Research article

Vegetable Farming Practices in Cambodia: Case study of Small-scale Vegetable Farmers in Kandal, Kampong Chhnang and Battambang Provinces

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Abstract Cambodia shifted from an agrarian-based to a service- and production-based economy through its fast-economic growth. However, agriculture is still a backbone of the Cambodian economy because 80 percent of the population lives in rural areas, and around 37 percent of the total workforce remains directly engaged in the agricultural sector. Even though the Royal Government of Cambodia (RGC) considered the enhancement of the agricultural sector as a high priority in its national development agenda for 2014 to 2018, Cambodia remains a net vegetable importer. Approximately USD 200 million of vegetable products are imported informally from Thailand and Vietnam each year. Several research studies have been conducted to identify farmers' constraints. However, challenges faced by small-scale vegetable farmers have yet to be clearly characterized. This research aimed to identify the farming practices and challenges of small-scale vegetable farmers in Cambodia. There were 40 households, selected by homogeneous purposive sampling method, surveyed from the Kandal, Kampong Chhnang and Battambang Provinces. The results of the study are divided into three parts, with the first component focused on farming practices. There were 12 types of vegetables that were identified as being grown in the studied areas. However, only 5 types of vegetables were commonly grown by farmers. Chinese mustard (55%) was the most popular vegetable being grown in the areas, followed by green mustard (50%), pak choi (45%), leafy mustard (37.5%) and Chinese kale (27.5%). Due to small production size, almost all interviewed farmers harvested their products by sickle, knife, and/or scissors, and manual harvest is still in practice by some farmers. Post-harvest activities such as grading, sorting and cleaning products after harvesting and before selling are not commonly practiced by farmers. Second, the majority of vegetable products are sold to collectors; a small quantity of remaining products is sold to retailers, farmers' groups/cooperatives and direct consumers in the areas. Third, the study revealed three main challenges faced by farmers. Insect pests and disease infestation (87.5%) was the most prominent issue of vegetable farmers, followed by climate change (e.g. flooding, drought) (77.5%). Low selling price and considerable fluctuation in prices were equally problematic (both 57.5%). Other notable issues included post-harvest losses especially in peak seasons of oversupply (45%), lack of power in the market chain (42.5%), and lack of pest control information (40%), while lack of information about market prices (37.5%) and poor market information systems (37.5%) were the minor issues in vegetable production.

Keywords vegetable farming, marketing, post-harvest, value chain

INTRODUCTION

Cambodia has experienced rapid agricultural growth, among the fastest in the world. The annual growth of agricultural gross production was 8.7 percent from 2004 to 2012. However, the contribution of this sector in the Cambodian economy has been decreasing and is being replaced by manufacturing and services (World Bank, 2015). Even though the Royal Government of Cambodia (RGC) considered the enhancement of the agricultural sector as a high priority in its national development agenda (National Strategic Development Plan, 2014), the development of the Cambodian agricultural sector has been slow. Cambodia is a net agricultural importer. Their imported commodities include vegetables (about USD 200 million of vegetable products was informally imported annually), agricultural inputs and finished products primarily from Thailand and Vietnam (USAID, 2019). Several issue which have been hampered the small-scale vegetable production are lack of agricultural techniques, unreliable supply and demand, and competition with informal imported vegetables. Even though there have been various research studies conducted in the vegetable sector, the practices and challenges of small-scale vegetable farmers have remained ambiguous.

OBJECTIVE

This research aimed to identify the farming practices and challenges of small-scale vegetable farmers in Cambodia.

METHODOLOGY

Mixed methods, quantitative and qualitative, were used to conduct this study. The total sample was 40 households, selected by homogeneous purposive sampling method, from the Kandal, Kampong Chhnang and Battambang provinces. The selection of study location based on two reasons. First, these provinces are among Cambodian vegetable production's zones. Second, characteristic of smallholders in these provinces represents the farmers in all location in the country. Ensuring accuracy in sample selection, researchers reviewed literature, screened names in the list of vegetable farmers provided by the local authority, and then discussed and finalized the selected sample with the local authority. The collected data was analyzed by using descriptive statistics.

RESULTS AND DISCUSSION

Table 1 Household demographics

Items	N	Minimum	Maximum	Mean	Std. Deviation
Family members	40	2	9	4.85	1.545
Children ≤ 15 years old (male)	18	1	3	1.56	0.784
Children ≤ 15 years old (female)	14	1	2	1.21	0.426
Adults 16 – 60 years old (male)	36	1	4	1.67	0.956
Adults 16 – 60 years old (female)	39	1	5	1.77	0.931
Elderly >60 years (male)	9	1	1	1.00	0.000
Elderly >60 years (female)	11	1	1	1.00	0.000
Valid N (listwise)	0				

*Source: Authors, *multiple answers will not add up with 100*

To understand the current practices and various challenges faced by small-scale vegetable farmers in Cambodia, 40 smallholder vegetable farmers were interviewed in 18 villages in 5 districts of Kandal, Kampong Chhnang and Battambang provinces. The household demographics are shown in Table 1. The gender and age distribution as well as the family size between the villages surveyed were similar.

Of the respondents, 67.5% were male, 32.5% were female, and the average age of respondents was 47.30 years old. Ninety-five percent of respondents were able to read and write Cambodian language, while 5% were illiterate. The majority of interviewed household (95%) were nuclear families[1], while 5% were jointly family[2]. The average family size was 4.85 members.

Table 2 Household land use

Distribution of household land in hectares	Kandal	Kampong Chhnang	Battambang
Main dwelling land	0.007	0.005	0.008
Other dwelling land	0.074	0.136	0.070
Agricultural land	0.611	1.569	3.204
Total owned cultivable area in 2018	0.884	1.569	3.170
Total rented cultivable area in 2018	0.051	-	0.600
Own areas under vegetable farming	0.308	0.199	0.293
Rented areas under vegetable farming	0.017	-	-
Total owned land	1.884	3.478	6.745

Source: *Authors*

The household land distribution is shown in Table 2. The household land size and agricultural land size differed between provinces. Farmers in Battambang province owned on average 6.745 hectares, which was greater than Kampong Chhnang (3.478 hectares) and Kandal (1.884 hectares) provinces. Similarly, farmers in Battambang had the most agricultural land (3.204 hectares), followed by 1.569 hectares in Kampong Chhnang province and 0.611 hectare in Kandal province. In contrast, the average area under vegetable cultivation in Kandal province was 0.325 hectare, which was higher than Battambang province (0.293 hectare) and Kampong Chhnang province (0.199 hectare).

Table 3 Types of vegetables grown in the studied areas

No	Name of Vegetable	Frequency	Percent
1	Pak choi	18	45.00
2	Leafy mustard	15	37.50
3	Chinese mustard	22	55.00
4	Cabbage	2	5.00
5	Chinese cabbage	1	2.50
6	Green mustard	20	50.00
7	Lettuce	10	25.00
8	Spring onion	1	2.50
9	Crown daisy / Chrysanthemum green	0	-
10	Chinese Kale	11	27.50
11	Gallic chives	0	-
12	Culantro	4	10.00

**multiple answers will not add up with 100; ** N=40.*
Source: Authors

There were 12 types of vegetable identified as being grown in the studied areas (Table 3). However, only 5 types of vegetable were commonly grown by farmers. Chinese mustard (55%) was the most popular vegetable being grown in the areas, followed by green mustard (50%), pak choi (45%) and leafy mustard (37.5%). Chinese kale and lettuce were grown by 27.5% and 25% of farmers,

[1] ''A nuclear family, elementary family or conjugal family is a family group consisting of two parents and their children (one or more). It is in contrast to a single-parent family, the larger extended family, and a family with more than two parents. Nuclear families typically center on a married couple; the nuclear family may have any number of children'' (Wikipedia '' Nuclear family'' accessed by January 22, 2020: https://en.m.wikipedia.org/wiki/Nuclear_family).

[2] ''A joint family or undivided family is an extended family arrangement prevalent throughout the Indian subcontinent, particularly in India, consisting of many generations living in the same household, all bound by the common relationship'' (Wikipedia '' Hinu Joint Family'' accessed by January 22, 2020: https://en.wikipedia.org/wiki/Hindu_joint_family).

respectively. Culantro, cabbage, spring onion and Chinese cabbage were not commonly grown by farmers in the studied areas. Post-harvest activities such as grading, sorting and cleaning products after harvesting and before selling were rarely implemented by farmers. There are three main reasons encounter the postharvest practices of farmers: interviewed farmers do not have knowledge and experiences on postharvest activities; the required materials are not accessible in the target, and no requirements for grading, sorting and cleaning products from collectors, retailers, agricultural cooperative, and customers.

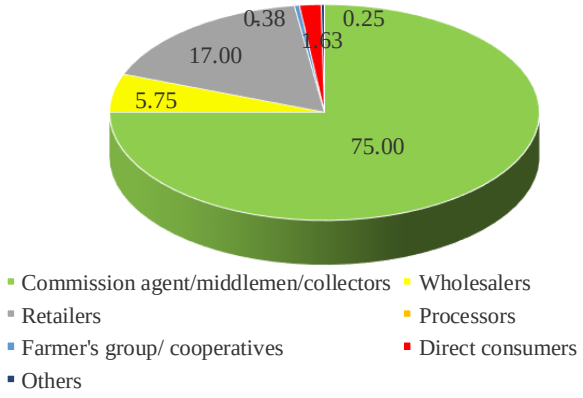

Fig. 1 Vegetable distribution channels

The produced vegetables were distributed to 6 channels: commission agents/middlemen /collectors, wholesalers, retailers, processors, farmers' groups/cooperatives, and direct consumers (Fig. 1). The majority of products (75%) were sold to collectors in the area and retailers (17%) in Phnom Penh, Battambang, Kampong Chhnang and Siem Reap provinces, while some vegetables (5.75%) were sold to wholesalers in the areas. Vegetables were less commonly sold to consumers, farmers' groups and other channels because the quantity of product was small and some producers have supplied contracts with collectors and retailers.

Table 4 Challenges of vegetable producers

No	Challenges	Frequency	Percent
1	Insect pests and disease infestation	35	87.5
2	Climate change (e.g. flooding, drought)	31	77.5
3	Low selling price	23	57.5
4	Considerable fluctuation in prices	23	57.5
5	High price of inputs	21	52.5
6	Post-harvest losses, especially in peak seasons of oversupply	18	45.0
7	Lack of power in the market chain	17	42.5
8	Lack of pest control information	16	40.0
9	Lack of information about market prices	15	37.5
10	Poor market information systems	15	37.5

**multiple answers will not add with 100; ** other challenges consisted of: lack of technical skills, poor shelf life of vegetables, differentiated price based on quality difference, labor shortages during critical times, lack of access to cold chain facilities, lack of storage facility, poor coverage and quality of extension services, lack of consumer preference for quality vegetables, high temperature especially at night, insufficient and lack of quality seed, lack of incentive for grading, lack of packaging, long distance to market, poor transport network, lack of access to credit, difficulty finding a buyer, and lack of quality seed ** N=40.*

There were 10 prominent challenges faced by vegetable producers in the studied areas (Table 4). Insect pests and disease infestation (87.5%) were the key issue of vegetable farmers, followed by climate change (e.g. flooding, drought) (77.5%). Low selling price and considerable fluctuation in prices were equally problematic (57.5%). Post-harvest losses, especially in peak seasons of oversupply (45%), lack of power in the market chain (42.5%), and lack of pest control information (40%) were considered as important challenges; while, lack of information about market prices

(37.5%) and poor market information systems (37.5%) were the minor issues of vegetable farmers. Sokhan et al. (2018), in their study on the effect of agricultural cooperatives on smallholders' incomes in Svay Chrum commune, Svay Rieng province, Cambodia, found that vegetable farmers faced several similar challenges, including high production cost, disease infestation and prevention techniques, and fluctuation of market price. More than half (59%) of interviewed vegetable farmers, non-members of Svay Rieng Agro-Products Cooperative (SAC), did not know market information. Therefore, price setting for their products depended on vegetable collectors. Ibeawuchi et al. (2015) who conducted a study on Fruit and Vegetable Crop Production in Nigeria revealed that pest and disease was one of important issues that affected fruit and vegetable in the field. More specifically, it reduced shelf life and appearance of vegetable and fruits.

CONCLUSION

The study on current practices of small-scale vegetable famers was conducted in three provinces of Cambodia to identify the farming practices and challenges faced by small-scale vegetable farmers. The results of study found that twelve types of vegetables (pak choi, leafy mustard, Chinese mustard, cabbage, Chinese cabbage, green mustard, lettuce, spring onion, crown daisy / chrysanthemum green, Chinese kale, gallic chives and culantro) were being grown in the provinces. However, only five types of vegetable were prominently grown, including Chinese mustard, green mustard, pak choi, leafy mustard, and Chinese kale. As production size is small, the majority of farmers used sickle/knife/scissors to harvest their products, and manual harvest is still being practiced by some farmers. Post-harvest activities such as grading, sorting and cleaning products after harvesting and before selling are rarely implemented by farmers. In terms of product marketing, majority of products are sold to collectors; while, a small quantity of remaining products is sold to retailers, farmers' group/cooperatives and direct consumers in the areas. The study also identified that three main challenges faced by farmers were insect pests and disease infestation, climate change (e.g. flooding, drought), and considerable fluctuation in prices. Other issues e.g. high input price, low price of products and post-harvest losses, especially in peak seasons of oversupply, also hamper the vegetable production in the studied provinces. Introduction of contract farming model is the best option to tackle the current issues of farmers. First, vegetable smallholders need to integrate into the agricultural cooperatives in the areas. These cooperatives collect all farmers' produce and then contract with retailers and other marketing actors in and outside Cambodia. Second, producer's group need to form in order to monitor the farming practices of members. Finally, vegetable hand-on trainings are required for producers to ensure that required quality and quantity of vegetable are produced.

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