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INCORPORATING FINANCE INTO VALUE CHAIN ANALYSIS

CASE STUDY: ATAULFO MANGO VALUE CHAIN IN CHIAPAS, MEXICO

MICROREPORT #110

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1.0 INTRODUCTION

This case study describes one approach to incorporating analysis of financial aspects of value chains into broader value chain analysis. The document is a companion to the Ataulfo mango value chain analysis[1] that the Mexico-based AFIRMA[2] project conducted along with the AMAP[3] Financial Services Knowledge Generation project, both projects funded by USAID.

Finance is not always part of a solution to the issues that value chains face; access to finance often does not make the top of the list of immediate bottlenecks, as was the case in the Ataulfo chain in Chiapas. However, value chain analyses sometimes treat finance as an afterthought, or as an input at one level of the chain, rather than as an issue that cuts across the chain often with profound (though not always obvious) influence on chain dynamics at various levels. The approach described here examined financial aspects throughout the value chain analysis.

The goal of the case study is to contribute to the growing body of literature on value chain analysis that USAID, its partners, and others are building, by documenting how the AFIRMA project and FSKG incorporated finance into analysis of the Ataulfo mango value chain. The authors hope this case study is useful in informing similar efforts.

The report has five sections including this introduction. The following section describes the approach the team took to address financial aspects within the broader analysis. The third section provides some of the finance-specific approach and findings that may be relevant for other such efforts. The fourth section describes the initiatives that the AFIRMA project is planning, indicating where finance plays a role. The final section offers conclusions and key insights.

2.0 VALUE CHAIN ANALYSIS APPROACH APPLIED

In identifying and analyzing the Ataulfo mango value chain, the project applied principles that USAID and its partners have developed over the years. The overall approach applied in analyzing this chain is presented in four main areas below: selection, team, timing, and the method for data collection and analysis. The team based much of the approach on experience in agricultural value chains and on the growing body of literature on this topic, and the focus here is therefore on the manner in which financial aspects were addressed throughout the process.

2.1. VALUE CHAIN SELECTION

AFIRMA selected the Ataulfo mango chain based on a quick review of agricultural activities in Mexico using secondary sources of data[4], applying four categories of criteria as outlined in the report: the current and potential competitiveness and organization of the chain; its social relevance, including number and socioeconomic profile of participants; and the chain's current or potential relevance to biodiversity (as a cross-cutting theme important to USAID).

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[1] Hanemann, Patrick; Bourns, Nathanael; Fertziger, Ivana. "Ataulfo Mango in Chiapas, A Value Chain Analysis", USAID, July 2008. Available at www.proyectoafirma.org and www.microlinks.org

[2] *Acceso a las Microfinanzas para la Microempresa* (AFIRMA) project, funded by USAID/Mexico

[3] Accelerating Microenterprise Advancement Project (AMAP)

[4] At the first stage of selection, the project mainly used publicly available data sources from the Agricultural Ministry (SAGARPA) and the Food and Agriculture Organization's FAOSTAT database.

Although the AFIRMA project is focused on access to finance, it is important to note that current or potential **access to finance was not an initial filter** in terms of identifying the chain. Furthermore, the analysis was not a value chain *finance* analysis, rather a *value chain* analysis that sought to obtain an understanding of chain dynamics including financial dynamics, and then examine areas where access to finance might support improvements. This is a simple but important distinction.

2.2. ANALYSIS TEAM

Specialists tend to see clearest, or "zoom in" most quickly on, evidence that confirms hypotheses in their area of specialty. Such *confirmation* biases are well documented in psychology and behavioral economics, and can cloud analysis. For instance, a finance specialist may see the delivery of financial services as the solution to such a wide range of problems that it becomes the primary goal in its own right, while an agricultural specialist may see finance as an input in the way that fertilizer is an input, added in the right dosage to make things grow, but overlooking the importance of the permanence of the service or subtle but important ways finance might contribute. Narrow perspectives can complicate analyses of the current and potential role of finance and its importance relative to other aspects.

This project addressed this challenge by putting together a **multidisciplinary team** that included an expert in post-harvest handling and commercialization of fruits, with experience in mangoes in Mexico, along with AFIRMA project team members with experience in financial services in Mexico. The mix of perspectives and experiences on the analysis team was complementary, permitting an examination of issues from various perspectives, avoiding potential confirmation biases on the role of finance.

2.3. TIMING FIELD WORK

The team's decision to time field work to coincide with the Ataulfo harvest in Chiapas contributed to a deeper understanding of chain dynamics than would have been possible in the off-season. This called for added flexibility in scheduling and additional respect for the time of interviewees, but chain actors across the board were able to make time for interviews, which were enriched by seeing various production, harvest, transport, packing, and industrialization activities in action. Timing therefore contributed to insights in terms of the interaction among different players, the flows of transactions, finance and information (dealt with below), that would otherwise have been more challenging to understand or less accurate (based more on recall of last season, expectations for the coming season, etc.).

In addition to the consultations and interviews held during the harvest, the team also **returned at the end of harvest season to present and validate results with value chain actors** through a participatory workshop, attended by an important cross-section of chain actors.

AFIRMA and USAID held a participatory workshop in Tapachula, at the end of the harvest season (May 2008) with a full range of private sector value chain actors as well as public sector agencies and universities involved to differing extents in supporting or analyzing Ataulfo production and commercialization in the region. The workshop served to improve upon this analysis (while experience of the season was still fresh with the various actors), to prioritize common constraints, to share information across different types of chain actors, and to prioritize opportunities for upgrading. Below are the priority opportunities based on the workshop and the team's analysis.

2.4. DATA COLLECTION AND ANALYSIS

Field work followed a systematic process for simultaneously obtaining information on value chain and financial dynamics. The first step involved identifying data required to paint an accurate picture of the Ataulfo mango value chain in Chiapas, within its broader national and global context, and to gain an understanding of transactional/firm level dynamics within the chain. The team sought data on:

- **Historical trends** in mangoes in general and the Ataulfo variety specifically in terms of quality and volume of demand, supply, trade, competition, seasonality, geography and organics
- **Production Data—**production volume, hectares of production, plot sizes, yields, value for new plots versus full production, pre- planting costs, planting costs, capital/equipment costs, fertilizer, crop protection, irrigated vs. rain fed, yields and returns
- **Processing Costs** in terms of inbound transportation (from the orchard to the packing shed), packing, packaging material, treatment, storage, outbound transport both for fresh mangoes and for dried fruit, frozen fruit, pulp, and juice
- **Sales/Distribution Costs—**Certification/Inspections, other charges, loss, types and number of intermediaries, payment terms, etc.
- **Export Costs—**Compliance costs, transport costs, intermediation costs
- **Distribution** of rents and benefits along the chain
- **Financing relationships and costs—**including expressed need for finance, the role of trader finance, including its nominal and real/effective cost, transparency of pricing, financial institutions providing services, amounts, terms, and costs.
- **Returns** to the activity at each level of the chain

The team also looked at **information flows** and the dynamics of **commercial relationships**, both of which have important implications for finance. Finance is addressed more directly in the next section, but it is important to note here that the team studied financial aspects *along with*, as opposed to *apart from*, *after*, or *on top* of the broader chain analysis.

The team considered financial aspects of the chain throughout the analysis. The horticulture expert focused primarily on the core information highlighted above while the finance specialists were thinking about transactions, risk (especially credit risk) financial flows and the flow of information that could be used to support financial decisions (as discussed below). Finance was therefore addressed as a cross-cutting issue that permeates the chain, rather than as a separate aspect, or an element considered in isolation. This permitted the team to think broadly about potential roles for finance, especially third party finance provided by formal financial institutions.

The table below gives an overview of the core information and financial information that the team *sought* through interviews and secondary sources. As discussed in the value chain analysis report, not all of the desired data could be obtained, to the extent that the lack of availability of some basic data constitutes an important constraint for the chain.

TABLE 1 – INTERVIEWEES AND THE INFORMATION SOUGHT

Level of Interviewee	Core Information	Financial Information
Buyers (fresh)	Dynamics among producers, intermediaries and end markets, including: overall perspective and market trends, conditions and volumes required, prices, and payment terms. Interviewees included: • Local brokers and markets • Wholesale market • Retailers/Supermarkets • Exporters • Importers in end market	Payment terms (time and conditions under which producers or brokers are paid) • Offer of trade finance • Facilitation of factoring or bank loans • Perceived importance of credit
Agro-Industry	Local presence, volume and quality needs, terms and conditions, specifically reviewed: • Drying operations • Project for juice concentrate operation	• Need for investment capital • Offer, terms of loans/advances or advanced inputs to producers & producer compliance
Packing Houses	Understand relationships with producers, volumes commercialized, prices, types of packing operation for: • National market • Export market, including phytosanitary and source tracing requirements for the US vs. Canadian market	• Access to trade credit for on-lending • Access to investment capital from importers • Access to banks & non-bank financial institutions • Supply and terms of loans/advances or advanced inputs to producers & producer compliance • Information on performance of producers, potentially useful to financial institutions
Producer Associations	• Trend information available on the sector, including of volumes of production, prices, phytosanitary compliance • Access to producers, other chain actors	Understanding of the options for financial services in the area
Producers	Across a range of small, medium, and large producers, understand production costs, yields, returns, key issues and dynamics with other actors for: • Conventional irrigated production • Conventional rain fed production • Organic irrigated production • Organic rain fed production	Understand Basic *need* for financial services for working capital and investment, including: • How producers claim to use/could use finance • Propensity to invest in upgrading • Access to financial services from banks and non-bank financial institutions, local presence • Access to, and conditions on, trade finance • Conditions on advanced fruit (financing *buyer*)
Input providers	Attempt to understand availability of inputs and rough yield improvements based on: use of inputs, investment irrigation, organic conversion and	Understand the availability, qualification requirements, terms and conditions of provision for trade credit, or advances

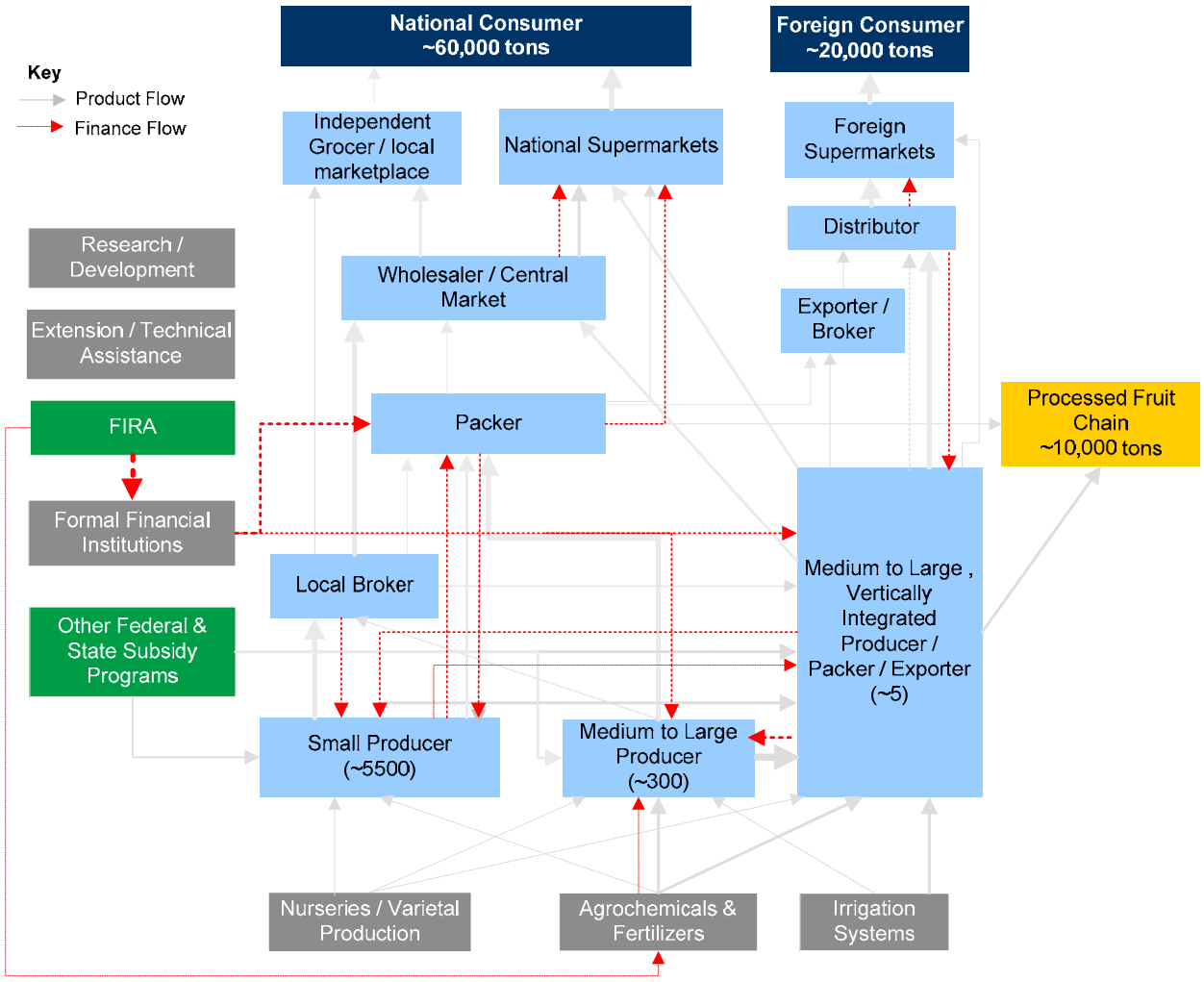
Level of Interviewee	Core Information	Financial Information
	certification	
Formal Financial Service Providers	Local presence of financial institutions lending to, or interested in lending to the mango sector, from the perspective of chain actors	Local presence & experience with the sector: volume of credit, number of borrowers, terms and conditions, loan repayment, future perspective
Local and National Government	Obtain data and understand subsidies made available, (e.g. irrigation, organic conversion) among: • Agricultural Ministry (SAGARPA) • State Agricultural Agency, Chiapas • APHIS – PPQ (USDA certifiers) • Associations, Phytosanitary board • Government lending, guarantee programs (FIRA, FIRCO, Financiera Rural)	• Terms and conditions for institutions accessing public lines of credit • Design of financial subsidies • Portfolio Volume and number of borrowers among mango producers
Research/Universities/Extension services	Data on production, trends, yields, techniques, issues, potential of the variety from: • National agricultural research institute (INIFAP) • Universities (UNACH)	Available studies on finance for the mango chain

3.0 FINANCE-SPECIFIC ANALYSIS UNDERTAKEN

The team conducted finance-specific analysis along four main lines: (1) review of characteristics of existing trade finance among value chain actors, (2) access to third-party finance through banks and non-bank institutions, (3) the capture and flow of information on commercial transactions and their potential use for designing financial services, and (4) the potential for expansion of third-party financial services to chain actors. The focus here is on how the analysis was conducted, illustrated with some key findings. Further findings are available in the full value chain analysis report.

Figure 1 shows the financial flows observed in the field analysis (red dashed lines) superimposed over the product flows discussed in the value chain analysis report (light grey). The financial flows include both formal financial services provided by financial institutions as well as trade finance flows internal to the chain. Thicker arrows indicate more prevalent flows observed in the field analysis.

FIGURE 1 – FORMAL AND INFORMAL FINANCIAL FLOWS IN THE CHIAPAS ATAULFO MANGO VALUE CHAIN



3.1. EXISTING TRADE CREDIT

To understand the current and potential role of finance in a given chain, it is useful to understand the dynamics of *trade credit* (sometimes referred to as direct finance), or the formal and informal financial flows or advances (of cash and product or service) between commercial value chain actors. At first glance, trade finance may have zero nominal cost to the recipient, and it is often presented this way, but analysis of cash and product flows often reveal both explicit and implicit costs.

Capturing information on trade credit that allows for estimating costs is less straightforward than it seems. First, these financial flows often take the form of advanced inputs or product, as opposed to cash loans, and costs often are less than transparent or are difficult to capture, especially when the **finance flows both ways** (from buyer to supplier and vice versa) at different points during the season, as observed in the Ataulfo chain.

Also, in addition to the flows of product and cash, *embedded services* such as assistance with applying fertilizers, advice on pruning, etc. are often present, though not well organized, understood or easily quantified. As observed in the Ataulfo chain, in some cases these services have real value that should be taken into account in the analysis of the financial flows (*how much would they pay if assigned an explicit price*?) while other "services" appear to add little value for the grower and are essentially an excuse to charge additional commissions. Although it may be useful to estimate the value of such services from the recipient perspective, this can be highly subjective.

In the Ataulfo mango value chain, various types of trade finance flow from importers to packers, and more commonly from packers to growers, especially in the months prior to harvest. These are present in a couple of variations, including:

- Loans with formal loan contracts, terms and conditions specified in writing: the team observed loans that had zero nominal interest rate, but that tied the producer into less favorable commercialization conditions (amounting to an implicit commission on the loan). Another case had explicit costs and an interest rate, and payment in fruit with no hidden commissions, according to producers.
- Loans of fertilizers or other inputs, whereby the packing house purchased inputs (at lower costs due to volume) and advanced them to growers. In some cases the cost savings were passed on to growers, and in other cases packers pocket the difference.
- Although less common, the team observed two cases of importers (in one case a Canadian firm and in another case an American firm) providing long-term capital for upgrading investments (e.g. the expansion of a packing house, improvement of fruit drying operations). These upgrading investment loans filled gaps where bank financing was either unavailable or too costly, and were paid off over time in mango exports.

Trade finance has important benefits including, most notably, the simple fact that **it often exists as an option where services from financial institutions do not.** But it also has certain drawbacks in terms of **limiting choices**, or **sub-optimizing commercialization and other choices because** of a lack of external capital available to the producer or to the chain as a whole. Some of the key benefits and drawbacks observed are outlined in Figure 2 below, which considers the most common

Trade Credit, Channel Selection and Value Chain Governance

Experience with the Ataulfo chain suggests that close examination of the dynamics of trade credit may offer insights into aspects of commercial channel selection and value chain governance. As with most agricultural products, the Ataulfo Mango chain is a *buyer-led chain*: buyers closest to end consumers (increasingly supermarkets) set key requirements, including payment terms which generally get pushed down the chain to price- and condition-takers.

While supermarkets set many of the general conditions, packer/brokers orchestrate the chain, and these dynamics can be better understood by observing how and when trade credit is extended. That is, the availability and terms of trade credit - in both directions - to and from packers, brokers and other buyers can actually **determine** the channels into which fruit is sold. This can work to the detriment of the grower, who may be making a sub-optimal commercialization decision out of short-term financial necessity.

For instance, a major supermarket chain – potentially a very attractive channel -- had interest in sourcing Ataulfos directly from producers. In addition to well-known volume and quality requirements, the 30-60 days of credit the supermarket requires help determine which type of producers can sell directly to the supermarket, namely those that have their own packing operations and have (or can demand of associated growers) the liquidity necessary to go 30-60 days before receiving payment.

One packer interviewed indicated that he could sell to the export chain because of trade credit accessed in this channel, but could not access the domestic supermarket channel because it would mean demanding payment terms of his growers that they would not accept. In other cases, producers may sell directly (at lower prices) to local markets or intermediaries because of the inability to "float" those buyers who might offer a more attractive price.

Many other factors shed light on value chain governance, and these observations are based on a limited data set, but the experience here suggests that review of trade credit dynamics may offer insights into channel selection and shifting power relationships.

case of financial flows from packing houses to growers.

FIGURE 2 – KEY BENEFITS AND DRAWBACKS OF TRADE FINANCE AMONG PACKERS AND GROWERS

	Benefits	Drawbacks
Packing House	• Help ensure volume requirements to run operation profitably, and meet buyer requirements • Repayment risk (from growers) reduced since packer is a "natural retainer" of loan payments discounted from delivery of fruit (although this can deteriorate where "side-selling" is common)	• Lending is not necessarily the best use of scarce capital, especially in a growing sector • Lending generally is not part of a packing house's core business
Grower	• It generally *exists* as an option, where other forms of credit often do not • Repayment schedules are well adjusted to the agricultural cycle • Nominal interest rate (if there is one) is often lower than third party lenders	• Generally limited to short-term working capital • Can limit commercialization options • A single actor (packer) normally has exclusive access to a producer's credit history • Full cost (including fees, transaction costs and impact of lower sale price) is unclear, hard to calculate, and can be greater than external credit

While the flow of trade finance *down* the chain (from buyers to growers) as discussed above was the most common type of finance observed, it is important to note that **finance flows both ways.** During and immediately following harvest, finance flows *up* the chain, from growers to packers, and from packers to importers and supermarkets which in Mexico, given their strong and increasing market power, are able to command stringent requirements that include payment terms ranging from 30-60 days. There is certainly a cost and a risk of non-payment (or under-payment) involved in the time between when growers and/or packing houses advance fruit and when they receive payment.

An attempt to calculate that cost would require assuming an opportunity cost for the cash over the period in question, and perhaps the risk of non-payment. While this would vary considerably from one actor to another, and is therefore not attempted in the analysis, it is important to note this dynamic, as it influences decisions about the channels into which producers and packers sell.

A key point observed in the Ataulfo chain is **that short-term needs for cash often drive decisions about the channel into which fruit is sold**. This phenomenon was also observed with one packing house which indicated that it could not sell into national supermarket chains because its growers were accustomed to 1-2 week payment terms and the supermarket required 45-60 day payment terms. While factoring (advances against receipts) would seem attractive in this case, and one supermarket interviewed (Wal-Mart) indicated that it did facilitate access to factoring, the packers interviewed indicated that margins with supermarkets were so thin as to make the cost of factoring prohibitive.

3.2. INFORMATION FLOWS

To attempt to understand the potential for expansion of financial services, it is necessary to understand these aspects, and in particular the **flow of information** through the chain. For example, in the Ataulfo chain the team observed that export packing houses often had quality data available on producers, as a result of good business practice in terms of understanding suppliers and of traceability requirements for phytosanitary compliance. Types of data collected include:

- hectares in production
- application of inputs
- type of production (organic vs. conventional)
- yields, segmented into size, quality and type of production
- prices paid to producers
- history of phytosanitary compliance (especially information on any cases of fruit fly infestation)
- history of contract fulfillment
- history of repayment of advances

This type of information is **potentially useful as a starting point for formal financial institutions looking to serve associated growers.** Although the data generally are not yet systematized in a way that it would be easily used by financial service providers as a historical database, multiple packing houses indicated that the data (including historical data) could be made available.

Formal Financial Services Contribute to Credit History "Portability"

A related aspect of information flows is the issue of grower credit histories. This is an intangible "asset" that growers in particular are not able to generate when their history is known exclusively by one actor, such as a packing house.

Whereas a producer may have a perfect history of meeting the needs of a given broker or packing house, and repaying all advances provided, in Mexico such a history remains outside the formal financial sector and cannot be used or easily observed by financial institutions, or other commercial actors that may under other circumstances be willing to do business with the producer.

Once credit is provided by formal financial institutions that report to a licensed credit bureau, a client's credit history can become "portable" across commercial buyers or financial service providers.

In addition to understanding the availability of key information on producers that could potentially support credit analysis, decision-making and monitoring, the team sought to understand the core **motivations** (see box below) of the packing houses (in this case) in providing trade finance, specifically:

- whether trade finance is part of the core business of actors within the chain
- whether trade finance *enables* a core part of the business, and if so, how
- whether chain actors are interested in exploring options for 3rd party finance for producers and, if so, whether they would be willing to provide information on producers and retain loan payments on behalf of the financial institution.

In the Ataulfo chain it appears that finance is not necessarily a core business (nor a core competency) of packing houses, but does play an important role for ensuring fruit volumes. [5] Therefore it was important for the team in thinking about options for financial services to consider how third-party finance might

[5] It is worth noting that one interviewee, Wal-Mart, does have financial services as a core business with the establishment of Banco Wal-Mart in Mexico in 2007 (Banco Wal-Mart does not currently appear to target growers as priority clients in the short-term), although fruit buyers indicated that they are open to facilitating factoring through any of their partner financial institutions.

change a packing house's ability to ensure adequate (in terms of volume and quality) supply to run the packing operation profitably, and whether it might free up capital for other investments in the chain.

The authors believe the combination of factors presented above indicates significant potential for using the information that certain packing houses have on producers to design formal financial services. Key opportunities along these lines are explored further in Section 4.0.

Estimating the Potential Acceptance and Role of Formal Financial Services

Changes to the financial relationships among value chain actors can obviously change other chain dynamics. From a financial institution perspective, it is important to estimate how third-party finance might be perceived by the various actors affected. Through analysis of the current situation with respect to trade credit and interviews at various levels within the chain it is possible to gain an initial understanding of:

- basic motivations of chain actors in extending or accessing trade credit;
- dynamics likely to be affected by outside capital injected into the chain, and likely acceptance by different actors;
- opportunities and constraints for designing financial services

This type of analysis can help outline promising partners likely to be "on board" and identify initial benefits and/or drawbacks for partners involved.

3.3. ACCESS TO FORMAL FINANCIAL SERVICES

Although one might view a strong presence of trade finance as sufficient, or at least a good start, it has important limitations. As González-Vega, Chalmers, Quiros and Rodriguez-Meza have pointed out in a study of the Hortifruti supermarket chain and its role in facilitating access to credit (without providing it directly) to small growers in Central America[6], a fast growing value chain is generally capital deficient and therefore does not have excess capital to lend, nor any competitive advantage in lending, nor for that matter a clear interest in or commitment to lending to producers who supply the chain. This fast growth is clearly the case among supermarket chains in Mexico[7] and is also the case among the leading packing houses in the region, both of which have strong interests in ensuring access to loans for associated growers to maintain their orchards and deliver sufficient volume and quality of fruit.

Under the right circumstances, formal financial services can address, at least partially, some of these challenges. But banks in particular and financial institutions in general in Mexico are reluctant to lend their own capital to agricultural activities, especially those involving small producers (most bank lending to agriculture is via the FIRA-backed lending scheme discussed below, and tends to be offered to larger-scale growers although FIRA is interest in refocusing on small producers), due to perceived and real risks and high transaction costs. The Ataulfo chain is no exception.

To understand the degree of access to formal financial services, the team sought to understand four key aspects that influence the ability of financial institutions to understand and serve the chain profitably, and that of clients to access services offered:[8]

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[6] González-Vega, Claudio; Chalmers, Geoffrey; Quiros, Rodolfo; Rodríguez-Meza, Jorge; "Hortifruti in Central America, A Case Study about the Influence of Supermarkets on the Development and Evolution of Creditworthiness among Small and Medium Agricultural Producers." The Ohio State University, USAID. April 2006.

[7] Reardon, Thomas; Berdegue, Julio A.; Echanove, Flavia; Cook, Robert; Tucker, Nancy; Martinez, Anabel; Medina, Ruben; Aguierre, Marx; Hernandez, Ricardo; Balsevich, Fernando; "Supermarkets and Horticultural Development in México: Synthesis Findings and Recommendations to USAID and GOM." USAID. August 2007.

[8] The four elements listed here are adapted from the 4A approach described in: Jansen, Anicca. "Value Chain Finance, Understanding & Increasing Access, a Concept Paper" USAID. Version: Draft for Comment, December 2007.

- **Acumen** of value chain actors to take informed decisions on where and how to use financial services, and in particular the ability to identify where a given type of credit can make sense and where it might best be avoided.
- **Accessibility** of current and potential financial services, including local presence, payment channels, and the provision of savings and other, non-credit products.
- **Business case** for financial institutions to extend credit to the individual or entity based on credible, demonstrable repayment capacity.
- **Capacity**, motivation and corporate culture of financial institutions to serve the chain and its actors. Capacity includes particular attention to risk management (tied payment schemes, portfolio diversification etc.) and cost structure.

The team found that financial institutions in the region (including local operations of financial institutions with broader coverage) appear to **lack a clear sense of the opportunities and risks involved in lending to the Ataulfo mango value chain**, despite the fact that this is a growing and competitive niche that is important regionally, and despite growing competition among financial institutions that is driving a search for new market niches. It is worth noting however, that the public finance company Financiera Rural is beginning to develop products for the sector and has approached the local fruit growers' association. Additionally, the public rural and agricultural trust fund FIRA showed interest in the sector and intends to continue serving the sector.

Importantly, the team found **significant demand for short-term credit,** but significant **limitations in terms of the propensity of growers to invest** for the long term, due to a problem of falling productivity experienced by many (though not all) Ataulfo growers. The productivity problem is caused by unknown factors and although theories abound, no scientific analysis has been both conducted and publicly shared. Obviously, if unaddressed, this would constitute a major constraint in the chain.[9]

Approaches and learning curves in expanding access to formal financial services vary by institution. At the risk of oversimplification, financial institutions that might have the appropriate structures and incentives to lend to the Ataulfo value chain in Chiapas can be grouped in four general categories:

- **Banks**, which in the past have shown that they will lend to the chain only when they are able to do so without taking risk, nor using their own capital (see Figure 3). Banks could lend directly or indirectly, and could provide access to the payment system and to basic accounts at multiple levels of the value chain.
- **Agricultural finance companies**, a small (relative to the number of financial institutions in Mexico) but growing group that tends to specialize in financing crops (as opposed to the concept of financing the *diverse flows of households* or growers) based on parametric scoring models determined by the agricultural lending fund FIRA, but few of these have significant experience to evaluate other flows and expenses, i.e. agricultural household analysis, and few operate outside FIRA schemes.
- **Microfinance institutions**, the best of which understand rural household financial flows well, and may offer small farmers of various types their standard individual or group loan products (and in a few

[9] See the full value chain analysis report for further details.

cases, savings), but generally have limited or no expertise in agriculture, and have products and lending methodologies originally designed for urban or semi-urban traders.

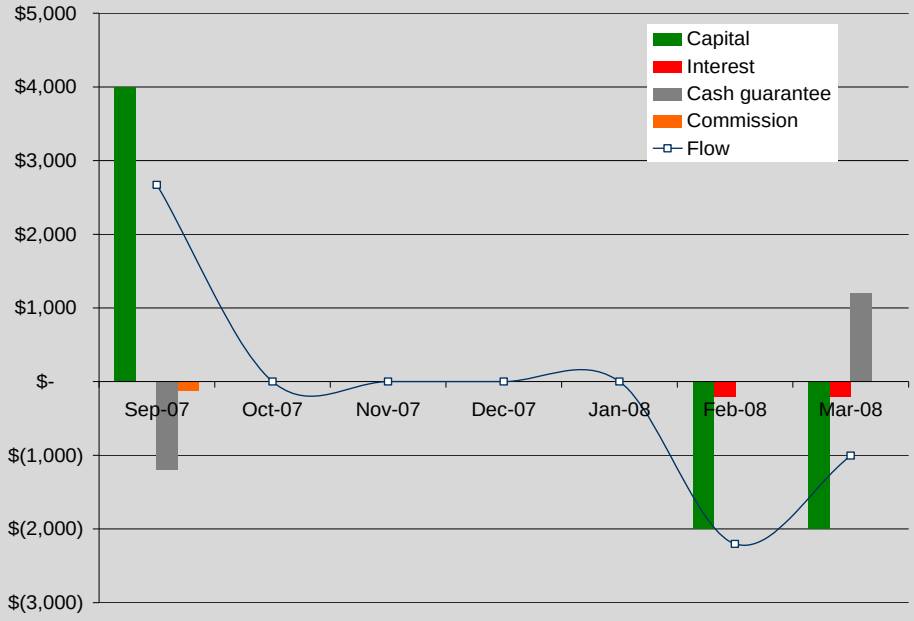
- **Credit unions** (*cajas*) which can offer savings products, but tend to be somewhat limited in their ability to measure agricultural cash flows and develop payment schemes around those flows, in stead tending to focus on loans that are a multiple of the amount of savings held on account at the credit union.

The most common variation of formal financial services observed involved government-backed and subsidized (FIRA) lending from commercial banks to packing houses, a detailed example of which is provided in Figure 3. The cash flows, including the cash guarantee, are calculated here to give a sense of the cost to borrowers of this type of loan. This may be useful as a point of reference for financial institutions interested in serving producers in this chain.

FIGURE 3 – EXAMPLE OF A FIRA-BACKED BANK LENDING TO GROWERS BY WAY OF PACKING HOUSES.

In this scheme, the packer, the grower, or some combination of the two, establish a 30% cash guarantee that is deposited in the bank, FIRA puts up a 63% guarantee, and the bank ends up taking 7% of the risk (although it often obtains additional guarantees such as property, plant or equipment). The bank then accesses FIRA (100% public) funds, lends to the packing house, which has a single loan contract with the bank with the understanding that it then on-lends to growers for the season at 4,000 pesos (a little more than US $400) per hectare, beginning in September, with payment to be made in mangoes during harvest in February and March.

The nominal interest on loans observed was 1.7% per month, or 20% annual, plus an access commission (comisión de disposición) of 3.22% each time the packing house accesses the overall line to on-lend. Assuming that the line was accessed only once (although one packing house reported accessing the line multiple times, significantly elevating costs), that all payments are made on time, and the full guarantee is returned at the end of the cycle, the cash flows depicted below result in an annual internal rate of return (approximating an effective interest rate) of 42.1%.



Note that in this case, as is common in agricultural lending in Mexico, the commercial bank takes **only 7% of the risk and used none of its own capital.** Under such conditions, the bank's **ability to measure and manage agricultural and business risks and costs is considerably less relevant that its ability to understand and manage the subsidy scheme.**

4.0 UPGRADING AND THE POTENTIAL ROLE FOR FINANCE

The process that the team is following in developing an assistance strategy is to: (1) identify key needs for upgrading, (2) verify these needs through a participatory process with a broad group of stakeholders in the Ataulfo chain, (3) implement the joint plan established, and (4) monitor and document results.

The companion value chain analysis report to this case study presents a series of upgrading opportunities that AFIRMA along with other stakeholders will seek to support. As described in that report, important bottlenecks exist that cannot be resolved through expansion of financial services, such as the need for basic research into productivity issues and dissemination of resulting recommendations. Finance therefore is not the primary constraint to a number of the core problems and the value chain report's recommendations address a number of non-financial issues that supersede finance. The following chart highlights upgrading opportunities for which financing **can** play a relevant role:

TABLE 2 – UPGRADING OPPORTUNITIES AND THE POTENTIAL ROLE OF FINANCE

Chain Actor	Upgrading Opportunity	Potential Role of finance
Growers	• Transition from sale to domestic markets to export markets. While many small growers are already selling to export markets, they don't necessarily receive the price benefits as a result of engaging in financing contracts with packers or other intermediaries that limit negotiating power.	• Third party financing from a financial institution.
	• Transition from conventional to organic mango production, which can provide 30 to 40% increased revenue.	• Third party financing of organic conversion, but should be provided once a solid technical package for organic mango is developed.
	• Increased productivity (via Irrigation/drainage, genetic grafting to improve cross-pollination, etc.)	• Third party financing may play a role, but only upon research to understand return on investment specific to the SOCONUSCO region in Chiapas, as well as rigorous research on determining factors for improved productivity.
Packing Plants	• Pass financing opportunities to third party financial institutions, thereby focus energies on packing activity, but still ensure fruit supply required by buyers.	• Third party financing to growers based on information from packers for short-term credit (initially) and possibly for longer term loans over time.
Processing	• Establish a processing plant in the region that would take advantage of lower quality fruit, and generate an industrial market channel for this highly perishable product.	• Investment capital financing of Processing Plant development

Given the focus of this case, this section describes the finance-related opportunities and initiatives that the AFIRMA project is planning. It is important to reiterate here how finance is considered in this process: as a *means* to supporting improved conditions and upgrading, rather than as an *end* in itself, and ensuring *long-term access* to a broad range of financial services beyond the current needs of this chain.

The main finance-related opportunities identified are:

- Write a short briefing note for private sector financial service providers to outline basic opportunities and risks in lending within the Ataulfo mango chain, distilling the aspects of the value chain analysis most relevant for providing services (cost information, returns, etc. as outlined in the full value chain report).
- Coordinate with other initiatives and actors interested in supporting the sector, especially public sector actors looking to increase their presence in the sector, such as Financiera Rural and FIRA to work together to inform proper design of products and programs.
- Link associations and cooperatives of producers to "missing middle" finance to groups of producers (in this case, Root Capital) assisting where necessary to pilot an initiative in this chain (and demonstrate the potential of the approach).
- Work with financial institutions to develop and/or apply relevant products technologies, and business models to address the needs of mango producers, building on lessons learned in value chain finance (such as structuring repayment schemes through buyers, adjusted to production cycles) and in agricultural microfinance methodologies (such as analyzing overall household cash flows as part of the credit decision).
- Help research the feasibility (both demand and supply) of long-term finance for investment and upgrading for multiple actors in the chain, including growers (irrigation, organic conversion, etc.), packing houses (facility upgrades, new lines of business like processing plants, etc.) and others such as cooperatives and/or growers' associations.

Given the long-term importance of expansion of access to the formal financial institutions once some of the near term challenges are resolved, the next section describes in greater detail the opportunities and planned initiatives related to this last point.

4.1. POTENTIAL FOR EXPANSION OF FORMAL FINANCIAL SERVICES

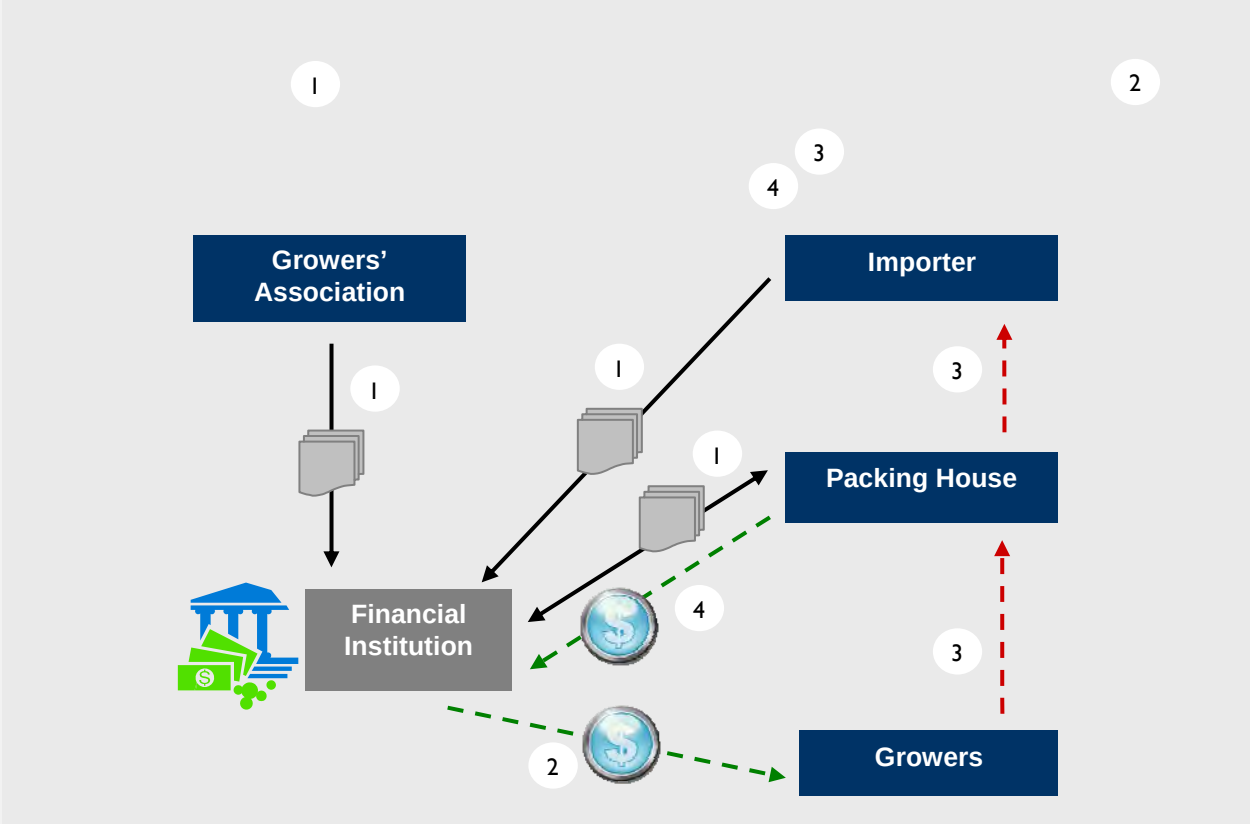
Through proper design of products, incentives, and business models, financial institutions can build alliances that use existing commercial relationships to assist with loan approval, monitoring and repayment, helping reduce risk and lower transactions costs. Furthermore, formal financial institutions are able to offer a range of financial services beyond short-term credit.[10] So, while their presence is currently minimal, formal financial institutions could have an important role to play in the Ataulfo mango chain going forward.

A financial institution that seeks to understand and manage risks in lending to the various actors in the chain has to understand the financial, product, service and information flows, as well as risks, and ensure that financial services meet real unmet (or underserved) needs. The authors hope that this case study and the accompanying value chain report may be useful for a first step in this process, although the authors recognize that each financial institution has unique products, policies, procedures, technologies, business models, and organizational cultures and must therefore do its own analysis and experimentation prior to committing to major new initiatives. With that caveat, one general scheme that appears to have some promise, and which AFIRMA seeks to pilot, is presented in Figure 4 below.

[10] González-Vega, Chalmers, Rodríguez-Meza, Quiros. 2006.

FIGURE 4 – ONE POSSIBLE SCHEME FOR USING VALUE CHAIN INFORMATION TO DESIGN FORMAL FINANCIAL SERVICES

In this general scheme: value chain actors provide information to a financial institution, which uses this information along with information itself obtains on growers to measure and manage risk, design products, and offer financial products and services. Growers then deliver fruit to the packing house which pays the producer and pays down the loan, as agreed and the packing house pays the bank and delivers fruit.



The **data points that a number of the packing houses have on producers** as a result of their own business processes and their need to show traceability of exported fruit (as outlined in Section 3.2 above) would make an **excellent starting point for motivated financial institutions** capable of lending to this chain. Obviously such data would be a starting point, and in the case of small producers, for whom there is no separation of family and farm/business cash flows, it would be advisable to adapt lending technologies that include household cash flow analysis to evaluate loan repayment capacities, making it possible to manage risks (without excessive guarantee requirements) and to base lending on more than parametric models of hectares and yields through the FIRA scheme.

Initially it would not be necessary for chain actors to invest in information technology (IT) systems for data capture and analysis, although IT could be considered to facilitate and/or build upon trade finance and control its risks as such investment is warranted. One option would be to build an application on top of traceability software. Once basic historical databases and routines are established, a number of ideas could be pursued in this sense, for instance using smart cards, to limit the use of loans to certain types of expenses, and not for others, etc.

The internal rate of return presented in Figure 3 in Section 3.3 above gives a first indication of the rate with which financial institutions that may be interested in serving actors within a given chain would be competing. In Mexico **this is a significant concern given the high lending rates**, especially among microfinance institutions, which **often charge rates that are higher than the returns attained within the Ataulfo chain** (or in most agricultural chains, for that matter).

Although there is an interesting niche of underserved Ataulfo producers, as well as unmet needs for capital for expansion higher up the chain, financial institutions considering entering this chain should also consider:[11]

- **Portfolio diversification**, in terms of **sub-sectors, geography** (and in terms of the services offered) in order to avoid concentration of risk in areas and in periods during the production cycle that tend to be highly covariant.
- Means for lowering **operational costs** without sacrificing the information and controls necessary to measure and manage risk, especially in lending to growers. Percentage returns tend to be lower among mango growers than is generally the case for urban traders, which suggests that **interest rates** have to be lower than what is typical in microfinance in Mexico for credit to contribute to development.[12]
- Related to the last point, the **full cost of trade credit** is often well above nominal costs, so sensitivity to interest rates may not be as severe as would appear at first review. Financial institutions might help clients calculate the real costs of the trade credit they do receive and determine together whether the financial institution can improve on those costs.
- **Leverage the relationships with value chain actors** and their deep knowledge of the needs, cycles, and histories of buyers and suppliers to develop structured financial products adaptable to these characteristics and to manage risk in doing business with chain actors.
- **Learn** from experience with agricultural lending in Mexico (knowing chain dynamics) and MF lenders (diversified household cash flow analysis) to find an appropriate hybrid methodology.
- **Business models** and organizational designs that **apply experience gained in mangoes to develop expertise** in other tree fruits, or **other chains that show some similar charac**teristics (e.g. the role of packing houses), or where lessons can be applied.

5.0 CONCLUSION

Although the focus of this case study has been on financial aspects of value chain analysis, the multidisciplinary team sought a broad view of the chain initially, later zeroing in on key issues. This helped avoid two separate analyses (one financial, one commercial), or an analysis of access to credit stuck on top of a traditional agricultural sector analysis.

The authors find that financial services could improve upon the current dynamics among value chain actors, permitting competition for product on commercial bases, rather than private information and

[11] For a detailed review of emerging lessons in agricultural microfinance, see: Peck Christen (CGAP), Robert and Pearce, Douglas (DFID). “Managing Risks and Designing Products for Agricultural Microfinance: Features of an Emerging Model”. Occasional Paper 11, CGAP, August 2005.

[12] Unless the amount lent is well below the amount required, as sometimes occurs, although this basically contributes to de-capitalization

dependence for credit. In the Ataulfo chain, advances are made not because the packing house or buyer is in the financial service business, rather because they need to ensure volume of fruit necessary to run the operation, and believe this most likely if they themselves provide credit to growers. Some actors in the chain, especially producers but also some packing houses, may welcome an expansion of access to financial services and capital across the chain; others that maintain and thrive on dependent and uninformed suppliers whom they can pay well under market prices, would be unlikely to encourage or even accept such an approach.

Given the potential benefits of formal, third-party financial services highlighted in this and other reports, the team needed to understand the potential for expansion of services from such actors. Different financial institutions require different approaches depending on their institutional capacity, organizational culture, and experience in agriculture. Basic capacity, commitment, interest, capital, and a predisposition to learning through controlled experimentation are "table stakes" for trying a new approach to agricultural finance. For instance, non-viable, struggling institutions, or those without a firm commitment, should not be encouraged to embark on such an initiative.

In addition to understanding the general situation with financial services in the area studied, a basic understanding of the value chain, including industry dynamics and demand trends, product flows, commercialization channels, seasonality, and support actors (extension, research, government etc.) is needed. Within this context it was particularly relevant in this case for the team, in analyzing and designing a response around the **current and potential role of finance to contribute to the chain**, to understand the following aspects:

- **Short-term needs for cash often drive decisions about the channel into which fruit is sold.** Other aspects of the chain often are sub-optimized to conform to access to capital. It is therefore important to understand capital constraints, and financial flows, throughout the chain.
- **Explicit *and implicit* financial flows,** especially trade finance (which, as discussed can flow both ways, from buyer to supplier and vice versa) and the timing and conditions on payments within each commercialization channel, can inform design of third-party financial services, including when, where, and how they might compete in benefit of the chain.
- Close examination of the **dynamics of trade credit**, may provide **insights into power relationships** and aspects of **value chain governance**.
- A sense of **demand and supply trends, cost and price infor**mation within the chain give an initial indication of the potential attractiveness for private sector finance if there are financial institutions prepared and motivated to enter this niche.
- **Payment processes** already existing within the chain can potentially be leveraged for financial transactions in order to lower transaction costs for clients and financial institutions alike should.
- Understanding **current and potential information flows can make major contributions to understanding and managing risk**, especially for financial institutions just beginning to serve this niche who are able to establish alliances with value chain actors.
- **Increased interest among financial institutions in learning to measure and manage risks and costs** (as opposed to, or at least in addition to, the ability to understand and manage public subsidy schemes)

will depend in no small part on financial institutions' need to take on risk (due to increased competition in other sectors) in order to serve this and other agricultural niches.

Well-designed financial services have the potential to increase capital dedicated to a growing chain with strong national and global demand, such as the Ataulfo chain. Furthermore, given growth of the financial sector in Mexico in recent years, banks and other financial institutions are looking for new market niches and some are gradually expanding into agricultural finance.

The combination of factors presented above suggests that although the Ataulfo chain faces some clear non-financial challenges (which are explored in detail in the accompanying value chain analysis report), there is also good potential for designing and providing financial services to various parts of the chain in order to improve the overall competitiveness of the chain, and simultaneously improve the benefits and/or allow growers to align themselves with value chain actors that most suit their long-term interests. This is especially the case for formal financial institutions capable of establishing and managing mutually beneficial alliances with commercial actors in order to understand the business, provide an additional source of external liquidity, taking advantage wherever possible of useful information to measure and manage risk, and leverage repayment channels to reduce both risk and transaction costs for clients and financial institutions alike.

Obviously no external document would be a substitute for a financial institution's own credit analysis and due diligence, but the authors hope that this and the companion value chain analysis report can help reveal mutually beneficial (but otherwise unapparent) areas of opportunity and potential approaches.