provide terms to sub-distributors, retailers and end consumers, but this is not always the case.

Both the international bank and the investment funds focus on the speed at which disbursements are made to partners in the supply chain. The value of the financing is directly related to the speed at which the transactions occur. The key is suppliers getting paid quickly enough to offset the discount, and recipients getting the financing in time to make payments to suppliers, order products and ensure cash flows when selling on credit.

b) Objectives and measurement

The goals of the private investment firms are to make money and scale their operations. This is not unique across any of the stakeholder groups, but an interesting aspect of scale for this group is that they are particularly focused on scaling along with their customer/partners. They are not selling or providing services to the end product consumers. But as the firms they provide financing to need additional working capital to grow, the investment funds will be in place to grow with them. They see themselves as being integral to the growth of the ecosystem. From their perspective and from a working capital standpoint, financing will be critical to the ability of the supply chains to scale.

This is especially the case for any of the supply chains that provide financing to end customers—both PAYGO and traditional sales models. Under the PAYGO model the products will stay on the service provider’s books for an extended period of time. This requires financing in the short term to cover the equipment costs until the customer’s payments have paid for the cost of goods sold. As the companies scale, the financing requirements will rapidly increase. Working capital requirements will not increase as dramatically for traditional sales companies, but they will scale at a pace that previous revenues will not cover. The investment funds do not see this as a negative occurrence, but rather as an opportunity for them to grow their operations.

A key issue in regards to scale is the relationship between scale and profitability. From the financiers’ perspective, they find that a critical decision point is when companies actually decide to scale. Further, does scaling actually lead to profitability? These questions run parallel to an increase in working capital requirements. Does growth in sales actually lead to a revenue increase that will exceed costs? This is an important consideration because scaling means that expenses increase as well. Oftentimes when scale is discussed, the focus is only on one side of the balance sheet. This is a mistake and can lead to an outcome in which cash flows fall short or working capital requirements cannot be met. One of the stakeholder’s viewpoints is, “The key is scaling up expenses only when financing has been assured, or there is an investor with deep pockets.” Companies should also be aware at what point profitability is reached. Is it 50, 100 or 500 thousand customers?

A common thread linking scaling decisions is the level of sophistication of the companies they work with. Many of the companies in this space are entrepreneurial-impact and/or product focused, meaning there is sometimes a management gap, and especially a financial management gap. There may not be someone in a CFO role. This is not unreasonable in a small company and is often a function of size and limited resources. It is also an area in which private financiers can provide value. In addition to providing financial capital, they help companies identify management issues. For example, one of the investment funds required that a company hire a full time financial manager as a precondition to the disbursement of funds.

c) Risk and mitigation

A service the private investment funds provide is matching investors who are comfortable taking on the risk that companies in the space entail. A challenge in regards to identifying and mitigating risk is the newness of the companies. It is difficult to judge the quality of the operations given the short amount of time they have been around and also the rapid change/growth within that time. Due diligence on the part of the financiers is critical, and the diligence includes both quantitative and qualitative assessments. The quantitative assessments include balance sheet, income statement, cash flow and previous investment analysis as well as using proprietary risk assessment tools. The qualitative risk analysis is especially interesting, and although it is more subjective, it is key to the risk identification and mitigation process. The analysis includes understanding the market as a whole, the business model of the company, and the quality/trustworthiness of the management team.

Two interesting points emerged in regards to understanding the market: 1) Local knowledge and hiring are critical to mitigating risk and 2) In the near-term, total market demand is not a concern. In regards to local hiring and familiarity, there is simply no substitute for knowledge of the market. This means that locals should be a part of the decision-making team, and that a local presence has to be maintained by the lenders. On the demand side, stakeholders see an almost unlimited near-term demand for clean energy products. This may seem unlikely at first glance, but given the low rates of electrification and energy infrastructure, it may not be an unreasonable assumption, at least in the short run.

While the total demand for these products and services may be unlimited, there is a risk that the financiers have identified in terms of what business model serves this demand. This refers to the PAYGO, traditional sales, and lease-to-own debate. There may be, and currently is, room in the market for all three models, but looking longer term, this may not be the case. The debt providers do not want to hear the industry players say, "We're not sure which model will win out." This uncertainty and the lack of track records within the companies create risks for lenders that may not be balanced by high enough profits. One stakeholder summarized the viewpoint lenders saying, "The challenge with the lack of debt capital is that lenders see it as equity risk with only debt returns." The lenders see a role for

government-backed financial institutions to enter markets that commercial lenders are not interested in.

Regardless of the PAYGO or sales model, the private financiers see a major value in the distribution network that delivers products or services to customers. And, the strength of the model has an effect on risk mitigation in terms of payments from end customers. There are multiple types of payment uncertainty, but when financing is provided to the end consumer, it comes down to capacity to pay and willingness to pay. Capacity to pay means that the financing and re-payment structure should be matched to the customer's cash flow. The value proposition of the product should determine the payment timeline. For example, with a clean cookstove, payments should be structured based on the money saved using the new product. Additionally, to ensure the customer has "skin in the game," an appropriate down payment should be required. The down payment helps address both capacity and willingness to pay.

The distribution network also plays a role in mitigating the willingness-to-pay risk. For the manufacturer and distributors the financiers support, a strategy to scale is establishing a respected and trusted brand and distribution network. As the brand and customer base grows, other and higher priced products are added to the catalog. It is similar to scaling the ecosystem. This mitigates the willingness-to-pay risk by keeping customers loyal to the brand or product line. The concern relayed by the two private financiers is that for the companies they lend to, other companies would come in and undercut a financing deal with a new product, and the customer would simply walk away while payments are still due. Given the lack of enforcement and the cost of repossession, it may not be worth it for the company to go after the customer. By ensuring brand loyalty and including other products in the financing package—and especially future aspirational products, the belief is that customers will be less willing to walk away. The thought is the carrot of future products will be a stronger motivator than the stick of adverse action.

The quality and trustworthiness of the management team is the final, and maybe most important, aspect of the risk mitigation strategy of the private financiers. The quantitative analysis is the first step in assessing the management quality, and one simple indicator is the management team's ability to produce the necessary financial documents and management

reports. Beyond the financials though, they want to ensure that the management team is capable, trustworthy and relatively conservative in that they have only made efforts to scale once the strategic decisions are made and financing is assured. According to the financiers, the last thing they want to hear is, “We are still working out the best distribution model how to bring our products to market.” They would much rather prefer, “We know exactly what we want to do and just need the financing to do a bit more.” The financiers understand that these markets entail risk, but they are looking for companies that take a professional approach. In addition to the financial management challenges discussed in the previous section, professionalism includes the ability to track inventory, keep accurate records, and manage credit and consignment programs.

Trust, communication and relationships are absolutely critical. If and when something goes wrong with a loan or investment, the financiers believed that a predictor of successful outcomes is the level of communication and the quality of the relationship between the parties. The countries where these entities operate are characterized by a lack of institutional control and an inability to remediate contractual disputes in courts. The relationships matter, and a key to building the relationships is trust on behalf of the lenders. As one lender said, “We want to be in the position where if something goes wrong, after the entrepreneur tells their business partner and spouse, we want to be the next to know.”

d) Context

Similar to the other stakeholder groups, context is important to all of the private financiers. The two investment funds are based in East Africa and focus on renewable energy. The motivation for locating there is a combination of environmental, financial and human impact. Electrification rates are extremely low, especially in rural areas, so there is a large demand for energy products and services, and they can help people in an environmentally sustainable manner. The international bank goes where its customers do business. That is what has driven their expansion into new markets. If they need to work with a local financial institution, they will.

Contextually, national and local regulations regarding asset-based financing are a critical part of investment entities’ decision-making process. Specifically, if a letter of credit

is issued, if inventory is financed or if receivables/payables are borrowed against, does the lender have a legal claim on the assets? Different countries have different regulations in place, and the rules are often not as well defined in developing countries. It is paramount that if a company borrows against its inventory and defaults, the lender has a legal right to that inventory. Navigating local regulations and having a local individual or consultant is an important component of their operations.

For the private investment firms, they have also seen a strong effect of government policy in regards to energy-specific programs. Firms they work with in Kenya were affected by the flip-flopping of the government on VAT for solar lanterns. On the positive side, the Kenyan government now requires new housing developments to have solar water heating. Similarly, the Rwandan and Tanzanian governments have put in place policies to use renewable energy product companies as a substitute for expanded electrical grid capacity.

7. Government and international finance agencies – within theme

The government and international finance stakeholder group consists of ten stakeholders. As the largest of the stakeholder groups, it is the most diverse in terms of the roles of the stakeholder organizations and the roles of the individuals interviewed. The group is a mix of development banks--both regional and international, government agencies involved in international work, and international development agencies. All are funded by public money, and all of the individuals interviewed are involved in a supply chain capacity in their organizations.

a) Capital availability and allocation

The stakeholders in this group are involved in supply chain financing activities in four primary ways: 1) providing resources to financial institutions, 2) financing public sector initiatives, 3) financing private companies or NGOs, and 4) procurement. These four roles are not necessarily representative of all the work the stakeholders are involved in, but it well-summarizes the data collected during the interviews.

Providing funds to regional and local banks is a primary strategy for international financial organizations. From a resource availability standpoint, this makes a great deal of sense. Given the lack of resources and financing in developing countries, the backing of local

banks, MFIs and other institutions that in turn will use the resources to support local businesses and initiatives is seen as an effective strategy for developing local and regional markets. The goal is to create a multiplier effect in which capital is provided to local lending institutions that will in turn be lent to local entities that would otherwise not receive funding. Lending to financial institutions provides a much greater reach, helps to meet capital needs, and develops local institutions. This is especially the case when the funds are ultimately used to support supply chain financing initiatives, exports and imports. That being said, these are not donations. Repayment is expected.

In this way the financing is similar to what is traditionally thought of as the role of the international development banks—infrastructure projects. Repayment periods are quite long, but the financing is provided with the expectation of a return. The amounts are often quite large, and from the standpoint of the stakeholders in the sample, these projects eat up a great deal of capital. One stakeholder referred to infrastructure projects as “resource hogs.” Infrastructure support is a key component of development financing, and although it is not the focus of this research, it is important to acknowledge as it often serves as a resource competitor to supply chain and other types of financing activities.

Direct financing to private businesses, NGOs or other entities is the third major role of stakeholders in this group. This is an interesting component because of both the potential impact and the challenge of providing public money to the private sector. The private entities capable of receiving large amounts from international financing agencies are often large companies that would not be considered appropriate customers of public funds. They are “rich world,” multinational companies that are already well financed by the commercial sector and have their own large resource base. However, they are often the power players in the supply chain, and the development agencies can achieve their impact goals by working through them. It is a major tactic of the development and government-backed programs to work through what one stakeholder calls the “anchor” companies in the supply chain. The issues of fairness and optics arise, and there is not a consensus as to the best strategy—working through the public sector or with the private sector.

The final role is the one that foreign governments play in the procurement of goods and services. It is not direct financing, but it is appropriate for this category in that it has a

development and a supply chain financing impact because the companies the governments purchase from often do not have the resources or technical capacity to meet the buyer's needs. The lack of resources and/or technical know-how necessitates bringing in a financing agency and also a third party logistics provider to support the market. Resources are brought in, technical training is provided and financing is available specifically because there is a large buyer backing the transactions.

An important takeaway from the interviews in this stakeholder group is that they have a very big picture view. There is a focus on developing the supply chains and entire ecosystems around the markets of focus. Extra attention is placed on the e-commerce platforms and technical, mobile-based systems that will enable entrepreneurs to easily and affordably enter markets and provide services to customers. The hope is that these systems will enable small businesses and consumers to borrow funds, collect and make payments. The lack of technical capacity in much of the developing world is a major area of concern for the international agencies.

b) Objectives and measurement

The primary goals of these stakeholders are to stimulate growth by providing financing to businesses that the commercial sector would not otherwise serve, while having a development-based impact. As identified in the previous section, this may mean providing resources directly to companies on their own, partnering with commercial entities to share risk and reduce costs, or providing funds to financial institutions who will in turn lend to or invest in private businesses. An overarching point of emphasis was not competing with the private sector. If and when growth occurs and the private sector becomes interested, the stakeholders are more than happy to step away. It means their mission is accomplished. They actually desire a transition from "soft" money to commercial-focused activities.

These stakeholders are willing to go where much of the private sector is not, but the majority of programs discussed are revenue-generating activities. The revenues and profits are what enable further interventions. That being said, another point of emphasis is that the government-backed entities can afford to take a longer view. Immediate financial returns are not as necessary, and this is a major added value and crucial difference from the other

stakeholder groups. It also means that other long-return programs such as pushing for regulatory changes, education reforms and training programs can be focused on. Education and training are especially important, and improvements are necessary in the management as well as more basic, laborer levels. This long-term focus and the ability to bring together multiple other stakeholders from NGOs to government bodies and private businesses is a strong component of what the government and international finance agencies can do. They are integrators of both ideas and the public and private sector.

There is also a heavy focus on scale—all of the stakeholders want to stimulate growth. This is not unique, but the respondents also added caveats. First, be somewhat wary of growth, scale and impact estimates—people may not like the negativity but realistic projections and a bit of healthy skepticism are important. Also, when funding these businesses or programs, the funding and growth goals should be matched to the market. Financing programs should not distort a market and funders should avoid building in excess capacity. Additionally, the approach should be demand-led at both the consumer and country level. A one-size-fits-all approach will probably not work across countries, and it certainly does not work when lending to individuals. Programs need to be tailored to specific contexts and industries.

Finally, financing is one variable in the equation of supporting businesses in developing countries, but it is not the only variable. For some organizations, the major components are financing, training and land rights. For others, it's financing, education, infrastructure and governance. Every stakeholder has a unique list, which financing for businesses and supply chains is on, but it is not the only barrier standing between developing countries and growth. Furthermore, its place in terms of whom financing programs are geared towards is not the same across the board. There are probably more pressing concerns for the poorest of the poor at the base of the pyramid. And, the higher income companies and individuals have other access to financing, even in developing countries. There is a wide middle range of small to medium sized businesses and farmers that should be the target of these programs.

c) Risk and mitigation

Demand-led financing and cash-flow based lending means that the repayment structure is based on the business and cash flows of the borrower. From a demand and capacity to pay standpoint, this may seem obvious, but it is not how financing in many developing countries works. From the perspective of this stakeholder group, it is especially a problem with smaller banks and MFIs that use structured and rigid loan packages. A structured process is used because it is easier to manage and scale. The small loan amounts are not particularly profitable, and ease of management and economies of scale are important to lenders. However, it creates an additional burden on borrowers, thereby increasing the likelihood they will not pay. This increases the risk to lenders who in turn charge higher interest rates, thereby making the loans even less affordable.

Similar to demand-led financing in that it considers the borrower and context when issuing loans, six of the stakeholders stressed that a company's risk should be assessed in the context of its supply chain, its partners and the contracts with its partners. Additionally, the duration of contracts should be used to assess the company's risk. For example, if a business sells products or services to a government, the risk to a financial institution lending to that business is relatively low because there is a buyer who will almost certainly pay. Lenders are aware of this, and respondents in this sample were able to set up lending and advising programs with a government buyer in place. Longer, more stable contracts reduce risk. However, risk assessments do not often take this into account.

Risk acceptance is an important component of government and international finance providers. Because of their resource base and ability to look beyond short-term profit motives, government-backed organizations have the benefit of backing riskier programs and businesses that the commercial sector is not interested in. This may be where these institutions can have the most impact. They have the added benefit of being able to use "soft" money, earmarked as donor funds. This allows the financial institutions to keep the funds on different portions of the balance sheet than traditional lending. Thus, it allows for riskier investments with a large potential impact.

One area where this stakeholder group is quite risk-averse is the environment, standards and governance, referred to as ESG. As public institutions, the stakeholders are very concerned with issues around international standards. These concerns are ever-present in their decision-making process, and include the previously mentioned environmental issues, fair-trade practices, child labor, and bribery to name a few. A major portion of their diligence work focuses on ensuring potential partners and borrowers adhere to international standards. As one stakeholder said, their clients must “not stop analyzing or taking responsibility at the factory gate.” This means they must look multiple tiers up and down the supply chain. These efforts can be costly and are often supported with financial subsidies.

d) Context

As government and government-backed institutions, there is a large focus on policy. One of the goals is to influence policy so that it reflects the positive aspects of successful countries and economies. There is a focus on making the legal and financial regulatory frameworks more reflective of what you see in developed countries. One strategy to influence policy is making financing contingent on regulatory changes. Funds are not disbursed until pre-determined benchmarks are met. Influencing policy is difficult because there are competing interests politically—within the financial institutions, their government backers and in the countries of focus. Additionally, there is not a specific policy prescription as to what works. One respondent highlighted that there is no “guiding algorithm” that says, “do this in this context to address this problem to get these results.” Rather, there are “general principles around policies such as land rights and ownership, customs, and collateralizing assets.”

Land rights are very important for local individuals and foreign investment. If there is no assurance that property or buildings are safe from government seizure, investments will not be made. One solution in less business friendly countries is to institute special economic zones where companies operate under different policies than the rest of the country. The programs have had some success, but there is a question as to the positive spillover effects from the zones. Collateralizing assets is of particular interest because it is essentially the pivot point on which supply chain financing is based. As one stakeholder

highlighted, if lenders do not have the ability to retrieve collateral through the legal system, “factoring and trade finance are ruled out.”

8. NGOs – within theme

The NGO stakeholder group consists of six individuals whose work primarily focuses on developing countries. Three work in agriculture, two focus on general business activities and entrepreneurship, and one supports businesses in the renewable energy sector.

a) Capital availability and allocation

The NGOs’ funding comes from private donors and governments. Allocation is based in large part on the market segments their impact is geared towards. In the agriculture sector, the primary interest is on smallholder farmers. One of the NGOs works directly with the farmers while the other works through the supply chain companies and traders who purchase inputs from the farmers. The energy sector NGO works with renewable energy product and service companies to help professionalize their operations and scale through borrowing and outside investment.

Except for one of the agriculture NGOs—which essentially functions as a non-profit distributor—the NGOs work as integrators between governments, supply chain companies, small entrepreneurs and investors. This is an important role the NGOs can play. They may not be a power player in the supply chain in being large or having legal authority, but they can function as integrators of the other stakeholders: private companies, international donors, and the individuals benefitting from the product or service. The NGOs have diverse roles and functions across the supply chain, and aspects of their operations and traits of their organizations fit into all of the stakeholder groups discussed thus far.

The NGOs operate across the spectrum of non-profit and for-profit activities. All of the stakeholders interviewed support revenue generating or for-profit operations. They view soft money as necessary to begin programs and entice entrepreneurs into risky environments, but the over-arching purpose is to support programs and businesses that will make an impact and also bring in money that supports future operations. They cross multiple spectrums in terms of their roles, and while they are NGOs in that they do not seek to operate

at a profit themselves, they do generate revenues, make equity investments, provide debt, and also function as distributors.

Three major issues were identified by the stakeholders in regards to financing: 1) It is available but not affordable, meaning the rates are too high or the rules are too strict so people fail. 2) Goods are not available in either the quantity or the quality necessary to generate the returns for repayment. 3) People do not have the training to use the financing itself or the resources and equipment attained through that financing.

b) Objectives and measurement

The NGO stakeholders are particularly focused on financial sustainability. This was not always the case, and the organizations initially placed more attention on the target impact area, i.e., the environment, smallholder farmers, fair labor, etc. While maintaining focus on the targeted impact group, the organizational focus has since transitioned to a realization that on-going impact—especially when competing for limited resources—is enabled through financial sustainability. One of the keys to the financial sustainability of their programs is supporting revenue-generating activities. This could be programs that bring in revenues to the organization or providing the backing to businesses and entrepreneurs that will enable revenue generation. The focus on financial sustainability does not mean the organizations are financially sustainable—in terms of revenues at least—but it is an objective that drives their decisions.

With this focus on financial sustainability, the specific models and target impact are different across each organization. However, they all provide financing, or aid in the acquisition of financing, for their target groups. Acquiring financing is difficult and expensive for the individuals and businesses the NGOs work with. The know-how and connections are not there. The resources and expertise that the NGOs bring to the table can be the difference as to whether or not it is attained. The NGOs function as integrators by bringing together those who need financing with the investors and lenders willing to provide it. Similar to the international development banks, the NGOs are willing to invest the time and money in processes where they may not reap benefits—other than the impact benefits that the organization is set up around. One of the major time and resource investments is training.

So, in addition to being an integrator, the NGOs provide entrepreneurs, farmers and businesses training on management skills, production and technical training, and financial literacy.

The NGOs also focus on supporting financially sustainable scale in which programs and revenues do not out-pace the ability to support themselves. One of the NGOs uses a model where donor financing is used for the initial cost of expanding into new markets. Then, once the infrastructure is in place, and the program is up and running, on-going operations are funded by local revenues before donor funds are used to further expand. In addition to financially sustainable scale, the NGOs recognize the importance of measuring and assessing how much scaling actually impacts the group/people being targeted. Does scale make a difference is a critical question—in terms of people impacted, financial sustainability, and the ultimate program objectives? And, there is not an easy answer given the multiple objectives of these organizations.

All of the NGOs in the sample spoke to the importance of financing as one of the critical enablers of scale. It is not the only important factor though. One of the stakeholders describes how the organization sees it as one of three major pillars—financing, training and distribution. Financing and making resources available is critical, but without the training to use the inputs and equipment the financing provides, it will most likely be wasted. Additionally, if the distribution network is not in place to deliver inputs and especially take outputs, financing will not be of use. It supports the supply chain, but is not an end goal in and of itself.

The NGOs identified two interesting issues regarding financing that were not discussed by other stakeholders. The first is that even if financing comes in, it is often spread across multiple projects, and it is not at a level that allows it to take a program to the next level where it could really make a difference. One respondent said that from a donor's perspective, it limits risk by "not putting all of the eggs in one basket," but the initiative's impact is reduced because it does not have the necessary resources. The second is that there is an obsession with newness—whether that is a technology, program or another impact area. Successful projects may not get the opportunity and required financing to scale because resources are diverted to new initiatives.

c) Risk and mitigation

Risks are viewed and experienced differently by non-profit NGOs than by for-profit businesses. The stakeholder NGOs are funded by private donors and governments that are not the direct beneficiaries of the “impact” the NGOs are geared towards. The funders are interested in impact as opposed to financial return. That being said, the respondents in the sample are well aware of the supply chain risks present in developing markets, and their work is often geared towards helping firms reduce risk. A link across all of the NGOs in the sample is that they are willing and able to support higher risk projects than for-profit businesses.

In addition to supporting riskier ventures, a critical service the NGOs see themselves providing is risk assessment and allocation. Investors often do not understand the business or risk profile of potential investments, and this uncertainty leads to higher premiums and interest rates. The NGOs can play the role of information provider/educator to ensure that companies get financing at a cost that accurately reflects their risk—as opposed to paying a higher premium based on a lack of awareness. Second, they can align the right investors with the right companies in terms of willingness to take on risk. These two functions are in addition to actually taking on a risky, first loss investment position as do multiple NGOs in the sample.

The NGO stakeholders focus on repayment risks. Working with smallholder farmers, two of the NGOs have had success using the microfinance model of group lending. The peer-group lending structures rely on the other group members to guarantee each other’s loans and reduce lack of payment, thus relying on trust, peer-group support and pressure from members. If a group member defaults, the group either covers that group member or defaults as a group. When covering the defaulting group member, it makes the decision whether or not to keep or expel the member. If the group defaults, it is excluded from future borrowing opportunities.

In addition to group lending, the NGOs that work with farmers stress that the lending structure should match the income flows of agriculture. One of the NGOs has very high repayment rate with its small farmers, and this is in large part because of the program

structure. It acknowledges that income throughout the year—especially for small farmers—may not be consistent across weeks or even months. Income will match the harvest season or other sources of work. Certain periods of the year will also have high spending requirements, such as when school fees are due. Bi-weekly payments are highly suggested from the lending groups, but payments are not actually counted as late until the end of the year. Defaults do not occur until the end of the period, but monitoring and supervision throughout the life of the loan are critical.

Trust on both sides of the transaction is also important. Trust is built in the organization's programs through a consistent presence and delivering on promises. The borrowers build trust by making payments and adhering to contracts. The key is not just providing the resources and walking away. The organization must either establish and maintain a local presence itself or work through a trusted local partner.

One respondent raised an interesting point in relation to payment uncertainty and willingness to pay in terms of gauging demand. The standard concern when lending is whether borrowers will be unwilling to pay after having taken a loan. However, this NGO provides loans in the form of seeds, fertilizer and equipment prior to the planting season. It is important to accurately forecast farmers' demand for the product not to waste inputs and money. The organization found that market surveys are not a good proxy for what people are actually willing to pay. She explained:

“I mean you ask a farmer, like from the perspective of a nonprofit you ask like, “Hey, would you be interested in a solar light?” Like the incentive to say no is so low. Obviously they're going to say yes. They don't know for sure what the price is, they're not actually putting money on the table. I actually think that that is a common problem, not just in development but across any market survey is that people are always interested in the option and sort of having more choice and stuff, but when it comes time to put your money where your mouth is, that changes things.”

When companies or organizations go in and ask, “would you want credit or loans?” the cost of saying yes—especially to outside organizations—is so low that it is not representative of what people will actually pay. Therefore, the NGO requires small down

payments and a signed contract, while educating the farmers on what that contract means. It then holds people accountable for those contracts.

The government funded NGO that works with larger agricultural companies got into the business for sustainability and traceability reasons. The governments were concerned about reputational risks and future supply due to factors such as child labor and environmental degradation. However, their attention has shifted towards the financial sustainability of the suppliers—the smallholder farmers. They came to the conclusion that while traceability and certification have added value, they do not actually make the farmer or factory more sustainable after a certain point. It may actually have the opposite effect of driving the smaller players out business if the program costs are too high. The original program pillars of environment quality and fair labor practices still play a role in the decision-making process, but they are no longer viewed as primary drivers of long-term risk for the NGOs interviewed.

d) Context

The NGOs are concerned with environmental impact and sustainability, which can refer to numerous issues: environmental quality, future raw material supply, small farmers' livelihoods, etc. Attaching the "sustainability label" to a cause is a driver of money flowing in from donors. The respondents' programs are especially geared towards agriculture and renewable energy—in large part because of environmental concerns. The focus on these two areas goes hand in hand with a tendency of the NGOs to focus on rural areas. The rural areas are the ones underserved by both businesses and local governments. The NGOs provide financing, agricultural inputs, and renewable energy products. Where the rural population is denser, like in Kenya, it is easier to reach people. However, it also means that farmers have less land, and it is more difficult to generate income from farming. Land insecurity is a major contextual issue the NGOs identified, and it may refer to scarcity as well as ownership and transferability, depending on the country.

The NGOs are used to operating in austere and potentially dangerous locations. Because they focus on selling products and services, the ability to set up revenue-generating and for-profit ventures plays a major role in where they are willing to make investments.

Therefore, regulations are a determining factor in where they operate. Similarly, crops are very politicized, and agriculture receives a lot of government attention. Food security is very important when sustenance crops are involved, and export crops are a major source of income. The stakeholders stressed that while national governments play a large role already, a focus on local governance is necessary for successful programs and enforcement. This is often lacking.

E. Findings Within Themes Across the Stakeholder Groups

The following sections discuss the key findings within each theme and across the stakeholder groups, addressing the second research question:

How do the decisions and context affect profit, sales growth and risk?

1. Financing availability and allocation

Reaching customers through multiple channels and financing the channels.

Reaching customers through multiple channels is a primary strategy for the manufacturers and distributors. The private financiers also highlight it—most notably when discussing the PAYGO versus traditional sales model, as the two models are structurally different as opposed to simply selling across different outlets. (The structural difference requires different financing.) For the manufacturers, this parallels the desire to own the distribution channel—i.e., to vertically integrate and grow through increased product offerings. They recognize a limit to how many times you can sell the same products in a market before saturation is reached. If different market segments can be reached through multiple selling channels, there is a short (current sales) and long-term (growth through future product offerings) advantage.

However, organizations have to consider whether the channels are aligned in terms of how they fit into the overall selling strategy of the company, its growth and long-term sustainability. Additionally, the desire of manufacturers to own their distribution channels brings up an issue with distributors. “Partnerships” will be discussed in a later section, but a key point is that the business model/channels goal of one stakeholder group may directly conflict with the well-being of another stakeholder group.

The spectrum of traditional sales, lease-to-own and PAYGO models in the renewable energy product sector is interesting from a channel perspective. On the one hand, stakeholders on the financing side are concerned by the uncertainty as to which model will eventually prevail. The manufacturers and distributors, however, are interested in servicing all three channels. From the business perspective, the models are indeed unique in terms of the balance sheet and financing implications for the companies. From the consumer perspective, the different models are simply ways to reach customers through multiple avenues with different financing structures. The lease-to-own model is very similar to traditional sales with a consumer financing option.

In terms of reaching the actual consumer though, there is almost no difference. The PAYGO is indefinite financing, but the logistics processes and supply chain structures that get the product to the customer are the same across the models. The major difference is in the reverse logistics requirements. This is a potentially major burden for the PAYGO model, and while lease-to-own and traditional sales will handle occasional repossessions and service requests, product realignment is a core component of the PAYGO model. This will be costly.

For the customer, it is very similar to paying for mobile phone service—or just paying an electric bill if the home was actually connected to the grid. For the businesses, the models have different cash flow and balance sheet implications, but at the core all of the models are just different avenues for providing end consumer financing. It is likely that there is room for all three models, but the key thing to focus on for businesses, financiers and development agencies is that the specific payment terms, timelines and repayment rates have direct financial implications. It is not so much about the winning model but the terms and ability to successfully collect payments within a specific program.

Working capital financing

Moving beyond the PAYGO-sales debate, working capital financing is an important consideration for all of the stakeholders—regardless of whether an organization is able to fund its working capital internally or requires outside financing. The manufacturers use working capital financing provided by international banks as well as by the private financiers

established specifically for this need. Small and medium-sized distributors have an especially difficult time attaining affordable working capital financing, but there is a goal of bridging this middle-tier financing gap. The need is recognized, and the private financiers are trying to be the ones positioned to meet the need while turning a profit. The international and government-backed development banks are aware of this as well. One of the manufacturers has actually worked with development banks to help set up a working capital financing facility for its distributors.

Supply chain structure and de facto financing

Across the stakeholder groups, the respondents stressed the importance of proximity to market for two reasons. The first was that proximity is key to accurately gauging the market. The second, and less obvious observation, was that the supply chain structure and financing are inexorably intertwined. Where an entity in the supply chain bases its products has a direct effect on the resource requirements of its partners and customers. For one of the manufacturers, establishing a warehouse in East Africa was a logistics decision that ultimately proved to be a financing decision. The motivation was to increase sales through a restructuring of its supply chain that would change the working capital requirements of its downstream partners. Inventory had been held nearer to the market, which meant that its customers had cash tied up in working capital for less time.

E-platforms and mobile payments

Electronic business platforms for ordering, payments and lending received a great deal of attention. The emphasis varies across the stakeholder groups. For the manufacturers and distributors, attention is placed on realizing economies of scale and improving operations management. The companies do not have sophisticated ERPs, so tracking inventory, payments and especially credit is time-consuming and difficult. The goal is to use electronic systems to automate and therefore speed up and improve processes. On the NGO and international development side, there is a strong emphasis on using electronic platforms to reach the masses. With the proliferation of mobile phones over the last decade, the hope is that mobile-based platforms can be used for a myriad of other purposes in support of development goals.

Multiple respondents brought up concerns about placing too much hope in e-platforms. On the donor and fundraising side, tech solutions are easily sellable, so they are very popular as a way to solve grand problems. From a marketing perspective, tech solutions are new and popular with donors. The concern is that a constantly shifting focus to new solutions does not allow for the continued funding of existing programs that may be effective. Another downside is that systems are costly. For the smaller to mid-size players, ERPs and tracking systems are prohibitively expensive to have customized while the off-the-shelf ones do not accurately reflect their operations. The key aspect from the supply chain viewpoint is whether the technical and mobile solutions actually help companies improve and scale operations.

Timing of funding

The timing and speed of financing is critical. The consumer durable goods products are low margin, and the cash to cash cycles are relatively long given that the products are coming from China—especially for the OEMs who import from contract manufacturers. Rapid financing and approval is the foundation on which supply chain financing rests. Both the international bank and the private financiers recognize this and seek to deliver funding and/or payments as rapidly as possible while conducting the necessary due diligence. This highlights the importance of relationships and repeat business between lenders and borrowers. Follow-on disbursements are quicker than the initial allotment. A disconnect between borrowers and lenders (or donors in the case of grants) is that funding is sometimes split into tranches. It's a risk mitigation strategy on the part of the "investor" but it also means that the recipient may be forced into making sub-optimal decisions, i.e., one manufacturer built only half a factory!

2. Scale, objectives and measures

Scale across the system

Scale is a common objective across the board, but the different stakeholder groups do not view scaling goals uniformly. The NGOs, international financiers and the private financiers are focused on scaling the economic "ecosystem." The private financiers want to help grow the ecosystem, so they can grow along with it and profit from the growth. The

international financiers want to help develop the wider economic ecosystem, and create systemic growth to reach large-scale goals. The NGOs fit more in line with the international financiers in that they are more impact focused while supporting financial sustainability. The medium-sized manufacturers want to own the entire supply chain—including the logistics, and with the PAYGO model, the financing as well. The MNC manufacturer on the other hand is specifically working with the smallholder farmers to help grow the ecosystem and make them attractive for commercial lenders. The distributors want to grow along with the ecosystem as well, but their core business revolves around the manufacturers not vertically integrating.

The divergence of scaling goals is highlighted to make a key point: The respondents are first and foremost concerned with the well-being of their own organizations. A linking goal of all of the organizations may be “impact,” but each organization has its own interests and objectives. Furthermore, the organizations have implemented their own strategy to meet these unique goals. Terms like “partner” are used, but the supply chain relationships are underpinned by different, and often competing, interests. The interests may not be directly opposed, but they are not perfectly aligned. If the ultimate goal is impact—however it may be defined, a supply chain wide view is absolutely required when focusing on supply chain finance in developing countries.

Scale and profitability

While all of the stakeholders are striving to increase scale, serious consideration must be given to the relationship between scale and profitability. Some of the organizations are profitable and want to grow their operations. The question for them is how to achieve that scale, which may mean additional sales channels in existing markets, consumer financing, expanding into new markets, etc. For others though, growth is seen as a necessary step to becoming profitable. Selling more products will allow them to achieve economies of scale in sales, marketing and logistics that are required to reach profitability. There are important considerations here and the stakeholders’ responses are fall along two lines: 1) Will any amount of sales growth actually lead to profitability? This is discussed further in relation to product subsidies and public money, but it is a fundamental question whether the marginal cost of each product is higher than the marginal revenue, and therefore whether any amount

of growth will ever lead to profitability. 2) Is the scaling point at which profitability is reached actually feasible? Are the growth goals realistic?

Value proposition of the product or service

The value proposition of the product or service must be such that a consumer will pay a price above the marginal cost of that product or service. If the goal is to build the market and support locally sustainable growth, the customers must be willing to pay for the products. The selling strategy to consumers or local businesses in the developing world is not different than selling in the developed world in this respect. Customers are concerned with the value the product offers at the price they can get it for. This may seem obvious, but given the motivation of the individuals in the business and the international resources dedicated to certain causes, it is important to remember. The individuals buying the product care about the direct value the product provides in relation to how much they have to pay for it. This contrasts with the NGO or development agency that may have provided a grant to the manufacturer of that product because of the carbon emissions that product will prevent. Consumers make the purchase for one reason, while the “development” dollars flow in for another. The important ramifications in consumer financing is further addressed in the “demand-led financing” section.

Management, Labor and Training

The difficulty in finding good managers and employees was discussed across all of the stakeholder groups. From a labor standpoint, while there is a large young population coming of working age, there are concerns with the education systems and the level of preparation for both blue and white-collar jobs. Training is very important at both the basic and managerial levels. Management skills, and especially financial management, are a major concern. Many companies working in the development space were started with an impact, product or environmental focus. Hiring individuals with financial, accounting, logistics and local experience is crucial to successfully running the operations. Because these are often small companies, individuals have many different roles. They are not large companies with accounting, operations and sales departments.

The problem is that the capacity, resources and willingness to invest in training depend on the resources available to the organization or company. The large MNC, the government-backed financial institutions, and the NGOs have much more of an appetite for longer-term training. There is less of a requirement for immediate payoffs, and one of the roles that the non-profit and publicly backed stakeholders can play is getting the organizations to the point where they are attractive to commercial lenders and investors. The smaller investment firms, OEMs and distributors have some capacity for training, but it is much more limited.

Role of “soft” money

The ability of the non-profit and government-backed organizations to invest in training programs highlights one aspect of the role of soft money in developing country supply chains. All of the stakeholders in the sample do however hold firmly to the belief that giveaways are not the correct course of action when building markets and growing the economy are the goals. (This would not apply to more extreme examples like food aid for the poorest of the poor or disaster relief.) Rather, public funds and grants should be utilized where commercial investors and lenders will not go, or to help get projects off the ground. Cost sharing with commercial investors is a role cited by individuals within the NGO, government, and manufacturer groups with potential. One of the government-backed finance agencies requires that public funds are only used when commercial money is also a percentage of the project. This helps ensure the responsible use of resources by requiring buy-in from other organizations or companies. Ultimately, it appears that cost-sharing and joint investments can help to overcome institutional and cultural barriers to financing for-profit activities.

One area where public and international funds could be used to support supply chain operations is investing in, or lending to, regional and local financial institutions. The resources can be allocated to financial institutions and earmarked for lending to private companies that require supply chain financing. This type of lending could be critical to jump-starting supply chain financing programs in locations where international commercial lenders are not willing to do business—as is the case with the international bank stakeholder. It would not be free money but for large and resource-rich NGOs and

government-backed financiers, it is a way to support for-profit ventures—distributors in particular—that would otherwise not be bankable.

3. Risk and risk mitigation

There are a myriad of risks that organizations and supply chains everywhere, and particularly those in developing countries, face. A primary risk for the stakeholders in the sample is based around the uncertainty of getting paid. Payment uncertainty was highlighted for two major reasons: 1) The ventures and markets are relatively new, so there is a great deal of uncertainty around demand and how to capture the market, and 2) As discussed at length, there is an inability to remediate contracts and hold people and organizations accountable for lack of payment.

Payment uncertainty from demand

Payment uncertainty from demand is a concern for all of the stakeholders, but they do not see it exactly the same. The manufacturers are confident that products will eventually sell, and they are often more adept at forecasting because distributors and other customers are ordering in large quantities. Business to business sales, as opposed to selling directly to consumers, enables the upstream players to pool demand to help reduce uncertainty. Holding finished inventory is a working capital concern but not as large of a concern as it is for distributors. Costs are lower farther upstream and generally the manufacturers are larger organizations with more resources. For distributors who work on smaller margins, the primary focus is turning products as soon as possible. The distributors do not often get favorable financing terms, so moving products quickly is critical to managing cash flow.

When selling directly to consumers, both the manufacturers and NGOs have found that pre-payments are an effective tool for gauging demand. Getting customer buy-in and ensuring customers have made a monetary commitment to the product or service is a very useful tactic. This is also a driver of the PAYGO and lease-to-own models in the solar and renewable energy realm. Both models allow for smaller, more affordable down payments while getting a monetary commitment from customers.

Demand-led financing

Demand-led financing is a term highlighted by Miller and Jones (2007) in their work on financing agricultural value chains. It prescribes that financing terms should be based on the needs and characteristics of the borrower. In addition to one of the government-backed agencies' respondents who said that demand-led financing can mitigate repayment risk, one of the NGO respondents provided an example of how payments from farmers are structured based on the seasonal nature of incomes. A strategy to mitigate risk is to match the financing terms and repayment structures to the product, in addition to the individual's need and the context.

Matching the financing to the value proposition of the product or service is a direct outgrowth of demand-led financing. It does not completely eliminate payment uncertainty, but it does account for situations in which customers are inherently unable to afford payments. Matching financing to the value proposition of the product or service and demand-led financing refer primarily to consumer financing. However, the concept is not different from trade credit and working capital facilities for distributors and manufacturers upstream. Successful lending arrangements require that the repayments be structured based on projected demand and cash flows.

Payment uncertainty from WTP & trust

There is a spectrum of payment uncertainty due to willingness to pay and trust. For both businesses and consumers, it is not as simple as payments will be made or not. On the one hand, there is unwillingness to pay simply because a person or business can get away with not paying. For the "dishonorable" player, he or she will not pay if it is to his or her benefit. So, this would mean this player would not be interested in a future relationship with the organization on the receiving end of the dishonesty. This no doubt occurs, but the stakeholders stressed the importance of the connection between unwillingness to pay and the quality of the relationship with the customers/partners. The quality of the relationship depends on the trust between the parties.

In addition to dealing with potentially dishonest partners, relationships are critical because issues will arise when payments are due and resources are scarce. The priority of

who gets paid and the level of effort that goes into making payments will depend on the quality of the relationships. This was stressed by almost all of the manufacturers, the private financiers and the distributor—who also stressed that this was how their retailers decided on who could buy on credit. The trust and relationship determined if credit/financing was provided and then also played a role in determining if payments were ultimately made. Across all of the groups, only after trust and relationships are built are arrangements scaled.

Trust and local awareness

Trust is a primary means of mitigating risk across all of the stakeholder groups. Saying that trust simply mitigates risk actually underplays how important trust is when it comes to the supply chain and supply chain financing in developing countries. It is not as if risk is simply mitigated after the decision to finance or sell on credit is made. Trust and the relationship determine if and how much financing will be provided in the first place. Then, communication and ongoing trust play a large role in determining how successful the relationship will be. There is no avoiding uncertainty, but trust is one of the primary means for accepting the uncertainty prior to a deal/transaction/partnership, and one of the primary means for successfully managing the deal/transaction/partnership over the course of the relationship.

In addition to trust, establishing and maintaining a local presence in the markets of interest is critical to assessing the market, knowing the customers, knowing whom to work with and understanding local regulations. This means that the management must include locals as well as outside individuals with expertise across multiple markets. It is important at both the upper level and middle levels of management. It is very difficult to say what the correct number is, but it is clear that individuals intimately familiar with the local context should be involved in key management decisions at the strategic level. At the lower levels of the organization, individuals involved in the day to day operational, buying and selling should also be locals doing business with other locals.

Risk aversion, assessment and allocation

Stakeholders from the development banks, the private financing institutions and the NGOs remarked that the development banks are surprisingly risk averse when it comes to

investments. While not advocating for reckless borrowing, there is an opportunity to use “soft” funds that the banks control on behalf of donor governments to support initiatives they could not otherwise have on their balance sheets. The use of “soft” funds was previously discussed, but there is a clear link between their use and risk. Soft funds can be used to overcome risk aversion by spreading risk across multiple organizations while not reducing the potential impact by making sub-optimal or time-delayed investments.

Risk aversion by investors, lenders and donors is compounded by how difficult it is to accurately assess the risk of companies and programs in developing markets. At both the individual and business level, there are few official banking and borrowing records. There are not credit reference bureaus, and while MFIs, NGOs and private investment firms are attempting to put together risk assessment tools, these are not widely used services. Because it is difficult to assess the payment risk of the customer base, there is added uncertainty when assessing the risk of the businesses selling to these customers. Further compounding the lack of knowledge, the businesses are often new with little transactional and credit history themselves. Traditional quantitative risk assessments see the businesses as very risky investments and/or borrowers. This may indeed be the case for some of the businesses, but developed world methods of risk analysis are not sufficient.

There is a crucial role for trusted organizations, with a local presence and locals on the management team. The organizations are needed to help assess factors such as how well the business model matches the market, the trust of the management team, and the company’s relationships with its supply chain partners. These integrators can help to accurately assess the risks and then also serve as the link between “risky” companies and the borrowers and investors willing to take them on. The value of accurately assessing the risk and the risk being allocated to funders based on this accurate assessment is that the costs of financing will be more appropriate for the risk profile. This contrasts with what is often the case: high premiums because of a lack of knowledge and understanding.

4. Contextual factors

Governance

A country's regulatory framework in large part shapes the willingness and ability of organizations—both for profit and non-profit, to operate in that country. From a contextual standpoint, the three governance issues focused on by stakeholders are asset-based financing, taxes and import duties and corruption.

Asset based financing is a cornerstone of supply chain financing, and the regulatory framework around asset based financing is lacking in many developing countries. For the international finance stakeholders—public and private, the entire system comes down to financing laws and the securitization of assets. For the manufacturers, distributors and their financiers, the business models for providing consumer financing is completely dependent on whether asset-based financing is backed by the law. It is a primary means of acquiring financing by using assets on their books. At both the business and consumer levels, it is the only way to ensure that you can actually go after assets if people do not pay.

As discussed within the stakeholder group findings, taxes and import duties can be especially problematic for the renewable energy product manufacturers, distributors, and financiers. Changing VAT levels and product exemptions can wreak havoc on pricing and administrative procedures. High import duties on finished goods raises the price of needed products, but lack of availability and the cost of raw materials make it difficult to manufacture locally. It is also difficult to export regionally due to high import duties and the lack of transportation infrastructure. It is not unique that businesses have issues with taxes and other regulations, but the major frustration is that the market for needed products is held back by what the stakeholders deem arbitrary and ever-changing policies.

Corruption is a concern across the stakeholder groups, but it is viewed as almost a *fait accompli*. Similar to sometimes arbitrarily changing regulations, it is simply something to be accepted when operating in many developing countries. The level of acceptance varies by the stakeholder's role, whom they do business with and their power in the supply chain. One small distributor chose not to expand its operations because of pressure from authorities. This contrasts with the larger, international distributor that worked with the

government to ensure supplies were not procured from untoward sources. Additionally, the respondent explained that efforts were made to ensure its local employees did not accept or offer bribes, even though it was a common practice where they were operating.

The supply chain companies working with the international community have the luxury of choosing whom to work with. The government-backed financing agencies have the power to influence some regulations and decisions. Ultimately, the interview respondents made clear that government and local corruption indeed influence how decisions are made when working in developing countries.

Population Density and Rural Customers

Rural population density is an important factor in how for-profit businesses, NGOs and government-backed programs seek to make an impact in developing countries. From the for-profit standpoint, the rural population is even less likely to be connected to the electrical grid than their urban counterparts. For renewable energy product providers, rural customers are a primary target market. Reaching rural customers is more costly however, so the density of the rural population is key to profitability. The additional logistics costs of reaching rural customers can be offset if sales are high enough. Companies target underserved rural areas with a high population density.

The large MNC, NGOs and government backed development agencies working in agriculture also target rural areas. In addition to being off the electrical grid and farther away from kerosene or other energy providers, the rural customers working in agriculture are also less likely to have access to financing. For these organizations, the goal is to use donor funds to help the local population through services ranging from insurance and school financing, farm inputs such as fertilizer and seed, increased market access following harvests, and productivity training.

F. Interactions and Findings Across Themes

This section discusses across group stakeholder responses that span multiple themes. Previous insights were categorized as falling under a specific theme, but in reality thematic boundaries are not black and white. There are critical connections across themes; and

factors or decisions in one area have important ramifications in others. The across group and across theme connections are used to address the third research question:

What are the key factors that impact a supply chain's success in developing countries?

1. The effect of the business model and controlling the distribution network on scale

The traditional sales, lease-to-own and PAYGO models were discussed in three of the “findings within themes” sections. The financing implications make this debate interesting, but it is important to note that there are many different sales channels within the traditional sales model. For example, a manufacturer may sell to distributors who have their own sales channels, sell directly to retail chains or independent retailers, through financing avenues, and through an independent sales force. Companies have and utilize multiple options. The model employed has a large effect on how demand is met. It is also tied to scale and risk.

The stakeholders involved in the durable consumer goods realm see the path to scale as going hand in hand with the business model and owning the supply chain. The competitive advantage and path for long-term growth is to own the distribution network and sales channels. The desire is to vertically integrate and continually push their operations closer to consumers. Margins are relatively small, and out-sourced logistics and distribution provides only limited opportunity for economies of scale. This requires an initial working capital investment—and potentially financing, but there is value in controlling the inventory and ensuring products are in place to meet demand. Maybe most important to mitigating risk, owning the distribution network ensures that companies can maintain access to customers. “Owning the customer” is a primary scaling strategy through the introduction of new and also higher priced products. It’s a multi-faceted strategy: Reach more customers through expanded channels. Maintain existing customers through expanded product offerings. Ensure customers that are currently financing products do not default because they receive a better deal or get an alternative offer with a new supplier. Realize economies of scale and sell more cheaply through vertical integration.

The private financiers are concerned about which model “wins” in the traditional sales, lease-to-own and PAYGO sweepstakes. They do not want to finance companies that choose a losing strategy. This is understandable, but the current consensus is that at this

point in the market, there is plenty of consumer demand to go around. Because the financing structures are short term, there is enough demand to cover near term borrowing and payments. More importantly, the manufacturers and distributors both stressed that the true value of their operations is in the distribution network. If the supply chain and distribution network are in place, it may not matter which model is ultimately victorious. The structures will be in place to capitalize on the “winning” channel when it becomes apparent. It is also possible that long term, there is room for multiple channels; the key is being in place to take advantage and being aware of the balance sheet and cash flow implications of the terms of each model.

2. IT and managing operations effectively

Businesses that capitalize on electronic and mobile systems for ordering, payments and inventory management may have a particular advantage. The international finance agencies and NGOs placed a great deal of emphasis on mobile access for the masses, but an issue across the smaller manufacturers, distributors and their financiers was inventory tracking and management. There are not great off-the-shelf solutions for small companies, and tailored ERPs and inventory management systems are very expensive. Tracking inventory by hand or using Microsoft Excel is labor intensive and prone to mistakes. Adding credit to the mix complicates product tracking and payments even more. Automating processes is a path to scale while also speeding transactions and limiting the risk of cash transfers. For PAYGO and lease-to-own, the entire model rests on the ability to remotely collect payments and deactivate the product if customers do not pay.

3. Risk

The importance of speed—in both financial and material flows—to reducing risk

The importance of time was addressed in “financing availability and allocation” in regards to both the time working capital is tied up in pipeline inventory and how follow-on rounds of financing are quicker due to established relationships. There is also a relationship between timing and risk. Speeding up the financing process means that the risk of stockouts is reduced through being able to hold inventory and more quickly respond to demand. Stockouts have not been previously discussed but can have a very negative affect on a brand.

The obvious one is delayed revenues—or lost revenues if customers take their business elsewhere. And, if the goal is to capture market share, build a customer base and scale product offerings to customers, stockouts have more than just a near term affect. Stockouts also have a negative impact on a company's supply chain partners, sales force and consumer finance partners. Even short-term issues can have lasting impact across the supply chain. Lack of product availability may serve to demotivate sales channels and partners may eventually take their business elsewhere.

The success of asset-based financing depends on institutional factors that reduce risk

How the quality and effectiveness of a country's regulatory framework affects asset based financing was discussed in "contextual factors." The link was not made however between asset-based financing, Miller and Jones' (2010) demand-led financing (risk), and financing based on the value proposition of the product. The regulatory framework determines the legality of asset-based financing in a country. Without a solid legal grounding, supply chain financing will not develop. If lenders do not have the confidence that they will be able to take ownership of products in a failure to pay situation, the risk is too high for any large-scale investment. On the consumer level, demand-led financing ensures the financing is tailored to the needs of the individual borrower. In addition to demand-led, tying the financing to the value proposition is the other key factor to reducing risk. Businesses, investors and policy makers should consider these separate but related aspects of supply chain financing when working in developing markets.

Scaling an initiative as a source of both increasing and decreasing risk

The stakeholder organizations want to scale their operations for two primary reasons. First, they are convinced that growth will help the financial outlook of their organizations, i.e., higher profits or reach profitability. Second, they truly want to have a greater impact with the work the organizations do. Scaling through increased expenditures and investments entails risk. Development funds are limited and failures are costly, both from a resource and reputational standpoint. One of the major long-term concerns highlighted by the respondents was the fear that financing failures could derail financing in the renewable energy products industry.

One way to mitigate the risk of failure is to spread funds across multiple projects. This may increase the overall impact in terms of the number of programs or people helped while reducing risk by investing in a number of projects. An added benefit is that it allows for pilot programs and different low-cost interventions to determine effective strategies. On the other hand, by spreading funds across multiple projects, the opportunity for a truly impactful, large-scale intervention may be lost. Additionally, it is difficult to get an accurate assessment of what a large investment may do in terms of impact without an actual large investment. The effects may not be linear. There is no easy solution, but the goals should be to find and support what can be scaled in a given context with the minimal—though sufficient—resources. If a strategy is proven effective, only then should the effort be made to scale in a different context, country or region.

G. Overall Findings and Going Forward

This section discusses the overarching findings from the stakeholder interviews, continuing to address the third research question.

1. Support but do not distort markets with subsidies

Non-profit and public money can be an important and sometimes necessary catalyst to back for-profit ventures. However, products should not be subsidized. The organization selling to the end consumer should not use grants or other public money to subsidize the product's price. This was emphasized by the companies that sell products to end customers and is a source of frustration for the for-profit companies when non-profits are in similar markets. Based on the emphasis placed on this point—especially by the manufacturers, a rule of thumb would be: Products should not be priced below the cost of goods sold. Doing so undermines existing markets and prevents new markets from taking off. Additionally, product subsidies remove the necessary feedback loops to accurately assess demand and how companies are actually performing.

One of the manufacturer respondents shared his frustration at working with non-profit organizations saying:

“(Name changed) is becoming a health service. They weren't able to move products. And they constantly told me that our margin wasn't enough. And it's like, 'Well, you

know, I've got 149 other distributors that can work with these margins.' But you go into their office and there's like six PhD students sitting around doing... No offense to PhD students. But you know, they finished their PhD and they're getting paid a lot of money. And they're doing complicated surveys, and they're on payroll, and expected to be paid with the business model that relies on selling products to the base of the pyramid. You can make it work, but you can't have a lot of overhead. And those models haven't -- they really just haven't worked.

"So there's been good partners, and we work with them, despite everything. And they get cash, and then they buy 500 stoves in cash and stuff. So whereas, lots of our other much more regular distributors could never buy 500 stoves in cash. So over the course of the year they'd move a lot more products. But -- so there's pros and cons. Like, you never turn down 500 stoves in cash. But as long as they're not, as you said, giving them away for free. Or grotesquely subsidizing them. Because sometimes they want to do that, because they've a big grant, and they want to show the world that they just moved a thousand products, or 30,000 products, or whatever. And they can totally screw up the market. Because Kenyans are super, super cost conscious and competitive. And if a neighbor finds out that the next-door neighbor got the product for \$3700 and she's being offered \$3800, she won't buy it. And even if you offer \$3600, the fact that there's now price discrepancy has entered the market, she'll think, 'I can get it somewhere for \$3500.'"

There are two main points in his comments. One, if people hear that a product can be gotten for free or for a lower price, they will no longer pay the actual retail price, i.e., the price that provides the companies across the supply chain with the margins necessary to fund their operations—or at least cover direct costs. Second, there are many businesses who can meet certain margins work, so the issue is more often one of high overhead as opposed to small margins.

2. The importance of relationships, trust and “partnerships”

Relationships and trust have been stressed throughout the chapter. They apply to every aspect of decisions made by stakeholders. Few will be surprised when reading that

trust is important in business, but the relationship between trust and financing risk mitigation in developing countries is not discussed in the supply chain literature. Trust may be difficult to quantify, but that does not undermine its importance. Rather, it should be acknowledged by outside investors or donors interested in being involved in a company or supply chain. Their method of analysis when studying potential companies must be expanded to include the relationships and trust the company has with its supply chain partners.

Referring to different entities in the supply chain as partners is a bit misleading. The “findings within theme” section discussed this under *scale*, but the organizations working together have their own objectives and interests in mind. When considering supply chains for life-improving products such as solar lanterns, the tendency is to look at the entire supply chain as one unit. The stakeholder interviews made clear that this is not the case. There are competing priorities, highlighting another similarity between businesses in the developed and developing world. The difference is that in the developed world, the profit motivation is clear. With development and impact-focused programs, the situation is much less cut and dried. Companies want to profit, others recognize the importance of generating revenues to support impact, and others are strictly impact focused. The entities within the supply chain are probably aware of these differences. If not, they should consider how their and their “partners” interests align. For entities outside the supply chain—NGOs, international finance, aid agencies, etc., the relationships and objectives of the organizations across the supply chain should be considered before becoming involved.

3. Optionality and not picking winners from the outside

Uncertainty and therefore risk are inherent in any business venture, and especially so in supply chains in developing countries. It would be impossible to classify all potential risks facing organizations and supply chains in developing countries. It is well beyond the scope of this research to classify risks and suggest potential options for mitigating those risks for just the stakeholder organizations interviewed. But, a major lesson emerges in how to think about risk from a supply chain/systems perspective. As Taleb (2004) argues, risk can never be completely eliminated but how we prepare ourselves for uncertainty is within our

control. The key is optionality: having options in how to deal with the inevitable, though unknown, issues that will face organizations and supply chains.

In developing country supply chains this means that decisions should be pushed to the lowest possible level at every opportunity. There are important ramifications at both the donor/investor and lower product levels. At the product levels, interventions should focus on product agnostic distributors that offer multiple types and brands. This allows the organizations closer to consumers to carry and sell the products that they deem of high quality and that customers want. The distributors will serve as a relatively neutral third party as opposed to manufacturers that will always put their own product on a pedestal. Customer demand will determine which products are most popular, having the added benefit of supporting financial sustainability.

Distributors also play an important role as advocates on behalf of consumers in developing countries. Consumer protection laws often do not exist, and customers have little recourse if quality or service issues arise. Retailers are generally small and purchase directly from distributors. The distributors function as the intermediaries between customers/retailers and the supplier.

The government and international finance agencies expressed a desire for more involvement in supporting companies and development goals through supply chain-financing initiatives. Similar to the in-country distributors having the advantage of proximity and local knowledge when working with retailers, gauging customer demand, and choosing suppliers, international finance agencies will have the highest likelihood of achieving their impact goals when working through trusted local organizations. Specifically, they can work through local financial institutions and private financing firms willing to provide financing to companies in supply chains that would otherwise not be able to get it. This also helps to eliminate the internal cultural barriers of working with private organizations.

Risk is never eliminated, but it is reduced by working through local organizations that are familiar with the market and have relationships with the individuals and companies on the receiving end of the financing. And, investing in financial institutions can actually help grow the market for supply chain financing. Revenues and profits from successful ventures

will help to create a virtuous, locally sustained cycle in which distant organizations are not choosing the “winners”. If the programs are not successful, it is a drop in the bucket of the billions of aid dollars spent by the international community annually. There is little downside risk other than finding out something else does not work.

H. Conclusion

1. Supply chain finance is one part of the solution

The purpose of the exploratory interviews was to develop a better understanding of how stakeholders in developing country supply chains think about and make financing decisions. Specifically, they were undertaken to address the gap in the literature on the role that supply chain finance plays in resource-constrained environments. The respondents were from a myriad of for-profit and non-profit stakeholder organizations across the globe. Conversations focused on how resources are acquired, allocated and used within businesses and across the supply chain. The explanations and insights provided by the respondents provided support for focusing on areas identified in the international development, economics and supply chain literature: financing acquisition and allocation, scale, risk and context. The stakeholders highlighted connections across these themes that serve as the basis for the key interview insights.

A key takeaway from the interviews is that while affordable supply chain finance is important, it is not a magic bullet. Finance may be a critical enabler of scale, but it is only one link in the chain. A number of other factors such as education and training, good governance and distribution are also critical. As a tool however, supply chain financing can influence all of these other factors that it would not traditionally be associated with. This connection with factors not usually considered as relevant to the supply chain offers further support for assuming a supply chain-wide view when considering financing in developing countries. The majority of businesses across the globe are small businesses that do not have departments with specific functions. In addition to operating where financing is difficult to come by, manpower, time and expertise within the companies are also limited. Factors outside of the traditional supply chain focus must be taken into account when examining supply chains in the developing world.

2. Phase 1 limitations

The first, exploratory phase of this research draws upon interviews with stakeholders. The data is qualitative, and the discussions focused on what stakeholders think are relevant issues to their organizations and the developing world at large. A wide sampling net was cast to add variability to the study, but it is undoubtedly clear that a majority of stakeholders are involved in either the agriculture or renewable energy sector. The hybrid-snowball sampling method certainly contributed to the weighting of discussions toward these two industries. At the same time, agriculture and renewable energy are two extremely important issues in international development.

Ending hunger and ensuring environmental sustainability are two of the UN's eight Millennium Development Goals (UN, 2005). It is logical that stakeholders—both for-profit and non-profit, would be focused on such critical issues as feeding the world and trying to bring energy to underserved households, while not damaging the environment. From a research perspective, agriculture and energy are also a good pairing in that they provide an upstream and downstream view, respectively. The insights garnered can be applied across a range of industries based on the upstream or downstream nature of the supply chain.

A concern with qualitative data from interviews is the truthfulness and openness of the respondents. Because quantitative data was not collected during this phase of the research, it was not possible to verify the accuracy of what the respondent said. (Quantitative data is used to validate qualitative data in the case study.) If interviewing another stakeholder from the same supply chain, I would ask questions on the same topic, but if a disagreement arose, whose word would be trusted? This is one of the main reasons the data collection and analysis focused on how and why decisions were made. Disagreements and conflicting reports actually became an interesting area of investigation as opposed to a troublesome data point. Along similar lines, multiple stakeholders reported quite optimistic growth projections. I do not think they were being intentionally misleading, but they may have wanted to promote a positive view of the work they are doing. This informed a takeaway regarding caution in regards to scale estimates and risk.

3. Identifying the case

In addition to using the exploratory interviews to collect data on how people are making decisions in the real world, the hope was that the conversations would identify an appropriate and willing organization or supply chain for a case study. This would enable testing of the hypotheses that emerged from the interviews with both qualitative and quantitative data. The effort was successful, and the company identified is a social impact, renewable energy product distributor in Kenya.

The company of focus has a goal of creating scalable, clean energy programs in developing countries and functions as a distributor of solar lanterns and energy efficient cookstoves. In Kenya this is a vital service. In 2012 over 75% of Kenyan households were not connected to the electrical grid (Africa, 2014). As a distributor for five manufacturers, the company established partnerships with two financial institutions: 1) A micro finance organization that primarily serves rural customers; and 2) A partnership with a major Kenyan bank that has over 100 branches around the country and offer financial services to independent retailers and consumers. This latter utilizes an SMS-based ordering and payment system to manage and track sales. The two sales channels and the supply chain financing structures within each sales channel are being evaluated for profitability, sales growth and risk. Because of different relationships with each manufacturer, the analysis is further broken down by product line within the sales channel.

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Chapter 3 Appendix – Interview Questionnaire

Script and list of questions for Manufacturers. Additional questionnaires available upon request.

Introduction

Hi, my name is Tim Breitbach, and I am a PhD Student in Engineering Systems and Supply Chain Management at MIT's Center for Transportation and Logistics. How are you doing today?

Thanks for agreeing to talk with me, and thanks for your time. The purpose of this interview is to ask you some questions about the work your organization does with funding businesses and activities in developing countries. This interview is part of my dissertation research on the role that supply chain financing can play in improving the profitability of companies throughout the supply chain and getting products to people in need. I would like you to think of it as an open conversation, rather free flowing, about the key variables that stakeholders are considering when making, or not making, financing decisions. *It won't take more than 1 hour but less time is of course ok.*

Since it is an academic interview, you have some special rights as a respondent:

- All the information you give me today will be treated confidentially.
 - Your name and your organization's name will not be linked to any answer.
 - I am having similar discussions with multiple stakeholders in this area, including individuals from NGOs, government and inter-government organizations such as the World Bank and USAID, as well as for-profit companies. Any insights or takeaways from our conversation will be reported as originating from the stakeholder group and not a specific person or company, unless you give me permission to do so.
- The interview is voluntary, which means:
 - You have the right to decline to answer any particular question,
 - And you can stop the interview at any time.
- I now request your permission to record the interview, if that's OK with you. ☺
 - You have the right to stop the recording at any time.
 - The recording will be kept in an encrypted digital file, guarded by me personally.
 - All copies will be destroyed once our research project is complete.

Do you have any questions? (Answer the questions, if any). Let's proceed.

Positioning Questions (~10-15 minutes):

- 1) What is the name of your current position?
 - 1a) What does your work primarily entail?
 - 1b) How long have you worked in the organization? In the development or supply chain realm?

- 2) Can you tell me a bit about _____'s background?
 - 2a) Where do you operate – regional or country specific?
 - 2b) What about the overall budget and size of your operations?

- 3) Can you talk a bit about your Production process?
 - 3a) Do you manufacture your own products?
 - 3b) If not, who do you buy from and what is the process? If so, where?
 - 3c) Regardless, is it make to stock or make to order?

- 4) Can you talk a bit about your Distribution processes?
 - 4a) What about shipping and warehousing?
 - 4b) Can you briefly describe how you make inventory decisions?

- 5) Where does the funding for _____ come from?
 - 5a) How does your company finance its working capital?
 - 5b) Investors, IGOs, etc...

Focused Questions on SC financing topics (~30-45 minutes):

- 1) Can you tell me about _____'s business model in terms of channel to markets or serving customers?
 - Payment systems and methods
 - Payment timelines and terms
 - In terms of how downstream (or upstream) customers or partners businesses, purchases or leases are financed?

- 2) What does your organization consider as financing when working with suppliers or customers? (If need be, explain my broader definition and bring in supply chain activities)
 - Do you provide up-front capital?
 - Do you provide on-going loans?
 - Do you fund inventory?
 - Funds for other operating costs?

- 3) Key “How” and “Why” Questions:
 - Why have you chosen this model?
 - What are the major upsides?
 - How long have you had this model?
 - Who was responsible for choosing and implementing it? (in terms of level in the company, maybe speak to them)
 - How did you arrive at this model?
 - Are there other models you have tried and can you discuss those?
 - What are the drawbacks?

- 4) What are the challenges and issues around financing?

- 5) How have financing decisions or focus on these changed in the last 5 years? (Or longer or shorter depending on time with company)
- 6) Do decisions of who to provide product or services to depend on:
 - Business form: i.e., retailers, distributors, and/or manufacturers
 - Farmer, non-traditional, micro-entrepreneur
 - The level of capital of the individual or business
- 7) Do you focus on / pay attention to 2nd and 3rd Tier customers?
 - I.e., Are the sales channels focused on if distributors or wholesalers are used?
- 8) Do you segment customers? How?
 - Is there a difference for business-to-business transactions versus-business-to-customer transactions?
- 9) What about up-stream, do you do any supply chain factoring or support your suppliers?
 - *The relevance of this question will be determined by the individual/company and the conversation thus far.*
- 10) Do you have any relationships with third party lenders or other organizations?
 - Could be local co-ops or large IFC type institutions
- 11) What is the effect of financing (availability or unavailability) on:
 - Demand
 - Profits
 - Ability to hold inventory and manage assets
 - Anything else....
- 12) What about risk and risk mitigation?
 - How do you identify risks?
 - The risks of financing and credit:
 - Generating enough revenue
 - Ensuring people pay
 - Theft and equipment damage
 - Is there some threshold of repayment-failures that is to be expected?
 - Has repayment been an issue in a particular setting, context, type of business?
- 13) Can you speak at all about the effect of government pressure or regulation?
 - Maybe in certain developing country markets or even from international organizations?
- 14) Can you talk about the context a bit in terms of the role that:
 - Local or national corruption plays into business decisions in that particular market in regards to financing?

- Regulatory uncertainty or the cost of doing business in that market
- Red tape and bureaucratic barriers
- Institutional corruption
- Government fiscal policy (in terms of redistribution) and tax policy
- Political violence, crime, other destabilizing forces
- Natural resource availability or depletion?

***** Most likely that these questions have come up at some point but use as a reminder to bring in as is appropriate to the flow of the conversation.

- 15) Does your organization even consider supply chain or logistics issues when making funding decisions? What about working capital?
- This may come up in procurement, production, or distribution as well...they key is to bring up working capital and logistics-related concerns when it is relevant
- 16) Have you seen any relationships between the type or form of business and the ability to get funding?
- 17) From a development perspective, can you discuss the short-term and long-term effects of the financing provided?
- Similarly, this should have come up at some point over the conversation already...leaving in as a preparatory reminder.

During the course of this conversation, try to move the conversation from the individuals to the organization's overall strategy and how it has positioned itself in the SC / Financing realm. Try to keep it anchored on how financing decisions are made and how the outcomes are measured.

- *For interesting things, ask: "Tell me more about X".*
- *When the respondent is getting vague, ask: "Can you give me an example of X?" (Especially important for successful or unsuccessful programs or operations. Make sure their definition of success is outlined).*
- *If the conversation is getting lost in operational details, ask: "What is the purpose of this?", or "What is the philosophy/idea behind this?"*
- *If the conversation is getting too strategic, ask: "How do you implement this?", or "How do you ensure this happens", or "How do you enable this?", depending on the subject.*

Strategic / Open section (~5-15 minutes)

(Note: All these questions are optional. Ask only those that seem relevant to the position and that have not been answered before during the course of the conversation.)

1. Opportunities and challenges (ask together if deemed appropriate):
 - What would you say is the biggest opportunities facing the development world today? (I.e., where does financing fit in?)
 - What would you say is the biggest challenge facing the development world ... or your organization in this realm?

2. What do you see as an area or need that is not currently being addressed by the market or other institutions? Or, maybe not being addressed on a large enough scale?
3. What do you see as an opportunity for partnerships with upstream, downstream or lateral businesses? (lateral would be other entities in the value chain)
4. What role can finance play in meeting the needs of the development world?
 - Who or what organizations should play the major role in this area?
5. Can you talk about any truly effective, or ineffective strategies that you have seen deployed in developing countries?

Thank you very much for your time and that's pretty much what I had to ask you. The formal portion of our discussion is over, and I'm turning off the recorder.

Are there any points you would like to add or do you have any feedback for me? I really appreciate your answers and your time. Would you happen to have any contacts that you think would be interesting in having a similar conversation?

I hope I can contact you with follow up questions after I have analyzed our conversation. I'll send a copy of the interview transcript if you would like to review our conversation.

Thanks again!

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Chapter 4 – Case Selection and Methods

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Chapter 4 – Case Selection and Methods

A. Case introduction

1. Case study motivation

The interviews in the first research phase were guided by the academic literature, focusing on how resources are utilized, how risk should be viewed differently in developing countries and the importance of context. The respondents were chosen because of their real world experience in development and impact-focused enterprises. The Phase 1 findings serve as guidelines as to how individuals and organizations think about and make supply chain financing decisions in resource-constrained environments. The interviews were exploratory and relied on qualitative data around how decisions are made and the impact of those decisions.

Chapter 4 shifts from the first, exploratory research phase to a case study on a durable, consumer goods supply chain in Kenya. The case study explores the hypotheses that emerged from the stakeholder practitioner interviews. The goal is to fill the research gap about the role that financing plays in developing country supply chains. This case study draws on a mixed methods approach of using and integrating multiple data types (Yin, 2014). Stakeholder interviews from across the supply chain are used along with sales, financial, transportation and contract data. The contracts and presentations fill voids that interview questions may have missed, and the sales and financial data are used to measure the actual results of supply chain and financing programs and decisions. This triangulation is critical to the strength of case study research (Barratt et. al., 2011).

2. Company and supply chain overview

The company of focus is a social impact, product distribution company. It will be referred to as “Distro”. Reporting results anonymously was the one condition agreed to when deciding to focus on this supply chain for a case study. Similar assurances were provided to the other respondents. Statements and findings will be attributed to a tier in the supply chain but not to a specific individual or organization. Reports will be shared with the stakeholder

respondents, but the research access was not contingent upon producing a report for any stakeholders or other outside parties.

DISTRO was founded on the belief that given the right know-how, technology and capital, microfinance institutions could be used as the basis for clean energy lending. It is headquartered in the United States and has field offices in Kenya and some Asian countries. This research focuses solely on the work in Kenya where the goal is to create scalable, clean energy programs for the country of almost 46 million people (World, 2015). Initially, the plan was to sell carbon credits to environmentally concerned companies on the European and U.S. carbon trade exchanges. Selling carbon credits remains a revenue source, but the international carbon markets have not taken off as hoped. DISTRO's focus has shifted to emphasize product distribution.

The products—energy efficient cookstoves and solar lanterns—provide basic services that the local infrastructure does not. Less than 25% of Kenyan houses are connected to the electrical grid. Solar lanterns that are charged during the day can provide security after dark and enable children to study and read at home. Additionally, most new solar lantern models have phone-charging capability. This allows individuals to re-charge their phones at home instead of having to pay at a mobile charging kiosk or require rural residents to walk to the local village and then pay for the service. Along with low electrical grid access, roughly 35 million Kenyans rely on biomass for cooking, which can have deleterious effects on both the environment and health. Considering that the average family's energy budget is used primarily on cooking (roughly 80%), this serves as a major daily expenditure (Africa, 2014). Any budget relief or efficiencies gained can pay large dividends for the average poor family that is most likely struggling to put food on the table, pay for children's education and save for the future (Banerjee & Duflo, 2011).

DISTRO is a product distributor for five suppliers, also referred to as Original Equipment Manufacturers (OEMs). Three of the OEMs produce cookstoves and two produce solar lanterns. The lantern OEMs have multiple product lines under their brand, and DISTRO offers the multiple product lines to its customers. In addition to working with the five suppliers, DISTRO has two primary sales channels: a micro finance institution (MFI) and a national bank. The MFI primarily serves rural customers in the agricultural sector. The

national bank has branches across the entire country and serves both urban and rural customers. Unlike the MFI, the national bank offers a mobile payment system for both its retail and business customers. DISTRO capitalizes on mobile payments and ordering when selling through the bank's network. Within the bank network, customers are reached in two ways: selling out of the branches by sales agents and selling through retailers.

DISTRO's supply chain was selected for a case study because of the desirable features of its sales channels, and the financing structure within each channel. Additionally, there are numerous advantages to using a distributor as an entry point for a consumer goods supply chain analysis. The distributor is somewhat product agnostic in terms of the OEMs. While margins may differ across brands and products, customers have multiple options within the sales channel. Customer demand drives sales. From a development and impact-focused approach, not having to pick a single OEM is very important. As long as there is a margin to be made and it is a high quality product, the distributor does not care which products sell. This differs substantially from focusing solely on one OEM that is primarily concerned with pushing its own products.

Additionally, entering a supply chain through the distributor enables both upstream and downstream access. The distributor has a working relationship with all of the OEMs and a close relationship with its downstream sales force, financing channels and retail network. The connections and access granted through the distributor in part mitigates the data collection challenges of the CITE work. DISTRO is a willing participant in the research. The access, openness and willingness to share data made an in-depth case study on its processes, supply chain and financing structures possible.

3. Research questions and hypotheses

The research on the DISTRO supply chain seeks to use a real world, contemporary case to study the effect of the supply chain and financing structures on decisions that affect profits, sales growth and risk. The academic literature and phase 1 results are used to guide the case study. Along with the myriad of interesting factors that emerged throughout the research, one thing became quite clear: this supply chain is a dynamic and ever-changing environment. The companies and individuals are constantly evolving to keep up with and

shape the market. There was also—what appeared to this researcher at least—a large amount of turnover within the companies of focus. Three of the general managers changed over the course of the research. Because of this change, it was especially important to rely on the literature and exploratory interviews to guide the case study and maintain the focus on financing a supply chain in a specific context. The research questions the case seeks to answer are:

1. How do the supply chain and financing structures affect profits and sales growth for a clean energy product distribution network in Kenya?
2. What are the major financial risks of the structures and how can these risks be mitigated?

4. Chapter layout

Section B is a discussion of the case study literature. The section includes an overview of empirical case studies in operations management research, using case studies to generate and test theory, and factors that lead to high quality case research. Section C lays out the case framework and the methods of data collection. Section D is a discussion of the methods of qualitative, quantitative and contextual data analysis within the case framework. Chapter 5 contains the individual sales channel reports, the cross channel report and a discussion of the case hypotheses. Chapter 6 examines the case conclusions and overall research contributions.

B. Case Literature

1. Case studies

Noted case researcher Robert Yin defines a case study as, “An empirical inquiry that investigates a contemporary phenomenon in depth and within its real world context, especially when the boundaries between phenomenon and context may not be clearly evident” (Yin, 2014, p. 16). The DISTRO supply chain is a real company in an existing market. The context is explored through interviews with stakeholders across the network, as well as data compiled by the World Bank. The latter half of Yin’s definition is especially apt in regards to supply chain research in developing countries. The phenomenon—the supply

chain and financing structures—are intertwined with the context, and should be examined in concert with each other.

This is difficult though, and it can be challenging to deeply understand the context while making use of the empirical data and using methodological rigor (DeHoratius and Rabinovich, 2011). There can also be a tradeoff between perceived reliability, internal validity and the precision associated with quantitative studies and the richness, background information and context that one can draw from a case study (Bonoma, 1985). The potential challenges and tradeoffs do not make case studies less desirable or appropriate, but the researcher should be well informed and draw upon techniques to strengthen the study.

One of the main techniques is the use of multiple data sources and types. Case studies draw upon numerous sources of data—both qualitative and quantitative. This research uses interview and observational data along with quantitative data—such as budget, sales numbers, and business plans—in addition to archival and other records. All of the data is used develop a fuller picture of the situation being studied (Bonoma, 1985). Boyer and Swink (2008) caution that without the use of multiple methods, researchers may fail to uncover the often complex social and behavioral elements involved in operations and supply chain management. Case studies utilize the strength of both qualitative and quantitative research (Creswell, 2009). With the multiple methods and multiple data types, the researcher can then pursue “perceptual triangulation” to better understand the area of focus (Meredith, 1998).

The researcher should also decide if the study is exploratory, descriptive or explanatory (Yin, 2014). Yin does not rank one type versus another in terms of quality and argues that case studies can be appropriate for all three. He does however say that case research is especially useful for answering “how” and “why” questions and that explanatory studies are geared towards the “how” and the “why”. Whetten (1989) echoes this sentiment saying that cases are ideal for addressing the “why.” This research is an explanatory study focused on how and why supply chain finance impacts profit, growth and risk in DISTRO’s distribution network.

2. Theory development

One of the goals of the case study is to develop theory and help fill the literature gap about the role that supply chain finance plays in developing countries. Additionally, I want to produce useful insights for stakeholders in developing countries. Case studies are ideal for this dual objective in that they are, “Unconstrained by the rigid limits of questionnaires and models, and can lead to new and creative insights, development of new theory and have high validity with practitioners – the ultimate user of research” (Voss et al., 2002, p. 195).

Eisenhardt’s oft-cited work on case studies offers strong support for the role and usefulness of using the method to develop high quality and empirically valid theory. Specifically, 1) Case studies have a high likelihood of generating novel theory due to the creative insights and “juxtaposition of contradictory or paradoxical evidence,” 2) The theory is likely to be testable with constructs that can be proven false, and 3) The theory is likely to be empirically valid (Eisenhardt, 1989, p. 546-547). The theory development process is an iterative process on the part of the researcher, and Eisenhardt points out that conflicting findings force the researcher to come up with unique solutions. As Ketokivi and Choi (2014) argue, theory is not discovered in the data. Rather, theoretical conclusions “are actively constructed by the cognitive mind” (Ketokivi and Choi, 2014, p. 238).

Eisenhardt (1989) and Eisenhardt and Graebner (2007) focus primarily on using case research to develop theory. Others in operations and supply chain management support the use of case research for theory extension and testing in addition to theory development. While agreeing that case research is an iterative process in which the researcher goes back and forth between existing theory and the data, Meredith (1998) argues that case research is appropriate for both theory generation and testing. Voss et al. (2002) argue that case research is appropriate for exploration as well as theory building, testing and extension. Ketokivi and Choi (2014) push this latter view to the point of saying that if the theory is developed through rigorous methods, further testing would not actually be necessary.

Edmondson and McManus (2007) point to three main research archetypes: nascent theory research, mature theory research and intermediate theory research. The work on supply chain finance in developing countries fits into the intermediate category in that it

draws from prior work and separate bodies of literature to propose new constructs and theoretical relationships. The “intermediate” archetype of Edmondson and McManus is closely related to Ketokivi and Choi’s (2014) methodological approach of theory elaboration. Theory elaboration is similar to theory testing, but differs in that the researcher “has identified a general theory that can be used to approach the empirical context” (Ketokivi and Choi, 2014, p. 236).

Theory elaboration most aptly describes what this research seeks to accomplish. It is important to note that while the methodological classifications are important and can be used to guide the research, in real world settings, it is rare that the approaches will ever be found in their “pure” form. Furthermore, the critical factor for researchers is to demonstrate transparency in their work by explaining procedures and logic as opposed to saying “x approach” was followed (Ketokivi and Choi, 2014).

Regardless of the academic debate about the use of case research in theory development versus testing and elaboration, Eisenhardt’s (1989) criteria for evaluating quality case research holds true. First, the theory should be testable, logical and emerge at the end of the study. Second, the strength of the evidence grounds the theory and rival explanation have been ruled out. Third, do new insights emerge? Ultimately, the validity of hypotheses and findings from the case will be in the “intimate linkage with empirical evidence” (Eisenhardt, 1989, p. 548).

3. Case drawbacks and generalizability

This section examines generalizability in case studies. The key factor is that generality should focus on the theory, not just the topic area. This is the criterion of duality, which means that cases should be situationally grounded and also seek a sense of generality (Ketokivi and Choi, 2014). This research topic is ideally suited for a case study. The companies, the supply chain and the financing across the system are intertwined with the developing country context. A mixed method case study that draws on both qualitative and quantitative data allows for a well-rounded examination of the factors and decisions at play, as well as outcomes as measured by profits and growth.

There are however drawbacks to utilizing a case-based approach. Cases are costly in terms of time and access for researchers who are unable to control elements of the study and may also be unfamiliar with internal procedures (Meredith, 1998). There is also a potential for bias because of the high degree of interaction between the researcher and the company of focus (Boyer and Swink, 2008).

The time and cost required to conduct case research is substantial, but it is up to the individual researcher to manage and be aware of these costs going into the study. Time and costs are not a threat to internal validity, but lack of familiarity with procedures and biases are a threat. Potential biases can be overcome by capturing insights from multiple stakeholders and capitalizing on contrasting and competing viewpoints. Focusing on the entire supply chain as opposed to only DISTR0 is a major strategy to mitigate bias in this study. It is also critical that the researcher strives for transparency by specifying the unit of analysis and including detailed descriptions of the research design, data collection and data analysis (Barratt et al., 2011).

Another potential drawback of case research is generalizability (Eisenhardt, 1989) (Boyer and Swink, 2008). As Meredith (1998, p. 451) argues, "if the study is weak in generalizability, it cannot provide an adequate test of theory." Generalizability is key to external validity and means that the findings are applicable outside the supply chain, companies and context from which it was developed. Meredith is not arguing that results derived from case research are less generalizable than other research methods however. Rather, instead of extending the results through an increase in the sample size, the goal is to extend theory to new populations.

Lee argues from a similar vantage point saying that case researchers should strive for "theoretic generalizability," which he describes as "particular observations may not be replicable, but whether a particular theory is proved or dis-proved would be replicable" (Lee, 1989, 41). If predictions hold up across multiple populations, the theory is proven true. Meredith (1998) offers three strategies to help the researcher accomplish this: 1) Include as many independent variables as possible while keeping the study tractable, 2) Include as many populations as possible to develop more comprehensive theory, and 3) Test the theory

on multiple populations. The following methods sections outline how these recommendations are followed in the design of the case.

C. Research Design and Data Collection

1. Case framework

The research design is multiple case study focusing on DISTRO's sales channels. DISTRO is the entry point into the supply chain, and the channels each represent a case. The reason for this channel-specific division is based on the research questions:

1. How do the supply chain and financing structures affect profits and sales growth for a clean energy product distribution network in Kenya?
2. What are the major financial risks of the structures and how can these risks be mitigated?

The channels have different financing structures, and the goal of the study is to better understand how the supply chain structures affect profit, growth and risk. The channels are defined as the avenue through which customers purchase products. There are three main sales channels: 1) MFI, 2) Bank, and 3) Retailers. Sales agents who hold products and sell directly to customers are included in the bank channel. Figure 1 - Case Framework shows the overall case framework. The benefit of multiple channels is it allows for replication, additional testing and anticipating similar or contrasting results based on the structure of what is being analyzed (Eisenhardt, 1989) (Eisenhardt and Graebner, 2007) (Yin, 2014). If the structures are similar, predicted results should be similar, and vice versa. Both Yin and Eisenhardt & Graebner make the point that the researcher must lay out the theoretical reasoning for including the cases. Barratt et al. (2011) support the Yin and Eisenhardt conclusions and add that multiple cases helps to limit bias and add to external validity.

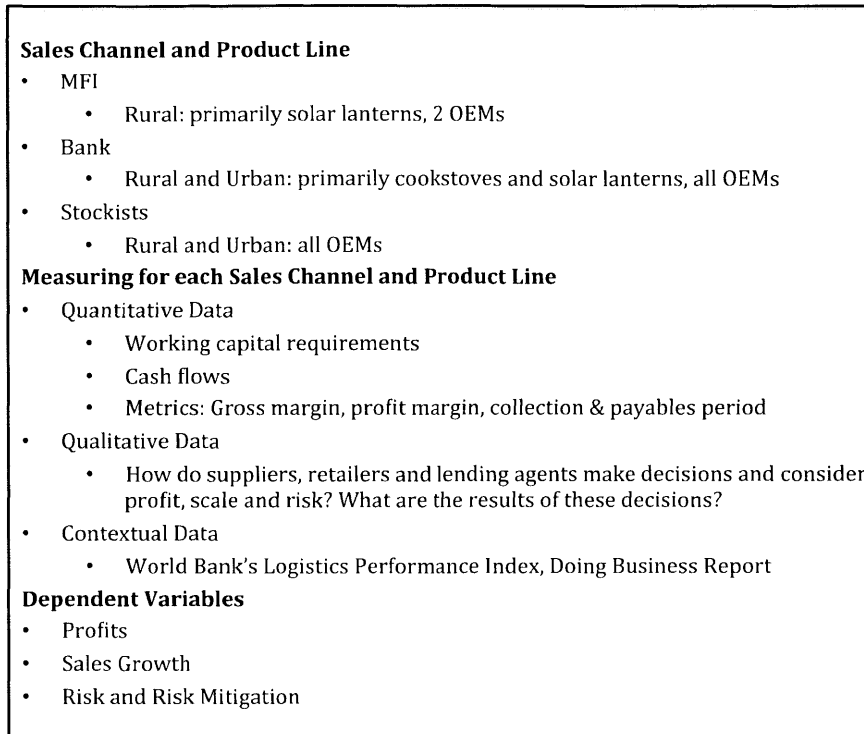


Figure 1 - Case Framework

The units of analysis are the DISTRO sales channels. It is critical that the case researcher monitors and controls for independent variables and parameters (Meredith, 1998). The independent variables are the brand and product-specific selling structures and terms, the local context such as taxes and consumer financing, and logistics costs. These independent variables lead to decisions made by DISTRO and the other stakeholders in terms of the channel-specific supply chain and financing structures. Parameters defined in the World Bank data are used to further establish the context in which the stakeholder decisions are made. The next sections explain the particulars of each of the independent variables and how the data were collected. The dependent variables are the sales and financial performance—as measured by the profits, growth and working capital metrics—and level of risk in each channel.

The analysis is completed on both the holistic and embedded levels. Holistically, the focus is on the DISTRO supply chain. This includes the performance of DISTRO and the downstream actors in each respective channel: MFI, retail and bank. The embedded units of

analysis are the performance of each brand and product line within the channel. Downstream, the embedded units of analysis are the individual stakeholders within the channels—the branches, sales force and individual retailers. The advantage of using an embedded and holistic analysis is that it allows for a detailed analysis of the factors impacting performance. Precautions do need to be taken with this type of analysis to ensure that cases do not get bogged down in subunit details. The focus should ultimately remain on the overall case purpose (Yin, 2014).

Three hypotheses emerged from the exploratory interviews that the case is used to further expand upon. The first is:

Hypothesis 1: Supply chain design and the logistics decision of a lead actor can serve as a de facto financing decision with a direct effect on the resource requirements of other supply chain actors.

This was a key insight from the exploratory interviews, and the case seeks to further explore the insight using real data from a developing country supply chain. The desire is to measure the impact of the supply chain design and financing structures on working capital and logistics costs in developing countries. Then, to explore how working capital requirements and logistics cost impact profit and sales growth. Such analysis has not been done with data from real, durable consumer goods companies in developing countries.

Hypothesis 2: A primary strategy favorable to grow sales is to own the distribution network and channel access to customers. Channels with optionality across brands, products and customer access points will provide more growth opportunities and less risk.

The point of entry in the case is DISTRO—a distributor that provides customers with multiple product options across multiple sales channels. Controlling the sales channels and access to customers is also a strategy of other supply chain “partners.” The issue from a growth perspective is that not all of the companies can own the distribution channel. Tradeoffs will have to be made and companies will continue to work together. Recognizing the competing interests of supply chain partners is critical when making finance and investment decisions.

Hypothesis 3: Mobile payments and sensor technology can increase market penetration and reduce risk throughout the supply chain by:

- 1) Lowering the cost of collection and speeding information and financial flows.
- 2) Reducing the risk of loss and theft.
- 3) Ensuring payment by allowing providers to remotely disconnect services.

Mobile-based technology was highly touted in the exploratory interviews. The question is whether or not these technologies will actually lead to increased customer access, and therefore sales for the product and service companies. Additionally, will the mobile platforms enable economies of scale and also reduce risk for companies? The key is whether the benefits of the mobile platforms outweigh the additional costs.

2. Case development

Figure 2 - Case Development and Analysis Plan, adopted from Yin (2014) outlines the phases of case development (Yin, 2014, p. 60). The DISTRO supply chain was identified, the research questions were developed, the channels were selected for analysis, and the data collection protocol was developed in the Define and Design phase. The data was collected and the channel-specific analysis completed in the Prepare, Collect and Analyze phase. The quantitative, qualitative and contextual data collection processes are outlined in the remaining sections of part C. The methods of analysis are discussed in part D. The sales channel reports that focus on the sales, financial performance and risk of each channel are included in Chapter 5. The case process concludes with Yin's Analyze and Conclude phase. The cross-channel comparison of the entirety of the DISTRO supply chain will bring Chapter 5 and the case study to a close.

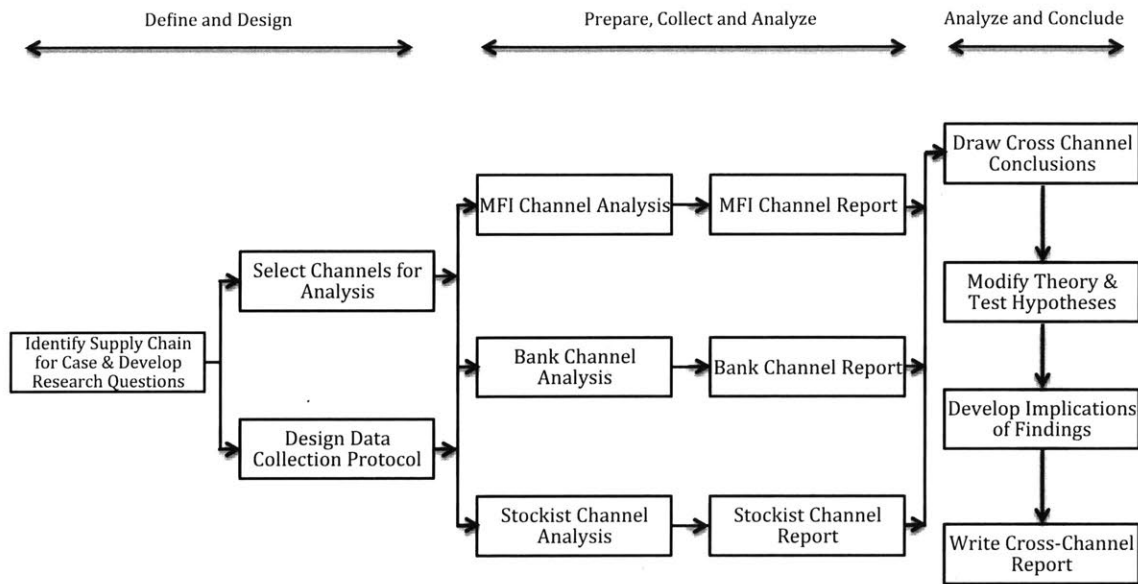


Figure 2 - Case Development and Analysis Plan, adopted from Yin (2014)

As the double arrows under each of the phases indicate, the boundaries between the phases are fluid. The arrows linking each box show one directional progress. However, in reality case research is an iterative process that often requires the researcher to go back steps and operate at multiple points simultaneously. As a conceptual framework though, Figure 2 provides a way to indicate the logic used in constructing the case and shows the layout of the remainder of the case study.

3. Mixed methods and data collection

A mixed methods approach that triangulates multiple data types is utilized to “develop a holistic understanding of the operations and supply chain management phenomena” (Boyer and Swink, 2008, p. 339). Figure 3 - Data Collection and Triangulation represents the triangulation of different data types, from multiple sources to assess the impact on the profit, growth and risk levels across the DISTRO supply chain.

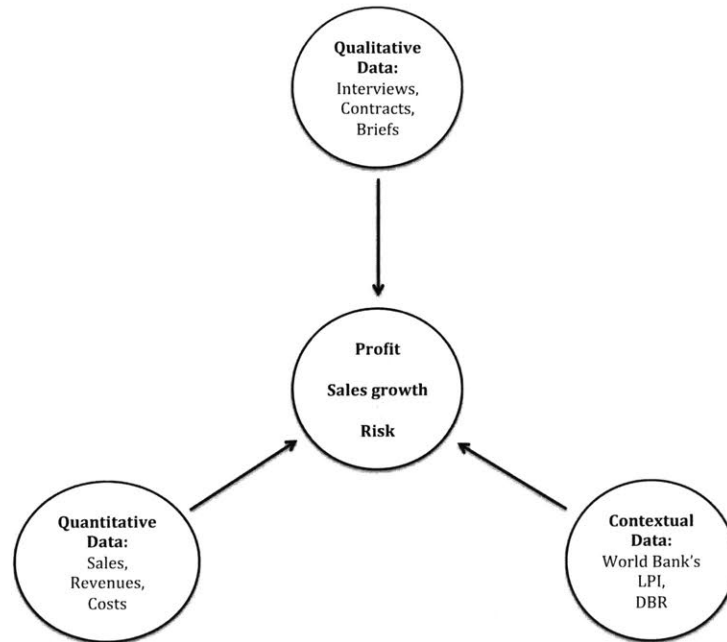


Figure 3 - Data Collection and Triangulation

Quantitative data was provided by DISTRO, which shared financial and operational data. This includes sales, revenue, cost and transportation data in addition to access to accounting and management outputs. Qualitative data were collected through interviews with the company personnel as well as the supply chain partners: manufacturer-suppliers, sales force, retailers and lending agents. Additional qualitative data include slide presentations, email correspondence, archival records, and contracts with suppliers. Contextual data collected and compiled by the World Bank, and publicly shared as the Doing Business Report and Logistics Performance Index, are used to frame the context and lay the groundwork for future extension beyond Kenyan borders. Integrating results from different data sources and types makes for a more complicated analysis, but as Creswell (2009) argues, problems in the real world are complex, and quantitative or qualitative methods by themselves are often inadequate to address this complexity.

Field research was used to collect the data. Edmondson and McManus (2007, p. 1155) define field research in management as, “systematic studies that rely on the collection of original data—qualitative or quantitative—in real organizations.” It “is critical to the development of scientific knowledge within operations and supply chain management”

(DeHoratius and Rabinovich, 2011, 371). Field research means gathering and using data from real companies, in real environments and is the foundation on which case studies are built. It serves as the basis of this case study, but no travel was conducted. A field data collection period was scheduled but cancelled at the last minute due to security and country clearance reasons. The inability to spend time on location with DISTRO and its supply chain partners was unfortunate, but an alternative plan was developed. Following an overview of the quantitative data collection, the alternative qualitative data collection plan is discussed.

4. Quantitative data

In addition to the uniqueness of the supply chain and financing model, one of the reasons for choosing DISTRO as a case study was their willingness to share sales, cost and transaction data. DISTRO offered on-going and nearly complete access to its files. A Data Use Agreement was developed, and the conditions agreed to were: the results of the study would be shared, and the identities of the companies would be masked. The quantitative data is used to establish “what” has happened in terms of sales, costs, margins, profits, etc., since July of 2015. (July 2015 is the cutoff for the quantitative analysis because transactional data is not available prior to then. Archival records do exist prior to this point, and these records will be discussed in the qualitative data section.)

Table 1 - Quantitative Data Type & Description

Quantitative Data Type	Data Description
Sales	Unit level sales from July 2015 to August 2016. The raw sales data are classified by brand, product type, location, sales agent, price and retailer (if made through a retailer).
Product Margins	Includes product cost, selling price, retail price, estimated transportation cost per product and commissions paid to the sales person and lending agent.
Transportation Costs	The total weekly and monthly transportation bills for DISTRO as well as quoted location-specific charges for the two transportation companies DISTRO has used since July 2015.
Accounting Documents	Semi-annual and annual balance sheet, income statements and cash flow statements produced by DISTRO for internal management and external reporting.
Taxes and VAT	Tax documents on product-based VAT expenses and income taxes.
Employee Salaries	Individual sales agents' salaries and consolidated management salaries.
Other Incomes and Expenses	Incomes from grants and carbon credits and other expenses where documentation can be found outside of the accounting documents.

Table 1 is a general overview of the quantitative data collected through a file-by-file search of DISTRO's online file storage. Every folder and file related to the East African business was examined for relevance. All relevant files were copied, saved and then catalogued for further examination. The quantitative data in its original form will not be publicly posted due to proprietary concerns. The analysis discussing the calculations will be shown in Section D, and the raw data used in the calculations will be included in the appendices. Sanitized portions of the raw data will be shared upon request.

5. Qualitative data

The qualitative data is used to the drill down to the core components of what the supply chain and finance structures look like and why the stakeholders made those decisions. The qualitative data adds the critical "how" and "why" aspects to the research, and there are two methods of qualitative data collection. The first is interviews with stakeholders across the DISTRO supply chain. The second is similar to the quantitative data collection and consists of presentations, contracts, correspondence, etc. This "diverse toolkit" of data collection

methods is at the heart of qualitative and mixed methods research that is useful, practical and can be used to develop and test theory (Kukartz, 2015).

a) Interviews

Table 2 - DISTRO Supply Chain Interviews is a breakdown of the interviews conducted across the DISTRO supply chain. I conducted the supplier and DISTRO management interviews over the phone and Skype. The sales agent, retailer, and lending agent interviews were conducted in person by a third party. The individual I hired was a social science graduate student in Kenya. He had previously worked in micro finance and had also done enumeration work on multiple projects for the NGO, Innovations for Poverty Action (IPA).

The original research plan was to conduct all interviews in Kenya, in person, during a one-month field visit. After the field visit was cancelled, an alternative plan was developed. I had been meeting regularly over Skype with DISTRO management and had also interviewed three of the DISTRO suppliers in June and July of 2015. I was confident that follow-on supplier and DISTRO management interviews could be done from a distance. In person would have been preferable, but Skype and phone interviews were a second best solution.

Table 2 - DISTRO Supply Chain Interviews

Tier in the Supply Chain	# of Interviews	Dates	Length and Description
Suppliers	7	May-July 2015 and May-July 2016	50-65 minutes and conducted over the phone and Skype.
DISTRO Management	11	June 2015 - July 2016.	40-75 minutes and conducted over the phone and Skype.
Sales Agents	13	April - May 2016	30-60 minute interviews conducted by third party
Retailers	8**	April - May 2016	17-60 minute interviews conducted by third party; retailer-only interviews were 17-21 minutes; **5 of the 8 retailers are also sales agents
Lending Agents	2	May 2016	No audio, only paper responses

The sampling strategy for the downstream stakeholders was to speak with a cross-section of the DISTRO sales agents, retailers and lending agents. Using sales since July 2015 as a guide, the sales agents were classified within the five DISTRO regions as high, medium and low sellers. The goal was to conduct half of the interviews with high sellers and half the interviews with medium and low sellers. Within each region, and within each selling classification, a random sample was used to select the interview targets. The initial interview goal across each stakeholder group, and the number of interviews actually conducted, is in Table 3 – Sales Agent, Retailer and Lending Agent Interviews.

Table 3 – Sales Agent, Retailer and Lending Agent Interviews

Tier in the Supply Chain	Target Interview #	# Actually Conducted
Sales Agents	10	13
Retailers	12	8**
Lending Agents	5	2
Total Downstream Interviews	27	18

**3 retailer-only interviews were conducted. Five of the sales agents also function as retailers. The total number of sales agent, retailer and lending agent interviews is 18.

The rationale for selecting more retailers than sales agents was that there are about four times more retailers across the supply chain than sales agents. The sales agents work with between two and nine retailers. The plan was to interview one lending agent from each region. The sampling plan was only partially followed. The sales agents, as DISTRO employees, were willing participants in the interviews. All of the targeted sales agents, plus three more, were interviewed. The additional sales agents were interviewed because of their familiarity with DISTRO, the different brands and the products. The fact that some sales agents also function as retailers was an interesting phenomenon that will be discussed at length in the next chapter.

b) Interview challenges

The retailers were willing participants, but because contacts with retailers were made through the sales agents, only three retail-only respondents were interviewed. It turns

out the sales agents spend almost all of their time at the bank branches rather than with retailers. Only two lending agents were willing to participate. While the bank leadership supported the program, for the most part the branch managers and credit officers would not let the lending agents be interviewed. The interviewer attempted additional interviews but was left waiting multiple times for hours at bank branches and in one case the respondent had malaria.

Initially, I was optimistic that sales agent, retailer and lending agent interviews could also be done over the phone and Skype. English is the language of business in Kenya, and DISTRO made email introductions for two pilot interviews with sales agents. It quickly became clear during the first call that this setup would not work. Through no fault of the respondent, the “interview” was incredibly bad. The conversation cycled through the same initial questions, and the sales agent repeated the same two responses for ten minutes before I thanked her for her time, and the call ended. The next call may have been worse. I called at the agreed upon time, and in this case the respondent seemed to be quite nervous as every question was met with, “No, no, no, no.” After a few minutes, I thanked her for her time and hung up.

Even though English is the language of business in Kenya, I later learned that people often mix Swahili into conversations. Additionally, I was calling a cell phone, so there could have been reception issues as well as difficulty understanding accents. The second and primary issue seemed to be a willingness to speak. This was quite clear during the second call, and it was obvious in hindsight. The female sales agents were nervous about speaking with a foreign man over the phone about the work with DISTRO.

The solution was to hire a local to do the interviews. Upon reading the interview transcripts, one of the reasons for the hesitation on the part of the sales agents became clear: there were trust issues between the DISTRO sales agents and management. The sales agents were concerned about job security and were very nervous about speaking with me. However, the interviewer I hired was able to get the sales agents to open up and even be critical of DISTRO.

A request for individuals with interview experience was made through two agencies that do international development work. Three candidates were interviewed over Skype, and the hiring and training process took two months. Multiple Skype training sessions were used to go over the sales agent, retailer and lending agent questionnaire that I had developed with input from DISTRO. (The questionnaires are available in the appendix). I explained to him what I sought to understand with each set of stakeholder interviews, the rationale behind each question, and answered any questions that he had.

Ultimately, 18 interviews were successfully conducted out of the 27 that were planned. All interviews except for the two with the lending agents were recorded. The third party interviews were transcribed. This was necessary because the interviewer and respondent would occasionally mix Swahili into the conversations. I have the recordings, but the analysis is based off of the transcripts.

c) Non-interview qualitative data

The non-interview qualitative data was collected in a similar manner to the quantitative data—through a file-by-file search of DISTRO's database, in addition to the management team sending certain files. This data adds a great deal of depth and richness to the analysis by plugging the “how” and “why” gaps that the interview questions missed. No matter how well structured and planned the interviews were, it is impossible to ask all of the potentially relevant questions. The DISTRO supply chain and financing partnerships—like any real world business network, are so complex there was no way a relatively small number of interviews could accurately represent all of the processes and programs.

Additionally, respondents' time is limited, and the effective window for conducting interviews from a distance seemed to be about 60-90 minutes. For these reasons and similar to the first phase's exploratory interviews, the case interviews focused on why programs and processes were set up a certain way. The non-interview qualitative data sources are then used to fill the gaps in terms of what those programs and processes look like. The qualitative data in Table 4 - Qualitative Data Type and Description, gathered from archives, was hugely beneficial to understanding the internal and cross-supply chain operations.

Table 4 - Qualitative Data Type and Description

Qualitative Data Type	Data Description
Email Correspondence	Email correspondence from August 2015 – August 2016.
Presentations	Presentations developed by DISTRO management for internal reporting, funding agencies and the bank partner. The weekly updates are the same format each week.
Contracts	Copies of signed contracts specifying terms and processes with suppliers, the bank, the MFI, sales agents, and retailers.
Bank and Lending Details	Documents outlining the bank partnership and the consumer finance details including the products, cost, lending terms and program management.
Sales Agents Contracts and Area of Coverage	Internal DISTRO documents showing sales agents hierarchy, branch coverage plan and employee contracts.
Marketing Documents	These documents and presentations outline the overall East Africa and channel specific marketing strategy, in addition to rollout schedule for new bank initiative. Includes flyers and other handouts used in the branches as well as expenditures.
Retailer Survey	Results of a DISTRO internal survey conducted in December of 2015 with retailers who experienced a drop in sales in the fall of 2015.
Warranty Information	Documents showing both supplier-specific warranty plans and claims.

6. Contextual data

The case’s third and final data source and type is contextual data compiled by the World Bank. The World Bank Group and its research arms put together massive amounts of data from countries across the globe and make it available for public use. The case draws from the Logistics Performance Index and the Ease of Doing Business Reports. There are two main reasons for including this data in the case analysis. The first is it functions as an independent check on what the stakeholders in the case report. It is another triangulation tool for establishing the case’s context. DISTRO’s supply chain can be viewed within the scope of the Kenyan regulatory and logistics framework. The scope can be changed from a global, to a regional, to an income group perspective.

The second reason for including the World Bank data is that it strengthens external validity. One of the limitations of focusing exclusively on the DISTRO supply chain is that it does not extend beyond the Kenyan borders. An obvious question then is how generalizable the findings are to other countries—even those in the same region and income group as Kenya. The contextual data establishes a baseline for the key parameters in the local

environment—as identified by the DISTRO stakeholders. Propositions can then be formed for future research as to the likely performance in other countries with (dis)-similar characteristics. Ultimately, the difficulty in extending the findings to other countries is offset by the value of an in-depth focus on multiple sales channels, but the contextual data adds a valuable triangulation tool and serves as a bridge for future research. Table 5 – World Bank Contextual Data and Citation presents the contextual data, years covered and a brief description.

Table 5 – World Bank Contextual Data and Citation

Title	Years	Description	Citation
World Bank Growth Data	1961-2015	Annual GDP growth by country, region and income class across the globe	GDP growth
International Logistics Performance Index (LPI)	2007, 2010, 2012, 2014, 2016	LPI Index for 160 countries across the globe – includes rank and raw scores	Global LPI
Kenya and Comparable LPI Scorecard	2007, 2010, 2012, 2014, 2016	Tailored LPI report comparing Kenya to Sub-Saharan Africa average, South Africa (top Sub-Saharan African performer), low income countries, and the six countries it shares a border with.	Country Score
Domestic LPI, Kenya and Comparable – Environment and Institutions	2007, 2010, 2012, 2014, 2016	Tailored LPI reports of surveys conducted with logistics professionals in their own countries. Compares Kenya to Sub-Saharan Africa, neighbors and income group.	Domestic LPI - Institutions
Domestic LPI, Kenya and Comparable - Performance	2007, 2010, 2012, 2014, 2016	Tailored LPI reports of actual domestic logistics performance. Compares Kenya to Sub-Saharan Africa, neighbors and income group.	Domestic LPI - Performance
Ease of Doing Business Report – Global	2004-2016	World Bank’s Global Ease of Doing Business Report for 210 countries. A comparative ranking to the world’s top performer in each applicable category.	Doing Business - Global
Ease of Doing Business Report – Comparable	2004-2016	Tailored Ease of Doing Business Report of Sub-Saharan African and low income and countries from 2004-2016.	Doing Business - Comparable
Ease of Doing Business Report – Neighbors	2015-2016	Tailored Ease of Doing Business Report to Kenya and direct neighbor countries for 2015-2016. Looks at year-to-year changes.	Doing Business - Neighbors

The Logistics Performance Indices (LPI) and Doing Business Reports (DBR) were customized on the World Bank website. The LPI data goes back to 2007 and the DBR data

goes back to 2004. The first data pull for each report includes all countries covered by the sample. This allows for a comparison between Kenya and developed countries. The customized reports are used to make four comparisons between Kenya and: 1) the averages across Sub-Saharan Africa, 2) South Africa—the top scorer in Sub-Saharan Africa, 3) the averages across low income countries, and 4) the countries with which it shares a border.

A country's international LPI performance is based on surveys in which respondents evaluate six components of logistics performance in up to eight main overseas partner countries. The six components are: 1) The efficiency of border clearance processes and customs. Efficiency includes speed as well as simplicity and process predictability; 2) The quality of trade and transport related infrastructure, includes ports, railroads, IT, etc.; 3) The ease of arranging competitively priced shipments; 4) The competence and quality of logistics services; 5) The ability to track and trace consignments; and 6) The frequency that shipments reach their destinations within the scheduled delivery times (LPI Report 2016, p. 6). A 1 to 5 scale is used, and a higher score denotes better performance. The scores are presented with 80% confidence intervals to account for sampling error, and "An improvement in a country's performance should be considered statistically significant only if the lower bound of the 2016 LPI score exceeds the upper bound of the 2014 score" (Arvis et al., 2016, p. 7). The scores are not perfect and while the 2016 LPI reports should be used with caution, the international LPI ranks do provide a basis of comparison.

The Domestic LPI reports drill down internally to look at the logistics performance and institutions within a country. In this survey, logistics professionals assess their own countries' performance on: 1) infrastructure, 2) services, 3) border procedures and time, and 4) supply chain reliability (Arvis et al., 2016, p. 27). The Environment and Institutions results assess performance in terms of the percentage of respondents answering high/very high or low/very low to questions such as, "Port charges are high." The Performance report provides discrete answers (as opposed to assessment of performance) to questions such as the average lead-time in days to export by ground.

The DBR captures features of a country's regulatory framework. It evaluates a country's regulations for starting a business, obtaining construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes,

trading across borders, enforcing contracts, and resolving insolvency (Doing Business, 2016). These factors were selected based on World Bank surveys with business professionals. The DBR uses two aggregate measurements as the basis of assessment: a distance to a category's top performer (called the Distance to Frontier score) and an ease of business ranking.

The distance to frontier score captures the gap between a country's performance and the best country's (global sample) performance over a five-year period. Performance is rated on a scale. The best is 100, and the worst is 0. A new best and worst performance score are identified every five years in each category. The average across all categories determines a country's overall distance to frontier score. Based on its distance to frontier score, a country is ranked within each category and overall. The year-to-year rankings can help indicate a country's trajectory. The assessments are made based on the largest city in the country. This is a limitation of the DBR. However, similar to how the LPI is not perfect, the DBR does provide a basis for cross-country comparison in the categories outlined.

D. Method of Analysis

1. Quantitative data analysis

The quantitative data is used to measure the profits, growth and risk of each channel and the DISTRO supply chain as a whole. The data is analyzed in Excel and R-Studio. The sales data and financial ratios and formulas outlined in Chapter 2 are used to measure performance. Ratios using share price and stock values are not used because DISTRO is a privately held, social impact company. Table 6 - Quantitative Data Analysis outlines how each data input is used and associated with profit, sales growth and risk. The ratios and equations are broken down into the three categories outlined by Higgins (2012) as measuring profitability, asset utilization, and leverage. The equations are listed in the Chapter 4 Appendix.

Table 6 - Quantitative Data Analysis

Quantitative Data Type	Used to Analyze:
Sales Records	Sales by channel, region and location and the sales agent associated with the sale. Sales broken down in the above categories by brand and product.
Product Margins	The margins are used to project gross income and are then compared to actuals based on the associated channel costs (i.e., taking out commissions) and the transportation costs.
Transportation Costs	Total transportation cost and cost per sale. Transportation costs are included in the accounting documents but are not broken out by channel or product.
Accounting Documents	Used in the ratio analysis. All of the ratios are run except for those focusing on stock price. The financial statements are an excellent overall tool for products, transportation, taxes, salaries, etc., but do not break anything down by specific categories. Good indicators of the overall health of the company but do not go into operational and sales channel issues.
Taxes and VAT	The accounting documents aggregate the tax expenses. The VAT and tax documents break the tax burden down by product and other categories.
Employee Salaries	Breaks employee salaries down by management and sales agents—enables further break down accounting documents. For management, can allocate costs across the firm. For sales agents, can compare to revenues and sales channels.
Other Incomes and Expenses	Grant and carbon credit income are separated from product-related income to assess their effect on operations. Other broken out expenses are marketing/product demonstrations and training.

2. Qualitative data analysis

a) Interviews

36 interviews are used in the case analysis. There are five categories of interview respondents: suppliers, DISTRO management, DISTRO sales agents, retailers and lending agents. Three of the suppliers were also interviewed during the exploratory interviews. This data is included in the case analysis. (The same individual from one supplier was interviewed during both sessions. The other two suppliers underwent management changes.) Including the first exploratory interview adds a time dimension to the goals and programs outlined by the suppliers. The programs and objectives from the summer of 2015 can be measured against brand performance and compared to the interview data from 2016.

The exploratory interview with the DISTRO regional manager is also included in the case analysis because it provides a good overview of the company's broader objectives. Using both rounds of interviews also meant that initial procedural questions would not have to be repeated. The follow-on interviews were more in-depth.

I transcribed relevant portions of the interviews with the suppliers and DISTRO management. The interview recording was listened to in its entirety, and a time note was made of relevant sections and quotes. Relevance was determined based on the respondent's remarks aligning with one of the sales channels or the coding themes from the exploratory interviews. The relevant portion was then transcribed and coded against the applicable channel(s) and theme(s). The sales agent, retailer and lending agent transcriptions were also coded based on sales channel and theme. I built a matrix for each channel, and the respondent data was organized by theme within the channel matrix. A matrix was also built for data that was more overall in nature and not applicable to a specific channel.

Coding directly into the sales channels ensured that the procedures outlined by the respondents were organized in a way that tells the channel's story and adds to the quantitative analysis. Additionally, because of the respondent's position in the supply chain, his or her insights were naturally geared (generally) towards one channel over another. For example, the sales agents spoke mostly about the retail and bank branch channels, and the suppliers focused on the performance of their brand within a certain channel. Coding by the themes from the exploratory interviews ensured all other relevant and interesting insights were captured. The interview matrices and memos are the basis for the narrative portions of the channel analysis.

b) Non-interview qualitative data

Over 175 documents were downloaded from the DISTRO database. There are caveats to this number and classification. The first is that many of the documents contain quantitative data. For example, the weekly updates contain numbers of sales, the marketing documents specify how much is to be spent on marketing and the lending details outline rates and prices. These are just three examples, and there are many more. The key difference between this and what is classified as quantitative data is that it is not focused on raw sales,

prices, costs, salaries, etc. The second caveat is in regards to the large number of files. Many are repeats of what is very similar information—i.e., the contracts, and minor updates to weekly sales numbers, and updates to on-going lending programs.

Caveats aside, the supporting documents are quite valuable to the analysis. They are used to plug in the procedural details to questions that the interviews and quantitative analysis either missed or brought up. For example, the income statements show how much was spent on marketing in a certain period. But, only the marketing documents show where those funds were spent and what initiatives the funds were spent on. Given that both the suppliers and sales agents stressed the need for more marketing, this was important information. A similar example occurred with the rollout of the new consumer finance program with the bank. The presentations explaining the program to upper level bank management and investors were critical to understanding the details of the program. I also would not have known about the progress made with the PAYGO initiative had it not been for the presentations found in the database.

The process of analysis after the initial download was to again review all of the files electronically. Relevant information was documented by file name and location in a matrix developed for each sales channel. Brand and product information were also grouped in each matrix. The suppliers were given their own matrices to document information not applicable to a specific channel. For example, a supplier's warranty would apply across all of the sales channels. In addition to using the information to plug specific gaps, memos were written for each channel. The memos are a key component of the channel reports.

3. Contextual data analysis

The Logistics Performance Index (LPI) and the Ease of Doing Business Report (EDBR) add to the context described by the case stakeholders. The data were compiled by the World Bank and analyzed in R-Studio. The outputs are displayed in the Chapter 6 case conclusions. Kenya's scores will be compared to its direct neighbors—Tanzania, Uganda, South Sudan, Ethiopia and Somalia—both because of similarity and proximity, and these are the logical East African markets for expansion by DISTRO. (Three of the suppliers are already operating in other East African countries). The average regional and income group performance are

used to compare countries with similar geographic and economic characteristics. South Africa is included as the top performer in the region to establish a high performer baseline—as opposed to using a high performing western country.

The international LPI scores include a score and rank. I will use the rank, as the score does not really indicate much without a comparison to other countries. Based on the LPI guidance, the rank range will be used. Countries should only be judged to be statistically different if the upper and lower bounds of their ranks do not overlap. I will also use the ranks (no ranges provided) for Customs, Infrastructure, International Shipments, Logistics Quality and Competency, Tracking and Tracing, and Timeliness. Hausman et al (2013) focused on cost, time and time variability, but the cost variable is not included in the International LPI after 2007.

Because the criteria changed after 2007, the LPI years included in the analysis of the International Scorecard are 2010, 2012, 2014, and 2016. The Domestic LPI results—i.e., surveys with logistics professionals about the performance of their own countries, do include more detailed information regarding time, cost and time variability. There are no scores for these categories, but the responses themselves will be compared across country, region and income group.

The overall EDBR country rank is available for 2015 and 2016. The overall distance to frontier scores go back to 2010. The distance to frontier scores for the ten EDBR categories go back to 2006. Kenya's distance to frontier score and overall rank will be compared to its direct neighbors, income group, region and the top performer in its region. In addition to the overall distance to frontier scores and country ranks, the categories that will be focused on in the analysis are Getting Electricity, Getting Credit, Paying Taxes, and Enforcing Contracts.

Electricity—or lack thereof—is a critical factor in the viability of the DISTRO supply chain. Access to credit is a major driver of this research, and both taxes and contract issues are mentioned in the development literature and during the Phase 1 exploratory interviews. The analysis will also include the country score and rank for the Starting a Business and Trade Across Borders categories. These categories are particularly relevant for expansion of the research beyond Kenya.

4. Conclusion

Chapter 4 provided an introduction to the case study and the DISTRO supply chain. The case literature outlined the theoretical underpinning of case studies in operations and supply chain management. Section C outlined the research design and data collection, and Section D discussed how the different data types are analyzed. Chapter 5 will share the results of the analysis on the DISTRO sales channels, the cross-channel report, and the case findings.

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Appendix

Interview Questionnaire – Sales Agents

Good morning / afternoon, my name is _____ and I am conducting interviews on behalf of a researcher associated with DISTRO. The purpose of the interviews is to better understand the supply chain and how the financing and products affect sales. Everything you say is completely confidential, and the interviews and the research are being used for academic purposes. The results of the interview will be shared with the researcher who will compile all of the input across the interviews before sharing with DISTRO. Unless you would like them to, they will not know who exactly shared any particular comments. Additionally, I would like to record the interview. Is that ok with you?

Do you have any questions before we begin?

Intro Questions:

- Can you tell me a bit about yourself and your background?
 - o How long have you worked with DISTRO?
 - o Do you have other employment in addition to DISTRO?
 - o What other type of work do you do?
- What got you started working with DISTRO?

Process Questions:

- Can you describe your sales work with DISTRO?
 - o *As a prompt if needed:* maybe describe your average week in terms of doing demonstrations; how you travel between branches and the time you spend each day working for DISTRO?
- Can you explain your selling process and strategy? Do you focus on selling to stockists, to the bank branches or to individual customers?
- In your region, how do most people buy solar lanterns or cookstoves? In retail shops? Through SACCOs?
- Would customers be interested in delivery to their homes? (Model where product is delivered to Customer's home 48 hours after loan has been approved and processed).
- How many shops in the main town you work in stock lantern or cookstove products?
- Can you describe how often you communicate with stockists and how you work with them?
- Can you describe how often you communicate with your credit/loan officers?
- When you 'train credit officers' what does that mean? Can you elaborate?
- Similarly, when you're following up on pending loan forms, how do you work with credit officers to ensure that the process is sped-up?

- Is the branch manager ever involved in a case where a credit manager does not cooperate?
- How do you determine which branches or stockist locations where you will spend your time?
 - o *Follow-up:* How do you identify potential customers or good stockists?
 - o Are there certain factors that lead to higher sales at stockists?
- When you are spending time at a branch, how do you divide your time between marketing to customers and other follow-up activities?
- What are these follow-up activities?
- Do you sell products directly to customers or only to stockists? Why have you chosen this?
 - o *If functioning as a stockist...*how do you pay for the products that you purchase from DISTRO?
 - o How do you choose how many units or products to hold?
 - o Would you want credit from DISTRO and would this help you sell more?
 - o *If not also a stockist, ask...*why not and if the individual has thought about it?
 - o ****For both, ask...*why have you chosen this path and how did you make the decision?
- Can you discuss the different sources of income from DISTRO—salary, commission or transportation reimbursement? How do these impact:
 - o How you conduct your sales?
 - o The products you sell?
 - o The branches you allocate your time to?
- Do you prefer to sell certain products—lanterns or cookstoves, or a certain brand? Why?
- Do customers or stockists prefer a certain product or certain brand? Why?
 - o *Trying to determine:* What are your thoughts on the individual products and the margins/incentive of selling that product?
- What would help you to sell more?
- Do you think stockists would want credit or loans for the products?
- Can you explain the payment and delivery process?
- Can you talk about the amount of time it takes customers to get products and how that affects sales and customers?
- Did you receive training on either selling or using the products? Would you want training?
- Have you had previous sales and marketing expertise? Do you think you need sales tips/training to best sell products?
- How much time do you spend reporting on ONA?
- What motivates you to go to groups/agents/stockists if it is time-consuming/tiring
- If nothing, what would motivate you?

If a Team Lead:

- Can you describe your role as a Team Lead?
- What types of things do you do as a Team Lead in addition to sales?

- Do you train the sales agents in your region? How closely do you monitor your sales agents?
- Do you think the Team structure will help motivate the other sales agents?
- Do you think the Team structure will help boost sales?
- Do you track how much your sales agents sell or how they spend their time?

Trust, Risk and Regulations:

- Have you had any issues with stockists or any partners backing out or breaking agreements? Or, any issues with individuals or businesses not paying or paying late?
 - o If so, how did this affect to you and did it change how you operated after that?
- What are the types of issues that you worry about or consider risky?
- Have you had any issues with local authorities in terms of taxes or payments or other laws and regulations? If so, can you describe these?
- Are there legal issues that prevent you, the stockists or DISTRO from selling more?

Open Questions to Finish:

- Are there any ideas or insights you would like to share that may be helpful or that you find interesting?
- The recorder is off, is there anything else you would like to share?

Financial Metrics

Profitability:

$$\text{Return on Equity (ROE)} = \frac{\text{Net Income}}{\text{Shareholder's Equity}}$$

$$\text{Return on Assets (ROA)} = \frac{\text{Net Income}}{\text{Assets}}$$

$$\text{Return on Invested Capital (ROIC)} = \frac{\text{EBIT} * (1 - \text{Tax Rate})}{\text{Interest-bearing debt} + \text{Shareholder equity}}$$

$$\text{Profit Margin (\%)} = \frac{\text{Net Income}}{\text{Sales}}$$

$$\text{Gross Margin (\%)} = \frac{\text{Gross Profit}}{\text{Sales}}$$

$$\text{Return on Permanent Capital} = \frac{\text{EBIT}}{\text{Non-current liabilities} + \text{equity}}$$

$$\text{Operating Margin} = \frac{\text{Operating Margin}}{\text{Sales}}$$

$$\text{EBIT Margin} = \frac{\text{EBIT}}{\text{Sales}}$$

Asset Utilization:

$$\text{Assets to Equity (also called Financial Leverage)} = \frac{\text{Total assets}}{\text{Equity}}$$

$$\text{Inventory Turnover} = \frac{\text{COGS}}{\text{Ending Inventory}}$$

$$\text{Collection Period} = \frac{\text{Accounts Receivable}}{\text{Sales}}$$

$$\text{Days' Sales in Cash} = \frac{\text{Cash and Securities}}{\text{Sales per day}}$$

$$\text{Payables Period} = \frac{\text{Accounts Payable}}{\text{COGS}}$$

$$\text{Days of Inventory} = \frac{\text{Inventory}}{\text{COGS}} * 365$$

$$\text{Cash Conversion Cycle} = \text{DIO} + \text{DAR} - \text{DAP}$$

$$\text{Working capital} = \text{Current assets} - \text{current liabilities}$$

$$\text{Working capital} = \text{AR} + \text{Inv} + \text{Cash} - \text{AP}$$

$$\text{Capital Turnover} = \frac{\text{Sales revenue}}{\text{Permanent capital}}$$

$$\text{GMROI} = \frac{\text{Gross Margin}}{\text{Avg Inventory Cost}}$$

Leverage and Liquidity:

$$\text{Financial Leverage} = \frac{\text{Assets}}{\text{Shareholder's equity}}$$

$$\text{Debt to Assets} = \frac{\text{Total liabilities}}{\text{Assets}}$$

$$\text{Debt to Equity} = \frac{\text{Total liabilities}}{\text{Shareholder's equity}}$$

$$\text{Current Ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

$$\text{Acid Test} = \frac{\text{Current assets} - \text{inventory}}{\text{Current liabilities}}$$

Free Cash Flow = $EBIT * (1 - Tax Rate) + Deprec. - Cap. expend. - WC investment$

Alt FCF = $EBIT * (1 - Tax Rate) - Change in Net Assets$

Debt Ratio = $\frac{Non-current liabilities}{Non-current liabilities + equity}$

Acid Test (alternative) = $\frac{Cash + AR + ST Investments}{Current liabilities}$

Working capital turnover = $\frac{Sales}{Working capital}$

DuPont Identities:

Profit Margin = $\frac{Net income}{Sales}$

Asset Turnover = $\frac{Sales revenue}{Total assets}$

Equity Multiplier, i.e. financial leverage = $\frac{Total assets}{Equity}$

ROA w/ DuPont = $Net Margin * Asset turnover$

ROE w/ DuPont = $Profit margin * Asset turnover * Equity Multiplier$

Modified DuPont Identities:

Fisher et al. (2002):

Operating Margin (OM) = $\frac{EBITDA}{Sales}$

Total Asset Turns (TAT) = $\frac{Sales}{Total Assets}$

ROA = $OM * TAT$

GMROI = $Gross Margin (GM) * Inventory Turnover (IT)$

ROA = $GM * (1 - \frac{SGA}{Gross Profit}) * \frac{Inventory}{Total Assets} * IT$

ROA = $GMROI * (1 - \frac{SGA}{Gross Profit}) * \frac{Inventory}{Total Assets}$

Lietz and Maranville's (2011):

Operating Profit Margin (OPM) = $\frac{EBIT}{Sales}$

$$\text{Capital Turnover (CT)} = \frac{\text{Sales}}{\text{Invested Capital}}$$

$$\text{Financial Cost Ratio (FCR)} = \frac{\text{EBT}}{\text{EBIT}}$$

$$\text{Financial Structure Ratio (FSR)} = \frac{\text{Invested Capital}}{\text{Equity}}$$

$$\text{Tax Effect Ratio (TER)} = \frac{\text{EAT}}{\text{EBT}}$$

$$\text{ROE} = \text{OPM} * \text{CT} * \text{FCR} * \text{FSR} * \text{TER}$$

Chapter 5: Sales Channel Reports & Case Analysis

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Chapter 5 – Sales Channel & Case Analysis

A. Introduction

1. Supply chain and sales overview

DISTRO views itself as a service provider for end customers, retailers and financial institutions in the clean energy space. The East Africa operations are based out of Nairobi, Kenya, and the country is divided into five geographical sales regions. Nairobi, the largest market by population, is split into two, so there are actually six sales regions. Figure 1 - DISTRO Sales Map shows sales locations—by financial branch, across DISTRO as a whole. The green markers indicate sales made through the MFI channel and the red markers represent bank branches. The bank will be referred to as KSB—for Kenyan Savings Bank. The MFI is referred to as Farmers Trust. Both are made up names to mask the participants' identity. The six regions are Nyanza, Rift Valley, Embu / Mt Kenya, Nairobi 1 & 2, and the Coast.

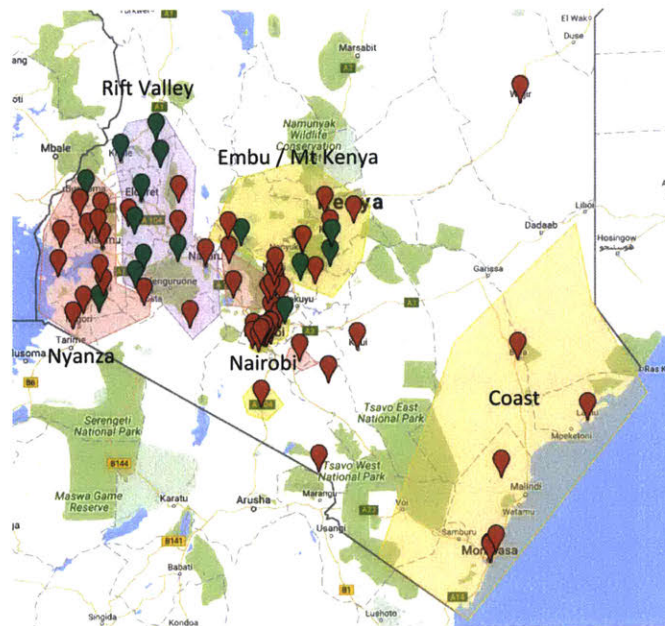


Figure 1 - DISTRO Sales Map

The sales channel distinctions are MFI, Retailer and Bank. The MFI channel encompasses all sales made through the MFI. Though both the bank and retail sales are made through the bank network using the bank's mobile platform, the supply chain structures and selling processes are quite different. The two are distinctly different channels to market. Sales made by DSAs directly to customers, i.e., a traditional retailer is not involved, are covered in the bank channel report. Sales made through retailers are allocated to the retail channel.

Each region has a team leader who is nominally in charge of the sales force (referred to as a DSA for "DISTRO Sales Agent") for that region. All DSAs are paid a monthly salary and receive a commission bonus if they sell more than 50 products in one month. Team leaders are paid an additional \$50 (US dollars are used throughout the chapter unless otherwise specified), and the teams receive a monthly bonus if a regional sales goal is met.

The channel reports will discuss the supply chain structure, ordering and selling within each channel, but the base process is: a DSA or a retailer orders and pays for products using DISTRO's SMS-based ordering and payment system. DISTRO headquarters aggregates orders and schedules the transportation and supplier pick-ups. DISTRO serves five suppliers, four of which manufacture and assemble in China. One does so in Kenya. All of the suppliers store inventory at warehouses in the Nairobi region, which serves as DISTRO's pickup point. The transporter retrieves products directly from suppliers and delivers to retailers or bank branches.

DISTRO holds almost no inventory and buys products—generally with 30-day payment terms, at the supplier's wholesale price. Depending on the product, DISTRO's margin before value added tax (VAT) and transportation ranges from \$4-8. The Kenyan government charges a VAT on cookstoves but not on solar lanterns. The VAT is a 14% charge on the markup at each tier in the supply chain. For example, if DISTRO charges the retailers \$4 more (on each product) than it paid the suppliers, the VAT owed to the Kenyan government by DISTRO is 14% of \$4, or \$0.56. Then, if the retailers sell the product to the end customers at \$4 more than they paid, they are also assessed a 14% VAT. The suppliers set the final retail price, and there is the possibility that the final price is marked up by more than the suggested amount.

2. DISTRO sales overview

The case sales analysis covers a fourteen-month period from July 2015 – August 2016 and includes the top seven selling products offered by DISTRO. The top seven products account for 98% of sales during the period of focus. Figure 2 - DISTRO Sales and Profits by Month shows the general sales and profits trend over this period. Both sales and profits peaked in August 2015. The decline in sales will be discussed in the channel reports, and the graphs are included to show the overall drop over the last year and a half.

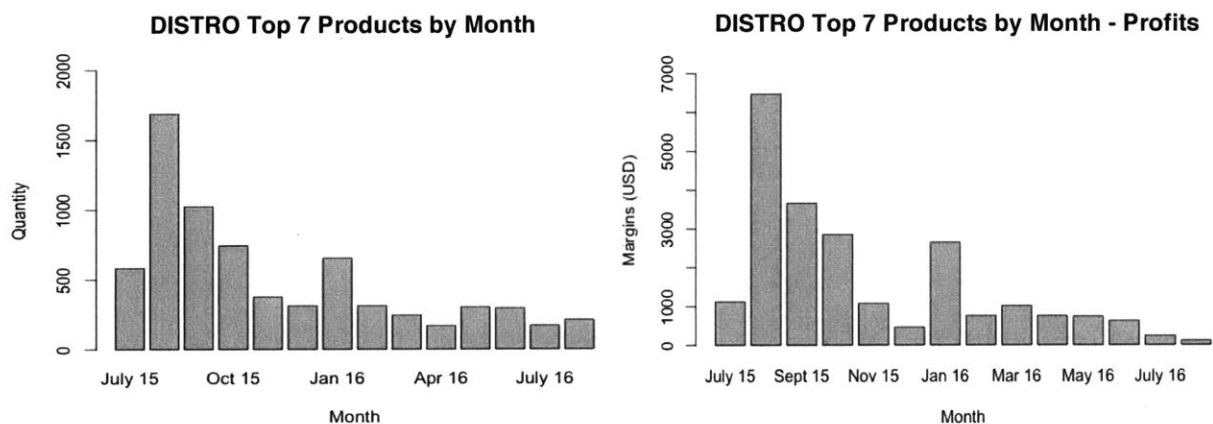


Figure 2 - DISTRO Sales and Profits by Month

Figure 3 - DISTRO Sales and Profits by Product by Month show the monthly sales and profit breakdown by product. The discrepancy in the contributions of different products to overall profits shows the variation between the products. It is clear from Figure 3 that solar lanterns are substantially more profitable. The channel reports will discuss why the drop off in lantern sales has been more dramatic, but the overall sales and profit trends provide an indication that substantial challenges have been faced over the past year.

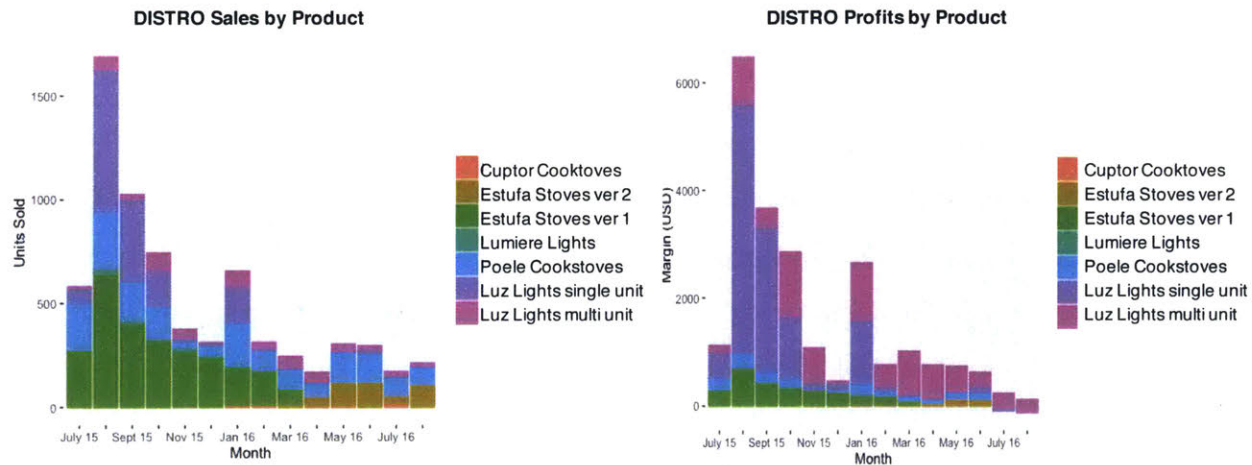


Figure 3 - DISTRO Sales and Profits by Product by Month

3. Chapter layout

This chapter is broken down into three sales channel reports, a cross channel analysis and a discussion of the case hypotheses. The sales channel reports use DISTRO sales data and stakeholder interviews to examine how the supply chain and financing structures of each channel impact profit, sales growth and risk. The cross channel analysis focuses on company-wide sales and supply chain finance metrics. These results are used to tie the entire distribution network together and represent the overall case findings.

The research questions the sales channel reports seek to answer are:

- 1) How do the supply chain and financing structure affect profits and sales growth for a renewable energy product distribution network in Kenya?
- 2) What are the major financial risks of the structures and how can these risks be mitigated?

B. Micro Finance Channel

1. MFI channel overview

Quantitative data were collected on the MFI channel from DISTRO sales reports and accounting outputs. Qualitative data were collected during multiple interviews with DISTRO management in Nairobi, from two suppliers that also work with the MFI and from three DSAs who worked in the MFI channel. The MFI will be referred to as “Farmers Trust.”

The MFI primarily serves rural customers in the agricultural sector. The MFI channel sales are in the Nyanza, Rift Valley and Embu / Mt Kenya regions. (The Embu region was re-named Mt Kenya in the spring of 2016). Figure 4 - MFI Channel Sales by Region by Month shows the sales by region for the MFI channel in August, September and October 2015 and in January 2016—the only months with sales through the MFI channel. Sales were made out of five branches in both the Rift and Embu regions, and two branches in the Nyanza region. The majority of sales in the MFI channel are from MFI branches in the Rift Valley region.

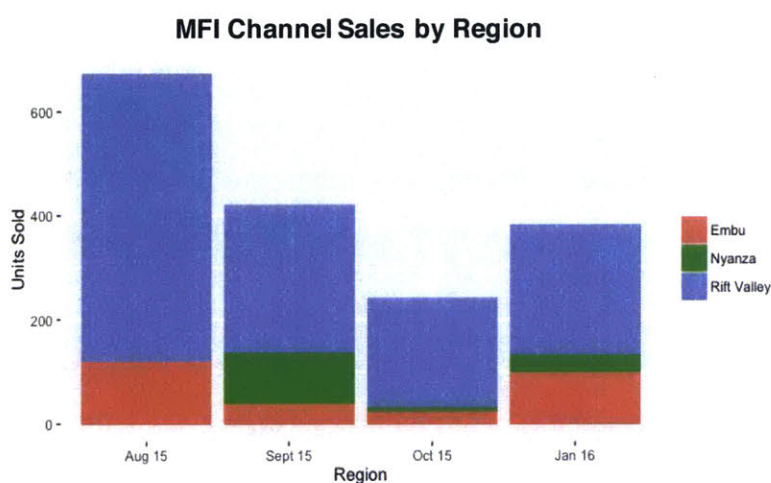


Figure 4 - MFI Channel Sales by Region by Month

The MFI channel sales were highest in August, lowest in October and were similar in September and January. The absence of sales in November and December, as well as the reasons the relationship ended, will be discussed later in this section. There are different, and sometimes conflicting, versions of the events, which has implications for the other channels and the supply chain as a whole going forward.

a) MFI channel supply chain structure and selling process

Farmers Trust has eighteen local branch offices divided into four regions north and west of Nairobi. Each region had a dedicated DSA serving as a sales and service representative. The regions do not align with how DISTRO divides the country, but DISTRO provided a DSA to each of the Farmers Trust four regions. The DSAs divided their time across

branches based on the lending officers' scheduled group visits. The primary sales strategy was for the DSA to accompany the branch's lending officers to group meetings of branch customers.

Group meetings are gatherings of individuals—usually women from low-income households, who meet to support each other in savings and borrowing. The lending officers meet with the groups weekly or biweekly to make new loans and collect payments from the groups. At the meetings, the DSAs made a sales pitch and product demonstrations to the group members. The Farmers Trust lending agents had the authority to approve loans on the spot to group members. Using a mobile tablet, the lending officers had the ability to pull borrowing and payment histories for each member while at the group meeting. Explained by one former MFI DSA, “I would go with them (the lending officers) to the groups and from there I would make a sales speech. The clients would immediately fill out a form and others would buy in cash. We would leave them with the product there, and so it was just a matter of going to groups and filling out forms.”

The DSA's last sentence is very important and denotes a key structural factor of the MFI channel: Farmers Trust branches held inventory. Having stock on hand, combined with on the spot loan approval, or disapproval, meant that the selling process through the MFI channel was very quick and easy at the branch level. As one DSA said, “The approval process was so fast. It made it easy for the group leaders to meet their targets.” The lending officers were supportive because the DSAs managed the stock, and the loans helped them reach sales performance goals, while also earning commissions. Regarding the supportiveness of the lending officers, an DSA stated, “They were well compensated, and they also wanted to improve their KPIs due to the number of loans.” Because the group serves as cosigner / guarantor of the member's loans, it was very low risk for the MFI.

The DSAs worked with the branch managers to manage the local inventory. The branch manager would make the order by email to DISTRO, but according to the DSAs, they were the ones who actually tracked sales and advised the branch manager what to purchase. DISTRO headquarters then aggregated into weekly orders for the suppliers. DISTRO also made a delivery request through the transportation provider. Products were picked up at the supplier's warehouse and delivered directly to the branches. DISTRO offered 30-day

credit terms to Farmers Trust, passing on the credit it received from the suppliers. Holding inventory at the branches enabled cash sales at or around the branches.

2. MFI channel sales and profits

Figure 5 - MFI Sales and Profits by Month shows the total sales and margins by month in the MFI channel. 1,718 products were sold during the period of study. Total revenues were \$68,808 and total profits—defined as the selling price minus the sum of the total cost of goods sold, the wholesale cost, VAT, transportation and commission—were \$12,354. The total product margin percentage was 17.8% for the MFI channel.

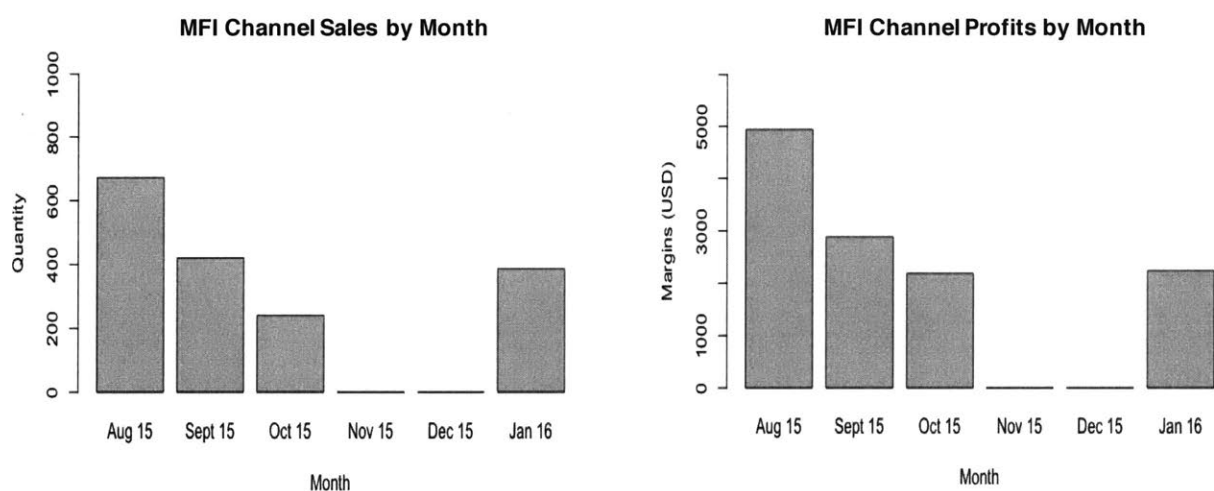


Figure 5 - MFI Sales and Profits by Month

Table 1 - MFI Channel Sales & Profits by Product provides a summary of the MFI channel sales, margins and margins by product. Though both lanterns and stoves were offered through the MFI channel, the vast majority of sales were Luz solar lanterns. (All brand and product names are masked). The more basic and lower priced product—Luz single unit—was the top seller each month, followed by the Luz multi-unit home system. Though it accounted for less than 1/5 of the sales of the basic unit, the more expensive home system accounted for over 1/3 of the total margins. Table 1 also shows how much larger the margins are for the solar lanterns than for the cookstoves. The consumer’s purchase price for the basic solar lantern and Estufa stove is about \$40. The Poêle stove is about \$45, and the multi-unit solar home system is about \$80.

Table 1 - MFI Channel Sales & Profits by Product

Brand	Type	Sales	Profit	Margin per Sale
Luz – single unit	Lantern	1325	\$9,135	\$6.89
Luz – multi-unit	Lantern	223	\$3,056	\$13.70
Estufa cookstove	Stove	20	\$22	\$1.10
Poele cookstove	Stove	150	\$141	\$.94
Total	Combined	1,718	\$12,354	*\$7.19

*Weighted average of margin per product in MFI channel

3. MFI channel discussion

a) MFI channel “discontinued”

The DISTRO relationship with Farmers Trust ended in January 2016. The party that terminated the relationship depends on who you ask. While sounding glib, it is an accurate description of the conflicting versions of events shared by interview respondents with DISTRO management and the suppliers who continue to work with the MFI.

When the initial interviews were conducted with DISTRO management in September and October of 2015, issues with the MFI surfaced. Even though August sales through the MFI channel were similar to the combined sales through the other two channels, DISTRO management viewed the bank and retail channels as the avenue to scale and focused primarily on those channels. Additionally, DISTRO and multiple suppliers had experienced payment issues with the MFI. Luz and Estufa actually refused to sell directly to the MFI because of poor repayment history. In July of 2015 DISTRO became the intermediary for Luz and Estufa products sold to the MFI. Poele continued to do direct business with the MFI and paid DISTRO a marketing fee for each product sold through the MFI channel.

From DISTRO’s perspective, the suppliers quit selling to the MFI because it had “poor accounting practices.” DISTRO stepped in to fill that role but soon encountered the same issues. For five months in a row in the second half of 2015, the MFI was late on payments. For this reason, DISTRO cut off shipment of new products—which accounts for zero sales in November and December 2015. This was done while the four DSAs were still in place in the Farmers Trust branches. Eventually Farmers Trust caught up on payments, and DISTRO resumed shipments in January 2016. However, this time credit was not offered. According

to DISTRO, two of the suppliers were willing to continue offering credit, so Farmers Trust chose to go directly to the suppliers. There were no sales through the MFI channel after January 2016.

I was not able to speak with anyone from Farmers Trust, but I did interview the two suppliers it continues to work with. (Both suppliers continue to sell through DISTRO's other sales channels and described good, personal relationships between management at the two companies). From the suppliers' perspective, the problems were a result of the frustration the MFI felt with DISTRO. One respondent said, "When Farmers Trust came to us and said, look we're not happy with DISTRO, we take that on face value and I didn't have any reason to question it. Whether it was DISTRO who pulled the plug to save face, I don't know. But, it was a Farmers Trust decision to pull the plug and not the other way around." This supplier does not think that DISTRO does a good job of consolidating orders and "getting stuff from A to B."

The other supplier says that the MFI is, "The channel we work most with. They have been a really good partner for us." This supplier has not had payment issues though they were warned by DISTRO. The respondent continued saying, "Farmers Trust's side of the story is they had immense frustrations. On the DISTRO side, they were deadbeats and weren't paying." Though the MFI does not provide the suppliers regular data on its customers' payment rates, they conclude that because they are being paid on time and are not receiving complaints, the MFI's customers are also paying on time. According to the suppliers, the MFI did not think that DISTRO was doing enough aggressive marketing and generating the sales volume to justify its margins. Regarding their own experience with DISTRO, one supplier said, "We weren't getting sales results with DISTRO. Customers would have approved loans, and we were represented in Farmers Trust by DISTRO and there was not action going forward." Gaur et al.'s (2005) "turnover path" relies on a dedicated effort to move products quickly and often.

At the branch level, one of the DSAs shared his perspective on the relationship deteriorating by saying, "At Farmers Trust they saw the deal as too good (for DISTRO), and thought they would do the job themselves. You find managers describing it as a parasitic relationship whereby they think you are benefiting more than they are." Additionally, the

DSA reported that towards the end of the relationship, it became challenging to get the manager to order products.

b) Ramifications of losing the channel

Even though the lending and selling process at the MFI branch level was good and had very low administrative requirements, the repayment issues with the MFI management could not be overcome. DISTRO was willing to let Farmers Trust walk away, even though the channel accounted for a substantial number of sales, because they ultimately viewed the path to scale through the other channels. The problem with the decision is that the other channels did not begin to make up for the lost solar lantern sales—the highest margin products.

The interesting takeaway from the dissolution of the MFI channel is the completely different experience of DISTRO compared with the suppliers that continue to work with the MFI. For DISTRO, the branch level relationships were seen as generally very good but there were problems with the MFI's senior management. That contrasts with the suppliers, one of whom went so far as to say, "I emphasize that this is very relationship based and why we invest in senior management. We've never had a late payment from Farmers Trust, month over month growth and it's a very healthy channel." As has been emphasized throughout this thesis, relationships and trust are key to successful supply chains.

C. Retail Channel

1. Retail channel overview

Quantitative data were collected on the retail channel from DISTRO sales reports and accounting outputs. Qualitative data were collected during multiple interviews with DISTRO management, thirteen DSA interviews and three retailer interviews. The retail channel is made up of independent retailers who partner with local KSB Bank branches. DISTRO estimates that each bank branch can work with up to 150 retailers; the total potential retailer network is in the thousands. From July 2015 through August 2016, 165 retailers made sales through DISTRO, and there are currently 120 active retailers in the network. This does not count DSAs who double as retailers.

Figure 6 - Retail Channel Sales by Region shows the regional sales breakdown in the retail sales channel from July 2015 – August 2016. The overall sales trend will be examined

later in the section, but from a distribution standpoint, the portion of sales in the Nairobi region, i.e., where products are transported from, has fallen. Nairobi area sales accounted for over half of monthly sales through April of 2016. Rift Valley and Nyanza now comprise the majority of retail channel sales. This is noted because transportation costs are dependent on distance from Nairobi.

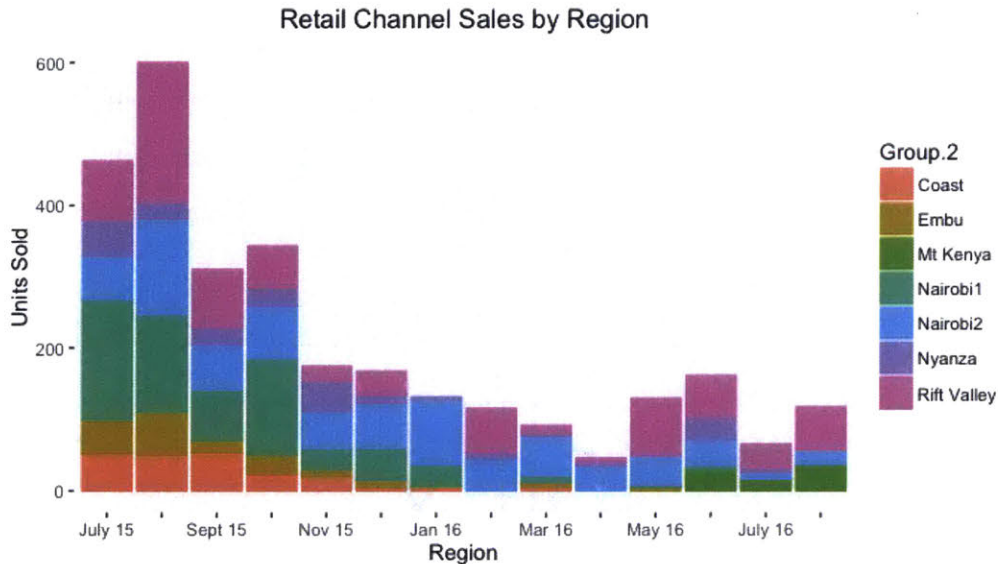


Figure 6 - Retail Channel Sales by Region

a) Retail channel ordering and payment

Stockists are brought on board by DISTRO management, DSAs and the local bank branch officers. The DSA is assigned to bank branches and is responsible for serving the retailers in the branch's area of coverage. The DSAs are supposed to do product demonstrations, training and have a general presence in the community to generate sales. The retailers carry the products (sometimes) and are the order, delivery and pickup point for customers. The retailer's margin ranges from 9-11%, depending on the cost. Higher priced products bring a higher profit.

Under the bank's clean energy lending program, customers can receive loans from the bank for products sold by DISTRO. Purchases can also be made in cash—either in hard currency or using the mobile payment system. The retailers are allowed to carry other clean

energy products, but bank financing is supposed to be used on DISTRO products. (Though there are reported examples when this is not the case.)

The retail channel uses a mobile phone-based ordering and payment system. Payments to retailers are made directly from customers, or from the bank if the customer is purchasing on credit. To generate an order, the retailer uses his or her mobile phone to text a product request and receives an automatic response asking for the delivery location, product name, quantity and a request for funds. The retailer uses the mobile payment system to transfer the funds and receives a payment receipt. The advantage of the bank's mobile payment system, according to DISTRO management, is cost. The major Kenyan competitor charges a 10% fee for all payments and transfers, whereas the bank charges a flat \$0.50 plus a 0.1% processing fee.

A major benefit of the mobile payment and ordering system is that it automatically generates a transaction record. What was once a manual processing of orders using emails or phone calls became an automated process that simplifies record keeping. The retailers appear to be supportive of the mobile ordering and payment system and trust that their payments will not be lost. One retailer says that while the majority of her other products are paid for in cash, her renewable energy sales use the mobile system. Answering a question on the mobile platform, she said, "It is good and has a good impact." None of the retailers expressed concern or a lack of faith in the mobile platform.

b) Order processing, delivery and inventory

At the end of each week DISTRO consolidates orders, verifies payment and provides pickup and delivery requests for the transportation provider and suppliers. The delivery lead-time varies based on when the retailer places the order and the week's transportation schedule. If the retailer does not hold inventory, the customer comes back to the shop to pick up the product after it arrives.

If the retailer decides to hold inventory, a replenishment lead-time is not an issue. The three retailers interviewed all hold inventory because they see a positive relationship between holding inventory and sales. One said that having the inventory is critical, and:

“Not having the product in store greatly impacts sales. There was this time DISTRO had no products last year from November to January. Customers completed payments and had to wait until the products were available. This negatively impacted on the whole business as they lost hope and even the loan officers were discouraged and demotivated. The led to very few sales subsequently.”

The multiple month delay time was due to supplier stock-outs. While holding a month’s worth of inventory would not counter-balance a three-month supplier stockout, according to the retailers and DSAs, having product on hand is directly related to sales. The retailers interviewed all hold inventory, but according to the DSAs, this is not the norm. The unwillingness of the retailers to actually hold stock is one of the two major issues that the DSAs have with the retail network. The other is commissions...or lack thereof, which will be further discussed later in this section. (There is a selection bias with the retailers interviewed as they were referred by DSAs, meaning the DSAs have positive relationships with the retailers in the sample. This is not always the case.)

2. Retail channel sales and growth

Figure 7 - Retail Channel Sales & Profits by Month shows the retail channel sales and margins by month from July 2015 – August 2016. Total sales over the thirteen-month period were 2,931 units. Total revenues were \$95,839, and total profits were \$4,557. The retail channel had a 4.8% product margin. Retail channel sales peaked in August 2015 when DISTRO brought on additional sales interns to conduct product demonstrations and generate sales. This was a temporary experiment that saw a positive relationship between sales staff and total sales.

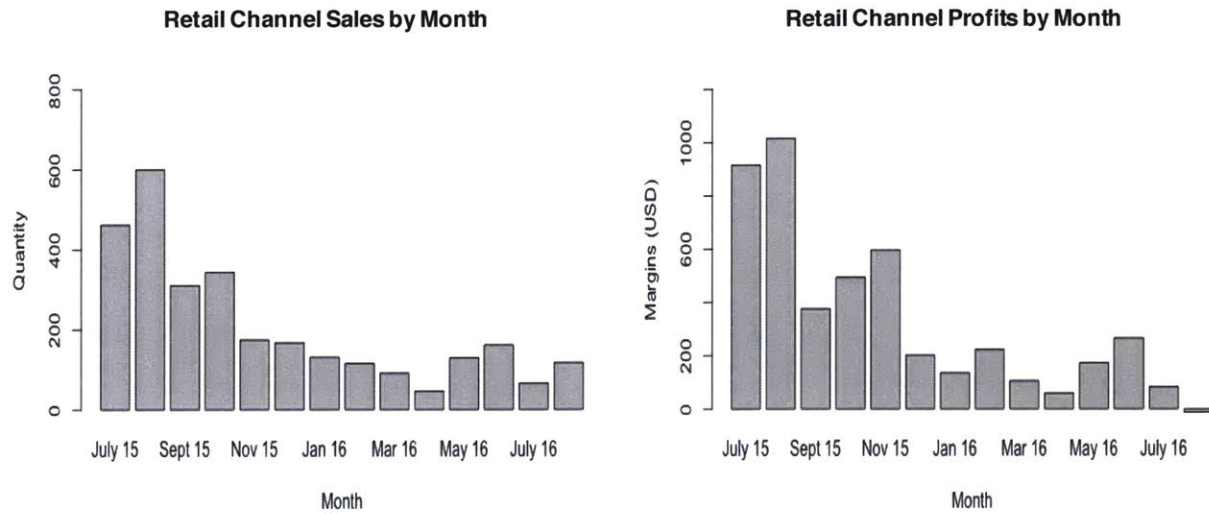


Figure 7 - Retail Channel Sales & Profits by Month

What is especially interesting in Figure 7 is where the unit sales trend does not match the margins. Figure 8 - Retail Channel Sales & Profits by Product by Month helps to explain the mismatch. The majority of sales in the retail channel are cookstoves, but the solar lanterns—base model and especially the multi-unit system, account for an out-sized portion of the channel’s margins.

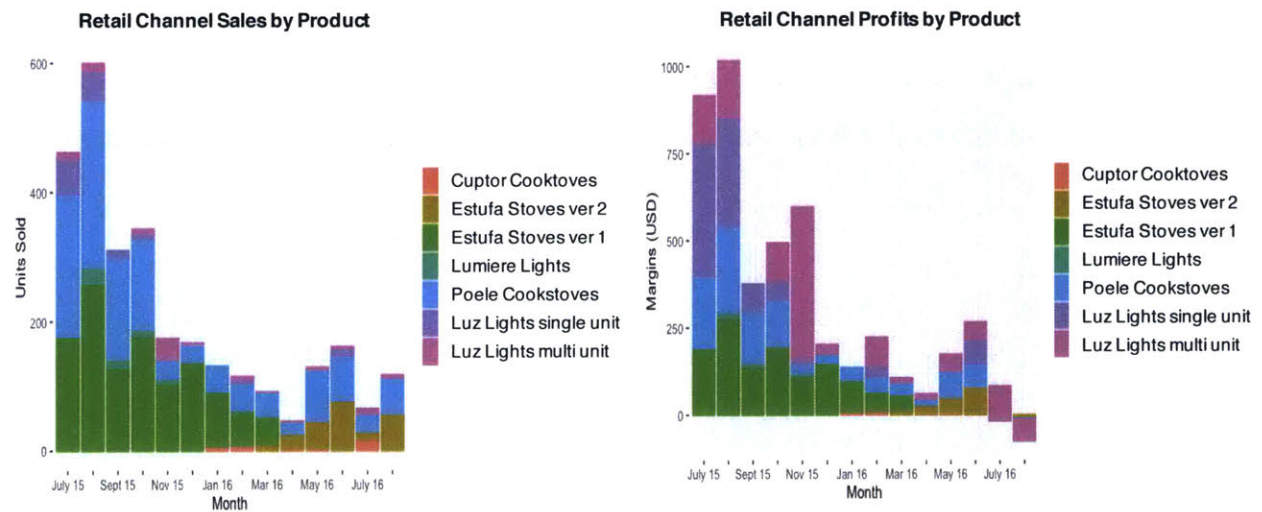


Figure 8 - Retail Channel Sales & Profits by Product by Month

The negative margin in the graph on the right shows where DISTRO transitioned to a new transportation provider in late spring 2016. The transporter was slightly more expensive on a per-unit basis, but there were multiple upsides to the switch. First, the transporter delivered the next-day. Second, delivery costs were based on the actual delivery location. Previously DISTRO was paying a flat delivery fee based on kilometer distance away from Nairobi. Additionally, they received a bulk discount if a minimum quantity was met for the week. So, they were getting a reasonable deal on deliveries to the regions outside of Nairobi but a terrible deal when delivering in Nairobi. Third, and this will be further examined in the bank channel section, the transporter would deliver directly to the customer's home. The higher transportation cost would be worth it because DISTRO would keep the retailer's margin. However, the new transportation price meant a slight loss for the already slim-margin cookstoves in the retail channel.

Table 2 - Retail Channel Sales & Profits by Product provides a breakdown of the retail channel's product sales, margins and margins per sale. From a channel sales perspective, the lanterns are vastly more profitable even though they account for a small percentage of the total unit sales. The retail prices are the same as highlighted in the MFI channel.

Table 2 - Retail Channel Sales & Profits by Product

Brand	Type	Sales	Profit	Margin per Sale
Luz – single unit	Lantern	140	\$854	\$6.10
Poele	Stove	1,199	\$951	\$.79
Estufa Jiko	Stove	1,182	\$1,277	\$1.08
Luz – multi-unit	Lantern	93	\$1,248	\$13.42
Estufa G3	Stove	223	\$150	\$.67
Lumiere	Lantern	57	\$37	\$.65
Cuptor	Stove	37	\$40	\$1.08
Total	Combined	2,931	\$4,557	*\$1.55

*Weighted average of margin per sale in retail channel

3. Retail channel discussion

a) Roles and incentives

DISTRO's top management outlined two strategies to grow sales: 1) Mobilize the retailer channel, and 2) Mobilize the bank staff to lend. DISTRO wants the retailers to invest in the products, so that when the banks make loans, the goods are on hand and ready to be

picked up. However, the DSAs explained during the interviews that most retailers do not carry inventory. This is a major frustration for the DSAs because of the link between inventory and sales. As a result, the DSAs become retailers.

Five of the thirteen DSAs interviewed hold products to sell directly to customers. Six out of the eight who do not said they would hold stock if they had the capital to do so. Regarding the other two: One did not specify, but the other said unequivocally that he would not hold stock because he would not want to compete with his retailers.

Explaining why she began to purchase products on her own to sell directly to customers, one DSA explained that, “It was difficult to allocate time to the retailer and they weren’t ordering many products.” Additionally, she “was doing most of the work while the retailer was getting the commission! They would get about 425 Kenyan Shillings (KES)—it wasn’t worth selling through them.” (425 KES is about \$4.25). As would be expected, the retailers receive a margin on the products they sell. However, DSAs do not earn a commission on a per product basis. Rather, they get a bonus if they generate 50 total sales a month. Conversely, if they can afford to purchase products, they earn the commission while working towards the 50-unit goal.

One DSA takes the middle ground. When the retailers signed on to the program, they agreed to hold inventory, so that “When a customer was approved for a loan, the product would be at the retailer waiting to be picked up.” However, this was not happening—at least for solar lanterns. Therefore, the DSA holds solar lanterns but not cookstoves because one of her retailers carries them.

At times, the DSAs were forced to hold products because the retailers grew frustrated with delivery delays. An DSA explained her challenge and why she lost her retailers. “In fact, I started with 3 retailers but DISTRO failed in delivering products. When I joined, we started with ... (Removed Name) ... and she would bring products to us even before we pay, so we pay as we sell thus the retailer feels comfortable. When she went they changed, and you have to pay via MPESA, and even if you have a check, it’s not accepted until you tell the customer to bank the check, wait till it matures then take the cash and send via MPESA. That person

can't wait. Also after ordering, delivery will take a week. That was so disgusting." She goes on to say that "The retailer had no problems with me. It was with DISTRO."

To the retailers, DISTRO did not deliver on its end of the deal. The main issues were a lack of marketing and how little they actually see the DSAs. The trust is there, and the retailers and DSAs sometimes collaborate on credit, but the lack of marketing and in-person visits from the DSAs has negatively impacted sales. One retailer said, the DSA "only comes to know how the sales are doing and for any other problems arising." Rather, she should "educate people about the cook-stoves and the home solar systems."

A second retailer echoed this claim. Though she reported a good relationship, the DSA would call her twice a month. "She only came once (to the store) when she recruited me." Furthermore, "The time she was around, the sales were higher. I sold seven units the time that she came." She concludes with, "The DSA should visit often to remind the people and rejuvenate the credit officers on training and demonstrations." The third retailer estimated that sales are 50% higher when the DSA is around and would like the "DSA to regularly hold activations within the vicinity of the stores to attract customers."

Credit from DISTRO has at times put the DSAs in a tenuous position. One recounted that when a retailer was provided a product on consignment but did not pay DISTRO in a timely manner, she was held accountable by management. She was told, "Unless the balance is cleared, you will not be given any more products. And, like she is older so you can't go pressuring her, and you are being pushed by the program manager even saying he will deduct it from your salary."

Ultimately, the DSAs are upset that the retailers do not hold more inventory, so it is challenging to make sales. Additionally, DSAs resent the retailer's margins while feeling as if they have done much of the work of selling. The retailers do not see much of the DSAs, and because of uncertain demand, do not purchase products to hold in the stores. The DSAs do not earn a per product commission, so they choose to spend more time selling through the bank channel. It is a negative feedback loop that further erodes sales in the retail channel.

b) Cash and credit sales

Encouraging lenders to loan in order to make sales through the retail channel is a key component of DISTRO's growth strategy. The question however is how important lending is to selling the DISTRO's clean energy products. DISTRO management believes that customers want and need the loans to make purchases. It is unclear how often this is the case. DISTRO believes that about half of its sales in the retail channel are made using funds borrowed from the bank and that about half of sales are on a cash basis. They do not actually know because all payments—whether made on a cash or financed basis, come through the mobile network. The data on cash or credit is not collected.

Further insight comes from a retailer statement. The retailer indicated that she only released the payment after the customer has paid the full balance to the bank. She described what is more of a layaway system where, "The credit officer notifies me that the payments are complete and sends the customer to my shop for the cook stove." The bank transfers her the money, but the customer has still paid up front, except to the bank and not the retailer. To the retailers and the DSAs, they do not care whether it is a cash or financed sale. Even the lending agent does not necessarily care. He or she still receives a referral commission, and as an added bonus, the loan does not need to be processed. The issue for DISTRO is that by not knowing the value of the financing, the value of the channel—and the costs of marketing, commissions and transportation, cannot be accurately quantified.

c) Channel credit alternatives

In addition to altering the commission structure, an option to encourage retail channel sales is to provide products on consignment or credit terms. The retailers and DSAs made clear they did not want loans, but two of three retailers and all but one of the DSAs operating as retailers would take credit if offered. From a top level management standpoint however, credit terms and consignment are viewed as a very risky proposition. Throughout multiple interviews, DISTRO management repeated that credit was offered in the past, but it did not work. Repayment rates were low, and credit required additional effort from an asset tracking and book-keeping standpoint.

However, multiple individuals in management stressed the potential impact of credit. One said that in addition to delivery delays, credit is the biggest issue facing the retail channel. The individual highlighted that though the mobile payment system works well in terms of orders and payments, it is believed that the retailers are not all that supportive because they can no longer use post-dated checks. Another management individual thinks the retail system is being “choked by a lack of capital.” And, this is why DSAs functioning as retailers make so many sales. The individual closest to the customers recognize the importance of the working capital.

This individual highlighted three ways that the DSAs pursued as workarounds. The first—using their own funds to become retailer themselves, has been discussed. The second was that a group of DSAs were able to get Kiva initial working capital loans to become retailers. (Kiva is an international micro credit provider). The third avenue was that some DSAs would actually front money to retailers to encourage the retailers to hold products. While getting a Kiva loan entailed risk, at least the DSA controlled the selling process. It was much riskier for the DSAs to provide short-term loans to the retailers, but some were willing to do so.

D. Bank Channel

1. Bank channel overview

Quantitative data were collected on the bank channel from DISTRO sales reports and accounting outputs. Qualitative data comes from interviews with DISTRO management, thirteen DSAs, two lending agents and four product suppliers. The bank channel is defined as sales made through the bank network that are not through a retailer. The sales are made out of the bank branches, at small savings and lending groups serviced by the bank, and by the DSAs in the community. 45 DSAs made direct sales from July 2015 – August 2016. There are currently 22 DSAs on staff. There are over 100 bank branches across Kenya, and the bank’s estimated customer reach is in the millions.

Figure 9 - Bank Channel Sales by Region shows the sales breakdown in the channel from July 2015 – August 2016. Once again, only products with sales greater than ten items

are included. Of the three channels, bank channel sales are the most evenly divided across Kenya. Nairobi has the highest percentage of sales and is followed by Embu / Mt Kenya.

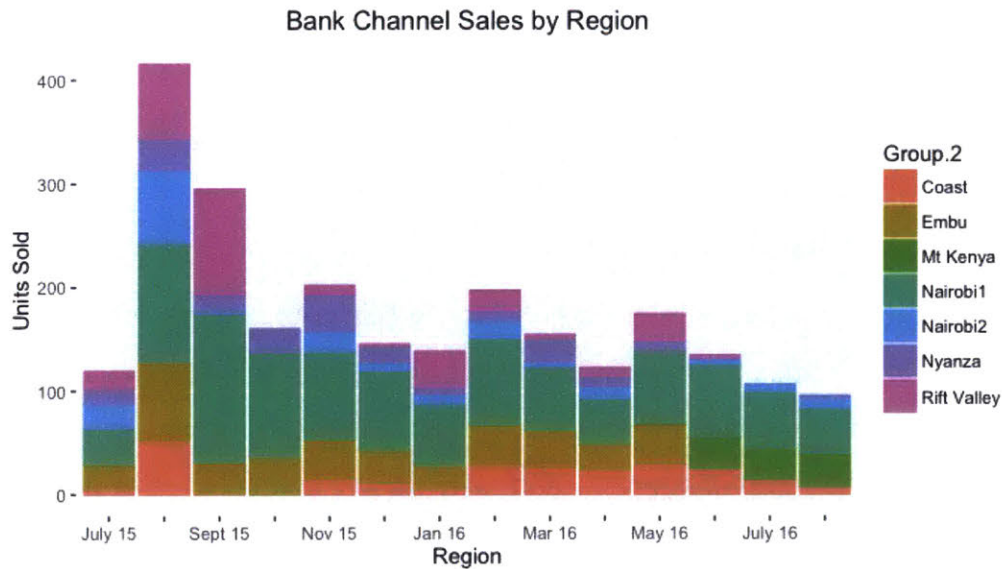


Figure 9 - Bank Channel Sales by Region

a) Bank channel structure and selling process

As the name suggests, bank channel sales are based around the bank branches. Ideally, each DSA is assigned to three branches, but in reality, the DSAs are responsible for anywhere from two to eight. The assignments are made geographically. A major takeaway from the interviews is that while the DSAs “should” be using the branches to mobilize sales in both the retail and bank channels, they indicated that the majority of time is spent at the branch and with the lending officers.

The role of the DSA is to market the product, provide a demonstration and answer any questions from either the group members or at/near the branches. Additionally, the DSAs train the branch staff on the products and how to sell so that sales can be made when the DSA is not on site. If the stock is on hand and it is a cash sale, the sale will be made immediately. If it is a loan sale, the product will be provided as soon as the loan is approved and the funds are transferred. If stock is not on hand, the order and payment is processed using the SMS system. Similar to the retail channel, DISTRO aggregates and processes orders

at the end of the week and then schedules the delivery with the supplier and transporter. The DSAs who purchase and hold stock place orders using SMS system.

b) Group sales and lending

When the DSAs accompany lending officers to local group meetings, they “target groups since they have the power to repay the loans, and they are in need for such products since they are mostly women and from the villages.” The lending agent continued saying, “When we market the products, a customer will show interest. Then, if his/her credit rating is in order, she qualifies for the loan, and we proceed to filling out the forms. After that I discuss the form with the credit committee. Then the loan is disbursed to the customer’s account.” The basis of approval for the loan is the customer’s repayment history, the fact that he or she is in a group, and whether or not the individual has a savings account. Because, “The group members know each other and are friends, they are the guarantors thus no proof of income is needed.” If the individual is not a member of the group, a spouse must serve as the cosigner.

According to the lending officers, the loan terms are for six months, and payments are made either weekly or bi-weekly depending on the group. The vast majority (one estimated 99%) of loan applications are approved. When asked further about what happens when loans are not approved he said, “It is very rare for such a case since when filling out the forms, we already know the credit history. Those who don’t meet this are advised to buy in cash.” Though the loan approval estimates are very high, the mix of loan and cash sales is unclear in this channel as well. One DSA actually “encourages people to buy in cash because of the interest rates,” and that even in the groups, “most people still pay in cash.”

Another DSA said her sales are a mix of cash and loan sales depending on the branch. The same DSA explained that at one of her branches, the lending officer got higher commissions from another stove sold by the bank. So, she never made a sale there and quit going. The lending officer receives a referral commission of \$1-2 per product regardless if it is a cash or loan sale. The commission provides an incentive for the lending officers to work with the DSAs. Coordinating visits with the lending officers is critical for the DSAs. One explained that, “If you go to groups blindly, you end up wasting time.”

c) Holding inventory

Having inventory on hand is very important to sales in the bank channel. One DSA pointed out that saturation has been reached with the groups, so she spends 100% of her time at the branches and actually keeps stock at the branch. Another stressed the importance of inventory by explaining, "It's difficult to sell a product you don't have." She continued, "I think everyone would want to buy something they can see and carry home." She suggested that DISTRO should purchase stock and store it at the branches. She thinks the retailers should be cut from the equation.

To the suppliers, the ability to make immediate sales at the branches is also very important. Discussing the importance of physical sales locations in regard to marketing, the supplier said, "We will probably do a radio campaign in a few months. But, there's no point in doing a radio campaign unless you tell the customer where they can buy it. That's why supermarkets work well and why branches work well. Everyone knows where the KSB branches are. So, if we were to do a radio campaign now, I don't think it would really be successful. We need to work on that first."

Comparing the selling process in the bank channel with how the MFI channel worked, a former Farmers Trust DSA expressed his frustration with the lack of goods on hand. He said, "Like the group I visited last week, I did not have the product to display. I need to have the products with me. I am told they are on the way but I am yet to receive them." Asked about any changes she would like to see in the sales channel, another DSA said, "It's good you have asked that question because it's something I have found out if I was asked my opinion I would honestly say I wish we had more of the stock at the branch because like now in just one week, I have had 5 cash sales. And, all these customers have to wait for a week until the products are delivered so it takes a lot of convincing for customers to wait. There is a lot of trust issues telling them to deposit the amount and wait for the products to come." One of the lending agents actually has the DSA confirm if a product's available prior to making a loan.

In addition to having products, capturing a customer quickly is key to sales. One DSA said, "If you tell them to take and discuss, they won't and other needs will arise like why not

apply for school fees loan? So, you have to capture the attention then and there.” In support of this, multiple DSAs stressed that their duties included following up with the lending agents and branch managers to ensure loans were processed in a timely manner. This not only includes having the applications on hand but helping to process the loan requests and relaying delivery times to the customers. The application process is supposed to take 2-3 days but can often take up to a week.

2. Bank channel sales

Figure 10 shows bank channel sales and margins by month from July 2015 – August 2016. The revenue graphs for the bank channel are included because revenues do not follow the same trend as unit sales—unlike in the MFI and retail channels. Total sales over the thirteen-month period were 2,453 units, and total revenues were \$84,301. Total profits were \$5,647 for a 6.7% product margin. Similar to the retail channel, bank channel sales peaked in August 2015 when DISTRO brought on additional sales interns.

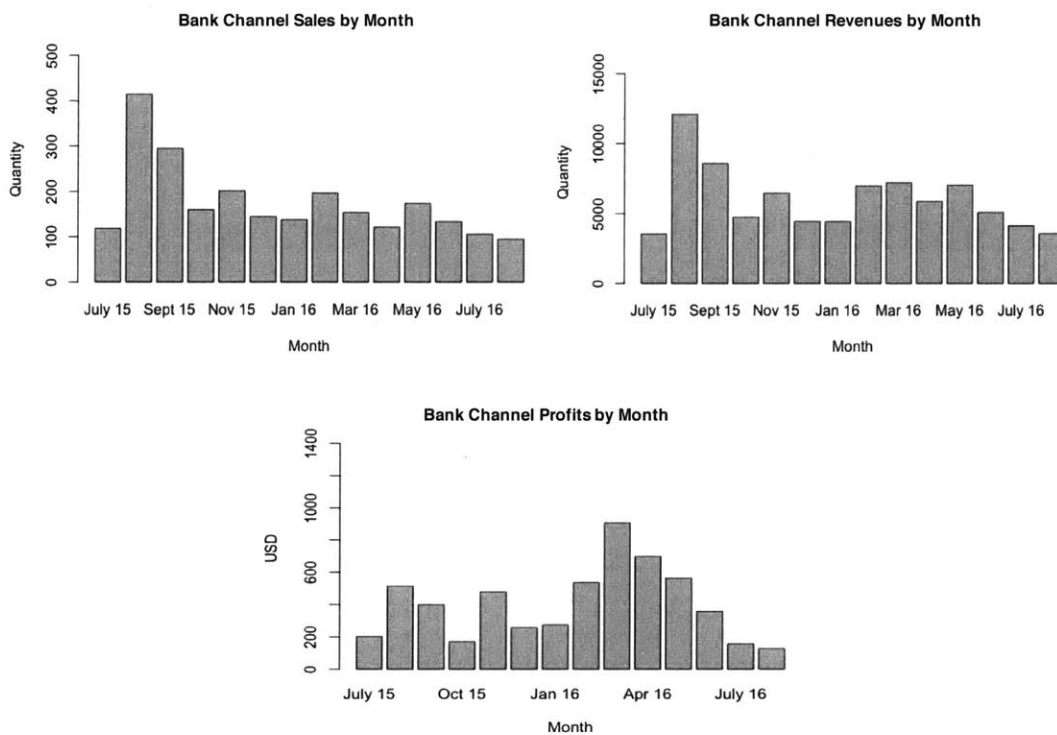


Figure 10 - Bank Channel Sales, Revenues & Profits by Month

Other than August and September 2016, total bank channel sales were similar across months. The product breakdown, shown in Figure 11, accounts for the variation between the sales, revenues and margin trends. Lanterns, as a percentage of sales, have a huge effect on margins. Cookstoves account for the most physical sales, but lanterns bring the highest product margins when average transportation costs and commissions are subtracted. As Figure 11 indicates, because of the higher transportation cost after the switch to the new transporter, cookstoves actually had a negative per unit margin in June and July 2016. However, aggregated transportation costs are used for all cookstoves and not only those sold in this channel. In reality, the majority of cookstoves sold in the bank channel stay in the Nairobi region. This means that the cookstoves in the bank channel are a better proposition than they initially appear.

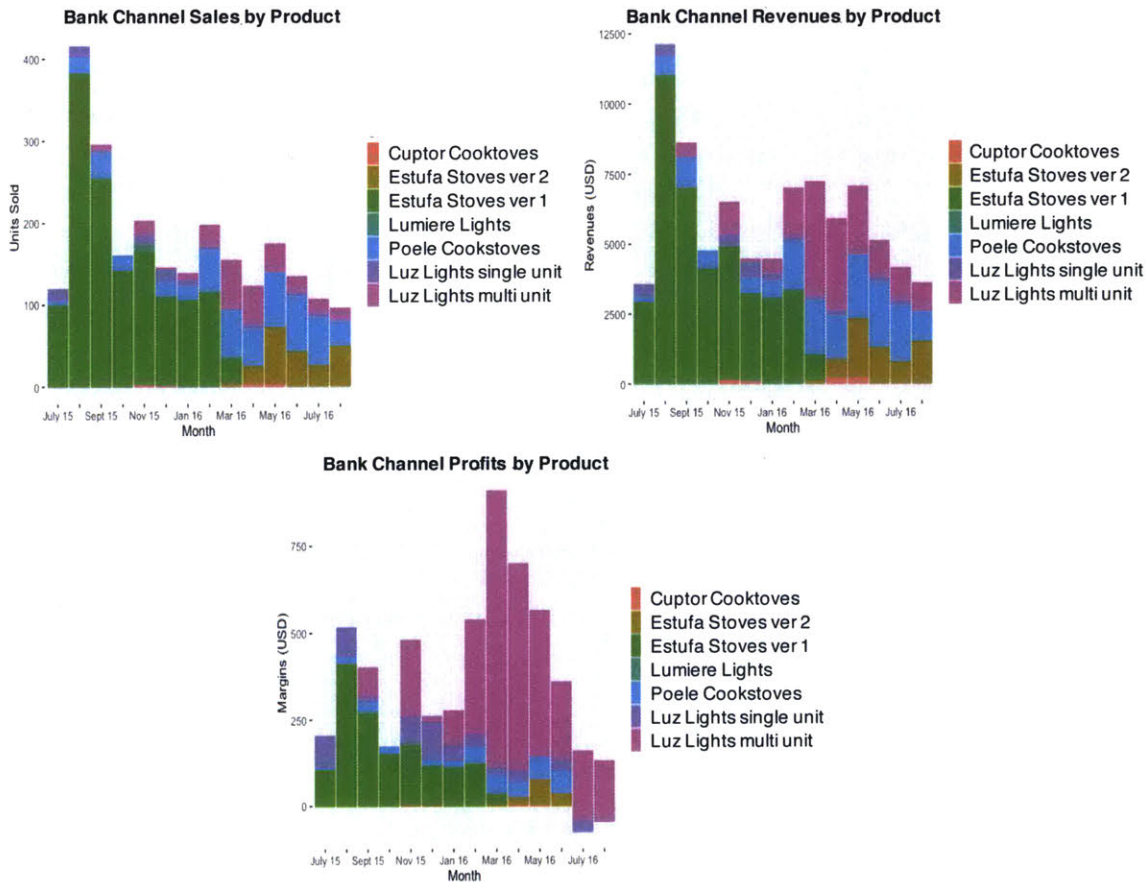


Figure 11 - Bank Channel Sales, Revenues & Profits by Product by Month

Table 3 provides a breakdown of bank channel product sales, margins and margins per sale. The Estufa cookstoves have the highest demand, followed by the Poele cookstove. The Luz multi-unit solar home system has the highest per unit product margin and the highest total margin.

Table 3 - Bank Channel Sales & Profits by Product

Brand	Type	Sales	Profit	Margin per Product
Luz - single unit	Lantern	84	\$570	\$6.79
Poele	Stove	490	\$270	\$.55
Estufa original	Stove	1,398	\$1,509	\$1.08
Luz - multi-unit	Lantern	240	\$3,146	\$13.11
Estufa (new version)	Stove	214	\$127	\$.59
Lumiere	Lantern	14	\$11	\$.79
Cuptor	Stove	13	\$14	\$1.08
Total	Combined	2,453	\$5,647	\$2.30

*Weighted average of margin per sale in bank channel

3. Bank channel discussion

a) Sales and incentives

In late spring of 2016 DISTRO switched to a new transportation provider. The per unit cost of delivery was higher, but as was previously mentioned, prices are based on actual delivery locations. Because products would be delivered directly to a customer's home, the retailer could be removed from the supply chain, and DISTRO would capitalize on the retailer's margin. The higher transportation cost would be offset by the higher margin.

But, the direct delivery experiment has not proven successful thus far. According to DISTRO management, customers did not want products delivered directly to their homes. They would have to be present to receive the delivery because they did not trust that their lanterns or stoves would be safe if left at the door. This explanation makes sense, but the issue of incentives must be considered as well.

DSAs are very concerned with commissions. That is an obvious statement in most sales networks, but the DSAs only receive a commission if they sell 50 or more products. It is one of the two main reasons that DSAs become retailers. As one DSA complained, "If you sell 48 you get nothing." Multiple DSAs called the lack of commissions demotivating, and

while the lending agents earn a referral commission on each sale, the DSA is “doing most of the work and is pushing the sales.” The DSAs—acting as retailers, are not going to push direct delivery sales when they will lose their margin. Combined with customers not being comfortable with direct delivery, the new delivery model had little chance of success.

The lending agent interviews also stressed the importance of commissions. Both lending agents suggested that DISTRO should expand the product offering to include solar powered televisions, water heaters and refrigerators. In addition to new products alleviating the issue of cookstove and lantern saturation, more expensive products would lead to greater loan revenue for the bank and potentially higher commissions for the lending agents. When asked what product she preferred to provide loans for, one of the two lending agents said, “Solar lanterns due to the higher commissions.” (The other claimed to not have a preference because it was his job to issue loans, not choose products.)

b) Risk – maintaining the relationship

DISTRO does not offer credit in either the bank or retail channels and has almost no demand risk because they hold very little inventory. Stockists and DSAs assume the demand risk for products they choose to hold as inventory. The consumer lending risk is transferred to the bank, and from the lender’s perspectives, the loans are very low risk. The individuals have a prior relationship with the bank and/or are guaranteed by other group members.

The risk felt by the bank is reputational. Answering a question on the biggest risk the bank faces in the channel, a lending agent said, “Probably if the company bought inferior products or did not meet their end of the deal, and the groups tarnish the bank’s name. Customers associate the products with the bank. Some think KSB is the one selling the products.”

DISTRO’s major risk is its ability to maintain its relationship with the bank. This relationship appears to be what keeps DISTRO relevant in the market. One supplier described why they continue working with DISTRO: “It’s been a relationship fraught with challenges. We mostly want to work with DISTRO because of their relationship with KSB Bank because they are a huge player. I’m worried about that. We’ve had a lot of issues with DISTRO, and I want to see DISTRO succeed, but I want to see us succeed first.”

Another supplier echoed the importance of holding on to the bank relationship by saying, “They have two big customers: KSB and Farmers Trust. And Farmers Trust got so tired of DISTRO that they wanted to come directly to us. So now Farmers Trust buys directly from us, cutting DISTRO out. And, things haven’t gotten to that point and the bond is a stronger relationship. I don’t think KSB is going to pull the plug on DISTRO. But, I feel that DISTRO really missed out on maximizing the value they can offer on consolidation.” Keeping the near monopoly on the clean energy sales through the bank is absolutely critical.

E. Cross Channel Analysis

1. Cross channel sales comparison

Channel summaries for sales, revenue and margins are shown in Table 4. The retail channel had the highest total sales, followed by the bank channel and the MFI channel. As a reminder, the MFI sales all occurred in four months. Total revenues follow the same channel rank order as sales. However, revenue per sale, margins and margin per sale do not. The rank order for the latter three categories is actually the opposite and speaks directly to the profitability of each channel. It is in large part determined by the product breakdown between the channels—lantern versus cookstove sales. Figure 6 - Cross-Channel Sales Comparison shows the sales trends by month across each channel. The peak in retail channel sales is higher than in the bank channel, but bank sales are higher in the latter half of the period of focus. The drop-off in MFI channel sales is immediate when the relationship ended.

Table 4 - Sales, Revenues & Profits by Channel

Channel	Unit Sales	Revenues	Revenue per sale	Profits	Profit per sale	Margin
MFI	1,718	\$68,809	\$40.05	\$12,354	\$7.19	18%
Retail	2,931	\$95,839	\$32.70	\$4,557	\$1.55	4.8%
Bank	2,453	\$84,302	\$34.37	\$5,647	\$2.30	6.7%
Total	7,102	\$248,950	\$35.05	\$22,558	\$3.18	9.1%

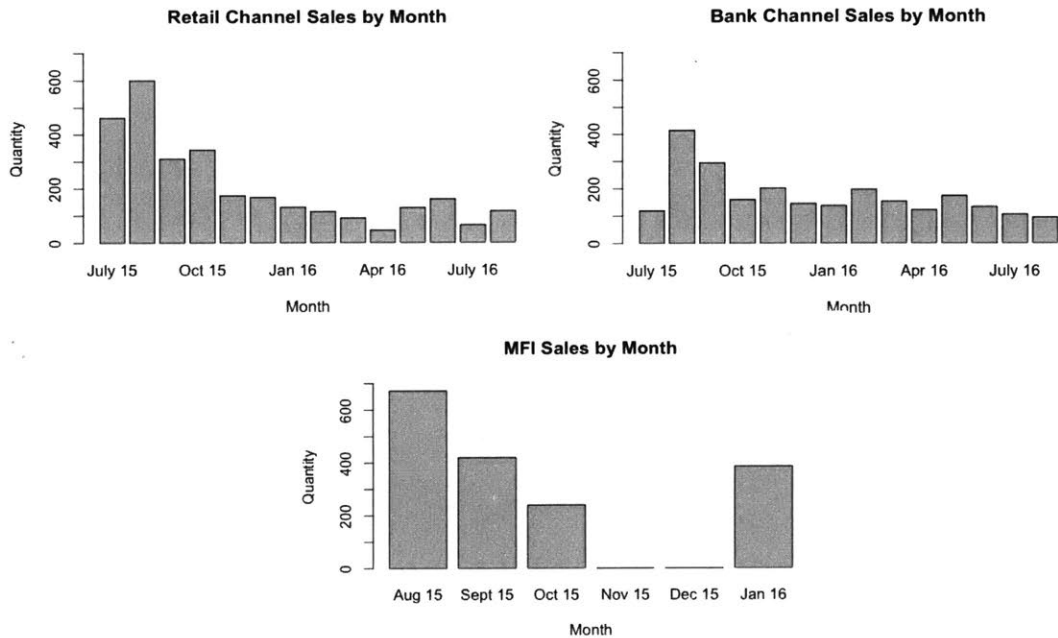


Figure 6 - Cross-Channel Sales Comparison

Table 5 breaks down retail and bank channel sales by month since February 2016—the latter half of the period of focus and since the MFI relationship ended. Average monthly sales were 103 in the retail channel and 141 in the bank channel. The retail channel sales had the highest monthly totals in the first half of the period, but the trend reversed from February – August 2016.

Table 5 - Retail & Bank Channel Sales since February

	Retail	Bank
February	115	197
March	91	154
April	46	122
May	129	174
June	161	134
July	65	106
August	117	99
Total	724	986

The retail and bank channel margins trends—Figure 7, reversed as well. The margin shift was actually more substantial than the change in sales. This is critical because total margins by month are a direct indicator of the profitability of the channel. Product sales

explain the difference in profitability. Figure 8 shows product sales by month. From a strict sales and margin perspective, the difference in margin is due to solar lantern versus cookstove sales.

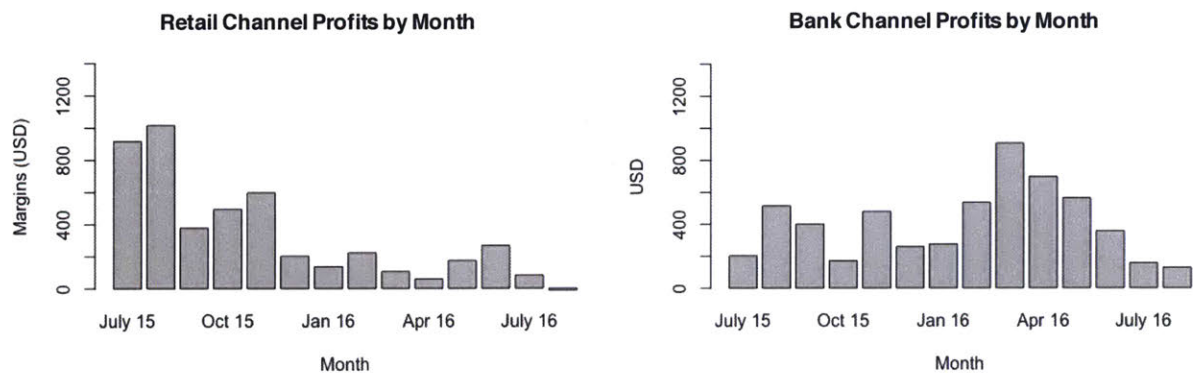


Figure 7 - Retail & Bank Channel Profits

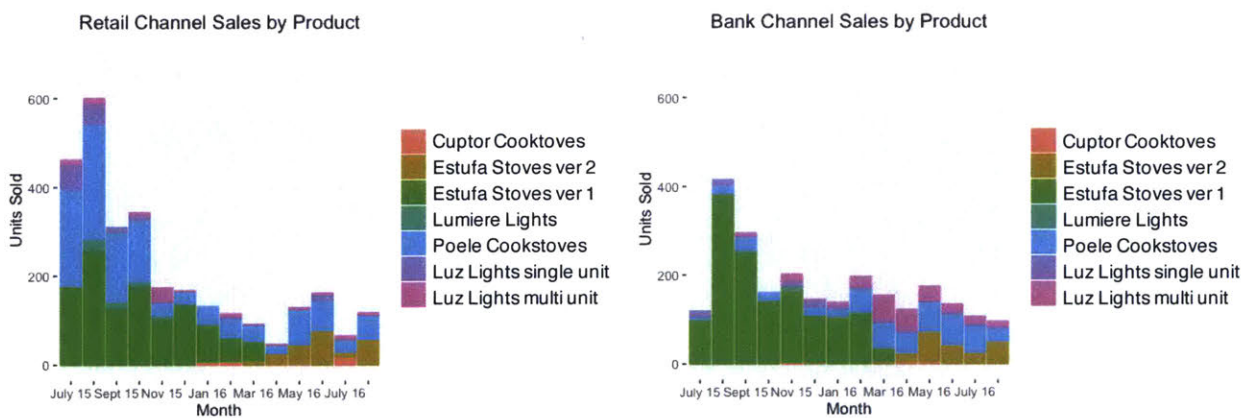


Figure 8 - Retail & Bank Channel Sales by Product

The graphs and tables show the results of sales across the DISTRO channels. The demand for cookstove through both of the channels is still substantially higher than for lanterns, yet on average, DISTRO loses money on a cookstove sale. The highest selling product accounts for almost no profits. The supply chain structures in place—most notably transportation, are a major driver of the low margins on the cookstoves.

Figure 15 shows channel sales by region. While all of the MFI sales are outside Nairobi, thus having higher transportation costs, the higher margins from the lanterns offsets the cost. The retail channel however sees the highest sales in the Rift Valley and Embu/Mt Kenya, and the bank channel sees the highest sales in Embu/Mt Kenya and Nairobi.

Poele and Estufa cookstoves, respectively are the highest selling products in the Rift Valley. In Embu/Mt Kenya the two go back and forth as the highest selling products. Cookstove sales are very low in both the Rift and Mt Kenya Regions. Cookstoves account for the most sales in Nairobi and the Coast region, but lantern sales are higher there than in the other regions.

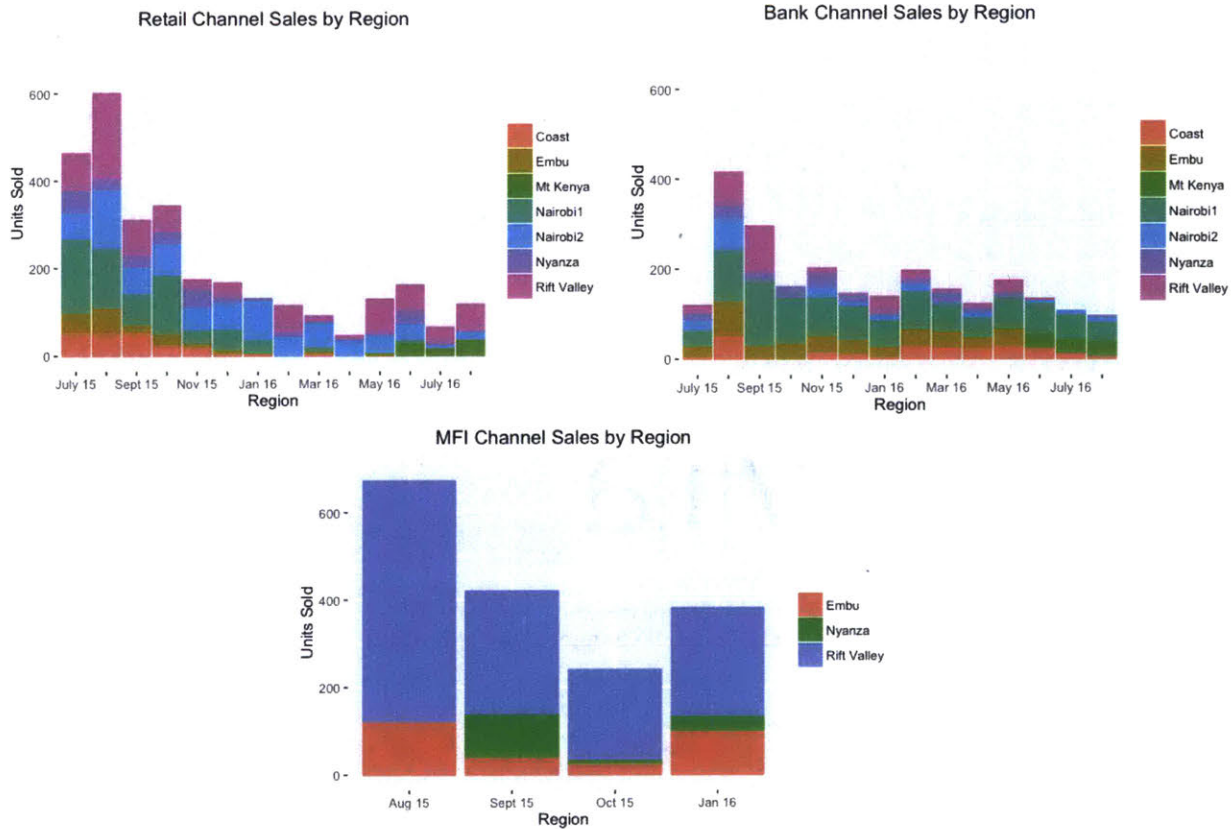


Figure 15 - Channel Sales by Region

2. Cross channel financial analysis

Section 1 looked across DISTRO's sales channels to provide an overview of what has actually transpired in terms of sales results. Sales across the channels are the basic unit of analysis, but the value added from a mixed methods case study is the ability to dig deeper and attempt to answer how and why events transpired as they did. The following sections seek to do this using the actual sales results, the financial ratios and the interview data. The analysis is scoped by how the supply chain and financing structures set up DISTRO and the other stakeholders impact profits, sales growth and risk.

a) Brand Profitability

Table 6 shows DISTRO's revenues, profits and product margin percentage by brand. Sales by brand reflects the sales by channel results discussed in the previous section: the solar lanterns account for a slightly larger share of revenues but a much larger share of margins. Product margin is DISTRO's profit after subtracting the cost of goods sold, transportation, commissions and VAT from the selling price. The impact of transportation costs has been discussed at length, but the effect of VAT is clearly illustrated in the brand comparison.

The Kenyan government does not assess a VAT on solar lanterns. However, a 14% VAT is charged on cookstoves. The 14% VAT assessment—assuming the product price would not change, puts the lanterns and cookstoves on roughly the same level of profitability. Or, the cookstoves price could be reduced—making them substantially less expensive for consumers. This would be expected to increase demand at no additional cost to DISTRO or the suppliers. Government regulations have a substantial market impact.

Table 6 - DISTRO Revenue, Profit and Margin by Brand

OEM	Revenue	Profit	Product Margin
Estufa cookstoves	\$87,930	\$3,057	3.5%
Poele cookstoves	\$63,311	\$1,372	2.1%
Luz lanterns	\$94,181	\$18,028	19.1%
Cuptor cookstoves	\$2,958	\$53	2.0%
Lumiere lanterns	\$570	\$48	8.4%
Totals	\$248,950	\$22,558	9.1%

Considering that DISTRO’s total profits from the seven highest selling products over a fourteen-month period were \$22,535, a legitimate question is how can they afford to operate? Before digging into the financial analysis, there are two additional sources of income: marketing fees and grants. In addition to generating revenue from product sales, DISTRO also charged suppliers a marketing fee for products sold through the MFI channel. As indicated in Table 7, this means that the per-product margins of each brand are slightly higher than they first appear in Table 6. The Poele products also get a bigger bump than the other brands because DISTRO would sometimes purchase Luz products through Poele for the MFI channel. The total marketing fees are \$8,294 which is a substantial amount—over one-third of the total profits. However, because the MFI relationship has ended, this revenue stream has ended as well.

Table 7 - Marketing Fees and Grant Income

	Product Revenues	Product Profits	Marketing Fees	Original Margin	Adjusted Margin	Grant Amount
Estufa	\$87,929	\$3,057	\$238	3.5%	3.8%	\$13,661
Poele	\$63,310	\$1,372	\$4,412	2.1%	9.1%	\$29,235
Luz	\$94,180	\$18,028	\$3,406	19.1%	22.7%	0
Cuptor	\$2,598	\$53	\$238	2.0%	11.2%	0
Lumiere	\$570	\$48	0	8.4%	8.4%	0
IFC	NA	NA	NA	NA	NA	\$9,615
DISTRO HQ	NA	NA	NA	NA	NA	\$13,711
Totals	\$248,587	\$22,535	\$8,294	9.1%	12.4%	\$66,222

*Adjusted margin includes marketing fees but not grants

One of DISTRO’s main revenue sources is grant income. As a social impact company in the renewable energy space, this is not unexpected, and it is one of the major reasons it can continue to operate. Table 7 also shows the grant sources from July 2015 – August 2016. Though two of the grants are associated with suppliers, grants are not contingent upon product sales. The adjusted margin does not include grant income. As argued in the Phase 1 findings, while public and non-profit money is critical in the development space, products should not be subsidized.

One of the grants was part of a revolving fund to be used for providing credit to cookstove distributors. This enables the partner cookstove company to give DISTRO

payment terms. The other grant associated with the cookstove company came from the Global Alliance for Clean Cookstoves. The IFC grant is to support a marketing initiative across the country, and the grant from DISTRO headquarters is essentially an equity investment. Grants are basically the lifeblood of DISTRO.

b) Profitability Metrics

The focus on profitability up to this point has either been at the channel or the brand/product level. The cross channel analysis will now shift to include supply chain finance metrics that look at how the supply chain and financing structures have impacted DISTRO as a whole. Table 8 shows the profitability metrics from 2014-2016. (The 2016 financial reports are only available through June.) The metrics are computed using the formulas outlined in Chapter 2 and the Chapter 4 Appendix. All inputs are taken from financial reports produced by DISTRO’s management over the previous two years. Quickbooks accounting software is used to generate income statements, balance sheets and cash flow statements in Microsoft Excel format. I cleaned and consolidated the accounting documents into CSV format and used R-Studio to generate the metrics.

Table 8 - Profitability Ratios

	2014	2015	2016
Profit Margin without Grants	-364%	-216%	-51%
Profit Margin with Grants	-364%*	-175%	-47%
EBIT Margin without Grants	**	**	-103%
EBIT Margin with Grants	**	**	-98%
ROIC	-50%	-58%	-86%
Gross Margin %	NA	29%	4%
Return on Permanent Capital	-35%	-44%	-86%
Asset Turnover	.87	4.32	1.47
Financial Leverage	16%	8%	60%
ROA without Grants	-316%	-935%	-76%
ROA with Grants	-316%*	-756%	-68%
ROE without Grants	-50%	-71%	-45%
ROE with Grants	-50%*	-58%	-41%

*No grant data from 2014

**Same as profit margin

The most glaring takeaway from Table 8 is the number of metrics that have negative values. The product margins highlighted in the previous section do not cover all the costs of running the business. That is clear from the profit margin and EBIT margin without grants. When the grants are added to the books, the outlook improves but only marginally. Profit margin without grants is simply net income divided by total sales. Profit margin without grants is (net income – grant income) divided by total sales. One interesting item to note from a profitability standpoint is the EBIT margin from 2016. This was the first year—according to the accounting documents, that DISTRO faced a substantial tax burden. It is also possible that as the processes have developed, it is the first year that the tax burden was actually documented. EBIT margin--with grants--was calculated in the same manner as profit margin.

In addition to profit margin and EBIT margin, it is worth discussing the gross margin percent, ROA and ROE. These trends are particularly troubling. While the other metrics are not positive, DISTRO invests little in actual capital and physical assets, so ROIC, Return on Permanent Capital and Asset Turnover are not very useful. The gross margin trend shows however that DISTRO made less on each sale so far in 2016 than it did in 2015. This reflects the loss of the MFI channel—and its high margin solar lantern sales, and the increase in transportation costs. So, the supply chain finance metrics tell a similar story as both the sales data and the qualitative interviews.

Both ROA and ROE are worse in 2015 than in 2014. (2016 does show improvement thus far, but it may be due to the partial year reporting.) This is a troubling trend. Costs and investments have increased, but there has not been a corresponding increase in sales. While it may be fine for a social impact company to be unprofitable for a time, there is a limit as to how long that can go on. Grants and equity investments from DISTRO headquarters enable the East Africa operations to continue, but there is a finite amount of resources. There is also a finite amount of goodwill from the supply chain partners who are also social impact companies, but want and need to make money.

One of the supplier's highlighted this saying, "DISTRO came to me and said, 'We're not making any money.' When I looked at what they were paying, I nearly fell off my chair. I couldn't believe it. They were paying 350 KES to get up the road." His point was, "If you're

going to advertise yourself as a logistics provider, you need to think like a logistics provider. And, they don't do that." On the topic of being a "social impact" company, he said:

"We pitch ourselves as a social impact company to investors because they like it. They like that warm and fuzzy feeling. But at the end of the day, it all comes down to the numbers. We're a for-profit business and we need to think like a business. And you need to be at times very commercially minded at times or you don't survive. Impact investors think about how many carbon tons we've reduced or trees we've saved, but I don't think about that on a daily basis. For me it's all about the numbers."

All of the suppliers' expressed similar sentiment that can be summarized as: Profit is the cost of staying in business. The companies want to have a social impact, but in terms of running their businesses, the goal is profits. A key to profits for all of the companies in this distribution network is sales growth. The next section ties together growth strategies, whether growth has actually occurred and working capital management.

c) Sales growth and working capital

DISTRO's sales have not grown. The tables and graphs have repeatedly made this point and the supply chain and accounting metrics show the same results. A problem for DISTRO is that all of the suppliers reported sales growth, but the growth is occurring outside of the DISTRO sales channels. This indicates it is not a market problem.

Note that while the suppliers had no incentive to lie, one thing that became clear throughout the case study was that numbers reported during conversations often did not align with numbers reported from actual sales data. This is an important lesson and one of the primary contributions of this work—the value of mixed methods supply chain analysis that looks at multiple tiers in the supply chain, multiple data sources and multiple data types.

DISTRO management believes the path to growth is leveraging the bank's retailer network. A key component of this is "Developing a coherent sales and distribution strategy for the bank." It was not discussed in the bank or retail channel reports, but spanning the entire period of the case study (over a year), DISTRO and the bank have been in the process of rolling out a new lending platform. It is a primary objective of DISTRO management because a major point of resistance with the current clean energy program has been with

“on-the-ground middle management at the bank.” DISTRO believes that the energy loans are pushed to the bottom of the queue by lending agents because the loans are small, and the credit team does not make very much off them.

The new platform will automate lending for clean energy products. The borrowing application and approval process will be added on to the bank’s existing mobile payment system. The belief is that the clean energy program on top of the mobile platform will: 1) simplify the lending process, and 2) leverage more of the bank’s capacity.

It is a necessary improvement. As one DISTRO employee stated, “the current lending process is relatively slow and rather expensive on an individual basis.” This contrasts with the MFI loan product where individual lending agents could approve loans on the spot. “With Farmers Trust, they had a good loan product with very little administrative requirements. But, there were issues with management. It’s the opposite with KSB, where there is management support, but variability across the branches has been an issue. The variability is in the loan support and paperwork processes at each branch. It negatively affects the sales staff.”

The optimistic goal is to reach 30,000 product sales a month, but “a more realistic goal is 10,000 sales a month.” This is a vast increase over current monthly sales, but DISTRO management highlighted that in the first year it was operational, one million customers used the bank’s mobile payment system. The goal is to have six million customers by the second year.

DISTRO’s average total sales—following the loss of the MFI channel, were between 200-300 units a month. This is far below the 10,000 units per month goal. Table 9 shows the asset utilization metrics for 2015 and the first half of 2016. (The balance sheet data is almost non-existent for 2014.) The ratios of note are the days of inventory, days’ accounts receivable, days’ accounts payable and working capital. DISTRO’s lack of inventory investment has been discussed—and will be further in the “findings” section, but for a distributor, it is almost unbelievable. As one of the suppliers said, “If you’re going to call yourself a distributor, you have to act like it.”

Table 9 - Asset Utilization Ratios

	2015	2016
Days of Inventory	4.2	6.6
Days Accounts Receivable	22.5	0.1
Days Accounts Payable	110.8	56.9
Cash Conversion Cycle (days)	-84.1	-50.1
Working Capital (USD)	579.3	-3075.6

*Financial data on asset utilization not available for 2014

Days' accounts receivable represents how much time it takes DISTRO to collect from its customers. Days' accounts payable is how long it takes DISTRO to pay its suppliers. DISTRO is getting much more generous terms from its supplier than it gives to its customers. The channel reports highlighted this, but credit was only given to the MFI until it quit paying its bills. Therefore, in 2016 DISTRO had essentially a zero balance of account receivables. Though the days of the cash conversion cycle increased from 2015 to 2016, it still has a negative working capital amount in the first half of 2016.

For some businesses this means they are extremely efficient at converting resources into sales. In DISTRO's case it means they are not investing in working capital. Given the lending agents', DSAs' and retailers' insistence on the importance of inventory, the lack of sales growth is certainly in part due to this lack of investment. As the employee said, the network is "starved for capital," and the metrics in Table 9 indicate that the supply chain and logistics structures that DISTRO has in place are at least partly to blame.

d) Risk

DISTRO management mentioned the payment issues with the MFI from the beginning of the case study. A main finding from the exploratory interviews was that a strategy to mitigate risk in supply chains is relationships. One of the suppliers emphasized the power of relationships saying, "A credit history is a relationship history." This supplier only offers credit to companies it has a longstanding relationships with and a "history of sales, repeat transactions and on-time payments." For this supplier, a company's demonstrated history of payments is more important than how risky they appear on paper.

Table 10 - Leverage and Liquidity Ratios shows how risky DISTRO appears on paper. From a risk standpoint, DISTRO has relatively little debt but a low current ratio and acid test.

Basically, it does not have the ability to quickly convert assets into cash because it has very few assets. This is not positive but also not unexpected given what we have seen previously—they hold very little inventory and have almost no fixed investments. The biggest potential problem is the negative cash flow. Equity infusions (and grants) from DISTRO headquarters keep the East Africa offices running. So, if the ability to inject cash to pay salaries was lost due to an issue with the corporate offices, serious problems would arise.

Table 10 - Leverage and Liquidity Ratios

	2014	2015	2016
Debt to Assets	NA	5.11	0.24
Debt to Equity	NA	0.39	0.14
Current Ratio	NA	1.01	.75
Acid Test	NA	0.98	0.64
Free Cash Flow	\$-180,463	\$-355,226	\$-81,322
Debt Ratio	.31	0.24	NA

An example of this occurred in the winter of 2016. An expected grant did not come through for DISTRO headquarters, causing them to reduce transportation reimbursements for the DSAs. The transportation reduction had a negative impact on the DSAs’ ability to visit their multiple branches and especially the retailers. Six of the thirteen DSAs said the reimbursement reduction created a serious problem. One elaborated, “I am told I am allowed 2,000 KES per week. But (names of branches removed for anonymity), its 2,000 on a single day. Then, you write to claim the reimbursement, it becomes an issue.”

Transportation reimbursements were a notable topic with both management and the DSAs. While the reimbursements were reduced to cut costs, management also believed that some of the DSAs may have been inflating reimbursement requests to pad their salaries. That said, the need to cut transportation costs was due to cash flow concerns.

Payment uncertainty and cash flow are risks, but they were not the main ones highlighted during interviews with DISTRO management. Three different management personnel highlighted—as the main risk facing DISTRO—potential issues with the bank relationship. One said the main risk was “Getting buy-in and engagement from the bank management for the programs” as buy-in will be the key to scale. Another echoed this by

saying, “The biggest risk is pushing the project with KSB because we can’t achieve scale without full buy-in.” The individual explained that competing interests within the bank are challenging to overcome, and DISTRO must define its role to provide the best service to KSB and the suppliers.

The third individual tied DISTRO’s risk to the roll-out of the new mobile lending platform. The concern is that the new platform holds a lot of risk for DISTRO because if it is successful, “The suppliers will want to bypass DISTRO and build a direct relationship with KSB.” Basically, they will want to cut DISTRO from the equation. To prevent this, two things are critical. First, they must ensure that KSB understands the value that DISTRO creates. Second, he stressed that DISTRO needs to “own the customer.” This means that for sales made out of the branches or through the retailers, “DISTRO should be creating the sale and managing the after-market service.”

By this he meant that DISTRO needs to make it easy for KSB. The effort on the bank’s part should be absolutely minimal other than processing and managing the loan process. The bank should not be managing relationships with a number of manufacturers who want to sell products out of the branches, nor have to deal with customer service issues. Additionally, the bank should never hear that DISTRO is only doing an ok job with logistics.

The major risk for DISTRO is losing the near-monopoly on the bank’s clean energy lending business. Future success depends on its ability to maintain the bank relationship, which relies on the ability to be the customer’s sole access point and manage the selling process, transportation and after-market service for the remaining two channels. As found during the Phase 1 exploratory interviews, “partners” in the supply chain is used a bit loosely. Often they are competitors as well, and even if not directly competing, the interests of the different stakeholders are not perfectly aligned. The suppliers will also want to “own the customer” and capture DISTRO’s margin. The bank may begin to listen to the suppliers if DISTRO is not effectively managing the supply chain.

F. Case Conclusion - Aligning the business model and strategy with core functions

The selling strategy of DISTRO's suppliers range from a decentralized micro entrepreneur sales force to a large retail presence supported by mass marketing campaigns. DISTRO, as it should, has its own unique sales channel strategy in which the DSAs drives sales in the bank and retail channels. Based on the high level interviews with the suppliers and the on-the-ground interviews with DSAs, retailers and lending agents, there is a disconnect with how DISTRO's sales channels try to capture the market.

Retail sales provide the best opportunity for sales growth and are the main focus of DISTRO management. The retail network attached to the local bank branches will have the largest customer reach. Additionally, when the new lending program is fully online, lending and purchasing through retailers can be completely done without the customer having to visit the bank branch or see a lending agent in person. However, because of low margins, the commission structure and an unwillingness to hold inventory, DSAs do not invest time promoting retail sales. Combined with the fact that DSAs already cover multiple branches, spreading them even thinner, it means that the retail channel is often ignored.

As one of the supplier's explained, "We've found that cookstoves require a demo in order to effectively convert sales." The supplier was familiar with DISTRO's model and had worked with them in the MFI channel. The issue is that if there is one DSA for five branches, he/she will only be seen once a month or not at all. Sales are not made—or are rare, when the sales agent is not present. He concluded with, "We work on building trust with consumers, with a local resource who will available to help with the product."

DISTRO is a social impact company and in a relatively new market, and an apt comparison is to a start-up. The fact that it is not currently profitable is not necessarily indicative that the long terms prospects are negative. However, as can be seen in Table 11 - DISTRO Net Income 2014-2016, the annual losses have grown while the sales have not. The parent organization is able to inject enough cash into the system to cover the annual net operating loss in the hundreds of thousands of dollars. Given that DISTRO's share of its suppliers' business has decreased over the past three years, if the sales do not increase it will

see further losses that can only be sustained for so long. A further erosion in sales will mean losing its place in the market and the near monopoly with the bank—its biggest risks.

Table 11 - DISTRO Net Income 2014-2016

	2014	2015	2016
Net Income	\$-180,463	\$-364,135	\$-36,340
Net Loss Brought Forward	\$-282,500	\$-462,936	\$-827,071
Net Loss Carried Forward	\$-462,963	\$-827,071	\$-863,411

*Only January – June 2016

The key factor going forward will be how well DISTRO can deliver on the value it promises to its supply chain partners. The possibility exists that the bank’s new lending platform will lead to sales growth, but the question exists as to whether DISTRO’s logistics processes can support the growth. During interviews with the management team, multiple individuals stressed that one of the company’s strengths was in the carbon markets. Carbon revenues enable DISTRO HQ to inject cash into the East African operations and are a main reason that they are still in business. However, from an operational standpoint, it is completely unrelated to the value provided to its supply chain partners—with the caveat that a percentage of carbon revenues are shared with the bank and the suppliers.

The focus on carbon revenues, though critical to paying the bills, has kept the focus away from reaching competence as a distributor. In the early stages of the business when the market was even newer, this may have been fine. The partner companies and OEMs were willing to work with them because they were just entering the market and would basically take any outlet to achieve sales. But, the partners have professionalized and grown while DISTRO has not. They are being left behind and this focus on carbon sales has allowed them to rely on that from a revenue standpoint, as opposed to being forced to improve their supply chain and sales functions out of necessity. Now they do not deliver the quality of service the suppliers expect of a distributor. Basically, they’re being kept afloat—from an operational standpoint, by the goodwill of personal relationships and the monopoly on the KSB relationship.

Three of the four suppliers mentioned multiple times that they are not happy with the service DISTRO provides. Similar complaints were made about inventory, delivery delays and stock-outs by the sales agents and retailers. When commenting on his own organization, one member of DISTRO management attributed the issue to staffing. He said that the people are great in the field and working with people on the ground. But, they are “former Peace Corps types” who do not have much experience from a management perspective. This reflects two key issues identified during the exploratory interviews—challenges with management and training. One of the suppliers summarized the issue by saying: "I think it comes down to the fact that they're bringing people in from the states who are fairly young, have no Kenyan or logistics experience to manage what is effectively a logistics company in Kenya. I think they should've made more of an effort early on to find the right people to run the organization. But I think they're fixing it."

Chapter 6 examines the overall research contributions, limitations and opportunities for future work.

Chapter 5 Appendix – Sales, Revenues & Profits

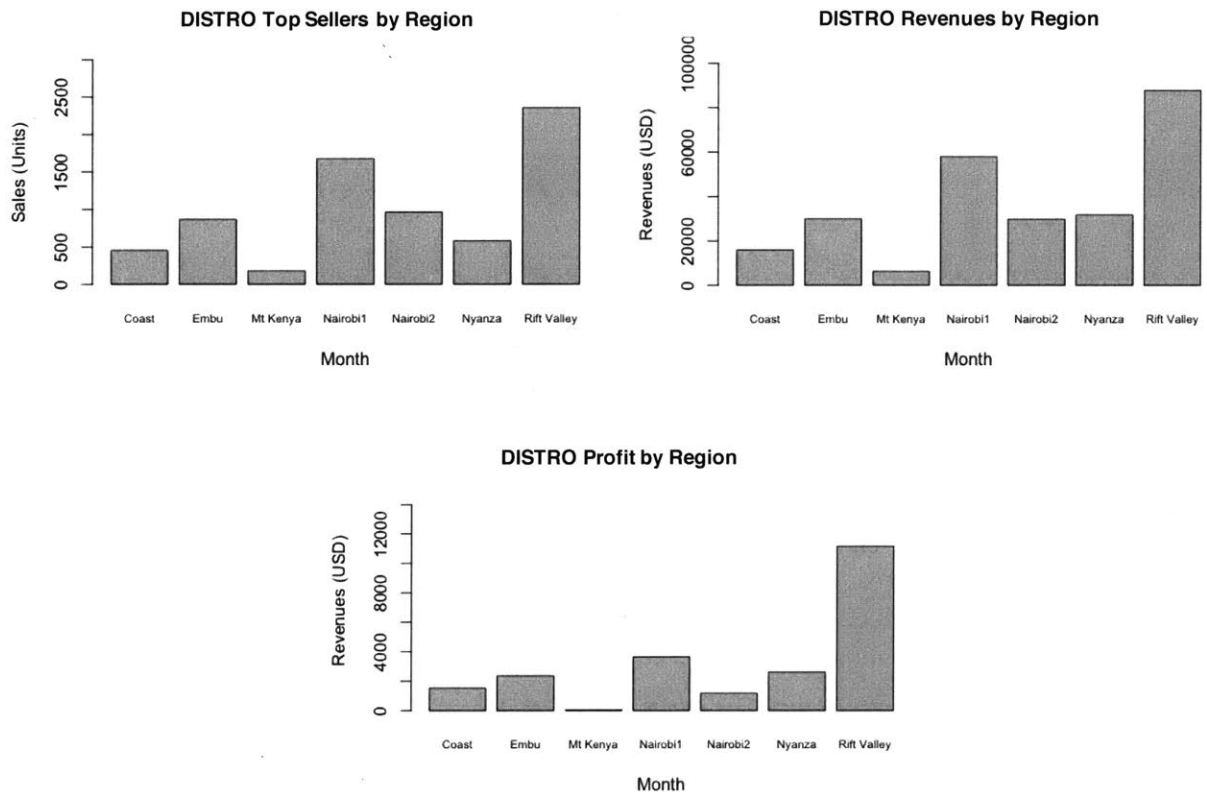


Figure 16 - DISTRO Sales, Revenues & Profits by Region

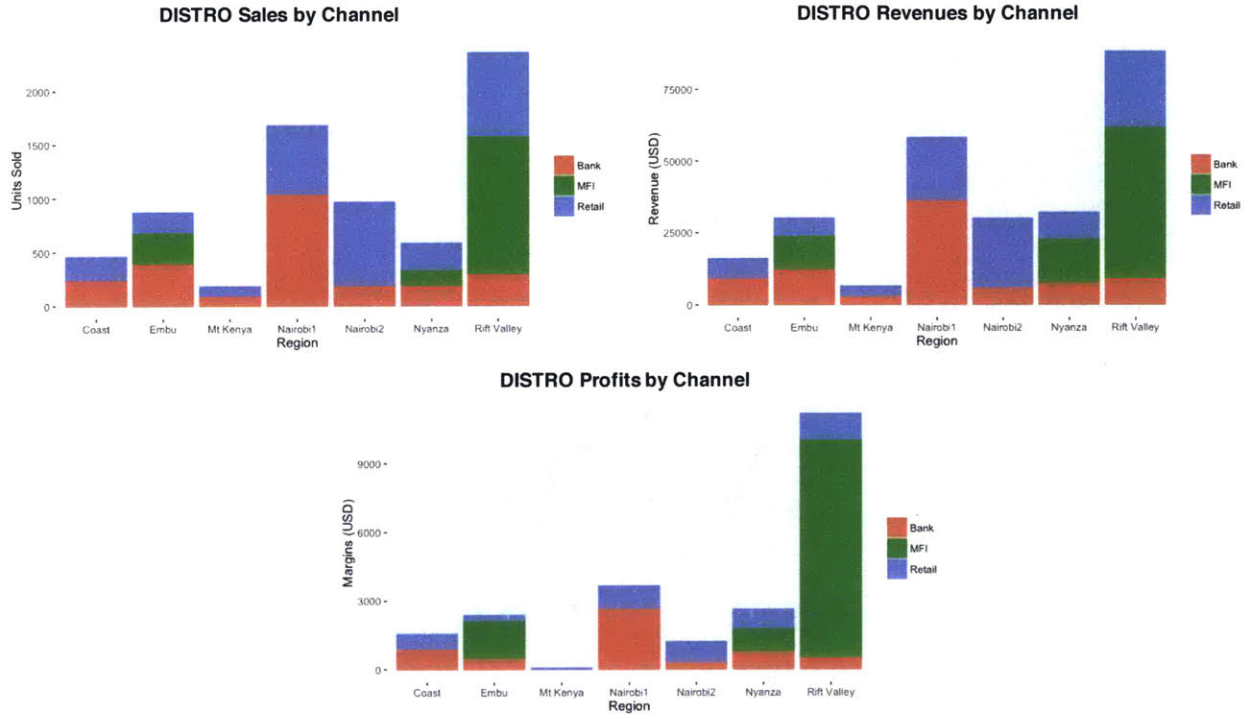


Figure 17 - Sales by Region by Channel

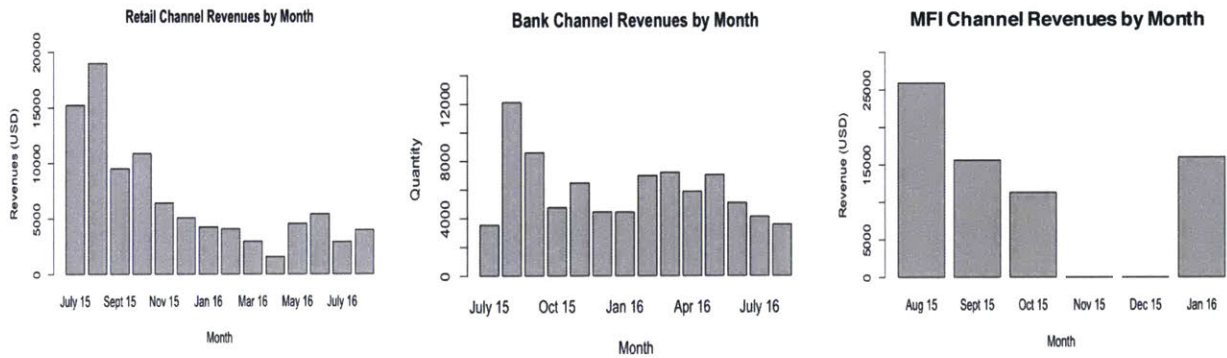


Figure 18 - Revenues Across Channel

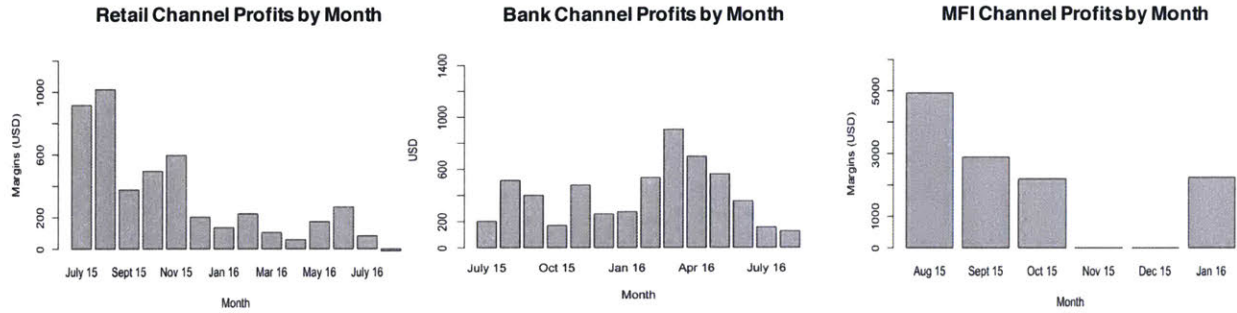


Figure 19 - Profits Across Channel

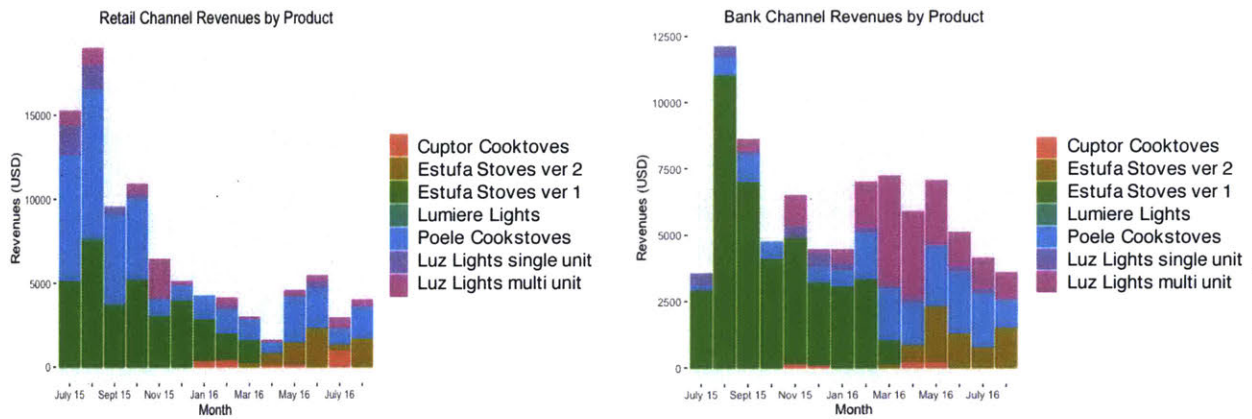


Figure 20 - Retail & Bank Channel Revenues by Product by Month

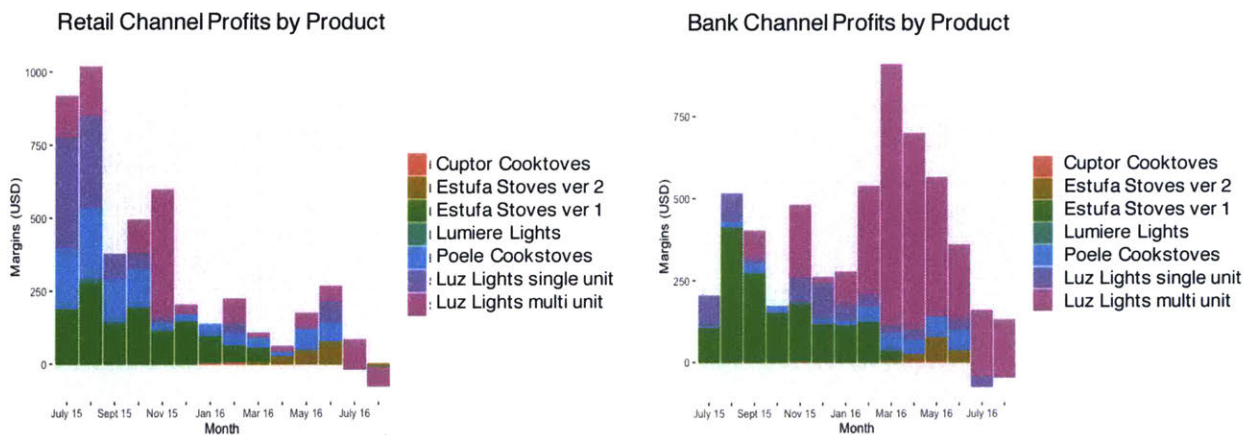


Figure 21 - Retail & Bank Channel Profits by Product by Month

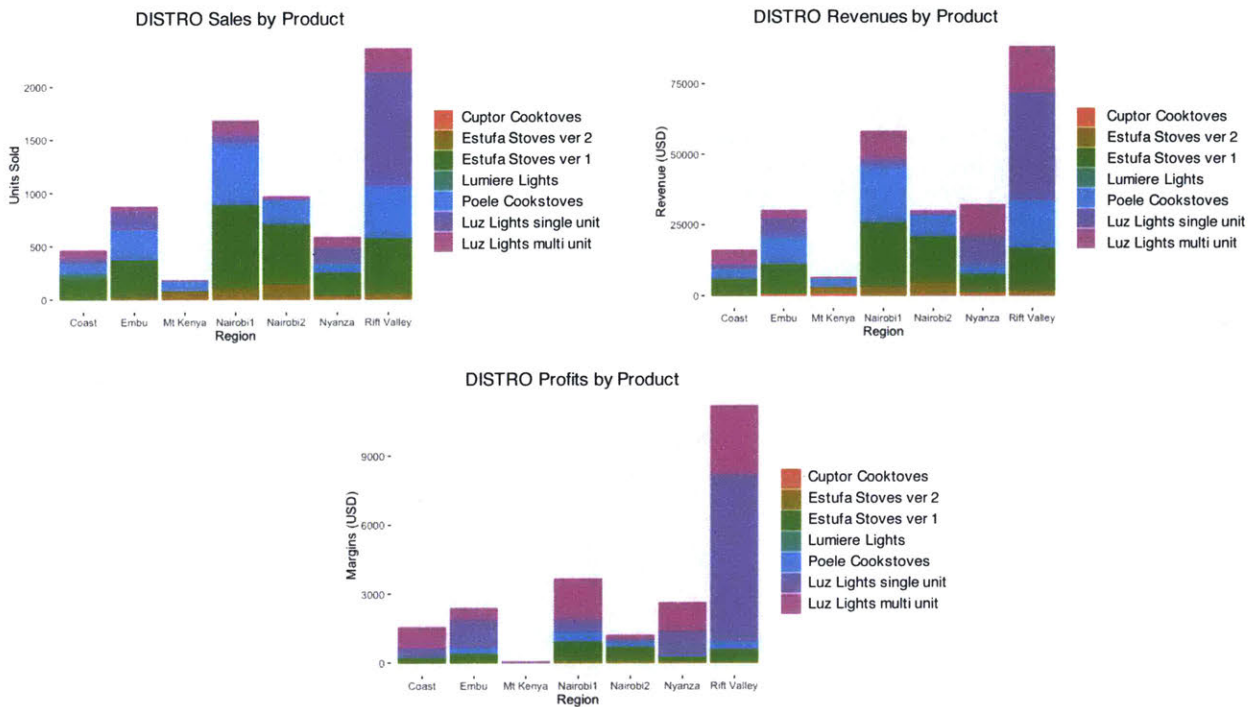


Figure 22 - DISTRO Sales, Revenues & Profits by Product by Region

Table 12 - Total Sales, Margin and % Margin by Channel

Brand	Type	Sales	Revenues	Profit	%	Primary Channel
Luz - single unit	Lantern	1,549	\$54,213	\$10,558	19.5%	MFI
Luz - multi-unit	Lantern	556	\$39,967	\$7,451	18.8%	Bank
Lumiere	Lantern	74	\$570	\$48	8.4%	Retail
Estufa new	Stove	437	\$13,296	\$278	2.1%	Bank
Estufa old	Stove	2,580	\$74,633	\$2,786	3.7%	Bank
Cuptor	Stove	50	\$2,598	\$53	2.0%	Retail
Poele	Stove	1,839	\$63,310	\$1,361	2.1%	Retail

Chapter 6 – Conclusions and Contributions

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Chapter 6 – Conclusions and Contributions

A. Research Contributions

Chapter 6 examines the overall research conclusions and contributions from the two-phased research effort. Chapter 2 provided a literature that examined the intersection of economic development, supply chain management and supply chain finance. Phase 1 began with Chapter 3, and hypotheses emerged from the exploratory interviews about the role and importance of financing in developing country supply chains. Chapters 4 and 5 used a case study to further elaborate on and explore the hypotheses using mixed methods and multiple data sources. One of the goals of the research was to use the hypotheses to build theory on the importance of financing in developing country supply chains. The following sections discuss the research contributions.

1. Research contribution 1

Supply chain design and the logistics decision of the lead actor can serve as a de facto financing decision with a direct effect on the resource requirements of the other supply chain actors.

This hypothesis was first formulated as a result of the solar lantern manufacturer in phase 1 explaining that opening a warehouse in East Africa was essentially a financing decision disguised as a logistics decision. The regional warehouses enabled smaller orders and drastically reduced working capital requirements for distributors and other partners because of how much quicker shipments arrived. It was an interesting insight and worth exploring further in the case because it represented a core tenet of what this research is trying to understand—how supply chain and financing structures impact the decisions that people and businesses make, and ultimately, the success of those businesses. The benefit of using the case to examine the hypothesis is that it can be considered across DISTRO's multiple sales channels and from the perspective of different supply chain actors.

It is clear that two of DISTRO's structural decisions directly impact the resource requirements of its retailers and sales force. One of the decisions—not to provide credit—is a direct financing decision. The second is its decision not to hold inventory. Comparing the MFI channel versus the retail and bank channels, sales were quite similar even though the

personnel presence was substantially lower in the MFI channel. The MFI branches were offered terms and held inventory. Additionally, both the sales agents and retailers stressed the importance of having products on site. Six of the seven sales agents who do not purchase their own products would if they had the capital, and all but two of the sales agents would accept credit if offered. These decisions matter from a sales standpoint.

DISTRO's decisions contrast with those of the supplier manufacturing in East Africa. This supplier touted the benefits of being near the market base for both the cost structure and the responsiveness to changing market demand. Additionally, distributors are able to order any quantity, and the respondent felt this was a large advantage of their model. It directly corresponds with what the solar lantern manufacturer highlighted in Phase 1.

In the case of both DISTRO and the suppliers, this hypothesis is not proposing which supply chain or logistics decision is better. For example, selling on credit may indeed be too risky, and there were repayment issues with the MFI. Furthermore, the cost benefits of manufacturing locally may disappear if the government changes the VAT on raw materials (which it did). The key point is that logistics decisions—which are not normally considered financing decisions, are exactly that. The case study shows that decisions that appear to be internal supply chain and logistics decisions should be considered as potential financing decisions in light of how the other supply chain actors are affected from a resource requirement standpoint. In resource constrained environments, i.e., developing countries, this is critically important.

2. Research contribution 2

A primary strategy to grow sales and mitigate risk is to control the distribution channels and be the customer's dual access point for both a product and its financing.

Multiple individuals in DISTRO management and all of the suppliers stressed the importance of being the customer's main access point for products. For them it is the path to growth and profitability—which they see as directly related. The margins are relatively low, so one of the keys to profitability is gaining economies of scale. In addition to lowering the per product cost, this is done by building a trusted brand and establishing a distribution network where other and more expensive products are offered. (Chapter 3 explained that

from a risk mitigation perspective, one of the ways to ensure competitors do not undercut your current lending arrangements is through the carrot of future product offerings.)

One of DISTRO's supplier's stated, "We're hoping that once we develop this channel (referring to a group borrowing/savings model), we can really push other products through it. Water, solar, and products we think will help make people's lives better. We think it has a chance to scale." Another shared a similar viewpoint: "To me, that's what scale looks like. It's a multiproduct portfolio with more ownership in the supply chain. By more ownership, implicit in that is more efficiencies."

This is the stated strategy, but it is not clear if it is actually effective. DISTRO's two largest suppliers overall did not achieve their main growth using this model. Rather, Luz Solar's largest sales channel is an NGO distributor that sells their products to agriculture customers. Estufa's main customer is a distributor who primarily sells through large, chain retailers. Thus far, the growth has not actually occurred in the desired manner. Even though there is a stated goal of controlling the access to customers from an efficiency, cost and growth standpoint, it is unclear if this will actually occur.

One issue with this strategy is that it puts supply chain "partners" in direct competition. Both the manufacturers and DISTRO want to be the customers' sole access point for products. However, for the larger two of DISTRO's four main suppliers, growth has not been the result of this strategy. From a risk mitigation standpoint though, controlling the sales channel has proven quite useful to DISTRO. In addition to a decrease in total sales, DISTRO's share of its suppliers' business has decreased over time. However, because of the relationship with KSB through the retail and bank channels, it is still a player in the market. The MFI channel was lost, but KSB's customer base is huge, and DISTRO controls that distribution channel. Maintaining control of the bank's distribution channels is the key to mitigating its major risk—being pushed out of the market by its suppliers.

The question might be asked: How this is different from supply chains or businesses in any other markets? Companies will always try to capture their competitor's market share, so in that respect it is not. However, the development and social impact nature of these markets separates them. An illustrative quote from the exploratory interviews was from a

respondent who worked for an international development bank. Answering a question about the dual nature of their lending purpose in regards to generating financial as well as social returns, he responded, “Yeah, well, if we get our money back but we didn’t create any impact, then I think we might as well have invested in government bonds.” The public sector funding and social impact focus necessitates that outside funders and stakeholders consider the potential issues that may arise within the supply chains, and how the players look strategically at the market.

3. Research contribution 3

Mobile payments and sensor technology can increase market penetration and reduce risk throughout the supply chain by lowering the cost of collection and speeding information and financial flows. Additionally, these technologies can reduce the risk of loss and theft and better ensure payment by allowing providers to remotely disconnect services.

Mobile payments and ordering require substantially less manual processing while generating an automatic record of transactions for DISTRO. The automated record-keeping, order and payment tracking has been the biggest benefit of the mobile-based system. The SMS-based system has also reduced payment uncertainty. Once the transfer has been received, there is no need to pressure retailers or sales agents for payments as had been the case in the past. Both order placements and monetary transfers are immediate.

This means that for DISTRO and the bank the costs are lower. Loans applications, approvals, and disbursements can be processed quicker and therefore cheaper. Per the statements of the sales force and lending agents, the ability to capture orders quickly lowers the rate of lost sales. Retailers and sales agents can quickly process orders and payments and should sell more products. This is a good thing for customers as well. They get products quicker.

However, DISTRO management believes the stockists are not particularly thrilled by the mobile payment system because post-dated checks are no longer allowed. The flexibility—and what is essentially credit in the case of post-dated checks—has been removed by the mobile system. DISTRO gets paid immediately, but the products are not shipped immediately. The positive aspects of the mobile-based system are more heavily

weighted towards DISTRO. This assertion is supported by Miller and Jones (2010) who argued that technical innovations are important, but the benefits of access are unequal and cannot be realized in all contexts.

The retailers were not the only ones impacted by the system's lack of flexibility. When considering a pilot program to offer credit to trusted retailers and stockists, one of the major barriers was the inability to track products sold on credit with the current payment system. This issue was very similar to an issue that a different distributor highlighted in the exploratory interviews. Because of how their systems tracked products and monthly sales, all sales and transactions needed to be closed by the end of the month.

The literature has also identified that banks play a crucial role in managing IT systems integration across networks (Silvestro and Lustrato, 2014). In markets where banks are moving towards mobile payment platforms, Kenya for example, it is much cheaper for companies to use the platforms set up by large financial institutions. While increasing customer reach and market penetration by capitalizing on the financial institution's customer base, it is easier for companies and tiers across the supply chain to work together because of the common system. For smaller companies and individuals, the greatest benefits from the mobile payment and ordering systems are when they are tied into platforms established—and supported—by financial institutions.

Mobile and SMS-based platforms also enable pay-as-you-go and lease-to-own models. Both systems are focused on products that can be remotely shut off if customers do not pay. Basically, it is a way to extend credit while getting added protection from payment uncertainty. With DISTRO and one of its solar lantern suppliers, work is being done to roll out a lease-to-own model with the bank. The bank will provide financing, and the product can be turned off remotely. The benefits of PAYGO were discussed at length in previous chapters, but the key factor is that the mobile systems allow the companies to engage directly with consumers in terms of both payments for the service—potentially through the financial institution—and providing repercussions, i.e., disabling the product, when the terms of the purchase are violated. Additionally, the company receives real-time data on customer usage and demand.

The added security and usage data is beneficial, but there is the question of how much additional security the financial institution needs. Basically, is PAYGO and the remote shut-off worth the cost? The bank is uniquely positioned to hold customers accountable for not paying back loans. It can freeze accounts, refuse to do future business and go to co-signers. So, it already has protections that other PAYGO or lease-to-own providers do not. A recommendation would be that the extra expense for PAYGO-enabled systems is not worth the added payment security when financial institutions are financing the product/services for existing customers. Rather, PAYGO is appropriate for businesses that are financing the products themselves or when working with new customers of a financial institution.

For DISTRO and two of its suppliers, a lot of faith is being put in the bank's new automated lending program. However, there have been many delays, and the culture at the branch level has been difficult to overcome. A third supplier also questioned the projected customer increase due to the new program, in addition to how well the actual physical distribution of the products will be executed. Basically, even if the new lending program is as successful as hoped for, there is a concern that supply chain processes currently in place will not be able to satisfy the increased requirements.

Ultimately, the verdict is out on how the mobile system will affect the DISTRO supply chain. It offers potential to scale profitably but whether or not it actually enables it is yet to be seen. It certainly speeds financial and information flows, but it does nothing for the product flows. And, you have to deliver on the core competencies of your business. Automation may lead to efficiencies, but the operations still need to be effective. An area ripe for future research is the role that technology and automation plays in helping the alignment, or emphasizing misalignments, of supply chain flows in developing countries.

4. Research contribution 4

The effect of personnel turnover in organizations emerged as an important factor in both phases of research. During the exploratory interviews respondents across multiple stakeholder groups stressed that organizations need to hire locals at all levels of the organization—including upper management. Hiring locals is key to understanding markets and navigating cultural and regulatory frameworks. What became evident throughout the

case study, however, is that as important as knowing and being familiar with the local market is, another key reason for hiring locals—especially in management, is that it can help to reduce turnover.

Organizations need people who are local and are going to stay in the organization. DISTRO is now on its third Regional Manager and second operations manager in the year and a half I have been in contact with them. All of the individuals have been very competent and engaged, but it is difficult to create stability or initiate lasting changes in such a short time. High employee turnover negatively affects any organization, but social impact companies like DISTRO appear to be especially vulnerable because of the fact that so many of the managers are not from the markets where the companies operate.

Most are generally young and come from the US, Europe or Australia. The issue is that they eventually go home, and the organizations need to fill the vacancy. The high turnover rate limits the ability to really improve processes over time and implement long-term initiatives. Turnover and strategies to reduce it would be an interesting area for further research on supply chains and organizations in developing countries.

5. Framework for considering context, growth and risk

The first phase of research began with exploratory interviews because of how little we knew about supply chain finance in developing countries. The academic literature acknowledges that financing is critical to business success and that it is often lacking in developing countries. However, existing research does not go into how resources are accessed and utilized both within businesses and across the supply chain. Similarly, the supply chain development literature gives very little attention to performance measurement. The economic development literature focuses on risk in developing countries, but the supply chain literature in developing countries does not.

The exploratory interviews therefore focused on how companies are acquiring and utilizing financing, performance measurement, risk, and the role of context. The case research questions examined how supply chain and financing structures impacted profits, growth and risk. Findings in both phases of research emphasized that these three key factors are directly related. Specifically, companies see growth as a path to profitability, and

strategies for growth carry certain risks. In the durable consumer goods realm, a framework for scale emerged.

Manufacturers and distributors want to capture market share and build a customer base with a trusted brand. As sales grow they try to build up their supply chain and logistics processes to establish a deeper presence in the market. By controlling more of the distribution channels, they can gain economies of scale and reduce costs. Ultimately, the goal is to build out the sales channels and offer additional products. This alleviates the problem of market saturation and also helps to mitigate the risk of other companies coming in and undermining existing credit offerings. The blue arrows in Figure 1 represent how manufacturers and distributors think about scale in developing countries.

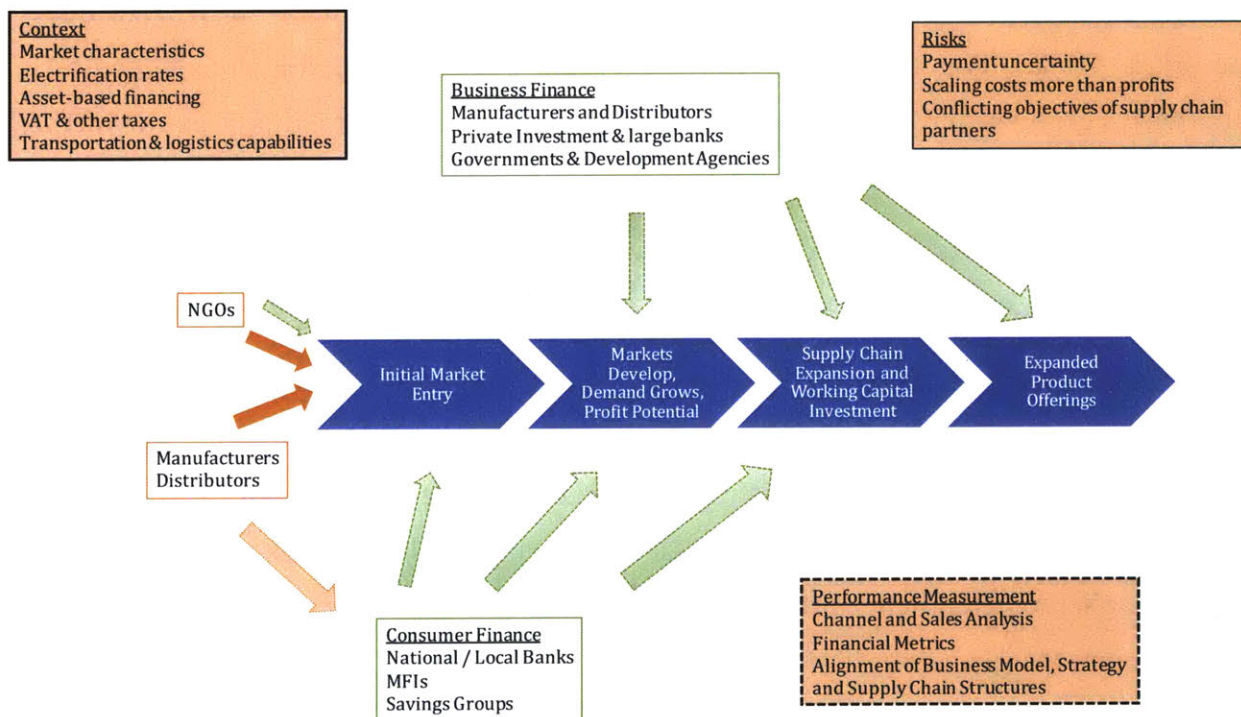


Figure 1 - Consumer Product Scale Framework

The framework incorporates the critical inputs and questions that must be considered throughout the scaling process. In terms of context, do low electrification rates mean that demand will be high enough to support solar products? Does the country's

regulatory structure allow for asset-based financing, and does the lender have a legal recourse if the borrower does not pay? Is the country's logistics infrastructure capable of supporting the operations?

The solid orange arrows represent the initial entry into the market. Manufacturers, distributors and NGOs—with different objectives in mind, generally drive the initial market entry. The manufacturers and distributors line up consumer financing with banks, MFIs and local savings groups. As one solar manufacturer stated, “In the last couple years, we've realized that a lot of our sales are coming from the consumer finance channels. A lot of our growth has come from channels that inherently offer consumer financing—through MFIs, employer purchase programs, etc. It's really about removing as many barriers as possible to anyone wanting to access our products.” The question exists as to what the most appropriate form of consumer financing is for the product and market, but that can be determined through market familiarity and having locals on the management teams.

The green arrows represent financing sources and the growth in financing requirements as the supply chain increases in size. As the market and product offerings grow, the working capital requirements increase, thus increasing the need for financing at the business level. At every stage the financing requirements, source and measurement of the objectives need to be considered. As seen in the DISTRO case, sales and financial metrics analysis can be used to measure how the supply chain and financing structures align with profits, sales growth and risk.

Figure 1 provides a conceptual framework of how stakeholders in developing countries think about scale in consumer durable goods markets. The stages outline how organizations seek to grow their market presence and product offerings as well as how funding requirements—both for businesses and consumers, increase as the market develops. Manufacturers and distributors will of course know their own strategy to scale, but the framework can help them to better understand how their supply chain partners and funders think about objectives, measurements and risk. The framework can be especially useful when assessing how financing and supply chain structures align with local markets and the company's ultimate objective—profits, financial sustainability, impact, etc.

For private lenders and government-backed development agencies, it is also critical that they understand how the companies they fund think about scaling operations and growing their market presence. This will help to ensure their limited resources are used wisely and the funding does not undermine existing markets. Additionally, both companies and funders can tailor their strategies based on what point in the along the spectrum they enter the market.

B. Methodological Contributions

1. World Bank data sets

The first consideration shown in the Figure 1 scale framework is context. The literature review argued that there are many barriers to growth in developing countries—financial, regulatory and corruption to name a few. This research has argued at length that when considering supply chain and financing structures, these factors must be considered. One way to assess context is through the use of World Bank data—specifically, the Logistics Performance Index (LPI) and the Ease of Doing Business Report (EDBR). Chapter 2 provided an overview of the use of these data sets in previous research. The existing academic work focuses primarily on demonstrating the importance of export time and cost, logistics infrastructure and trade policies to cross-border trade.

The data sets can be used along with the scale framework to help understand country-level context prior to entering markets and establishing the supply chain. Figure 2 – Country LPI Rank shows where Kenya, its direct neighbors and South Africa rank against the rest of the world from 2007-2016. Figure 3 – Ease of Doing Business: Getting Electricity and Trade Across Borders, shows the country rank for the two categories in 2015 and 2016. In Figure 3 Somalia is replaced with Rwanda because of data availability in the EDBR. Rwanda is not a direct neighbor of Kenya, but is in the East Africa region and the manufacturers and funders interviewed work in Rwanda in addition to Kenya.

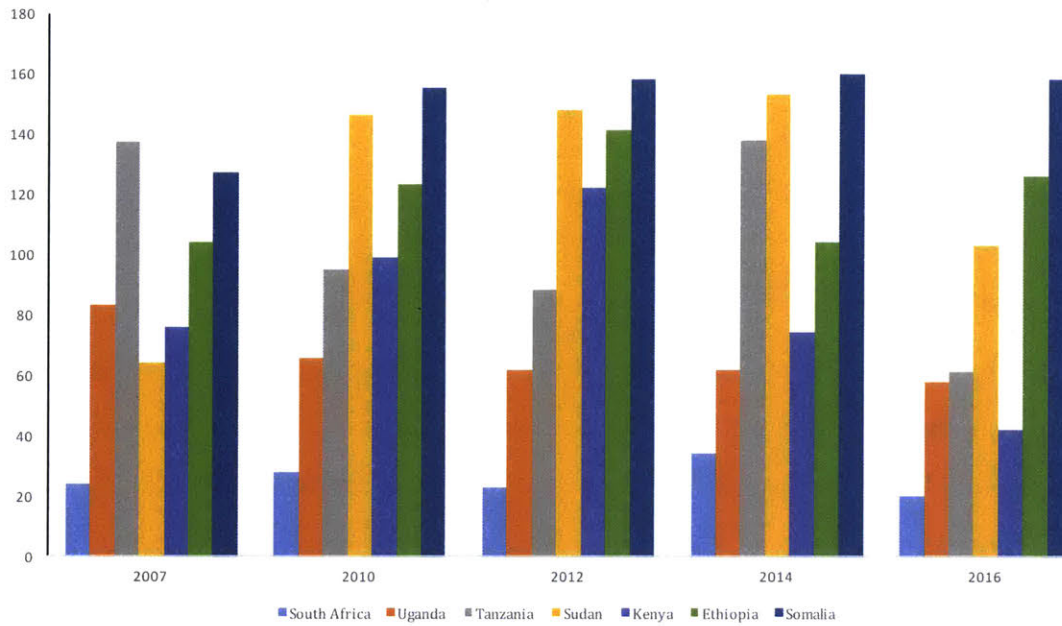


Figure 2 - Country LPI Rank (Global LPI, 2016)

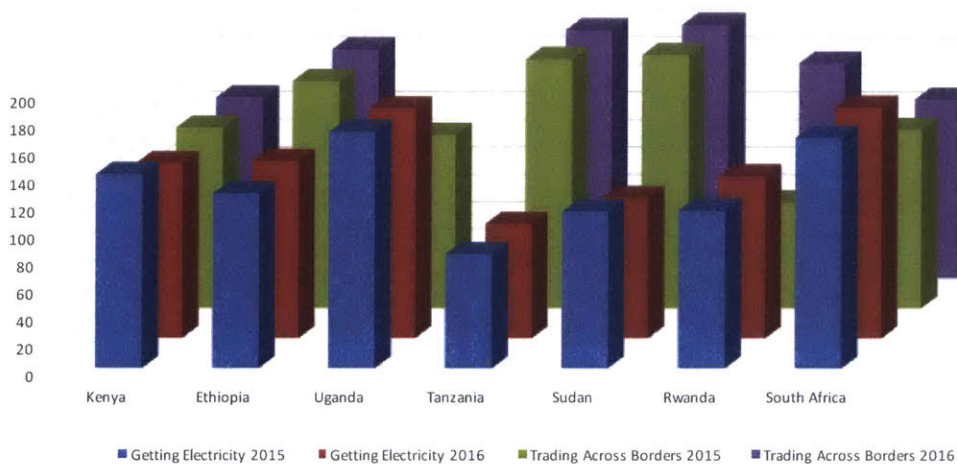


Figure 3 - EDBR: Getting Electricity & Trade Across Borders (Doing Business, 2016)

The previous academic research uses a gravity model with the LPI and EDBR data to predict trade between two countries. This is useful at the country level to show the importance of sound policy and investing in trade and logistics infrastructure, but it can also be used by stakeholders across the supply chain when making business model and financing decisions. For example, consider the solar lanterns in the DISTRO case. With their foothold

in Kenya, the natural outward expansion would be to neighboring countries. Figure 3 shows however that it is actually cheaper and quicker to establish a permanent grid connection in all of Kenya's neighbors except for Uganda. The demand for solar products may not be as high as one would think. Granted, this is just one measurement, but it is a technique for informing decision-makers when expanding into new markets or evaluating current business models.

The LPI ranks in Figure 2 shows how Kenya stacks up against the rest of the world. Most relevant to supply chain decisions, it compares Kenya against its direct neighbors. If DISTRO is looking to expand outward, we see that in 2016 Kenya was the top performer in the region. If logistics costs represent a significant portion of costs now, they would likely be higher in other countries. At the same time, the EDBR results indicate that getting credit is quite difficult in Tanzania, so DISTRO's financing model may be effective there.

Similarly, if a large multinational company was looking to expand into East Africa, it could use LPI and EDBR data to target certain markets and/or tailor its supply chain based on market characteristics. On the government and NGO side, the same strategy could be used. An impact goal or target impact area could first be defined. The data sets above, as well as additional data sets in the appendix, could be used to choose the country where the initiative is most appropriate. Then, the programs could be geared toward the specifics within the country.

Ultimately, the World Bank data sets are an under-utilized resource that can be used by stakeholders to understand existing markets and help select which countries/markets to enter. The opportunity also exists for academics to use the data sets to look at performance within countries as opposed to focusing exclusively on trade between two countries. Additional research on what factors are most appropriate for which countries and industries would be extremely useful. This better understanding can then help organizations establish or adjust their supply chain and financing structures in accordance with the country's characteristics.

2. Role of mixed methods research in developing country supply chains

The focus of this thesis has been on how supply chain financing impacts profit, sales growth and risk in developing country supply chains. One of the goals throughout the research has been to tie these three factors together using multiple research methods and data sources. The first phase used exploratory interviews to collect stakeholder data on how for profit and non-profit organizations think about supply chain financing in developing countries. I wanted to address the gap in the academic literature, and to use data on real experiences and practices from across the globe to produce insights that are useful to practitioners.

The case study is the first research effort on a consumer goods supply chain in a developing country to use accounting and supply chain financial metrics analysis in conjunction with sales and qualitative analysis. The methodological contribution is the use of mixed methods to tie the quantitative and qualitative analysis together in a developing country supply chain. Detailed sales data were used along with accounting and supply chain metrics analysis to assess how DISTRO has run their operations. The sales were broken down by channel to market, region and product for an in-depth look at how products were moved from the manufacturer to the end customers. The ratio and metrics analysis looks at the profitability, asset management and leverage of DISTRO.

Qualitative analysis was a key component of the case study, and interviews were conducted across multiple tiers of the supply chain. I conducted interviews with DISTRO's management and suppliers over the phone and Skype. Combined with Phase 1, I did 49 interviews using this method. In-person interviews may be preferable in general, but it would have been impossible to speak in person with the range of individuals that I was able to interview. Modern communication and the internet have expanded possibilities for qualitative research methods.

There are limits to the use of Skype and phone calls, and these limits were quite clear when I first attempted to interview DISTRO's sales agents over the phone. Because English is the language of business in Kenya, I mistakenly thought that if DISTRO made the introductions, I could personally conduct the interviews as I had the others. I was wrong.

While English may be the language of business, in reality Swahili is inter-mixed with English in many conversations. The individual I hired to do the interviews explained this, and the recorded interviews confirmed it.

Additionally, because the sales agents had trust issues with DISTRO's management and were concerned about job security, they were wary about speaking with a foreign man over the phone. The referral from DISTRO only heightened the wariness. This completely contrasted with the exploratory and other case interviews. In all except one, I was referred by someone with whom the individual had a professional or personal relationship. The trust issue was mitigated by the referral.

Hiring someone to do the sales agent, retailer and lending agent interviews worked out quite well. The individual was a Kenyan graduate student in the social sciences and had interview experience. He was not employed by a research firm. The cost estimate from a professional research firm was four times what the individual ultimately charged. I built the questionnaire, selected the target respondents and then conducted multiple training sessions over Skype to bring the individual up to speed. He recorded the interviews and also translated/transcribed them. The total cost was cheaper than the scheduled month of travel that had to be canceled for security and clearance reasons. The entire process took longer than going myself, but for supply chain research in difficult to reach areas, hiring a local individual to do interviews proved to be an excellent back-up option.

This research demonstrated the importance of mixed methods data collection and analysis when analyzing supply chains in developing countries. Additionally, it shows the value of applying these techniques to social impact ventures. If one thing was made clear by the stakeholder interviews it was that financial sustainability is key to continuing the ability to have an impact. Sales and supply chain structures impact the income statement and balance sheet, which provide a view of the current state and trajectory of an organization. This research demonstrates how companies, funders and non-profits can look at resource allocation across the supply chain and see the ramifications of those decisions.

C. Opportunities for Future Research

Three interesting areas emerged for future research as direct follow-ons from the case study: 1) examining the effect of inventory and credit on DISTRO's sales, 2) extending the case study to other consumable goods, and 3) extending the study to other countries.

The academic literature, the CITE studies and the case interviews highlighted the importance of credit terms in resource-constrained environments. DISTRO's sales agents and retailers also stressed the relationship between having inventory on hand and sales. A controlled test in which DISTRO sold products to retailers and/or sales agents on credit could be used to test whether this is actually the case and the strength of the effect. Additionally, DISTRO could choose to hold inventory at the bank branches or in regional warehouses. These initiatives would take working capital resources but would be relatively simple to implement and monitor—if the company is willing to do so.

The second and third areas for future research are natural extensions of the research and also help to address generalizability. The case study focused solely on clean energy products in Kenya. It would very useful to test the case results and apply the scale framework to other consumer goods in Kenya and to other developing countries. For example, in Kenya do the lessons learned in the DISTRO case apply to other durable or non-durable consumer goods? In terms of expanding to other countries, a useful first step would be to use the World Bank's LPI and EBRD to analyze supply chains moving similar products in Kenya's (stable) direct neighbors—Uganda, Ethiopia and Tanzania. As the framework is refined and lessons are learned, research could move to other regions in Africa or Asia.

D. Conclusion

Supply chain and financing structures are often considered independently, but they are inexorably linked. Decisions by one stakeholder can have major financial ramifications across the supply chain. This is an especially important consideration in resource constrained environments where financing is difficult to access for small and medium sized businesses. There are already so many risks and barriers to success, the source and type of financing has to be considered and tailored to the specific context and requirement. Organizations must look beyond their own operations and recognize that the decisions they

make have financial implications on their supply chain partners and customers. A systems approach will determine the success of the supply chain as a whole. As this research demonstrates, this is especially critical in developing countries.

This research can be used by for-profit and not-for-profit entities on how to best allocate resources in developing markets. When private companies are looking to improve existing operations or expand into developing countries, this research can guide them when setting up their supply chain, and what the financial ramifications will be of that set-up. For example, a large manufacturer may realize that extending its lower cost of capital throughout the supply chain may in turn increase sales and profitability. Given the type of business, the type of product and the local context, it may be worth assuming additional risk by extending additional credit or backing outside financing.

Additionally, non-profits and government agencies can use the insights to guide strategies for economic growth and on-the-ground impact. Whether that is supporting local finance and credit organizations, subsidizing technology diffusion, or providing grants to local manufacturers, the framework and hypotheses from this research are applicable to both for-profit and non-profit sectors. Progress will most likely require a hybrid of public and private ventures, and supply chain financing can be utilized to more effectively deliver goods to people in need while increasing the likelihood that successful businesses will drive economic growth and improve living standards.

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Chapter 6 Appendix – World Bank Data Tables

Table 1 – LPI Domestic Indicators: Performance (Domestic LPI – Performance, 2016)

	Year	Kenya	Sudan	Ethiopia	Uganda	Tanzania	South Africa	Sub-Saharan Africa
Export distance from port (kilometers)	2016	145km	1233km	N/A	710km	46km	278km	558km
Lead time to port (days)	2016	3 days	11 days	N/A	5 days	4 days	3 days	4 days
Export distance for land supply chain (kilometers)	2016	496km	1872km	750km	2483km	234km	1281km	1232km
Lead time for land supply chain (days)	2016	5 days	18 days	6 days	8 days	6 days	6 days	6 days
Import distance from port (kilometers)	2016	262km	924km	N/A	787km	79km	224km	639km
Import lead time from port (days)	2016	3 days	12 days	N/A	6 days	4 days	3 days	6 days
Import distance for land supply chain (kilometers)	2016	439km	1673km	750km	1250km	322km	730km	1030km
Import lead time for land supply chain (days)	2016	6 days	16 days	3 days	4 days	7 days	4 days	8 days
Shipments meeting quality criteria (%)	2016	77.37%	67.90%	82.50%	59.27%	81.67%	76.26%	71.36%
Number of agencies - exports	2016	5	5	7	4	6	2	5
Number of agencies - imports	2016	4	5	4	5	6	2	5
Number of documents - exports	2016	5	5	7	6	5	3	5
Number of documents - imports	2016	4	5	5	5	5	2	4
Clearance time without physical inspection (days)	2016	2 days	3 days	2 days	2 days	2 days	1 days	2 days
Clearance time with physical inspection (days)	2016	2 days	5 days	3 days	4 days	4 days	4 days	3 days
Physical inspection (%)	2016	40.18%	34.14%	4.83%	50.61%	60.79%	3.75%	25.46%

Table 2 – 2016 LPI Indicators: Environment (Domestic LPI – Institutions, 2016)

	Kenya	Sudan	Ethiopia	Uganda	Tanzania	Rwanda	Region: Sub-Saharan Africa	South Africa	Income: Low income
Quality of Infrastructure: Evaluate the quality of trade and transport related infrastructure (e.g. ports, roads, airports, information technology) in your country	Percent of respondents answering low/very low								
Ports	8%	33%	33%	40%	38%	20%	33%	21%	43%
Roads	33%	50%	0%	27%	35%	0%	39%	0%	37%
Warehousing/transloading facilities	12%	33%	0%	27%	19%	10%	32%	0%	33%
Telecommunications and IT	8%	33%	0%	9%	12%	0%	28%	14%	36%
Competence and Quality of Services: Evaluate the competence and quality of service delivered by the following in your country of work	Percent of respondents answering high/very high								
Road	24%	67%	0%	50%	16%	50%	22%	42%	14%
Air transport	54%	50%	33%	40%	20%	70%	40%	58%	38%
Warehousing/transloading and distribution	34%	0%	0%	50%	28%	50%	25%	42%	20%
Freight forwarders	55%	33%	50%	60%	44%	70%	47%	50%	48%
Customs agencies	35%	50%	0%	60%	44%	90%	46%	42%	46%
Customs brokers	28%	33%	0%	30%	40%	33%	29%	42%	26%
Consignees or shippers	44%	17%	0%	50%	32%	60%	29%	42%	34%
Sources of Major Delays: How often in your country of work do you experience	Percent of respondents answering often or nearly always								
Criminal activities (e.g., stolen cargo)	10%	0%	100%	11%	13%	20%	11%	42%	16%
Solicitation of informal payments	35%	33%	0%	30%	35%	10%	25%	17%	26%

Table 3 – EDBR – Distance to Frontier Score (Doing Business – Global, 2016)

	2010	2011	2012	2013	2014	2015	2016
Kenya	58	57	57	57	60	54	58
Ethiopia	46	48	49	50	55	49	50
Uganda	49	51	50	50	54	52	57
Tanzania	53	55	57	57	57	51	52
Sudan	49	49	50	51	52	46	47
Rwanda	58	60	60	64	69	69	68
South Africa	68	68	70	71	71	65	65

Table 4 – EDBR – Global Ranks 2015-2016 (Doing Business, 2016)

	Getting Electricity		Trading Across Borders		Getting Credit		Enforcing Contracts		Resolving Insolvency	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Kenya	141	127	131	131	118	28	102	102	145	144
Ethiopia	127	129	165	166	165	167	84	84	118	114
Uganda	172	167	126	12	128	42	78	78	106	104
Tanzania	83	83	181	180	150	152	64	64	98	99
Sudan	114	102	184	184	165	167	142	142	154	154
Rwanda	115	118	77	156	4	2	123	127	97	72
South Africa	168	168	130	130	52	52	117	119	38	41

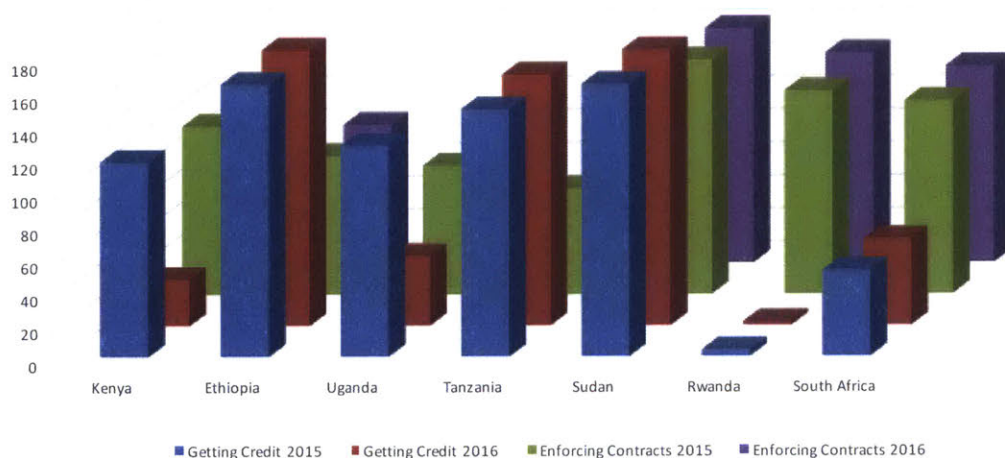


Figure 4 – EDBR – Getting Credit & Enforcing Contracts (Doing Business, 2016)

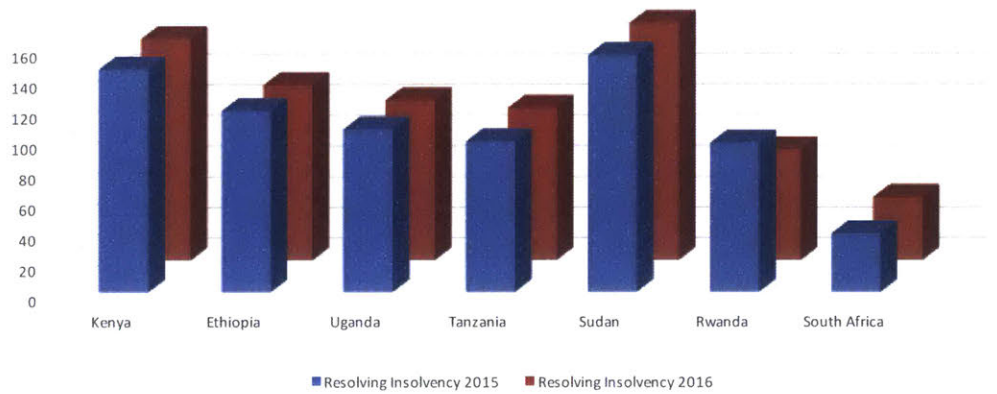


Figure 5 – EDBR – Resolving Insolvency (Doing Business, 2016)