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The Household Characteristics of Chinese Cabbage Farming Models in the Rainy Season at Lowland Area, Cambodia

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Abstract: -Cambodia's crop production makes up around 57% of agriculture's contribution to GDP. Vegetable production is a key component of farm diversification strategies to provide a promising economic opportunity for reducing rural poverty and unemployment in developing countries. Many desirable vegetables such as cabbage, lettuce, and tomatoes are difficult to produce inthe rainy season condition without significant inputs such asproper greenhouses, plastic row covers, and pesticides. The discontinuous supply of vegetables at stable volume has caused vegetable value chain to break and losses of competitiveness to the neighboring countries, namely Vietnam and Thailand.The better farming model would be of great benefit to vegetable producers; which will lead to a better market connection and stable production margin. The Chinese cabbage is one of the most popular leafy vegetables of Cambodian producers and consumers among many kinds of vegetables for their daily food security and income generation; while 100% of Chinese cabbage is imported all year round.The main objective of this research was to evaluate "The household characteristics of Chinese cabbage farmingmodelsin the rainy season at lowland area, Cambodia". The research was conducted atfour lowland provinces of Cambodia; with 120 Chinese cabbage producers contained 3 different farming models including: open field (OF), net house (NH), and plastic house (PH). The results of the research were found as follows: 1) The application of Chinese cabbage farming models was dependently correlated with the householder's demographics.2) The Chinese cabbageproductionwas significantly differentfor each farming models in term of production size, yield, produces price,and productivity (frequency of cycle and period). 3) The household perceptions on production obstacles, potentials, awareness, and suggestionswere absolutely relied on each farming models.Conclusively, the Chinese cabbage producers should apply the farming models under the net house or plastic house conditions to increase their productivity during rainy season with more potential market and price to generate their daily incomes and livelihoods.

Keywords:- *Chinese Cabbage, Demographics, Perceptions, Farming Models.*

I. INTRODUCTION

Cambodia's growing population is approximately 16.7 million [1], with over 60% of the Cambodian population lives in rural areas [2]; and around 37% of the total workforce remains directly engaged in the agricultural sector [3]. Thus,agriculture is a key pillar inCambodia economic growth, enhances food security, reduces poverty, and fosters rural development; while the share of agriculture in Cambodia's gross domestic product (GDP) was 22.85%, including the contributions of fishery at 5.5%, livestock at 2.6%, forestry at 1.6%, and crops at about 13%.The crop production takes the biggest share of total agricultural production; which makes up around 57% of agriculture's contribution to GDP [4].Among Cambodia's five top crops, vegetable production has the highest gross farm margins and return to labour, followed by cassava, maize, dry season rice, and wet season rice [5]. Vegetable production is a key component of farm diversification strategies to provide a promising economic opportunity for reducing rural poverty and unemployment in developing countries [6].

Cambodia is a net agricultural importer with vegetable imports worth approximately USD 200 million annually [3]. The heavy reliance on neighboring countries on vegetables is associated with the highly seasonal productions of Cambodian producers lasting for around only three months from late December to late March. The period is appropriate for vegetable production as the weather is relatively mild and dry [7]. Moreover, farmers are free from rice production and some of them opt to produce vegetables for additional income, causing the volume of vegetables to reach a peak while the price falls to the lowest one [8]. After the period, water becomes scarce and the soil becomes too dry whereas the wet season faces the problem of too much rainfall, causing waterlogging, high pests, and diseases [7]. The discontinuous supply of vegetables at stable volume has caused vegetable value chain to break and loss of competitiveness to the neighboring countries, namely Vietnam and Thailand. It is reported that local capacity for vegetable production could supply approximately 45% of the market demand, and 70% is in the peak period of the production [9]. The most challenge of vegetable industries in Cambodia face with low yields, especially in the wet-season[10]; while the vegetable production is concentrated mostlyin the dry season [11].Vegetables are increasingly recognized as essential for food and nutrition security [6]; in particular are an important part of the Cambodian diet, both

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in terms of quantity and frequency of consumption [12].The Chinese cabbage is one of the most popular leafy vegetables of Cambodian producers and consumers among many kinds of vegetables for their daily food security and income generation [13]. The 95% of cabbage is imported from July to October; while 100% of Chinese cabbage (*Brassica Pekinensis L. Rupr.*) is imported all year round [14].

Hence, the topic entitled "The household characteristics of Chinese cabbage farming models in the rainy season at lowland area, Cambodia" is essential in determining the better farming models, which will potentially help farmers to take benefits of higher prices and fill production gaps in terms of productivity,quality, and profitability. This will lead to a better market connection and production margin which is stable in the daily income generation and livelihood.

II. RESEARCH OBJECTIVE

"The household characteristics of Chinese cabbage farming models in the rainy season at lowland area, Cambodia" was conducted with 3 specific objectives as below:

- To characterize the household demographics of Chinese cabbage farming models,
- To evaluate the household productions of Chinese cabbage farming models, and
- To analyze the household perceptions of Chinese cabbage farming models.

III. RESEARCH METHODOLOGY

A. *Observation Site*

The research was conducted in 4 lowland provinces of Cambodia including: Kandal, Kampong Cham, Kampong Chhnang, and Svay Rieng Provinces (fig.1). The research was observed during the rainy season from August to November2022 with 120 Chinese cabbage producers in the 3 different farming models (40 producers in each model) including: Open Field (OF), Net House (NH), and Plastic House (PH).

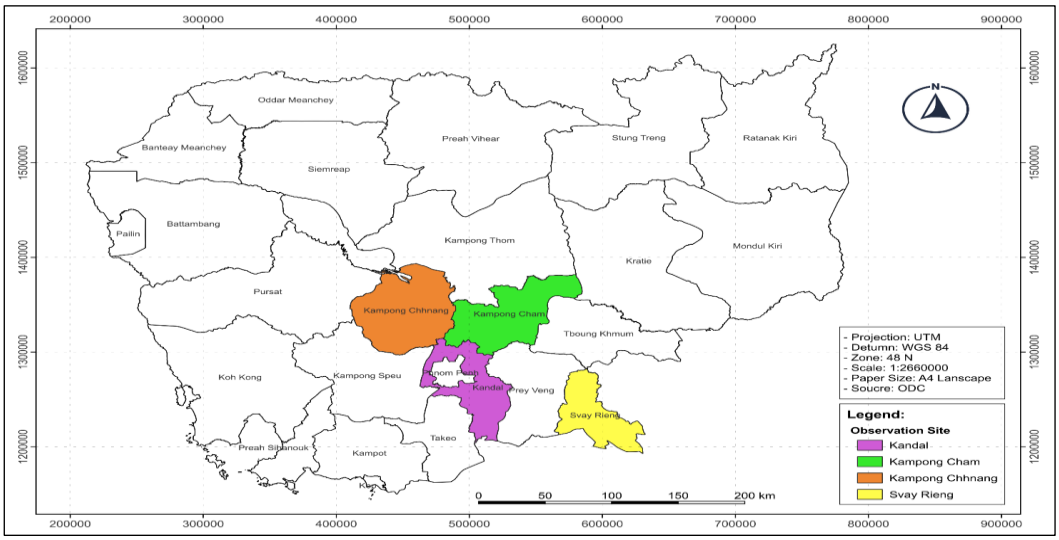

Fig. 1: Map of target provinces

B. *Data Collection*

The purposive sampling method was used to select the target provinces and determine the total sample size, since there is no exact population on Chinese cabbage producers; and the quota sampling method was used to determine the sample size in each target province and each production type. The semie structure interview and key individual interview were used with Chinese cabbage producers via the questionnaires to collect the data including: the household demographics, production status, obstacles, potentials, and perceptions of the Chinese cabbage production models.

C. *Data Analyses*

The collected quantitative and qualitative data were normalized and analysed withdescriptive statistic tools by using Minitab 24.0 program to examine the frequency, percentage, and mean comparison.

IV. RESULTS AND DISCUSSION

A. *The household demographics of Chinese cabbage farming models*

The household demographics as in the below table 1 presented that:1)Gender of householder: the most female householder accounted 22.5% for NH farming model, followed by 20% for PH and 15% for OFfarming models;conversely the most male householder accounted with 85%, 80%, and 77.5% for OF, PH, and NH farming models; respectively. 2)Age of householder: the most householder wasaccounted 62.5% at the age of30-50 years old for OF farming model, followed by50% at the age of 51-70 years old for PH farming model, and 47.5% at the age of 30-50 years old for NH farming model.; while the least householder was at the age of >70 years oldaccounted for 7.5%, 7.5%, and 2.5%for OF, PH, and NH farming models; respectively.3)Education of householder: the most

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householder was educated with 50% at primary school for NH farming model,followed by 47.5% at primary school for OF and 47.5% at secondary school for PH farming models; while the least householder was none illiteracy for NH, followed by 7.5% illiteracy and 12.5% at high school for PH and OF farming models; respectively.4) Household's member: the most household's member was 3 persons per family with 35% for NH, 32.5% for OF, and 32.5% for PH farming models; while the least household's member was 5 person per family with 12.5% for PH, followed by 15% for NH, and 17.5% for OF farming models.5) Household's female labour: the most household's female labour was only1 person per family with 90% for OF, 82.5% for NH, and 77.5% for PH farming models; while the least household's female labour was none per family with noneaccount for OF, followed by 5% for PH, and 7.5% for NH farming models.6) Household's male labour: the most household's male labour was 1 person per family with 70% for NH, 67.5% for OF, and 65% for PH farming models; while the least household's male labour was none per family with 7.5% for NH and PH, followed by 2 persons per family with 10% for OF farming model.

The results are similar to a study on greenhouse vegetable production conducted by Yamada S., et al.,2022revealed that 67.5% of the respondents were male, 32.5% were female, the average age was 47.30 years old, 95% were able to read and write Cambodia language; while 5% were illiterate; andthe average family size was 4.85 members [15]. In addition, according to Rana M. M., et al., 2021 expected that education is one of the importantfactors in determining respondents' level of knowledge andbehavioural pattern in the application of vegetable production [16]. These results would be presented that the application of Chinese cabbage farming models was mainly correlated with the householder's education as well as the householder's gender, age, member, and labours.

Table 1: Household demographics of farming models

Characteristics		OF (N=40)	NH (N=40)	PH (N=40)
Gender ofhouseholder	Male	85.00 %	77.50 %	80.00 %
	Female	15.00 %	22.50 %	20.00 %
Age ofhouseholder	<30 Years Old	17.50 %	5.00 %	10.00 %
	30-50 Years Old	62.50 %	47.50 %	32.50 %
	51-70 Years Old	12.50 %	45.00 %	50.00 %
	>70Years Old	7.50 %	2.50 %	7.50 %
Education ofhouseholder	Illiteracy	25.00 %	0.00 %	7.50 %
	Primary School	47.50 %	50.00 %	35.00 %
	Secondary School	15.00 %	37.50 %	47.50 %
	High School	12.50 %	12.50 %	10.00 %
Household Member	2 persons per family	20.00 %	27.50 %	25.00 %
	3 persons per family	32.50 %	35.00 %	32.50 %
	4 persons per family	30.00 %	22.50 %	30.00 %
	5 persons per family	17.50 %	15.00 %	12.50 %
Household Female Labour	0 person per family	0.00 %	7.50 %	5.00 %
	1 person per family	90.00 %	82.50 %	77.50 %
	2 persons per family	10.00 %	10.00 %	17.50 %
Household Male Labour	0 person per family	22.50 %	7.50 %	7.50 %
	1 person per family	67.50 %	70.00 %	65.00 %
	2 persons per family	10.00 %	22.50 %	27.50 %

B. The production characteristics of Chinese cabbage farming models

The household production characteristics of Chinese cabbage farming models as in the below table 2revealed that: 1) The farm size:Most offarmers produce the vegetable under the NH farming modelaccounted for 2,738 ha, followed by 2,184 ha and 1,881 ha for OF and PH farming models; respectively.Similarly, the most available size of cabbage farmaccounted for 2,031 ha was under the NHfarming model, followed by 1,228 ha and 511.10 ha for OF and PH farming models respectively; while the size of cabbage farm in the rainy season was smaller than that in the dry season for all OF, NH, and PH farming models accordingly.2) The cabbage yield: the most cabbage yield per cycle was accounted for 24.36 ton/ha for PH farming model, followed by 22.56 ton/ha for NH and 7.47 ton/ha for OF farming models in the rainy season; while in the dry season, the cabbage yield was higher than that accounted for 17.99 ton/ha, 25.04 ton/ha, and 25.88 ton/ha for OF, NH, and PH farming models; accordingly.3) The cabbage price: the most expensive price of the cabbagein the rainy season accounted with 961.30 $/ton for NH farming model, followed by 937.50 $/ton and 826.20 $/ton for PH and OF farming models respectively; while the price of cabbage inthe rainy season was more expensive than that in the dry seasonfor all farming models.4) The annual growing cycle and period: the most cabbage production was 1-2 cycle accounted with 82.5% for OF farming model, followed by 1-

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2 cycle accounted with 67.5% for NH, and 1-2 and 3-4 cycles accounted for 42.5%for PH farming models; while at least the production with 4-5 cycles annually accounted with 15%for PH farming model in comparing with none for OF and NH farming models. Anyways, the most cabbage production period was in the beginning of rainy season from July to September accounted with 75% for OF, 80% for NH and PH farming models; while the least production period was from Octoberto December 55% for OF, from January to March 47.5% for NH and 40% for PH farming models.

It was also noted by Kimberly Duncan, et al., 2012 that many desirable vegetables such as cabbage, lettuce, and tomatoes are difficult to produce in the rainy season condition without significant inputs such as proper greenhouses, plastic row covers, and pesticides [17]. This would be presented that the vegetable production scale under the OF farming model was quite bigger in term of production size, growing periods, and frequency of production cycle; which was the same result as the finding in the bellow table 2.There was also another experiment conducted in the rainy season by Tithya Kang, et al., 2023 reported that the cabbage yield was 9.53 ton/ha for OF, 21.57 ton/ha for NH, and 26.7 ton/ha for PH farming models. The results were better than the bellow table 2 since it was more precise with the full-control condition of experimentation which would be possible in generalizing the actual condition of the country [18]. Furthermore, the above authors (Tithya Kang, et al., 2023) also mentioned that the cabbage contracted price was 750 $/ton for OF, and 1,000$/ton for NHand PH farming models[18]; which were slightly different in comparing with the results in this paper.Thence, these results would be illustrated that the Chinese cabbage productionwas significantly differentfor each farming models in term of production size, yield, producesprice, and productivity (frequency of cycle and period).

Table 2: Production characteristics of farming models

Characteristics		**OF (N=40)**	**NH (N=40)**	**PH (N=40)**
Total farm size (ha)		**2184.00**	**2738.00**	**1881.00**
Cabbage farm (ha)	Available size	1228.00	2301.00	511.10
	Rainy season	1094.00	468.00	365.30
	Dry season	1131.00	476.00	388.00
Yield (t/ha)	Rainy season	7.47	22.56	24.36
	Dry season	17.99	25.04	25.88
Price ($/t)	Rainy season	826.20	961.30	937.50
	Dry season	505.00	818.10	923.12
Annual growing cycle (%)	1-2 Cycle	82.50	67.50	42.50
	3-4 Cycle	17.50	32.50	42.50
	5-6 Cycle	0.00	0.00	15.00
Growing period (%)	Jan-March	67.50	47.50	40.00
	April-June	57.50	62.50	75.00
	July-Sept	75.00	80.00	80.00
	Oct-Dec	55.00	62.50	75.00

Table 3: Obstacles characteristics of farming models

Characteristics	OF (N=40)			NH (N=40)			PH (N=40)		
Weakness	Strong	Moderate	Weak	Strong	Moderate	Weak	Strong	Moderate	Weak
Technical issues	42.50 %	47.50 %	10.00 %	30.00 %	42.50 %	27.50 %	30.00 %	27.50 %	42.50 %
Short production period	47.50 %	27.50 %	25.00 %	25.00 %	25.00 %	50.00 %	12.50 %	17.50 %	70.00 %
Labour shortage	32.50 %	40.00 %	27.50 %	22.50 %	22.50 %	55.00 %	22.50 %	32.50 %	45.00 %
Lack of capital	17.50 %	42.50 %	40.00 %	25.00 %	32.50 %	42.50 %	20.00 %	22.50 %	57.50 %
Lack of irrigation system	25.00 %	30.00 %	45.00 %	27.50 %	22.50 %	50.00 %	20.00 %	17.50 %	62.50 %
Lack of smart agro-tools	25.00 %	45.00 %	30.00 %	35.00 %	17.50 %	47.50 %	22.50 %	17.50 %	60.00 %
Lack of transportation	17.50 %	27.50 %	55.00 %	12.50 %	17.50 %	70.00 %	10.00 %	17.50 %	72.50 %
Threat	Strong	Moderate	Weak	Strong	Moderate	Weak	Strong	Moderate	Weak
Saturated soil	65.00 %	20.00 %	15.00 %	45.00 %	27.50 %	27.50 %	12.50 %	12.50 %	75.00 %
Less productivity	47.50 %	47.50 %	5.00 %	35.00 %	25.00 %	40.00 %	22.50 %	20.00 %	57.50 %
Much pest	65.00 %	30.00 %	5.00 %	35.00 %	40.00 %	25.00 %	22.50 %	30.00 %	47.50 %
Low vegetable quality	30.00 %	30.00 %	40.00 %	22.50 %	22.50 %	55.00 %	20.00 %	17.50 %	62.50 %
Competitiveness	47.50 %	25.00 %	27.50 %	45.00 %	20.00 %	35.00 %	22.50 %	25.00 %	52.50 %
High cost of inputs	90.00 %	5.00 %	5.00 %	77.50 %	15.00 %	7.50 %	65.00 %	20.00 %	15.00 %
Unstable price	50.00 %	40.00 %	10.00 %	47.50 %	30.00 %	22.50 %	25.00 %	35.00 %	40.00 %
Low demands	25.00 %	30.00 %	45.00 %	17.50 %	27.50 %	55.00 %	12.50 %	25.00 %	62.50 %
Average	41.83 %	32.50 %	25.67 %	33.50 %	25.83 %	40.67 %	22.67 %	22.50 %	54.83 %

C. The household perceptions of Chinese cabbage farming models

As in the bellow table 3, the obstacle characteristicsof Chinese cabbage farming models including weakness and threat revealed that: 1)The strongest obstacle was under the OF farming modelaccounted for 41.48% followed by 33.50% and 22.67% for NH and PH farming models; respectively. 2) The most moderate obstacle was under the OF farming model accounted for 32.50% followed by 25.83% and 22.50% for NH and PH farming models; respectively. 3) The most weakness obstacle was under the PH farming model accounted for 54.83% followed by 40.67% and 25.67% for NH and OF farming models; respectively. The parameters of obstacle characteristics including technical issues, short production period, labour shortage, lack of capital, lack of irrigation system, lack of smart agro-tools, lack of transportation, saturated soil, less productivity, much pest, low vegetable quality, competitiveness, high cost of inputs,unstable price, andlow market demands; while the most obstacle was 90% on high cost of inputs followed by 65% on saturated soil andmuch pest, and 50% on unstable price.

There was a result reported by Sokhan Chen, et al., 2018revealed thatthe most obstacle of vegetable farming was 70% on high cost of inputs followed by 63% on price fluctuation, and 33% on pest prevention [19]. Furthermore, Sean Kiely, 2019 also presentedthatthe most obstacle of vegetable farming was 62% on pest damage as well as 56% on crop price, and 54% on change in inputs cost [20]. These results were slightly same as the ones had found in the bellow table 3. Thus far, these results would be interpreted that the Chinese cabbage production was mainly affected by increasing of inputs cost, saturated soil and pest, and unstable produces price; especially for the OF farming model. These factors will make the Chinese cabbage farming at risks of price, production, and marketing during the rainy season.

The bellow results (table 4)found that the potential characteristics of Chinese cabbage farming models including strength and opportunity revealed that: 1) The most goodpotential was under the NH farming model accounted for 75.83% followed by 55% for NH and 48.33% for OF farming models. 2) The most moderate potential was under the OF farming model accounted for 19.44% followed by 16.67% and 11.94% for NH and PH farming models; respectively. 3) The most badpotential was under the OF farming model accounted for 31.94% followed by 28.33% for NH and 12.22% for PH farming models. The parameters of potential characteristics including technical standard realization, available land, group membership, quality certificate, farming contract, policy support, job opportunity, migration reduction, and market opportunity; while the most goodpotential was 95% on job opportunity for OF followed by 92.50% on available landand 90% on technical standard realization for PH farming model.

There was a report conducted by Thira Pinn, et al., 2020 showed that the household land size and agriculturalland size differed between the provinces.The household own area under vegetable farming accounted for 97.88% (0.80 ha) in comparing with the rented area under vegetable farming accounted for 2.12%(0.017 ha) [3]; which was similar with 92.50% respondents on the available land under vegetable farming in the bellow table 4. In addition, there was also a result reported by Khin Pisey and Thong Meas, 2016 revealed that the five vegetable commodities which have high potential for GAP certification include cucumber, cabbage, curly wrap pak choy, Chinese green, and water convolvulus. For hotels and restaurants, in addition to cucumber and cabbage, other three potential vegetable commodities for GAP certification are lettuce, tomato and bok choy. These commodities are generally among the most commonly purchased by consumers and also among those with low level of safety perception [21]. These results indicated the consumers' standard realization; meanwhile the producers' standard realization was needed to be compliant. From this point, the producers' standard realization was very potential as the results mentioned in the bellow table 4; while the application of NH and PH farming models would get much more conveniences to compliance with the standard to generate their daily job opportunity.

Table 4: Potential characteristics of farming models

Characteristics	OF (N=40)			NH (N=40)			PH (N=40)		
Strength	Good	Moderate	Bad	Good	Moderate	Bad	Good	Moderate	Bad
Standard realization	25.00 %	35.00 %	40.00 %	45.00 %	30.00 %	25.00 %	90.00 %	7.50 %	2.50 %
Available land	77.50 %	17.50 %	5.00 %	82.50 %	10.00 %	7.50 %	92.50 %	7.50 %	0.00 %
Group membership	25.00 %	17.50 %	57.50 %	35.00 %	12.50 %	52.50 %	77.50 %	10.00 %	12.50 %
Quality certificate	15.00 %	7.50 %	77.50 %	27.50 %	12.50 %	60.00 %	52.50 %	15.00 %	32.50 %
Farming contract	20.00 %	12.50 %	65.00 %	27.50 %	2.50 %	70.00 %	45.00 %	5.00 %	50.00 %
Opportunity	Good	Moderate	Bad	Good	Moderate	Bad	Good	Moderate	Bad
Policy support	42.50 %	25.00 %	32.50 %	47.50 %	22.50 %	30.00 %	70.00 %	27.50 %	2.50 %
Daily job opportunity	95.00 %	2.50 %	2.50 %	90.00 %	5.00 %	5.00 %	90.00 %	5.00 %	5.00 %
Migration reduction	77.50 %	20.00 %	2.50 %	77.50 %	20.00 %	2.50 %	77.50 %	17.50 %	5.00 %
Market opportunity	57.50 %	37.50 %	5.00 %	62.50 %	35.00 %	2.50 %	87.50 %	12.50 %	0.00 %
Average	48.33 %	19.44 %	31.94 %	55.00 %	16.67 %	28.33 %	75.83 %	11.94 %	12.22 %

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The bellow results (table 5) found that the awareness characteristics of Chinese cabbage farming models revealed that: 1) The most strong awareness was under the OF farming model accounted for 67.50% followed by 53.33% for NH and 36.67% for PH farming models. 2) The most moderate awareness was under the NH farming model accounted for 28.33% followed by 25.42% and 22.92% for OF and PH farming models; respectively. 3) The most bad awareness was under the PH farming model accounted for 40% followed by 18.33% for NH and 7.08% for OF farming models. The parameters of awareness characteristics including unavailability in buying safe vegetable, much chemical use on vegetable, unsafe imported vegetable, high price vegetable in the rainy season, effect of unsafe vegetable on health, and effect of unsafe vegetable on environment; while the most strong awareness was 92.50% on unsafe import vegetable for PH farming model followed by 75.00% on much chemical use on vegetable and 72.50% on unavailability in buying safe vegetable for OF farming model. These would be a serious concern on the vegetable consumption in Cambodia in term of locally vegetables as well as the imported vegetables.

There was a result reported by NIRAS International Consulting, published by Noualyny Nara, 2022 presented that Cambodia itself could produce vegetable only 68% of total demand; while another 32% were imported. With this insufficient supply, there are a lot of concerns raised among Cambodian people on high chemical imported vegetable. Furthermore, the price of local vegetable was higher than the imported vegetable with 5% to 10% for the different kind of vegetable at the different time depending on the season; while the input cost was the major cause to the price gap which the imported vegetable was much competitive for wholesaler and retailer to generate more profit. Meanwhile, imported vegetable was stable supply with one year-round, it was less competitive for Cambodia farmer to compete the price and quantity in the market. There were many factors had been raised among consumers, farmers, government officers, NGOs, and private sectors on the causes of low supply vegetable in the country. These concerns were similar with the concerns be aware by the respondents in this recent result found in the bellow table 5; which would be taken actions immediately.

Table 5: Awareness characteristics of farming models

Characteristics	OF (N=40)			NH (N=40)			PH (N=40)		
	Strong	Moderate	Weak	Strong	Moderate	Weak	Strong	Moderate	Weak
Unavailabilityin buying safe vegetable	72.50 %	22.50 %	5.00 %	32.50 %	22.50 %	45.00 %	25.00 %	17.50 %	57.50 %
Much chemical use on vegetable	75.00 %	15.00 %	10.00 %	42.50 %	42.50 %	15.00 %	10.00 %	35.00 %	55.00 %
Unsafe imported vegetable	75.00 %	17.50 %	7.50 %	80.00 %	15.00 %	5.00 %	92.50 %	7.50 %	0.00 %
High price vegetable in the rainy season	67.50 %	30.00 %	2.50 %	65.00 %	17.50 %	17.50 %	35.00 %	40.00 %	25.00 %
Effect of unsafe vegetable on health	60.00 %	30.00 %	10.00 %	60.00 %	30.00 %	10.00 %	40.00 %	20.00 %	37.50 %
Effect of unsafe vegetable onenvironment	55.00 %	37.50 %	7.50 %	40.00 %	42.50 %	17.50 %	17.50 %	17.50 %	65.00 %
Average	67.50 %	25.42 %	7.08 %	53.33 %	28.33 %	18.33 %	36.67 %	22.92 %	40.00 %

As in the bellow results (table 6) found that the suggested characteristics of Chinese cabbage farming models revealed that: 1) The most suggested technical support was under the PH farming model accounted for 55% followed by 52.50% for OF and 35% for NH farming models. 2) The most suggested better produce price with stable market was under the NH farming model accounted for 65% followed by 62.50% for PH and 50% for NH farming models. 3) The most suggested reduction of agricultural inputs price was under the PH farming model accounted for 55% followed by 52.50% for OF and 50% for NH farming models. 4) The most suggested loan support with favorable condition was under the NH farming model accounted for 80% followed by 57.50% for PH and 55% for NH farming models. 5) The most suggested support of agricultural inputs was under the OF farming model accounted for 52.50% followed by 47.50% for PH and 22.50% for NH farming models.

These results would be translated that the Chinese cabbage production under all farming modelsstill need more suggestions; especially the suggestion on the reduction of agricultural inputs price, better produce price with stable market, and loan support with favorable condition.

Table 6: Suggested characteristics of farming models

Characteristics	OF (N=40)	NH (N=40)	PH (N=40)
Technical support	52.50 %	35.00 %	55.00 %
Better produce price with stable market	50.00 %	65.00 %	62.50 %
Reduction of agricultural inputs price	55.00 %	67.50 %	62.50 %
Loan support with favorable condition	55.00 %	80.00 %	57.50 %
Support of agricultural inputs	52.50 %	22.50 %	47.50 %
Average	53%	54%	57%

V. CONCLUSION

The characteristics of Chines cabbage differed between farming models in term of household demographics, production, and perceptions. The net house (NH) or the plastic house (PH) farming modelsindicated more better solutions and benefits for long term vegetable producers. Consequently, the vegetable producers should grow their vegetables under the net house (NH) or plastic house (PH) to increase the productivity with more potential output price at rainy season to generate their daily incomes and livelihoods.The government should promote more vegetable production under the net house (NH) or the plastic house (PH) farming modelsand support to solve the production obstacles to ensure less production cost and better outputs price viz: 1) Encourage private sector to invest on locally made of inputs, structure and accessory; 2) Subsidize agricultural loan with lower interest rate and favorable condition; and 3) Coordinate with contracted buyers and farmers to ensure better stable price.

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