Buyer Decisions on Hydroponic Vegetable Products

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Abstract. This study aims to assess the factors influential towards decision made by consumers to purchase hydroponic products. A quantitative research employing factor analysis, 100 samples were established as per accidental random sampling. The observed 11 variables – classified in four groups – were of hydroponic product feature (packing, size, freshness, and crunchiness), hydroponic product value (competitiveness and price), customer's background (income, education, association, and family size), and place (service). The result shows that those who chose the products were mostly female (98) – 73 of them are housewives – aged between 37 and 42 (42) with at least senior high school educational background (69).

Keywords: Hydroponic product, marketing strategy, pro-environmental behavior, supermarket

1 Introduction

Once could only be performed on vast scales of land, food crop cultivation is now employing small areas due to land conversion to various functions such as residences and plantations. Greenhouse farming has been a preferred practice with its ability to provide ideal developing conditions in a covered environment for the crop of choice [1] as well as protection against pests. Since greenhouses offer an optimal control on supporting microclimate, it is welcome in the USA where the total area of which has reached 405 000 ha [2–5].

Hydroponics, on the other hand, is a more manageable option for the same purpose [6] since greenhouse farming still requires so much land on account of conventional method utilization. Growing plants without soil, this system uses water and mineral nutrient solvents

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as its media, making it stackable for being lightweight. Requiring approximately 25 % of land compared to the conventional one [7–9], it is quantitatively proven to be superior in producing > 11 % lettuce crop [10, 11]. Its nature of vertical culture allows more space for plants to grow, resulting in higher productivity [3, 11].

In Indonesia, hydroponics has been gaining popularity particularly in urban areas. The increasing demand on fresh produce despite limited space has instigated more people to generate food sustainable societies and, at the same time, optimize available plots through hydroponic practice [11, 12]. Leafy vegetables are the fitting products [13, 14, 2] considering their weights, short harvest times, and consistency. In Pekanbaru, the capital of Riau Province, gardens and terraces of a large number of houses are adorned with hydroponic containers [14, 15] – their dwellers apparently take pleasure in not only the economical benefit, but also the tranquil sight of growing greeneries.

The most recent data obtained from the Central Agency on Statistics of Indonesia (*Badan Pusat Statistik*) regarding national provisions in 2021 [12] insinuates that it is beyond the farmers' ability to cover the entire amount of food demand by applying conventional farming method. Hydroponics is deemed feasible to be one of the solutions for fresh produce reliability in urban areas similar to Pekanbaru, which should also be able to support the government program on hyper-local food sustainability.

As of hydroponic produce, a number of researches have concluded that consumer's income is the significant aspect in its market demand while their age, family size, educational background, product feature, lifestyle, product variant, and gender are insignificant [16, 17, 4].

2 Materials and methods

The research was carried out on August 20 to August 30, 2022 in *Pasar Buah* Pekanbaru, a supermarket with fresh produce as its main merchandise. 100 samples [18] were taken from the supermarket's customers by accidental random sampling.

A total of 11 indicators were established, covering hydroponic product packing, hydroponic product size, hydroponic product freshness, hydroponic product crunchiness, hydroponic product competitiveness, hydroponic product price, customer's income, customer's educational background, customer's association (friends), customer's family size, and service (14). All data gained were evaluated as per Bartlett's Test of Sphericity, where any factor with a Kaiser Meyer Olkin (KMO) value of > 0.5 and a Bartlett's significance level of < 0.05 was considerably admissible and went on to Measure of Sampling Adequacy (MSA) for further calculation.

The indicators were then run through factor analysis in order to find out any factors with ability to correlate independent indicators observed. Principal Component Analysis (PCA) and Common Factor Analysis (CFA) were applied to determine the coefficient score factor [17–19]. The factor analysis was computed based on Equation (1):

$$Yi = Wi1X1 + Wi2X2 + \ldots.. + WinXn \quad (1)$$

Where,
Yi = estimated I factor
Wi = value or coefficient score factor
Xn = observed behavioral variable on decision to purchase hydroponic product

Behavioral variable (X) on purchase decision (Y) are the bound indicators, namely hydroponic product packing (X1), hydroponic product size (X2), hydroponic product freshness (X3), hydroponic product crunchiness (X4), hydroponic product price (X5),

hydroponic product competitiveness (X6), service (X7), customer's income (X8), customer's educational background (X9), customer's association (X10), and customer's family size (X11). Purchase decision (Y) is the free variable.

Aforementioned variables were assessed through factor analysis by employing SPSS 26 (Statistical Product and Service Solution ver. 26) program. The analysis utilized was of non-parametric referring to Likert scale for both summated scale [20] (where item responses are summed up to get a score index) and individual scale (where latent variables like PCA results require explanations). Respondents were given closed-ended questions, of which choices of response were of four levels from the highest intensity to the lowest as shown in Table 1.

Table 1. Scoring item.

Item		Scale
Strongly agree	SS	4
Agree	S	3
Disagree	TS	2
Strongly disagree	STS	1

Source: Sugiyono [21]

3 Result and discussion

3.1 KMO dan bartlett test

Table 2 depicts how the KMO value of 0.635 (> 0.5) confirms the substantial correlation of the variables and the Sig. value of Bartlett's test of 0.000 (< 0.05) validates the sample adequacy. Since both variables and samples are of correlation matrix despite identity one, further analysis is therefore applicable.

Table 2. KMO and bartlett test results.

Test		
Kaiser-Meyer-Olkin measure of sampling adequacy		.635
Bartlett's test of sphericity	Approx. Chi-Square	184.439
	Df	55
	Sig.	.000

3.2 MSA

In Figure 1, it is shown that the values of all observed variables are of > 0.5 and therefore proper for the next stage of analysis. This result is representative to the fact that hydroponic products are favored by scores of consumers, most likely due to well-conducted quality control in order to guarantee customer satisfactory

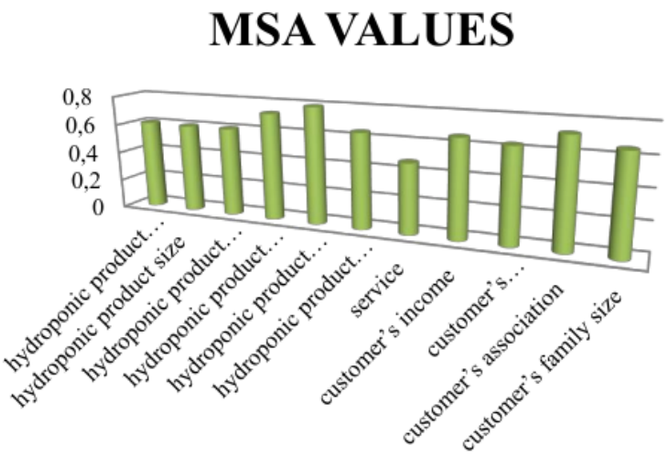

Fig. 1. MSA values.

3.3 Communality

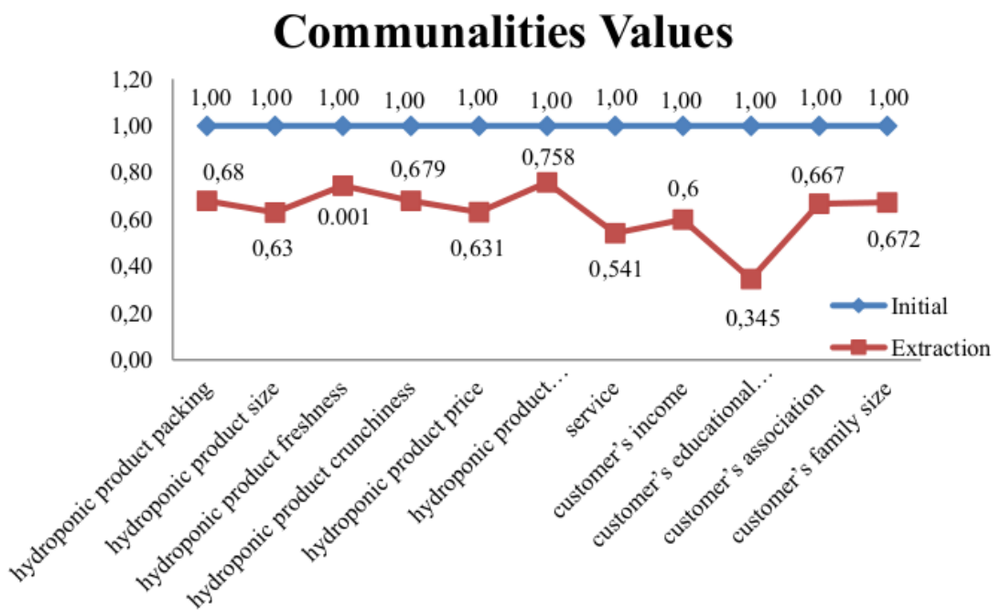

Fig. 2. Communality values.

From Figure 2, it is apparent that the customer's educational background is the least effective factor in being familiar with hydroponic products. Their consumption is not limited to certain groups of society, so it is convincing that such products are highly marketable in any time and any place.

3.4 Total variance explained

When all the variables were processed in the factor analysis, 11 factors were developed as a result and are listed in Table 3. Four of which are valued as > 1, proving their strong correlation with the formed factors, while the rest were < 1 which means weak correlation.

Table 3. Total variance explained.

Total variance explained						
Component	**Initial eigenvalues**			**Extraction sums of squared loadings**		
	Total	**% of variance**	**Cumulative %**	**Total**	**% of variance**	**Cumulative %**
1	2.883	34.587	34.587	2.883	34.587	34.587
2	2.292	34.068	34.955	2.292	34.068	34.955
3	2.390	13.895	49.680	2.390	13.895	49.680
4	1.308	9.275	53.775	1.308	9.275	53.775
5	.935	8.430	69.455			
6	.787	7.158	76.263			
7	.722	6.564	82.827			
8	.598	5.432	88.260			
9	.547	4.973	93.233			
10	.430	3.912	97.145			
11	.314	2.855	100.000			
Extraction method: principal component analysis.						

3.5 Rotated component matrix

A more comprehensive entry on variable distribution is the outcome of rotated component matrix, where each indicator goes into an estimated component, detailed in Table 4. The first component contains service; the second one holds hydroponic product packing, hydroponic product size, hydroponic product freshness, and hydroponic product crunchiness; the third one has customer's income, customer's educational background, customer's association, and customer's family size; the fourth one binds hydroponic product competitiveness and hydroponic product price.

Table 4. Rotated component matrix[a].

Rotated component matrix[a]				
	Component			
	1	2	3	4
Hydroponic product packing	.052	.784	.227	.098
Hydroponic product size	-.093	.699	.611	.054
Hydroponic product freshness	.167	.790	-.167	.017
Hydroponic product crunchiness	-.030	.402	.357	.256
Hydroponic product competitiveness	.090	.093	.278	.733
Hydroponic product price	.040	.037	-.084	.865
Service	.634	.020	-.198	.315
Customer's income	.123	-.019	.765	-.018
Customer's educational background	.384	-.047	.438	.058
Customer's association	.797	-.007	.878	.010
Customer's family size	.774	.225	.829	-.076
Extraction method: principal component analysis. Rotation method: varimax with kaiser normalization.				
a. Rotation converged in eight iterations.				

3.6 Component transformation matrix

With only one factor gaining a diagonal value of > 0.5 can it signify other formed factors in consumer's decision to purchase hydroponic product. Interpreting the formed factors in order to characterize variables belonging to each group is the step subsequent to factoring and rotating. Any figure following a minus (-) indicates the existence of correlation. Conversely, a diagonal value of < 0.5 hints at the absence of inter-component correlation.

Table 5. Component transformation matrix.

Component transformation matrix				
Component	1	2	3	4
1	.505	.581	.531	.353
2	.823	-.475	-.306	.064
3	-.239	-.124	-.254	.929
4	-.104	-.649	.748	.091
Extraction method: principal component analysis. Rotation method: varimax with kaiser normalization.				

Indicators on buyer decision in purchasing agricultural products are not limited to the ones observed in this study, as other researches [22, 23, 17, 5] are known to examine different ones. Other than product, for instance, there are price, place, payment method, and promotion. It is quite common for researchers to compare one indicator from another [24, 25, 17] where consumer's perception towards agricultural products is related to ones found in the market.

4 Conclusion and recommendation

Four factors in buyer decision to purchase hydroponic products are concluded from this study; they are hydroponic product feature, customer's background, place, and hydroponic product value. The product value, particularly in regards of price, is the most prominent factor of all. It is therefore recommended towards producers to pay close attention to balance the price tagged on each product and its quality.

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