ทัศนคติของผู้บริโภคภาคเหนือต่อผักไฮโดรโปรนิค

CONSUMER ATTITUDES TOWARDS HYDROPONIC VEGETABLES IN NORTHERN THAILAND

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บทคัดย่อ

งานวิจัยนี้ได้สำรวจแนวคิดของผู้บริโภคที่เกี่ยวกับทัศนคติและพฤติกรรมในการบริโภคผักไฮโดร-โปนิคในเขตภาคเหนือของประเทศไทย ซึ่งมีจุดมุ่งหมายเพื่อส่งเสริมให้มีการใช้วิทยาการการเกษตรสมัยใหม่ที่มีประสิทธิภาพเพื่อมาปรับปรุงการผลิตในประเทศไทย งานวิจัยนี้ได้ใช้วิธีการอภิปรายกลุ่ม โดยมีผู้เข้าร่วมการอภิปรายกลุ่มทั้งสามกลุ่มเป็นจำนวน 21 คน และใช้แบบสอบถามสำรวจผู้บริโภคในเขตภาคเหนือ จำนวน 450 คน (ผู้ชาย 155 คน, ผู้หญิง 285) คำถามหลักจะศึกษาถึงความเข้าใจเกี่ยวกับผักไฮโดรโปนิค พฤติกรรมของผู้บริโภค และศึกษาวิธีการที่เกษตรกรหรือผู้ค้าปลีกสามารถสร้างมูลค่าในการตลาดเพื่อตอบสนองความต้องการของลูกค้าให้ดียิ่งขึ้น ผลลัพธ์แสดงให้เห็นว่าคนไทยมีทัศนคติในเชิงบวกต่อผักไฮโดรโปนิค โดยเข้าใจว่าผักมีความสะอาดและไม่ใช้สารเคมีในการปลูก อย่างไรก็ตามก็ยังมีคนที่ไม่รู้จัก ผักไฮโดรโปนิค และไม่เคยบริโภค ดังนั้นการให้ความรู้ที่เกี่ยวข้องกับผักไฮโดรโปรนิค อาจช่วยให้ผู้บริโภคมีความมั่นใจในการซื้อสินค้ามากขึ้น และธุรกิจก็สามารถพัฒนาในเรื่องของความสะอาด บรรจุภัณฑ์ ความน่าเชื่อถือ การจัดจำหน่าย และโปรโมชั่นเพื่อสร้างสรรค์ประสบการณ์ที่ดีของการบริโภคของลูกค้าให้ดียิ่งขึ้น

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Abstract

This paper explores the concept of consumer attitudes and relevant behaviour on hydroponic vegetable in Northern Thailand as we hope to promote efficiency modern agricultural methods. Three focus group sessions of 21 participants were created to explore the issues. These participants were asked questions and their views on the topic were discussed. An online survey was conducted. The system automatically deleted responses from participants who were outside northern Thailand. A total of 450 questionnaires (155 males, 285 females) were retained as they were completed by respondents in the northern Thailand region. The main question asked concerned participants' understanding of hydroponic vegetables. The questionnaire also inquired into how growers and sellers can create product value. Giving information to potential customers about the product can help create a market or increase the market demand for the product. Survey results suggest that, Thai people have a positive attitude towards hydroponic vegetables as they view it as clean as no chemicals and insecticides are used in the production of such products. However, many people still do not know about hydroponic vegetables and fruit, therefore an information campaign could facilitate confidence in the product, and thereby create a greater market share for the product. Moreover, cleanliness, packaging, trust, distribution and promotions are also important factors, which can increase shopping experience for the customer.

Keywords: Consumer Attitude, Consumer Behaviour, Hydroponic Vegetables, Shopping Experiences

Introduction

In the agricultural sector the whole value chain, from farmer to the final consumer, the current trend is to give greater importance to sustainable consumption as well as healthy diet. It is possible to implement alternative farming methods that could increase agricultural output in order to guarantee food supplies for the growing population. An alternative farming method is Hydroponic agriculture.

Hydroponic agriculture provides many benefits to the ecosystem. First, it is a soilless production method so it does not need herbicides or chemical pesticides (Wattanapreechanon & Sukprasert, 2015) and so, it positively affects human health and the environment. Moreover, commercial hydroponic food production methods allow on average four times the amount of crops in the same space as traditional soil-based farming, and it can guarantee a faster growth for many kinds of crops (The Department of Agricultural Extension, 2015).

In the vegetable market, there are growing opportunities and greater consumer demand for hydroponic products. According to Johnson, Weinberger and Wu (2008), the rising demand for vegetables improved due to increasing urbanization. This increase in the demand for vegetables creates greater market potential for hydroponically grown vegetable products.

The Thailand Board of Investment (BOI) is fostering investment in the vegetable industry and hydroponics are being considered as one of the 'BOI priority areas' (Johnson, Weinberger & Wu, 2008). Thai consumers are increasingly aware of possible pesticide residue and increasing awareness of healthier ways of living (Posri, Shankar & Chadbunchachai, 2006).

Thus, the researcher believes that a greater understanding of the attitudes and behaviours of people in Thailand would help to create useful insights for a better response for growers and farmers in order to satisfy the demands of Thai consumers and market trends.

Additionally, the researcher aims to promote awareness of health and wellness concepts. Since vegetables are beneficial and can help to improve health (Fowke, Longcope & Hebert, 2000; Kiefer, Prock, Lawrence, Wise, Bieger, Bayer & Rieder, 2004) therefore the consumption of vegetables, especially hydroponic vegetables, is recommended.

Literature Review

Healthy trend and Overview of demand in vegetables

With regard to Thailand, Euromonitor International (Thailand Board of Investment, 2015) reported that in 2012, *"sales of health and wellness products grew by 10% in Thailand. The value of these products reached US$ 5.24 billion in 2013 and is expected to increase to more than US$ 6.63 billion by 2017. Products aimed at general wellbeing occupied the largest market share at 56%, followed by energy boosting at 10.3 %, which was in turn closely ahead of digestive health and weight management, at 9.8% and 8.2%, respectively."* This shows that the demand for health and wellness products in Thailand continues to grow gaining positive responses from the local community and people at different levels. The fact that in Thailand obesity has become a serious issue over the past few decades (Aekplakorn & Mo - suwan, 2009) with high increases of diabetes, cardiovascular risk factors and body weight could be seen as one of the driving forces of the higher consumption of vegetables and health products in general as a solution to such problems and/or a method of prevention; although studies indicate that the improved demand might come from increased marketing efforts within the sector (Cargill, 2015).

In this scenario, with the Government financing companies and private individuals towards the promotion of vegetable consumption. The government is also promoting hydroponic vegetable cultivation and production. The aim is to encourage greater awareness among people of healthier life styles, especially in the light of increased levels of urbanization (The World Bank, 2015). It seems clear how the production and commercialization of hydroponic vegetables and vegetables in general could soar and bring benefits to the whole country. More specifically, Northern Thailand would benefit, being the centre of most of the Thai vegetable production and the origin of the Vegetable Supply Flows (Johnson, Weinberger & Wu, 2008). Benefits for northern Thailand are considerable as the region is a leading vegetable producer. Greater production and commercialization on one side and increased

consumption of such products by different levels of consumers on another side would help to increase regional prosperity. With people becoming more conscious of the safety of food, the increased use of pesticides has become a matter of concern, especially as chemical residues have been found in vegetables and fruits across the country (Fernquest, 2016). The effect of the Government's efforts in changing consumers' minds and behaviours towards making greater use of vegetables and hydroponically grown produce, can be seen the increased general consumption of such foods and also the consumers' attitude towards them. Kashemsant, a director of ACK Hydro farm (Rungfapaisarn, 2012) said, "Domestic market demand for hydroponically grown produce has grown more than 20 percent per year due to increased awareness and increased interest in healthy ways of living among Thai consumers." Resh (1993) indicates that many vegetable producers are becoming interested in adopting hydroponic methods of production. A study reported by (Wattanapreechanon & Sukprasert, 2015) shows that touristic locations, big cities and urban areas, have seen a dramatic increase in hydroponics' production.

Hydroponic Techniques to Cope with Vegetable Demand

The Department of Agricultural Extension (DOAE) of Thailand introduced Hydroponic production methods (The Department of Agricultural Extension, 2015) across the region to pursue higher production levels in order to cope with the rising demand of consumption and to facilitate and train local farmers and producers. The growing method for hydroponics has been widely adopted in Thailand as plants grown by hydroponics had consistently superior quality, high yield, rapid harvest, and high nutritional content. The Thai government has recently developed a promotion campaign emphasising hydroponic methods as it is considered to be water efficient and the quality of the produce is high (Wattanapreechanon & Sukprasert, 2012).

Consumer Attitudes and Behaviours

The objectives of this study are to understand the consumers' attitudes towards hydroponic vegetables, especially in terms of the benefits and risks of hydroponic vegetables, and to identify their behaviours related to hydroponic vegetable consumption. This project also aims to forward suggestions for enhancing opportunities for growers using the 4 Ps of the Marketing Mix (product, price, place and promotion) (Kotler & Armstrong, 2013) and Consumer Style Inventory (CSI) which is defined by Sproles and Kendall (1986) as, 'pioneered to investigate consumer decision-making processes by profiling consumers into different decision-making styles'. These two concepts point to the importance of branding and effective marketing strategy. To achieve these objectives, the researcher also follows the concepts of three components of attitudes (LaPiere, 1934) including cognitive, affective and conative to have a better understanding of consumer attitudes and behaviour using the marketing mix. In this, marketing responses, purchasing choices and consumer habits in northern Thailand, need to be studied and applied to the marketing strategies used to market hydroponic vegetables.

Methods

The chosen strategy of inquiry for this is a mixed method approach. The mixed method approach used here includes the collection and analysis of data focussing on both qualitative and quantitative approaches. In this study, it involves interviews which is qualitative in nature and surveys, where the data was quantified and analysed, in keeping with the principles of quantitative research. The advantage of choosing a mixed method approach is that it helps to glean more in-depth information of the issues under investigation and to provide rich datasets, to improve the reliability of the findings (Azorin & Cameron, 2010). In the first phases, the study collected focus group data while survey data was collected in the second phase.

Focus groups

Three focus groups of 6-8 persons each were formed in Phitsanulok, Thailand, in August 2016. All participants were recruited through convenience sampling, availability and profiling. The selection included individuals who are responsible for food choice and purchases in their households and who had shown interest in hydroponic vegetables.

The demographic characteristics of the groups are summarized on Table 1. Two groups were made of women (grouped as 'single' and 'housewife', respectively). Men were included in the third group aged between 20 and 60 all of whom are employed or who have a college level degree. The reason for choosing such groups is because, in Thailand, women are still mainly responsible for food shopping and preparation in the majority of the households, whereas men of high educational background or income are becoming more involved with the food purchase and preparation.

Table 1 Profile of the participants in the focus group

Group	Gender	Status	Number
W1	Women	Single	8
W2	Women	Housewife	6
M	Men	Single	7

A moderator and two assistants led the discussions. The participants were seated in a circle – to allow eye contact and to maintain a free flow of discussion. The sessions were recorded. All participants understood that the sessions were recorded. Notes were taken by the moderator. Again, the participants knew that notes were being taken and had agreed to the procedure. The participants were encouraged to state their opinions freely and were informed that the researchers expected no right or wrong answers.

The themes and categories identified from the data analysis are the major finding of the qualitative phase. These have been shaped into a general description of the phenomenon of hydroponic vegetable attitude. Appendix 1 summarises the interview guide describing the sequence of questions put to each group. The open-ended questions

concerned the participants understanding, experiences and related consumption habits of hydroponic vegetables. Focus group discussions took approximately 30 minutes each.

Survey questionnaire

An online survey was chosen due to its cost-effectiveness, data availability and convenience. The survey was designed in a manner that would preserve participant anonymity. A filter was included in the online questionnaire system which automatically removed potential respondents from outside the region. The population of northern Thailand is 11,656,000 according to the 2010 census (National Statistical Office of Thailand, 2010). This means that the population is fairly large and therefore the number of prospective respondents may be large. For this reason, random sampling techniques were used in order reflect an accurate representation of the target population (Churchill, Brown & Suter, 2010). According to Cochran (1977), to determine the random sampling number of an uncertain population (including large numbers) it is possible to use the following formula,

$N = Z^2 /4e^2$

N = The sample size

P = The proportion of interested population choice

E = Confidence interval (e.g., 0.04 = +-4)

Z= Z value (e.g. 1.96 for 95 confidence level)

At 95 confidence level, the error that may be acceptable is at 5 % and the proportion of population is 0.5, the formula calculation is equal;

$N = Z^2/4e^2$

$N = (1.96)^2/4*(0.05)^2$

$N = 384.16 \approx 384$ Units

Thus, a sample of a minimum of **384** respondents across the northern region of Thailand will be the sample population of the survey in order to have a better understanding of customers' insights into the phenomenon and ultimately a more accurate evaluation of why customers think and behave in the certain ways.

The survey was then placed online in hydroponic websites and distributed through the social media network, filtered by question and answer to collect data from respondents who lived only in Northern Thailand. Description and content analysis was used to analyse the attitude, behaviour and trends affecting respondents.

Results

The majority of participants were female and interested in Hydroponic products. The characteristic of participants is shown in Table 2.

Table 2 Demographic characteristics of Hydroponic vegetable consumers in Northern Thailand participating in the research using survey methods.

	Survey (number = 445)		Focus group (number= 21)		Total (number = 466)	
Gender	Male 155	35.2%	Male 7	33.4%	Male 162	35.1%
	Female 285	64.8% [2]	Female 14	66.6%	Female 299	64.9% [3]
Age	< 15 years old		< 15 years old		< 15 years old	
	0	0%	0	0%	0	0%
	15 – 24 years old		15 – 24 years old		15 – 24 years old	
	96	21.5%	16	76.2%	112	24.4%
	25 – 34 years old		25 – 34 years old		25 – 34 years old	
	175	39.1%	2	9.5%	177	38.6%
	35 – 44 years old		35 – 44 years old		35 – 44 years old	
	102	22.8%	0	0%	102	22.2%
	45 - 54 years old		45 - 54 years old		45 - 54 years old	
	64	14.3%	1	4.8%	65	14.2%
	55 – 60 years old		55 – 60 years old		55 – 60 years old	
	1	0.2% [4]	2	9.5%	3	0.6% [5]
Career	Student		Student		Student	
	95	21.3%	10	21.3%	105	22.5%
	Private Company		Private Company		Private Company	
	131	29.4%	5	29.4%	136	29.2%
	Government Employee		Government Employee		Government Employee	
	79	17.8%	2	17.8%	81	17.4%
	Business Owner		Business Owner		Business Owner	
	100	22.5%	4	22.5%	104	22.3%
	Housewife		Housewife		Housewife	
	28	6.3%	0	0%	28	6%
	Other		Other		Other	
	12	2.7%	0	0%	12	2.6%
Interested in Hydroponic	Interest		Interest		Interest	
	344	77.3%	21	100%	365	78.3%
	No-interest		No-interest		No-interest	
	101	22.7%	0	0%	101	21.7%

[2] Missing 5

[3] Missing 5

[4] Missing 7

[5] Missing 7

Qualitative results

The transcripts of the interviews were analysed for themes and content. Prior to the analysis, group case summaries were constructed and irrelevant information were identified. Frequent clusters were developed reflecting the main topics or considerations rising from the discussions. Each cluster consisted of different units, which could be relevant to more than one group depending on the content. Several themes with supporting quotes were obtained from focus group discussions (appendix1).

Knowledge of Hydroponic Vegetables

The general understanding about hydroponic vegetables within the focus group shows a direct association to the crop production without soil and using lower levels of water. Some participants have shown an understanding of the growing methods and techniques and of how applying nutritional solutions; however, other participants could not give any explanation or description regarding the topic. Overall, most of the participants show awareness and a general understanding of the matter and some have had experience with hydroponic products: some people eat hydroponics at restaurants, some buy them at the supermarket or grow their own hydroponic vegetables, while others have learnt about them through media and the Internet or at events and fairs.

Perception of hydroponic vegetables (Benefits and Risks)

During focus group discussions and interviews, it was noted that, in most cases, respondents tend to believe that hydroponic products are **clean**, especially in the growing methods, and **nontoxic**, which is a sign of a positive overall level of perception. Being at the centre of what people have in mind when thinking of hydroponics, these two elements could certainly be adding value to the products, especially when compared to conventionally grown vegetables that show increasing levels of pesticides in vegetables available at stores and supermarkets (Fernquest, 2016). By contrast, those participants who are less familiar with hydroponics tend to confuse hydroponic and organic products. This might affect the way these people perceive the two different types of products and their buying behaviours. In this scenario, the Thai government through educational campaigns and informative communication could reduce this confusion between organics and hydroponics and aim to increase the consumption of both types of vegetables.

Furthermore, in every group, many participants, indicated concern with the **pricing** of hydroponic products “they are quite expensive” and their **availability** at stores and supermarkets. “It is not easy to find hydroponic products in the local market”. Other people have said how the **product** itself does not suit the needs of Thai cuisine “hydroponic vegetables are mostly used in salads and this is not suitable for many Thai dishes”. Also, some respondents are **uncertain of possible health issues** “I’m not sure about how the hormones (used) for growing hydroponics will effect the body”.

In addition, the qualitative study made use of some key words such as: *safe*, *environment* and *urban*, to understand how people would link such words with hydroponics. During the interview, therefore participants were asked to link hydroponics to the mentioned key words and to outline any reasoning behind it.

The following shows what this section of the study revealed.

Safe

Here most links were made with the production and growing methods; responses were: “no use of chemicals”, “no chemical-residue’, “best selection of vegetables”, “no bugs” and “Safe growing methods”. It appears that people understand how the hydroponic growing methods can reduce the presence of chemical agents and pesticides.

Environment

With this key word the perceived link with hydroponics can be split into two clusters: The first concerning the use of methods that do not hurt the environment and a second as hydroponics “help save water”, “need no chemical and save the land”.

Urban

Responses showed that people associate hydroponics with urban areas in terms of home-based and individual production, suitable also for urban areas: “big cities have little space” (to have land aimed at vegetable growing), “(hydroponics are) easy to grow at home” and “convenient as they need no soil”.

Overall it appears that the key words session helps people to associate hydroponics with some of their benefits (more than risks) and it highlights how many people correctly address the meaning and the main benefits of these products if given direction with the use of the key words used.

Purchasing Behaviours

According to the focus group, participants have different eating habits. Some participants prefer to cook by themselves, other participants prefer to eat ready-to-eat food and a few prefer both. However, from this research most respondents like to eat at home. When asking how much would they spend to buy vegetables in a week, the majority said around 100-600 baht, which is a relatively low amount even for northern Thailand also considering how most people tend to eat at home rather than out.

From the research, only people being part of numerous families spend around 1000 - 1200 baht per week to purchase their stock of vegetables for themselves and their families. With regard to location, although the fact that hydroponics are often available in many locations: farms, local markets and retail chains, supermarkets are the most common choice for people to shop for hydroponic items.

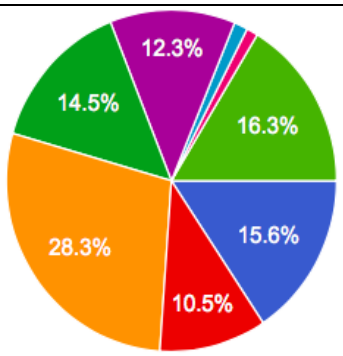
The study also asked about selecting a favourite type of hydroponic and here the respondent answers varied consistently. However, it is interesting to note that even though many Thai dishes do not involve hydroponics, many types of products were named and

chosen, as favourites and this could be a clear sign of how the consumption of salads and raw vegetables is increasing also in the northern regions of Thailand.

Quantitative results

Attitude towards hydroponic Vegetables

The question, "what is your understanding of Hydroponic Vegetables", was the first question to consider understanding more about participants' attitudes to the issue. Almost 30% of the population under study answered "Vegetables grown by water" and 16% said "vegetables without soil". These were ranked at the top as the participants' perceptions on hydroponic vegetables and this represents a positive and correct understanding of the product. However, 'Not sure' gained about 15% of replies and this highlights how around one sixth of the population was not completely aware of what hydroponics are.



	Numbers	%
Not sure	70	15.6
Natural Vegetables	47	10.5
Vegetables grown by water	127	28.3
Non-chemical vegetables	65	14.5
Non-toxin vegetables	55	12.3
High nutrient vegetables	6	1.3
Herbal	5	1.1
Vegetables without soil	73	16.3

Figure 1 Understanding of Hydroponic Vegetables

The survey also contained an open question supporting the consumer's understanding, which gave useful insights on what people think about and what key words they associate with hydroponics and their growing methods. The table below details the respondents' ten highest replies by key words.

Table 3 Opinion on growing method (use word association)

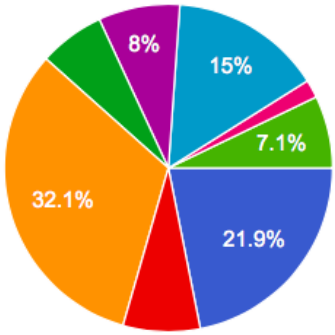
	1	2	3	4	5	6	7	8	9	10
Insight	Safety	Cleanness	Positive Benefits	Healthy	No Pesticides	Trendy	Quality of the product	No chemicals	Deliciousness	High nutrition in levels
Number	41	33	24	22	15	11	9	9	9	7

Safety, cleanness, (leading to) positive benefits and healthy are the most used key words. This reflects what can be considered the main perception on consumers' mind-set. People taking part the surveys identify hydroponics as safe, clean and healthy products that

can lead to positive benefits. Thus, this is could be seen as a positive factor towards the improvement of consumption: farmers, producers and resellers could in fact, market and communicate such products hitting on positive beliefs and perceptions to increase demand and sales

The second question, “what is the source of information of your understand of hydroponics” was asked in order to understand more about marketing and communication tools that can be implemented to increase people’s awareness and understanding of the issue. Interestingly, “Television and advertisement” is the highest response with more than 32%. “Word of Mouth” ranked second at almost 22%, whilst “Newspaper” (1,8%), “radio” (6,5%), “PR events” (7,1%), learning from school (7,6%) were ranked the lowest.

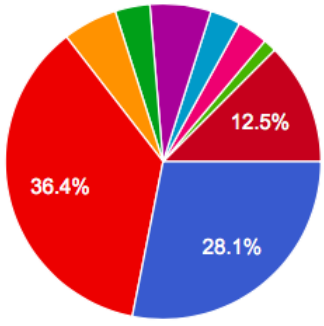
From these results it is possible to conclude that if the aim is to improve consumers’ attitudes and perceptions towards hydroponics, the use of television ads (videos, educational programs) and word of mouth (direct marketing and communication, consumers’ reviews, rating and experiences) may help.



	Numbers	%
Word of mouth	98	21.9
Learn from school/University	34	7.6
Television/ ads	144	32.1
Radio/ads	29	6.5
Books	36	8
Unsure	67	15
Newspaper	8	1.8
PR / Academic Events	32	7.1

Figure 2 Source of Information

The third question was: “What is the reason for your consumption of hydroponic vegetables?” in order to understand more about why people do consume hydroponics. Here, the highest responses were for safety and health reasons. The former gained more than 36% of responses and the latter more than 28%. All the other options provided were poorly chosen. These results clearly highlight that more than 64% of the population associates hydroponics with being healthy, containing high nutritional elements or being safe and non-contaminated.

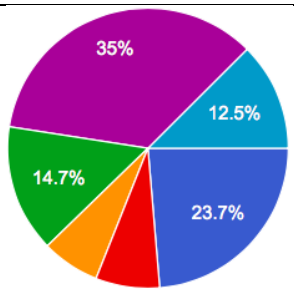


	Numbers |	%
It is healthy for body/ High nutrient	126	28.1
It is safety/ non-contaminated	163	36.4
It is delicious	25	5.6
It is available/ able to find	16	3.6
Good for cure the illness	28	6.3
It is affordable/ price is affordable	14	3.1
It can help the community	6	1.3
Unclear reason/ unsure	56	12.5

Figure 3 Reason of consumption

To the question, “What motivates you to buy hydroponic vegetables?” most of the people answered Healthy nutrition (more than 30%), and Price (more than 28%). Hence, some of the implications that can be drawn may be to focus on promoting and communicating the high nutritional levels and marketing with strategic considerations of pricing.

The question asked the preferred outlet for the purchase of hydroponic products. The supermarket was preferred by most participants at 35%.



	Number	%
Vegetable Farm	106	23.7
Stall	33	7.4
Vegetable and fruit merchants	30	6.7
Hydroponic Farm	66	14.7
Supermarket	157	35
Local market	56	12.5

Figure 4 Preferred Outlet

Willingness to purchase hydroponics at different levels of price

If hydroponic vegetables are cheaper than conventionally grown vegetables, I would like to purchase hydroponic vegetables

Yes 364 81.3% No 84 18.8%

If hydroponic vegetables have a similar price level to conventionally grown vegetables, I would like to purchase hydroponic vegetables

Yes 369 82.4% No 79 17.6%

Although hydroponic vegetables are a little more expensive than conventionally grown vegetables, I would like to purchase hydroponic vegetables

Yes 265 59.2% No 183 40.8%

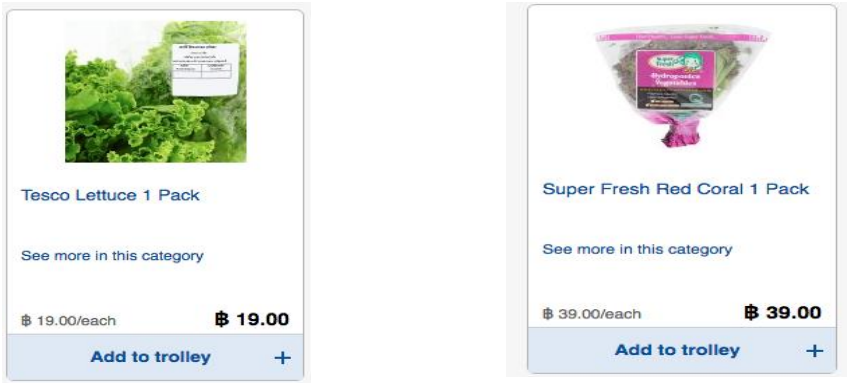
Although hydroponic vegetables are a lot more expensive than conventionally grown vegetables, I would like to purchase hydroponic vegetables.

Yes 214 47.8% No 234 52.2%

As per the results displayed above, price can be considered an important and influencing factor in the buyers’ decision-making process. As far as hydroponics are cheaper or even a little more expensive than other vegetables, consumers show positive receptiveness towards the purchase; however, when hydroponics are priced a lot higher than other vegetables, only 47.8% of participants would still buy them.

Tesco Lotus in Thailand sells both hydroponics and conventionally grown vegetables at different prices, although the hydroponic ones are priced higher than others (November 2016).

a) b)



a) Lettuce pack at Tesco Lotus, Thailand (November 2016)

b) Hydroponic Red Coral pack at Tesco Lotus, Thailand (November 2016)

Perception of safety levels of hydroponic vegetables compared with others

1. Hydroponic vegetables are less safe than other vegetables

   Yes 144 32.1% No 304 67.9%

2. Hydroponic vegetables are safe similarly to other vegetables

   Yes 322 71.9% No 126 28.1%

3. Hydroponic vegetables are safer than other vegetables

   Yes 325 72.5% No 123 27.5%

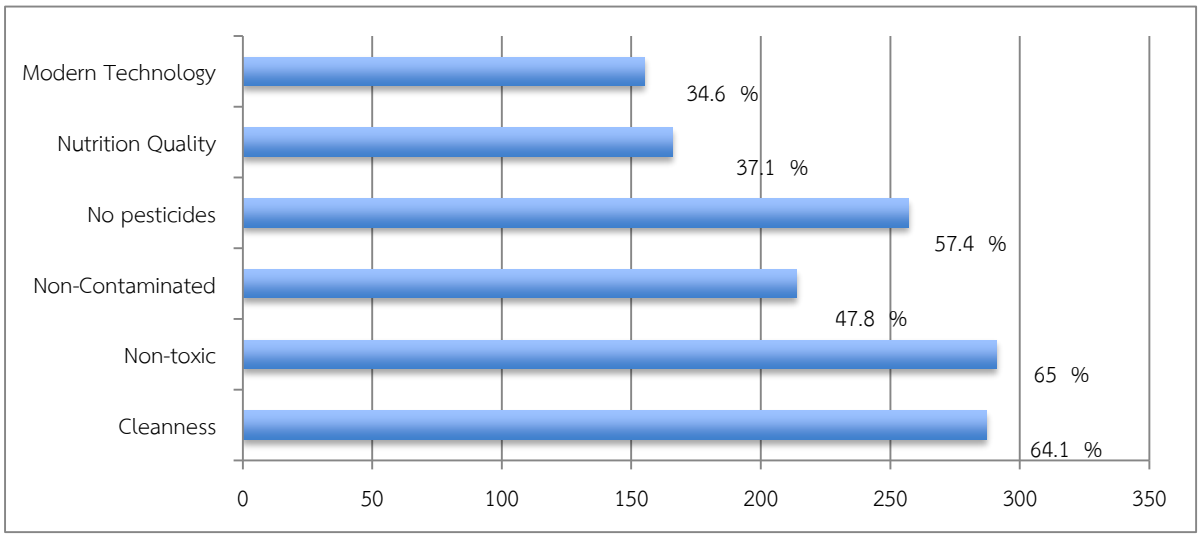


Figure 7 What makes you feel that hydroponic vegetables are safer than other vegetables?

An interesting factor being found is that hydroponic products are wildly perceived as safer (in terms of well-being) than other vegetables, with around 72.5% of people saying so. People tend to perceive such products as *clean and non-toxic* when compared with other vegetables. As can be seen in the graph above, cleanness and non-toxic are the options mostly chosen[6].

[6] Please note: participants could choose more than one option to this question.

Interest in growing hydroponics independently compared with purchasing hydroponics for consumption

Participants tend to purchase hydroponics for their daily consumption rather than growing their own products independently.

I am more interested in growing hydroponics than buying hydroponic vegetables

Yes	220	49.1%	No	228	50.9%

I am interested in growing hydroponics and buying them at the same level.

Yes	250	55.8%	No	198	44.2%

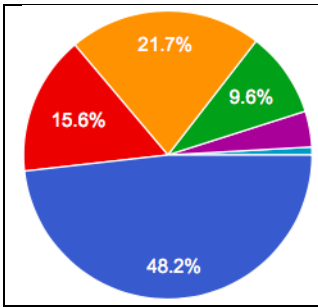
I am less interested in growing hydroponics than buying hydroponic vegetables

Yes	259	57.8%	No	189	42.2%

I have no interest in growing hydroponic vegetables.

Yes	247	55.1%	No	201	44.9%

Asking participants "*if you have never purchased hydroponic vegetables, what is the main reason for that?*" *Distribution* gained the highest response with almost 50% of responses. *Price* also gained a significant percentage with about 21%. This shows how producers and sellers could improve their distribution and selling strategies, in order to make hydroponics more widely available. In doing so, more people (and therefore more targets) could be attracted by purchasing the goods. Additionally, as mentioned earlier, price is a factor that people consider in their decision-making: hydroponics should be carefully priced to avoid losing market shares and clients because of pricing decisions.



	Number	%
Distribution (ex. Difficult to buy)	216	48.2
Quality (ex not confidence)	70	15.6
Price	97	21.7
Product (ex not fresh, no variety)	43	9.6
Growth by yourself	18	4
Others	4	0.9

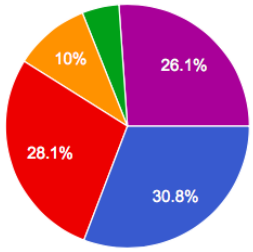
Figure 8 Reason of why customer are not purchasing

Consumers' behaviour

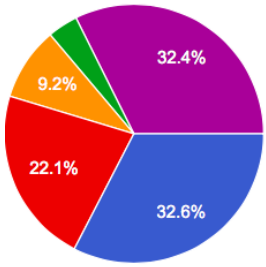
To know more about consumption habits the question "How often do you eat hydroponics per week?" was asked. About 30% of participants said that they eat them once per week and 28% that they eat two to three days per week. This shows how hydroponic vegetables are still not considered as part of many people daily diet, especially considering that people in Thailand usually eat vegetables almost every day.

To understand more about the frequency of purchasing, it was asked, "How frequently do you purchase hydroponics per week". Here, about 32% said that they buy them

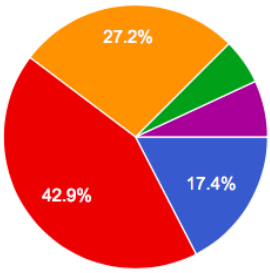
once per week while 32% do not purchase them at all. This means that there is still a large opportunity to increase the potential for more purchases; Thai people could be educated towards a more effective understanding of hydroponics and their characteristics and benefits, so that they would include such products in their daily diet. It is possible to see areas of improvement in terms of money invested into the acquisition of hydroponics. It was found that 42% of the respondents said that they spend around 50 to 100 baht per week when buying hydroponics. Again, this number confirms how this type of vegetable are still not as developed or consumed as other types of vegetables.



Frequency of Eating	n	%
One day per week	138	30.8
Two – Three day per week	126	28.1
Four – six day per week	45	10
Everyday	22	4.9
Do not eat	117	26.1



Frequency of Purchasing	n	%
One day per week	146	32.6
Two – Three day per week	99	22.1
Four – six day per week	41	9.2
Everyday	17	3.8
Do not purchase	145	32.4

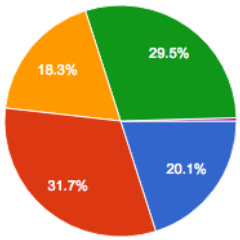


Weekly expenses (in Thai baht)		
1- 50 baht	78	17.4
50-100 baht	192	42.9
100-200 baht	122	27.2
> 200 baht	25	5.6
Other	31	6.9

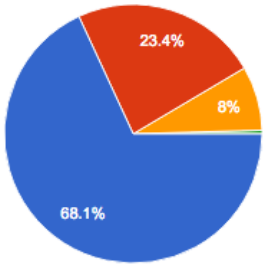
Figure 9 Habits of hydroponic vegetable consumption

With regard to how consumers make use of hydroponics, it was insightful to notice that consumers mainly buy or grow them for home consumption – respectively 31.7% and 20.1% - however other options were popular too, with people saying that they could eat hydroponics at restaurants (18.3%) or on the go (29.5%). This indicates how sellers could market their product in different ways, to carter for different purposes. A purely domestic ready-to-eat product could be produced.

People have shown a strong perception of hydroponics mainly as salad dishes. More than 68% of the participants to the survey expressed how they perceive such products as salad greens. Thus, the challenge for marketers is to expand the perception to other dishes or to strengthen the current perception to promote consumer experiences with salads and similar dishes.



Hydroponics consumption	Number	%
Grow and eat at home	90	20.1
Purchase and cook at home	142	31.7
Eat at restaurants	82	18.3
Purchase and ready to eat	132	29.5
Others	2	0.4



Popular uses of hydroponics	Number	%
Salad	305	68.1
Thai cuisine/herbal	105	23.4
Fruit	36	8
Others	2	0.4

Figure 10 Style of hydroponic vegetable consumption

The final part of the survey contained an open question to allow participants to give suggestions for areas of improvement of people's shopping experiences. Respondents' answers could be grouped around 5 main areas: *cleanliness*, *packaging*, *trust* and *knowledge*, *distribution* and *promotions*.

Cleanliness

People would like hydroponics to be clean and ready-to-eat and containing low levels of pesticides and other chemical agents.

Packaging

A clean, labelled and small package would be practical to be carried around to either consume to product outside, at work, when travelling or simply at home. Also, quantities could be reduced to create individual single portions.

Trust – Knowledge

People expressed the desire to have more knowledge of hydroponics, their origin and their possible benefits and uses; with higher levels of awareness, many respondents declared that their level of trust towards the products would increase and therefore they would be more willing to purchase these products. It appeared also that the meaning and benefits of hydroponics are still not as clear as they should be for some; educational campaigns and communication could encourage people to feel more confident.

Distribution

Some participants expressed the concern related to the availability of hydroponics in local stores and supermarkets. Thai people would like to find hydroponics more easily in their local markets or even have the chance to order them for delivery.

Promotion

Price is still a concern for consumers. Hydroponics should not be expensive, for some participants, especially if other vegetables are priced consistently lower.

Discussion

During this study several aspects concerning consumer attitudes towards hydroponics became clear.

It appears quite clear that many people in northern Thailand have started to purchase and consume these products, although their consumption could be increased; however it is even more obvious that many people do not have a full understanding of them. Farmers, producers, retailers and even the government could start educational and communication campaigns in order to create more awareness and understanding among people. Through such campaigns more people could become interested in these items and start consuming them.

Seeing that this study indicated that people who are already using hydroponics seem satisfied that the number of consumers in Thailand could be considerably increased.

Despite the fact that this research focuses only on northern Thailand, hydroponics could be developed across the whole country and bring benefits to many. Producers could make use of less land and equally important less water to grow their products. Consumers might be able to find fresh products available on a daily basis.

Additionally, it is certain that people would like to know more about these products and their efficacy. Also, it would be useful for both producers and consumers to understand what the benefits and the risks of such products are, in order to avoid confusion or misunderstanding. It is still unclear whether hydroponic products contain more or less levels of vitamins compared to other vegetables, although the nutritional levels present in hydroponics could be higher because of stricter controls by producers.

Some studies (Kwan, Yeung, & Au, 2004; Wickliffe, 2004) show decision-making styles are highly correlated with product characteristics (i.e. price, country of origin, habit and brand), which can affect purchasing in the certain ways. With regard to the 4Ps of the Marketing Mix, it is quite clear how pricing could affect the decision-making of many people: a price that is considered too expensive by the target population could lead to negative results, i.e. loss of sales, or if bundled with brand, it might affect decision making in the certain ways, such as customers buying the product on the assumption that the brand represents a good quality product.

Distribution should also be improved as too often hydroponic products are available only in supermarkets and big chains while consumers would like them to be more accessible.

Recommendations

Seeing that the government is currently active in promoting hydroponic products, it could be useful to start educational programs in order to promote research and supply accurate information about hydroponic products and nutritional benefits that can be accrued from them.

It is also possible to understand how the shopping experience could be improved: people would like to find hydroponics more easily and in more stores and to have clear and bold labels that can inform all potential buyers, packaging should be carefully planned and developed and pricing and promotional activities should focus on consumers and their needs. People would like to be healthier and safer, but some are sensitive to higher prices. Thus, one implication about pricing based on consumer styles inventory is to create new markets and branding emphasising potential health benefits. For those who like raw vegetables, hydroponically grown vegetables may taste better, thus opening another potential market. Also, this study suggests that different and more portable packaging could attract more people living in urban areas and having an on-the-go lifestyle.

There are still some issues regarding the nutritional value of hydroponic products when measured against conventionally grown vegetables. It appears that consumers believe that hydroponic vegetables could be better than their conventional equivalents further research is necessary to clarify these issues, especially as there are other growing methods such as organic methods, which also claim to be healthy options.

Conclusion

From this study it is possible to conclude that consumers show a positive attitude towards hydroponics, however there are still some points that could be developed and communicated. Many people are still unaware of these products or have an inaccurate understanding of them.

Currently pricing is significantly higher for hydroponics over conventionally produced products. This is based upon the perception that hydroponic products are superior, however this perception is not necessarily supported by scientific research.

Appendix 1 Interview guide for the focus group sessions.

1. Do you normally eat ready-to-eat foods or homemade food?
2. Do you normally eat outside or eat at home?
3. How frequently do you eat vegetables in a week?
4. What is your favourite type of vegetable?
5. What is your favourite type of salad?
6. What is your favourite spice?
7. How much do you pay for vegetables in 1 week?
8. What are hydroponic vegetables?
9. How do you learn/know about hydroponic vegetables?
10. What are the advantages to consumers of hydroponic vegetables?
11. What is your experience with hydroponic vegetables?
12. How do hydroponic vegetables link with the word “Health”?
13. How do hydroponic vegetables link with the word “Safety”?
14. How do hydroponic vegetables link with the word “Environment”?
15. How do hydroponic vegetables link with the word “Urban city”?

16. Where can you buy hydroponics?
17. Are these easy to buy?
18. Do you know any brand selling hydroponic products?
19. What is the main reason why you buy hydroponic vegetables?
20. What is the main reason why you do not buy hydroponic vegetables?

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