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Pakistan Peach Value Chain

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Abstract

The peach value chain of the Swat region of Pakistan is plagued by high levels of wastage and low margins for upstream participants. It is predominantly a low cost value chain and less importance is given to responsiveness. The most crucial drivers affecting its performance are an inefficient and wasteful transportation system and information asymmetry. A clear vision needs to be designed collaboratively by stakeholders to introduce safer, more specialized, vehicles and to utilize Information Communication Technology (ICT) tools to increase the collection, flow and availability of information to all participants. This can be achieved by promoting the benefits and costs of investment to the value chain participants. However, in a developing country context such improvement is not possible without the support and assistance of the government and donor agencies.

Key words: Peach, value chain, Pakistan, information

Background

The *Swat* area is one of the largest peach producing regions of Pakistan. A part of the *Khyber Pakhtunkhwa* province, it contributes approximately 40% (Safdar and Chughtai, 2013) of the country's production and from 1993-2009, peach production increased from 10,000 MT to 50,000 MT. Harvesting starts in May and ends in September and the average farm size is around 6 acres resulting in a highly fragmented sector. Much like most of Pakistan, Swat relies heavily on agriculture and approximately 50% of the region's economy is based on agriculture (Bangash, 2012). Other industries of the sector are aquaculture and hospitality.

During 2007 and 2008, the region was occupied by the terrorist group, Taliban, until the Pakistan Army initiated an operation in 2009 to eliminate Taliban occupation (Bangash, 2012). The mountainous region is also notorious for unpredictable weather and the devastating floods of 2010 affected roughly 20 million people (Kronstadt, Sheikh and Vaughn, 2010), destroying most riverside orchards and resulting in a decrease in supply of peaches. This has led to an increased interest of donor agencies such as United States Agency for International Development (USAID) and other NGOs (Non-government Organizations) to re-establish and develop the economy of Swat.

According to the M4P Value Chain Toolbook (Working Group, 2008), some of the criteria for prioritizing value chains are a high degree of integration of poor in the market, the potential for public sector interest and investment and the potential for the product to contribute to poverty reduction. Based on the discussion above, all these criteria hold true for the peach sector making it an important value chain for analysis.

This paper will start by discussing some of the major challenges that affect the performance of the value chain. Then, a value chain map will be constructed mapping out the major players and their functions. Next, the concept of strategic fit will be discussed before moving on to exploring the various drivers that affect performance and proposing which ones should be considered crucial for the development of Swat's peach sector. Finally, some recommendations will be made on how to address the problems with these drivers and what sort of impacts and outcomes should be monitored.

Challenges

Peach orchards are farmed by families who have been doing so for generations. Most of these farmers rely on a single seasonal yield as a source of their livelihood. As mentioned above, this source of livelihood was severely disrupted in 2010. However, the farmers, with support from provincial

government departments, were able to re-establish their orchards and farms. To this day, the farmers remain low on finances to operate their farms and are reluctant to collaborate for farming, purchasing or marketing. As outlined by Chopra and Meindl (2016), the sector follows a push strategy where products are produced in anticipation of customer demand. Furthermore, what shrinks supply chain surplus is that the structure of the value chain promotes only *inter-functional* strategic scope where each player in the value chain seeks to maximize company profits rather than trying to enhance supply chain surplus. Because of this, there is a lack of pricing efficiency caused by asymmetric distribution of information. As a result, while pondering the trade-off between operational effectiveness and pricing efficiency (Griffith et al., 2015), each player is striving to reduce their own cost, even if it is at the expense of loss of efficiency throughout the supply chain. This mindset, results in significant losses at various levels. An example of this is that part-time labour is used for harvesting. Damage to the fruit while harvesting and packaging is common and industry losses (postharvest) are reported at around 25% (Safdar and Chughtai M, 2013). This situation is further augmented as farmers try to pack as many pieces of fruit into a 5-8KG box as they can in the hope of saving the cost of packaging. Since the product is sold by weight at the next stage, their focus is simply on loading as much as they can into the truck.

Mapping the Swat Peach Value Chain

The basic structure and flow of goods of the value chain are described below (Safdar and Chughtai, 2013). A map is also displayed below (Figure 1) outlining the functions, actors and flow of goods.

Functions and players

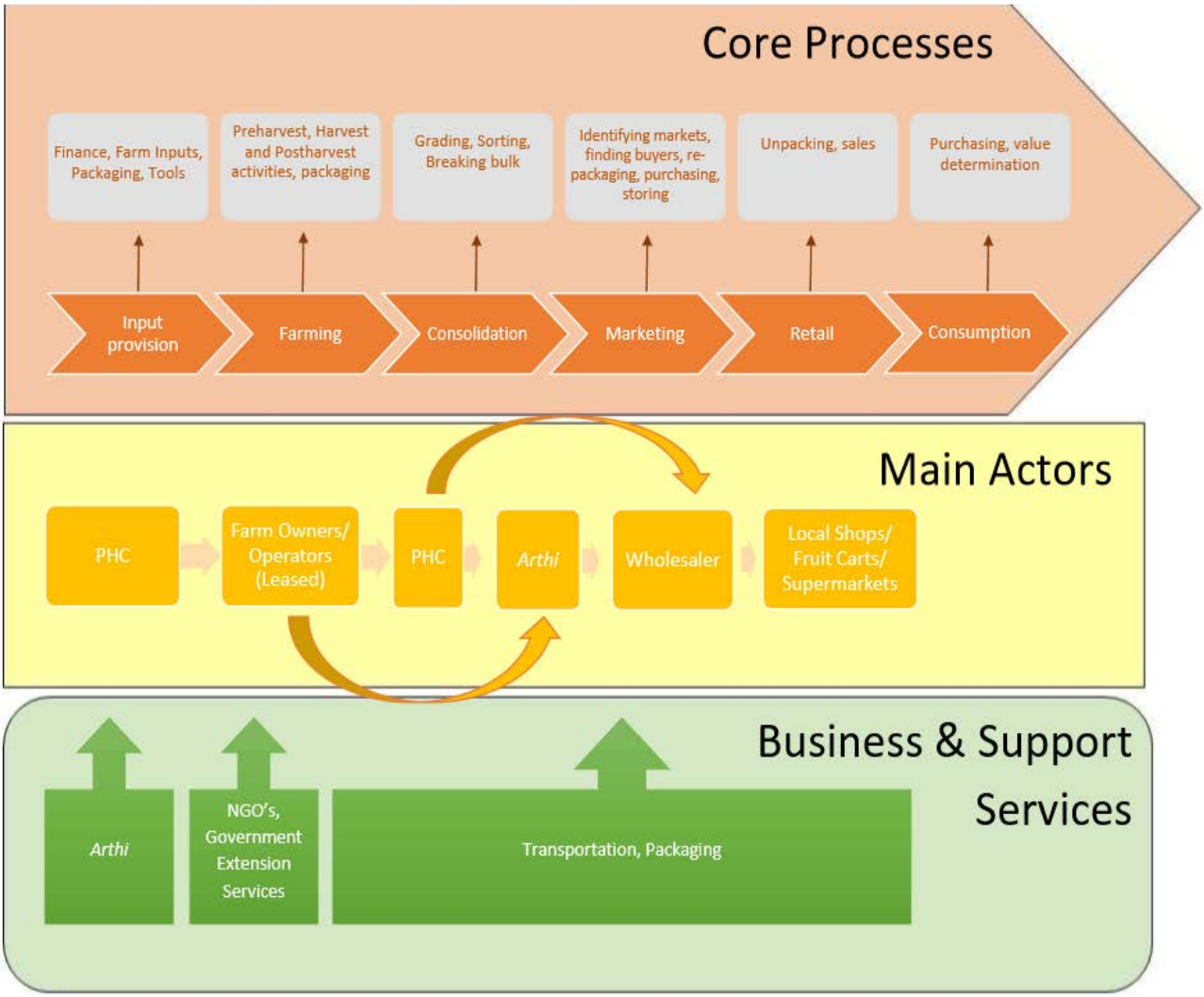
1. Farms are operated either by owners or by operators that lease farms for a season or more.

2. Predominantly, the produce is contracted in advance to *Pre-Harvest contractors* (PHCs) who provide the operational finance and bear the risk in case the production is destroyed. Theoretically, according to Simons, Francis, Bourlakis, and Fearne (2003), transaction costs can be reduced in this way through contracts.

3. A smaller proportion of farmers carry out self-marketing selling to the Commission Agents or *Arthi*. They play the vital role of financing the PHC, who in turn finance the farm operators or owners. They also provide the vital downstream link to the wholesalers and have sales offices at the wholesale markets. Unfortunately, they are also notorious for being the “big bad wholesalers” who squeeze the small farmers for margins. They also charge a percentage on the sale value from the supplier (be it the PHC or farmer directly).

4. The next step is the wholesaler or trader. Large lots are auctioned off in the wholesale markets by the commission agents (some of who might also be wholesalers) and bought by either large retailers or by wholesalers who then re-package the goods and sell to smaller retailers. The basic function here is the breaking of bulk for effective distribution.

Figure 1: Swat Peach Value Chain Map
Prepared based on Asian Development Bank Model (2007)



5. Finally, the retailers come in many forms: wooden hand carts, mobile vans, small shops, large retailers and supermarkets. The most common retail outlet is small fruit retailers.

6. A small percentage of the produce is also bought at wholesale markets or through commission agents by producers of pulp who use it to produce jams and juices.

7. An even smaller percentage is exported after being purchased at the wholesale markets or through direct contracts for the best produce with commission agents.

Support Activities

- Financing is provided by commission agents through PHCs,
- Agriculture extension services are provided by the provincial government agriculture department,

- Tools, training and other support services are provided by NGOs and other development projects,
- Farm input suppliers provide agriculture inputs such as fertilizer and plant protection products.

As recommended by the M4P Toolbook, it is possible to identify the "key governors" in a value chain based on a few factors to gauge power distribution (Working Group, 2008). In terms of the distribution margin, the Commission Agent and the Wholesaler hold considerable power (Appendix A). Even though the retailer gains the highest margin, it is primarily due to them being the final participant before reaching the customer and because of the costs of retailing and not due to power distribution. Needless to say, greater power does reside with downstream functions but the margins are more a function of costs and services provided rather than only bargaining power due to size. According to the M4P Toolbook, share of chain value added and chain profits are reasonable indicators since they reflect the importance and contribution to the chain's activities.

Strategic Fit

Safdar and Chughtai (2013) recommend that Swat's peach value chain should develop from a push (production driven) sector to a pull (market driven) one to meet market requirements. One of the reasons for the current structure might be the high implied supply uncertainty caused by unpredictable weather (Kronstadt, Sheikh and Vaughn, 2010). Implied demand uncertainty is low as commercial demand for both fresh and processed peach is high relative to average production and supply. Being supply driven, the value chain is unable to respond effectively to variations in demand. This suggests a focus on lowering cost rather than responsiveness. Some of the downstream functions, closer to the customer, are slightly responsive but lowering cost is still a consideration. As mentioned earlier, the supply chain is inefficient due to the focus on inter-functional scope by lowering costs to maximize company profits (Chopra and Meindl, 2016).

Figure 2 shows the extent to which each player absorbs implied demand uncertainty. It is somewhat correlated to the margins that each player enjoys in the value chain (Appendix A).

Key Drivers of Performance

To ensure focus and relevance, the most critical logistical and cross-functional drivers are discussed in detail, while the others are discussed only briefly, to analyze the performance of the value chain.

Logistical Drivers

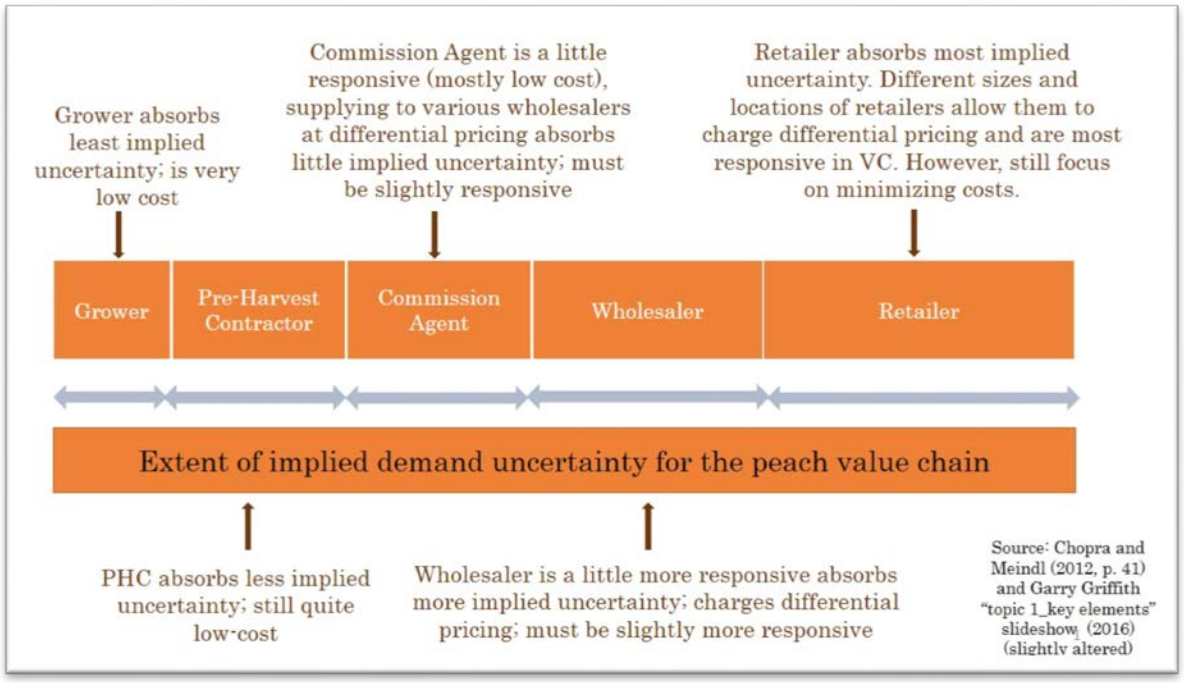
Facilities

These include farms, collection points and distribution centers (wholesale markets). Location choices are mostly opportunistic without formal analysis of lifespan considerations which limits capacity enhancement. Only the distribution centers are located strategically in larger cities as fruit markets called *mandi's*.

Inventory Management

Because of perishability, lack of infrastructure and low implied demand uncertainty, inventory planning is informal. Because of a lack of cold chain, the value chain attempts to get the product to the retailer as soon as possible.

Figure 2: Implied Demand Uncertainty Distribution Among Participants



Transportation

Combined with improper packaging, this is the driver which effects the performance of the value chain the greatest. Even though it only represents 6% of the cost of the final product to the retailer (Safdar and Chughtai M, 2013), it is the stage which effects fruit quality in terms of natural perishability (longer duration = reduced quality due to perishability) and also damage (lack of specialized trucks and damaged during loading and unloading). Contract transporters are used as no individual business is large enough to justify self-owned transportation. Even the distribution and collection centers do not invest in [1]specialized transportation vehicles because of seasonality and because of their focus on minimizing local cost rather than considerations for enhancing product quality. The only metric used to evaluate this driver is low cost and speed with minimum focus on efficiency and effectiveness.

Cross Functional Drivers

The aggregate planning methodology used (not formally but conceptually) is the Chase Strategy (Chopra and Meindl, 2016) where every subsequent decision is based on capacity utilization. This is due to cheap labour and ample demand.

[1] All pictures (including the cover photograph) were collected during the United States Agency for International Development (USAID) *Firms Project* from 2012 to 2014 which was implemented by Chemonics International INC.

Sourcing

Sourcing at the farm level includes decisions on farm inputs, tools, packaging and labour. Decisions on selection of almost all of these are primarily based on considerations of cost rather than productivity or quality which effects value chain performance.

Pricing

As pointed out by (Safdar and Chughtai M, 2013), differential prices or price discrimination is used by some players in the value chain (Chopra and Meindl, 2016). Farmers do not try and sell directly to higher-value markets because they lack the financial resources to pay for operational costs and do not want to bear the risk of loss of value due to perishability. Informal grading is used to describe varieties (Appendix B) but does not increase prices at the customer end.

Information

The most crucial driver in the value chain is information, or lack thereof. Even if the tools and infrastructure were available to reduce information asymmetry (Hiraj, 2013), formal information sources about prices, weather and inputs do not exist. The provincial government department[2] collects daily information on prices of fruits and vegetables from wholesale markets but disseminates them to the retailers only, considering them their primary client (Safdar, 2014). This makes it difficult for farmers to evaluate markets and customers accurately and limits their ability to take advantage of the differential pricing or capture more of the margin (Appendix A). Those downstream functions such as retailers and wholesalers that do possess this information do not share it.

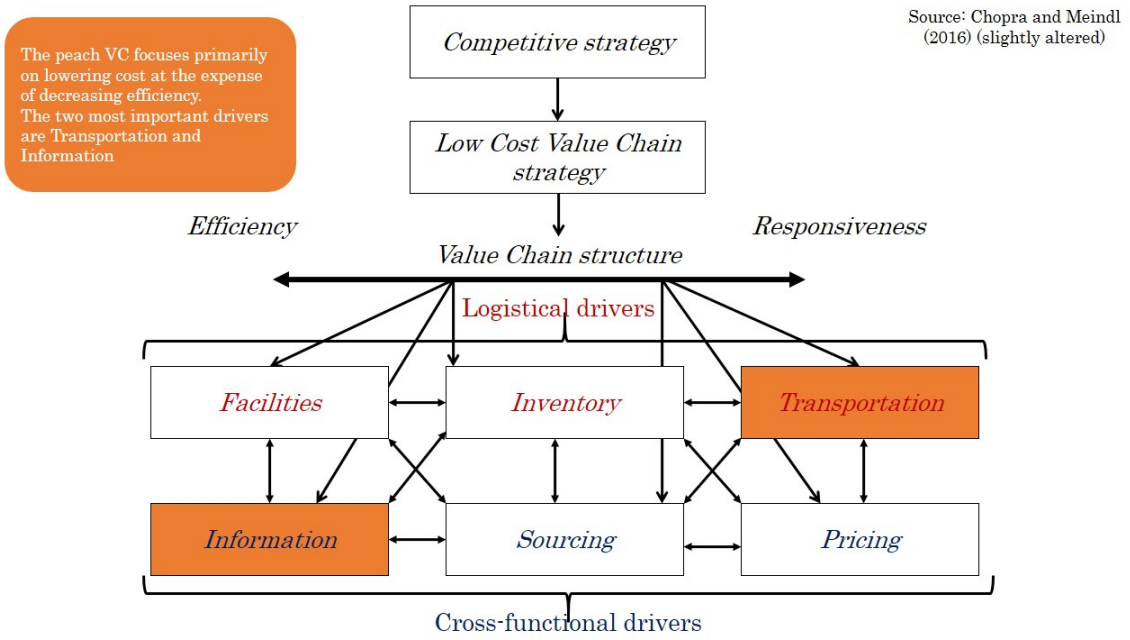
Another enabler of information asymmetry is lack of coordination. As pointed out by Chopra and Meindl (2016), obstacles to coordination can include incentive obstacles (fear of losing margin), information processing obstacles (how to collect and disseminate), pricing (how to compare quality of fruit) and behavioural obstacles (lack of motivation or incentives to trust).

Value chains with a low level of trust have various effects according to the M4P Toolbook (Working Group, 2008). Some of the important ones that apply to the peach value chain are that there is infrequent communication, price determination is adversarial in nature rather than collaborative and expertise is not pooled - thus stifling the possibility of technical assistance exchange.

Figure 3 (below), depicts the two more crucial drivers for the value chain: transportation (logistical) and information (cross-functional). Improvements in these areas have the potential to benefit the value chain substantially.

[2] Department of Agriculture, Livestock and Cooperation, Government of Khyber Pakhtunkhwa, Pakistan

Figure 3 – Analysis of Value Chain Drivers



Strategic Objectives, Profit and Performance

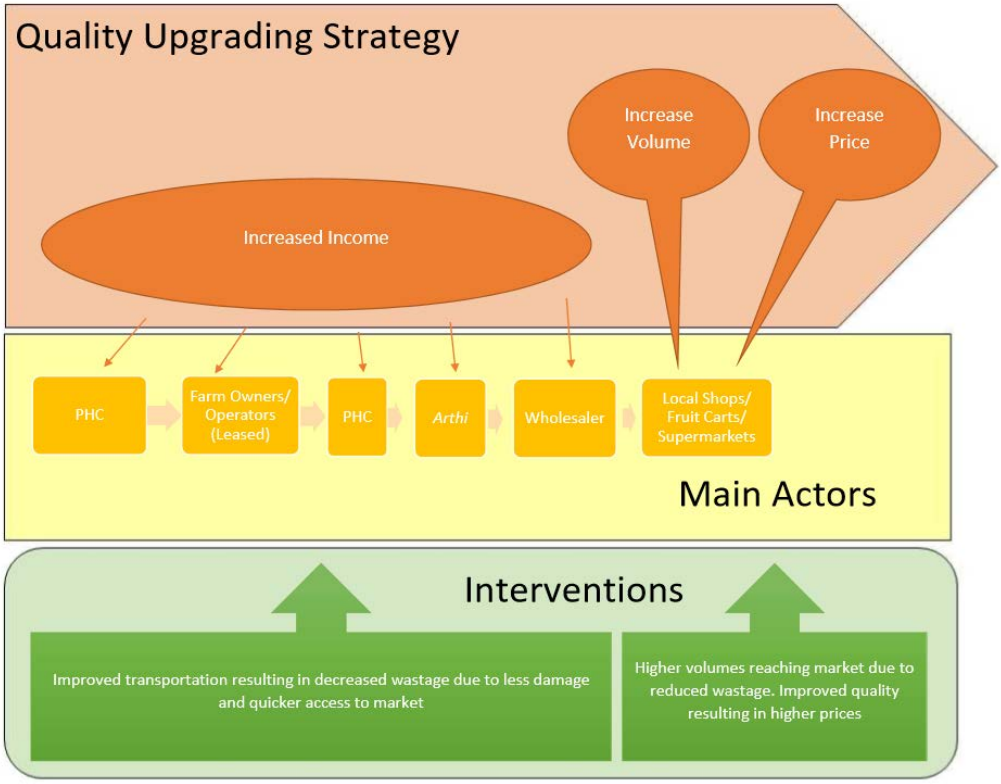
It is evident from the analysis above that transportation (logistical) and information (cross-functional) are the most important drivers effecting value chain performance. The methodology recommended in the Valuelinks Manual (gtz, 2007) will be used as a framework and adapted to address the two main drivers identified to try and improve the performance of the value chain.

Step 1 – Vision

The first step is to define a vision or the strategic direction (gtz, 2007). This is a very important step because it defines the intervention(s), provides strategic direction and helps establish consensus among stakeholders. At this stage, it would be important not only to involve the value chain participants outlined in Figure 1, but also other stakeholders such as the Government Agriculture Department, local and international NGOs and the Agricultural University of the Province. Even though this would make it difficult to gain consensus on one vision that helps address the concerns of each group, it would safeguard against retaliation or resistance from them later on.

If the intervention involves all these stakeholders, the most suitable strategy would be a Quality Upgrading strategy (gtz, 2007). This would primarily help address the transportation driver (Figure 4). If the intervention involves only the producers, a Value Redistribution strategy could help address the information driver but might result in worsening the transportation driver as the participants attempt to lower costs even further. The information driver could also be addressed by using a Market Penetration strategy that enables greater exchange and availability of information and would simultaneously reduce wastage by reducing the excess movement of produce through channels and ensure quicker time to market.

Figure 4: Quality Upgrading Strategy (adapted from gtz, 2007)



It would also be useful to identify and formulate a "core group" of the most dedicated and participative members of the stakeholders that formulate the vision. This group oversees the implementation of the intervention as in the case of the Spices value chain in Sri Lanka (gtz, 2007).

Step 2 - Interventions

Improved Transportation

The first proposed intervention to support the quality upgrading vision is to address the transportation driver problems by using better transportation to reduce damage to the fruit. Since most of the "cost saving" actions of the participants *appear* to be in line with attempting to follow low-cost strategic fit, the following describes how investment in transportation can improve margins and performance.

Post-harvest losses are estimated at 25%. According to the FAO (1989), losses due to transportation are high. For the sake of calculation, we can assume that 20% of the losses is damage during transportation (improper stacking of crates and overloading of trucks). If one truck load is 6000 KG[3], this means that by the time the product gets to the Wholesaler the sellable fruit is only 5700 KG. At that stage, this results in economic losses of PKR 15,177 (Appendix A). In 2013, peach production in the Khyber Pakhtunkhwa province was 50,300 MT which suggests substantial economic losses attributable to transportation.

[3] 1000 crates per truck of 6KG each

The price of one of the most popular pickup trucks in Pakistan, the Hyundai Shehzore, is PKR 899,000 (Autos.columnpk.net, 2016). This means that losses of approximately 60 truckloads (360 MT) would result in a break-even between the losses incurred and the price of a truck with a considerable disposal value and alternate uses. It would require reinvestment of profit by the farmer from 182 MT of peaches sold (comparing margins from Appendix C). Unfortunately, this is a relatively high investment for small farmers. Therefore, the ideal situation would be support from either the Government or international NGOs in providing trucks which could be used using a cluster approach as either cooperatively owned or as an independent service provider. Quite obviously, costs of refrigerated trucks would be higher but those can be a subsequent step once the basic requirements of safe transportation are met.

Reduction in Information Asymmetry

In 2014, the USAID Firms Project initiated an intervention named the "Pilot for Information and Financial Mobile Solutions" (PIFMS) in Northern Pakistan. One objective was to improve the availability and communication of market- and weather-related information to farmers (Tariq, 2014). It worked at both ends, to improve the information collection mechanism by collaborating with the provincial Agriculture Department and with Mobile Network Operators (MNO's) to code and transmit the information via SMS. This pilot had limited coverage and was successful in providing weather-related information but the market price component could not be launched.

Some examples of Government-led initiatives, supported by USAID, are Jamaica (JA-MIS) Rwanda (eSoko) and the Agricultural Market Information System in Mali which collect prices and have partners with donors to send these prices to farmers via SMS (United States Agency for International Development, 2011). This is a relevant example of a chain good that can help benefit all farmers. There is a need to introduce a broader focus from an inter-functional scope to a whole-of-chain or intercompany scope (Doljanin et al., 2014b).

A difference in earnings (Table 1) shows how a difference in information about the market can distribute profits. Greater availability of information will not only help participants make more informed decisions but reduce wastage due to unnecessary movement or storage of products before they reach the final consumer.

This can help reduce the chances of adverse selection. It can also help redistribute some of the earnings if the Income Redistribution Strategy is adopted which will help increase the buy-in of farmers to ensure that they don't focus on minimizing cost at the expense of the quality of product.

Table 1: Costs and Earnings for Various Value Chain Participants

	Pakistani Rupee (PKR)/KG
Cost of Transportation	2.50
Farmer Revenue	15.00
Commission Agent	45.59
Wholesaler Revenue	50.59
Retailer Revenue	63.75

Adapted from Safdar & Chughtai M (2013)

Forward Integration

As most donors work directly with farmers, the chances of a redistribution strategy are more likely. Therefore, data from Safdar and Chughtai M, (2013) can be used to check potential gains from bypassing intermediaries (Appendix A). The assumption would be that the farmer has access to the market and prices. Therefore, the *information* driver, and the initiatives outlined above, plays a critical role.

Based on Table 1, an assumed estimate would be that transportation costs increases 200% each time the grower attempts to bypass an intermediary. Therefore, their cost of transportation would be PKR 7.5[4].

Potential Revenue selling to Wholesaler (bypassing PHC and Commission Agent) = 50.59 - 7.5 = PKR 38.09.

This revenue, PKR 38.09, would be 154% higher than the farmer's current revenue of PKR 15. Quite obviously, there are other costs included in getting the product to the wholesaler but, with proper market information, participants can make accurate assessments of costs and benefits. Improvements in this manner could redistribute earnings which is in line with a "pro-poor" mindset but would not increase value chain surplus.

Step 3 – Monitoring

An important aspect of any development initiative is tracking the impacts and outcomes. Valuelinks (gtz, 2007) explains how it is important to track both. Table 2 below describes some of the possible impacts, outcomes and their resulting metrics that can be monitored (Adapted from Box 11.3 Valuelinks).

Conclusion

This paper has analyzed the peach value chain of Swat, Pakistan in an attempt to identify the major challenges, the reasons or drivers behind these challenges and analysis of how to overcome them. The major identified drivers which need improvement are transportation and the availability of market-related information. These can be improved by first agreeing upon a unified vision followed by initiatives to provide improved transportation, incorporation of ICT tools to improve information flow and forward integration by upstream participants to improve margins. The initiatives outlined would not only help improve the performance and surplus of the value chain but also initiate collaborative action.

This would help widen strategic scope and move the value chain along the spectrum from simply a low cost focus to a more responsive one. Improvements in transportation will help improve product quality, reduce wastage and increase margins while better flow of information will help increase trust and reduce the inefficiencies in the value chain cause due to market failure. Further research is required to conduct a more comprehensive financial analysis and prepare comprehensive implementation plans for the initiatives proposed.

[4] 1 AUD = 80 PKR

Table 2: Potential Impacts and Outcomes of Improving Value Chain Drivers

	Impact	Outcome	Metrics/ Parameters
Improved transportation	• Reduction in wastage • Reduction in transportation time • Improved income and value added	• Improved competitiveness • Greater efficiency • Improved value chain surplus	• Wastage % • Transportation time comparison with baseline • Income comparison with baseline
Access to information	• Better prices and higher margins • Reduction in transportation time • Reduction in storage time • Less focus on lowering costs	• Improved decision making • Greater trust • Greater efficiency • Improved value chain surplus • Broader strategic scope	• Margins comparison with baseline • Transportation time comparison with baseline • Storage time comparison with baseline • Tracing perishability • Income redistribution comparison

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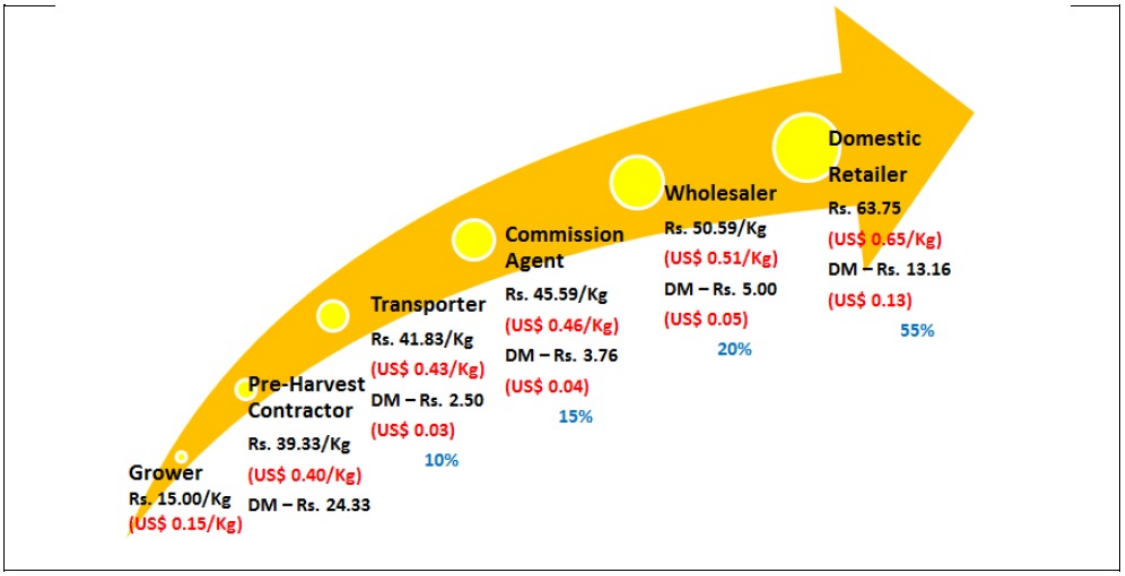
Appendices

Appendix A – Margins and Profits

e 7: Distribution Margin of Peach Value Chain – Farm sold to Pre-Harvest Contractor



(Safdar and Chughtai M, 2013, pg. 25)

Appendix B – Informal Grading

Table 1: Peach varieties of Swat and their maturity timelines

Sr. #	Variety	Maturity Period
1.	No. 1, Early GRAIN	May 08 – May 22
2.	No. 2, A-6	May 23 – June 10
3.	No. 3, (No specific name)	June 10 – June 25
4.	No. 4, Carmon	June 25 – July 10
5.	No. 5, NJC (China)	June 27 – July 20
6.	No. 6, Elberto (Golden, Sohani)	July 10 – July 25
7.	No. 7, Maria Delezia	July 20 – August 10
8.	No. 8, Indian Blood	August 08 – September 15

(Safdar and Chughtai M, 2013, pg. 11)

Appendix C – Costs and Margins

e 2: Structure and Cost Drivers at each actor Level

		Swat Peach		
		US$/Kg	PKR/Kg	%
Retailer	Average Selling Price	0.65	63.75	
	Average Buying Price	0.40	39.50	62%
	Gross Profit	**0.25**	**24.25**	**38%**
	Other Costs	0.08	8.30	13%
	Net Profit	**0.17**	**15.95**	**25%**
Wholesaler	Average Selling Price	0.40	39.50	
	Average Buying Price	0.35	34.50	87%
	Gross Profit	**0.05**	**5.00**	**13%**
	Other Costs	0.03	2.50	6%
	Net Profit	**0.02**	**2.50**	**6%**
Commission Agent	Commission Earned	0.04	3.76	
	Gross Profit	**0.04**	**3.76**	**100%**
	Other Costs	0.02	1.88	50%
	Net Profit	**0.02**	**1.88**	**50%**
Transporter	Truck Rent	0.03	2.50	
	Gross Profit	**0.03**	**2.50**	**100%**
	Other Costs	0.01	1.35	54%
	Net Profit	**0.02**	**1.15**	**46%**
Peach Grower	Average Selling Price	0.40	39.33	
	Average Cost			
	Production Cost	0.13	12.42	49%
	Harvesting Cost	0.05	5.00	20%
	Packaging	0.08	8.08	32%
		0.26	**25.50**	**100%**
	Gross Profit	**0.14**	**13.83**	**35%**
	Other Costs			
	Transportation	0.05	4.63	52%
	Commission & other charges	0.04	4.27	48%
		0.09	**8.89**	**100%**
	Net Profit	**0.05**	**4.94**	**13%**

(Safdar and Chughtai M, 2013, pg. 23)