

# Analysis of the vegetable value chain and its challenges for profitability in Cambodia

Kim Hour San<sup>1</sup>, Daniel K.Y. Tan<sup>1</sup>

<sup>1</sup> The University of Sydney, Sydney Institute of Agriculture, School of Life and Environmental Sciences, Faculty of Science, Sydney, NSW 2006, Email: daniel.tan@sydney.edu.au

## Abstract

Cambodian smallholder farmers are starting to cultivate higher value vegetable crops with traditional pulse and grain commodities. Vegetables are a major component in Cambodian diets, but production capacity is restricted to yearly availability of rainfall. The inconsistency and inadequate supply are compensated by imports of up to 70% of total domestic consumption from Vietnam and Thailand. However, there is a preference for high quality locally grown vegetables by retailers and consumers. This study investigated challenges through a value chain analysis on the market linkage between chain entities in the traditional and modern cooperative market networks. The issues in capturing profits by all market chain actors are interlinked from production to marketing stages which progressively siphons the value associated with specialised vegetables. The informal traditional marketing arrangements resulted in complications when the relationship between market actors deteriorated by financial mistrust and quality impairment. Yet, the lack of production knowledge and postharvest management such as packaging and cool chain management by smallholders in Cambodia contributed to deteriorating produce quality as it moved along the supply chain. This domino effect has resulted in adverse trade consequences, such as wastage being shared among the supply chain entities. The cooperative market chain had fewer market linkage issues due to the adoption of formal contracts but was challenged by similar wastage due to strict produce grading criteria. Ultimately the differences in trading volume and price between traditional and cooperative market chains were small, but the cooperative farmers benefited from an incentive to invest due to the mutual trust with buyers.

Keywords: Value chain, Agricultural cooperative, Vegetables, Relationship

## Introduction

Agricultural diversification is a common strategy for developing countries such as Cambodia to transform the economy from monocrop production to specialised crops such as vegetables to increase rural incomes and livelihoods (Reardon, 2015). The perishability and seasonality factor of vegetables require a higher degree of specialisation from production to consumer marketing which allows for a higher value of commercialisation. Cambodia's total paddy rice cultivation area has decreased as the government shifted to support agricultural growth through diversification and intensification schemes. Yet, the government of Cambodia only allocated 1.5% of state budget to agricultural and rural road development with extensive support from international donors (World Bank, 2015). Existing literature commonly cited constraints to Cambodia's agriculture with a lack of access to irrigation, basic cultivation knowledge, high input costs and ineffective regulatory enforcement of counterfeit agricultural inputs. These factors lead to ineffective management of pests and diseases and low crop yields compared with neighbouring countries such as Thailand and Vietnam (Morris, et al. 2012).

Vegetable production in Cambodia tends to be rice-substitute production during the early dry season due to favourable climate and adequate residual water left from prior rice cultivation mainly in lowland regions susceptible to flooding during the rainy season. This leads to insufficient year-round vegetable outputs which is compensated by high informal imports of up to 70%, largely from Vietnam (Goletti and Sin, 2016). The domestic supply chain is divided into both traditional and

cooperative market structures. Traditional markets account for 80% of total vegetable transactions while operating without contractual agreements where offered prices are based on daily negotiation of a market spot price (Desiree, 2017). The cooperative marketing pathway tends to supply safer vegetables while being established to promote improved grower bargaining power and production knowledge. Primitive postharvest management from farmgate to sale display further reduce domestic supply volume in both systems.

The progress from vegetable support from international aid programs often ceased once the development projects had ended due to unsustainable market mediation as they generally focussed at vegetable production and less so at value chains. This paper aims to better understand market behaviour and limitations in market linkages between Cambodia’s cooperative and traditional vegetable supply chains.

## Methods

### *Study area and sample selection*

The vegetable value chain surveys were conducted on key participant groups consisting of farmers, wholesalers and retailers within the cooperative and traditional market. Key provinces such as Battambang, Siem Reap and Phnom Penh were chosen based on the proximity to the country’s border, distribution centres and volume of vegetable cultivation performance. A homogeneous sampling approach was used to identify participants of each group that share similar characteristics and criteria while targeted sampling was applied to identify participants best suited to the research goals.

### *Mixed use of qualitative and quantitative methods*

Survey questions were designed based on a guide by the Australian Centre for International Agricultural Research on value chain and development for overseas development assistance (Collins et al. 2015). The surveys were conducted face-to-face with quantitative type questions followed by a qualitative questionnaire to facilitate open-ended discussions to justify the numeric data. The questions covered the topics of profitability from vegetable commercialisation, business relationship between key market groups and marketing challenges. A 5-point Likert scale was used to measure the subjective attributes from all value chain players on their relationship with their buyers and suppliers.

## Results

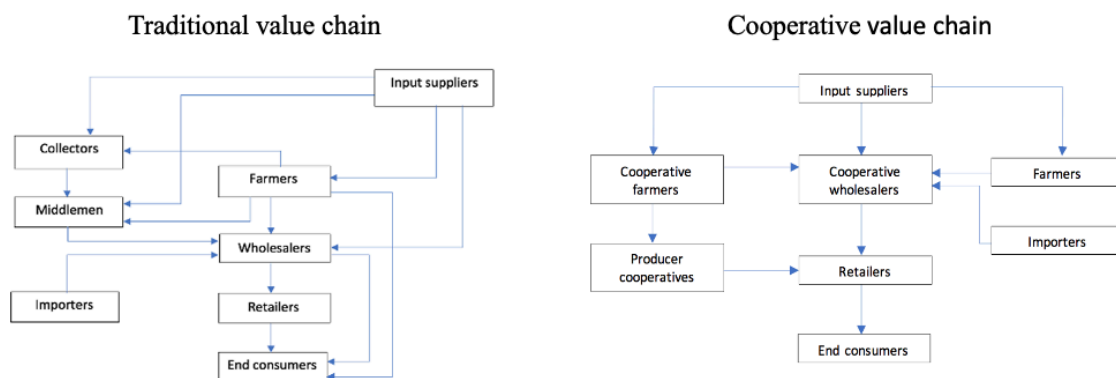


Figure 1. Mapping the vegetable value chains in Cambodia.

The traditional value chain had more uncoordinated flow of imported and domestic vegetables compared with cooperative value chain (Figure 1). Traditional wholesalers and retailers negotiated a price based on received quality where 81.3% reported unpredicted price reductions over disputed

quality. Cooperative chain players utilised contracts on price and purchase volume while prioritising domestic supply as opposed to traditional markets with an emphasis on price rather than origin. The 5-point Likert scale showed that only 4.8% of traditional wholesalers had a long-term relationship with growers compared with 50% of cooperative counterparts (data not shown). The cultivation capability of farmers from both market groups depended on credit provision from the buyers. However, cooperative farmers received higher fixed prices and credits either as cash or agricultural inputs per harvesting period.

All grades of vegetables were purchased by the traditional intermediaries while the cooperative network imposed strict grading. The majority of cooperative farmers sold unaccepted quality of vegetables under cooperative standard to traditional middlemen at discounted prices. Farmers accounted for the highest wastage amongst both groups, yet cooperative farmers had the higher share of wastage level due to high rejection rate (Table 1). However, both market chains shared similar total wastage of 36% (traditional market) and 33% (cooperative market) due to limited postharvest management and infrastructure such as cold chain logistics and high susceptibility to rots and bruising due to the use of plastic bags.

Table 1. A comparison of mean wastage level of cooperative and traditional market chains.

Market	Mean wastage (%)		
	Farmers	Wholesalers	Retailers
Cooperative	20	8	5
Traditional	12.5	13.5	10

All cooperative farmers claimed to have access to farm knowledge compared with 18.8% of traditional farmers who reported no access to farm knowledge. Traditional farmers relied highly on other farmers and themselves to determine their annual cropping decisions. The majority of cooperative farmers had ‘frequent to very available’ farm knowledge when required as they had multiple external sources to receive advice for their cropping decisions (Table 2). Cooperative farmers were more willing to work with others as they valued mutually beneficial relationships with the buyers and reported greater access to market demand information than traditional farmers.

Table 2. Comparison of influential sources to farmers’ cropping decisions and availability of farm knowledge for cooperative and traditional farmers in Battambang.

		Traditional	Cooperative
Availability of Farm knowledge (%)	None-available	18.8	-
	Occasional	50.0	12.5
	Frequent	31.3	68.8
	Very available	-	18.8

The independent t-test showed no significant difference on trading price (p-value = 0.11) and total volume sold (p-value = 0.21) between the farmer groups as they cultivated on a similar average farm size (cooperative farmers=0.71 ha, traditional farmers=0.51 ha). The cost of production breakdown revealed that traditional farmers spent more on inputs such as seeds, fertilisers and pesticides whereas cooperative farmers utilised higher labour rates for land preparation and safer practices such as compost and sticky traps leading to higher cost of production per hectare (Table 3). The vegetable wholesalers associated domestic vegetables with higher quality and better sale performance than imported counterparts. The quality of vegetables was based on visual appearances, size and colour grading suited to local demand while ‘sell better’ category was derived from Cambodian consumers’ preference for domestic vegetables.

Table 3. Gross margin calculation of farmer groups (riels/ha). (US\$1 = 4000 riels)

	Cooperative farmers	Traditional farmers
	n=16	n=16
Revenue (riels/ha)	11,756,363	8,600,000
Cost of production (riels/ha)	6,863,931	4,421,556
Gross margin (riels/ha)	4,892,432	4,178,444

### Conclusion

Cambodia's vegetable supply chains are yet to reach the self-sufficiency of commercial scale production. The use of contractual agreements creates stable operating environments for cooperative chain actors while on-the-spot negotiation employed by traditional actors is prone to quality challenges that can be exacerbated by poor postharvest management and exploitative behaviour where price insecurity is costly to vulnerable smallholders. Even though this study found no significant difference in price and trading volume between cooperative and traditional farmers, cooperative chain actors have a better positive relationship, production and market knowledge that can incentivise long-term interests in the commercialisation of domestic vegetables.

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