

Elopment of Intervention Model of Staple Food Consumption Pattern from Rice Toward Alternative Staple Food: Supporting Factors and Obstacles

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Abstract: One of the important issues related to food security in Indonesia (also global) is the dependency on rice based staple food. In fact, there are many resources that potentially be a staple food. Diversification yet achieved optimally. In previous studies shows that basically people have a positive attitude towards the alternative staple food. However, the intention to consume were low. Therefore, it is important to understand supporting and obstacle to behave consuming alternative staple food and chane the pattern of staple food consumption by reducing the rice based staple food which is replaced by alternative staple food. This research found 40 latent variables that support and 52 obstacle in changing the behavior of staple food consumption. By using factor analysis, 40 latent variables that support were reduced into three factors, those are the characters of alternative staple food, external motivation and knowlegde. Meanwhile, the 54 obstacles were reduced into four factors, those low image of alternative staple food, lack of information, hard to get and habit.

Key words: Staple food, food security, diversification, habit, information, staple food

INTRODUCTION

Food is one of the most basic needs for human beings. However, access to food is increasingly difficult for many reasons, among others, the issue of degradation of land, water and the environment, climate change led to a decrease in production and the uncertainty of harvest and population growth. Up to 2050 the growth in global food production required a minimum of 70% (FAO Staistical Year Book, 2012). FAO also indicates that in 2011, food-insecure population is expected to reach 1.02 bln. Therefore, the food security issue become crucial.

The problem of food security is quite complex as it includes issues of production, distribution and consumption of food and people's access to food. Focus on the consumption, one of the most basic problem is the rice domination as the most preferred staple food. However, basically people have a positive attitude towards non-rice staple foods. The previous studied shows that consumers have positive attitude towards non-rice non-wheat. Therefore, it is important to understand the consumer behavior of staple food that consist factors that supporting and obstacle to change their staple food consumption pattern by reducing the consumption of rice and replace it with an alternative staple food.

MATERIALS AND METHODS

Food availability is an important aspect in food security. The quantity and quality of food consumption

should be sufficient to reach the food consumption per capita per year according to figures nutritional adequacy. In Indonesia, development of rice consumption in the period 2010-2014 compared to the period 2005-2009 showed a downward trend. This is could be caused by the enactment of policies ranging diversification through various promotions. However, decline in rice consumption also needs to be watched since statistic data shows the trend of increased consumption of wheat (Jisana, 2014).

Food consumption patterns are influenced by a number of factors such as a person's experience, cultural, knowledge, size of income and perceived health benefits. Drewnowski and Hann (1999), Kekalih *et al.* (2015) states that there are four factors that influence consumption patterns, namely individual characteristics, food, prices and the environment. Hartog *et al.* (1995) states that family size influence the consumption habits and nutrition.

This research was conducted in Semarang in which middle up class society are taken as sample by stratified random sampling method. Respondents are taken from middle up class is based on assumption that lifestyle of a higher class would be reference the lifestyle of underneath. There are 16 districts in Semarang, for each district set by quota sample of 20 so that the total respondents is 320. This study consist two stages, the first stage aimed to identify the latent variables and the second stage to reduce the latent variables into factor by factor analysis.

RESULTS AND DISCUSSION

Of the 29 latent variables that support behavior change, there are some variables omitted in five rotations. The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) of 0.828 and Bartlett's test of Sphericity of 1211.114 are also significantly (Sig. 0.000) demonstrate the feasibility of employing data for factor analysis (Table 1).

All diagonal anti-image correlation indicates the Size of Sampling Adequacy (MSA) is a significant correlation coefficient close to 1. In this process, variables are grouped into three components subsequently used as a factors (based on the eigenvalues above 1) and total variance explained is 56.275%. The 56.275% total variance explained is distributed on component 1 of 25.195, component 2 of 16.702 and component 3 of 14.378. In the fifth rotation, all indicators associated with the formation of a factor seems have strong correlation (Table 2).

The 52 obstacle latent variables were reduced into four components after five times extraction that omitted some variables. Its KMO (Kaiser-Meyer-Olkin) already qualified at 0.883 (above 0.5) as well as the Bartlett's test of Sphericity which is significant at 0.05. The 52 variables extracted into four components that is reflected on components that have eigenvalues value >1. The four components are able to explain at 63.533%. The percentage of variance of component 1 is 18.180, component 2 is 15.765, component 3 is 15.124 and the forth component is 13.465 (Table 3). Those components subsequently named factor. The component transformation matrix shows that that are only one component has strong correlation between variables in it. That is component 1.

The first stage of this research found 29 latent variables that support and 52 obstacles in changing the behavior of staple food consumption. As mention in the previous subchapter, after the data processing is done and all indicators show that components feasible to be a factor, 29 latent variables that support are reduced into

three components and 52 obstacles are reduced into four components. The next step is naming a factor. As described in the previous chapter, the naming can be based on a loading factor of variables or based on keywords that can represent the variables clustered on the component. In this research, both approaches will be used. The supporting components 1-3 will be referred as a supporting factors of 1-3. There are six variables in factor 1, for variables in factor 2 and three variables in factor 3 (Table 4 and 5). The biggest loading factor in factor 1 is many kinds of alternative staple food. However, this loading factor won't be used as the basis of naming factor. If we look closely, the six variables in one factor are the things associated with the condition or character of an alternative staple food by consumers. The word "character" is a keyword that represents the six variables in the group. In this case, at least an alternative staple food has six such properties. Therefore, factor 1 named food characters. Likewise, the factor 2 that consisted of 4 variable such as aggressively promoted by government, much of the information processed and product innovation, recommended by doctor/experts And some information of the benefits. Factor 2 is named external motivation. Factor 3 has 3 variables in it are reproduction fertility, portability and knowledge of

Table 3: Rotated component matrix^a (supporting)

Variables	Component		
	1	2	3
Many kinds	0.777	0.044	0.030
Good taste	0.735	0.097	0.130
Can be made a wide variety of cuisines	0.721	0.032	0.267
Easy processed	0.695	0.060	0.105
Healthy nutrient	0.656	0.152	0.187
Suitable consumed for various situations	0.498	0.156	0.089
Aggressively promoted by government	0.495	0.028	0.471
Much of the information	0.081	0.756	0.179
Processed and product innovation	0.138	0.722	0.194
Recommended by doctor/experts	0.303	0.690	0.008
Some information of the benefits	0.027	0.685	0.010
Reproduction fertility	0.261	0.059	0.867
Knowledge of nutrient	0.140	0.256	0.827

Extraction method: principal component analysis; rotation method: varimax with kaiser normalization; ^aRotation converged in 5 iterations

Table 4: Component transformation matrix (supporting)

Component	1	2	3
1	0.805	0.345	0.483
2	0.444	0.890	0.104
3	0.394	0.298	0.869

Extraction method: principal component analysis; rotation method: varimax with kaiser normalization

Table 5: KMO and bartlett's test (obstacle)

Bartlett's test of sphericity	Values
Kaiser-Meyer-Olkin	0.883
Measure of sampling adequacy	
Approx. χ^2	3381.989
df	210.000
Sig.	0.000

Table 1: KMO and bartlett's test (supporting)

Bartlett's test of sphericity	Values
Kaiser-meyer-Olkin Measure of sampling Adequacy	0.828
Approx. χ^2	1211.11
df	4
Sig.	78.000
	0.000

Table 2: Total variance explained (Supporting)

Component	Rotation sums of squared loadings			Initial eigenvalues		
	Cumulative (%)	Variance	Total	Cumulative (%)	Variance	Total
1	25.195	25.195	3.275	32.120	32.120	4.1760
2	41.897	16.702	2.171	47.381	15.261	1.9840
3	56.275	14378	1.869	56.275	5.894	1.1560

Extraction method; principal component analysis

Table 6: Total variance explained (obstacle)

Component	Rotation sums of squared loadings			Initial eigenvalues		
	Cumulative (%)	Variance	Total	Cumulative (%)	Variance	Total
1	18.180	18.180	3.818	35.671	35.671	7.491
2	15.765	33.945	3.311	48.317	12.646	2.656
3	15.124	49.069	3.176	56.272	7.955	1.671
4	13.465	62.533	2.828	62.533	6.261	1.315

Extraction method: principal component analysis

Table 7: Rotated component matrix^{a 0} (obstacle)

Variables	Components			
	1	2	3	4
Primitive	800.000	0.036	0.117	0.109
Unprestigious	0.794	0.205	0.051	0.038
Underprivileged image	0.775	-0.017	0.291	-0.016
Yet trending	0.642	0.093	0.356	0.129
Can be bored	0.603	0.203	0.245	0.197
unsuitable for Indonesian	0.585	0.168	0.422	-0.073
less informed of the benefits	0.195	0.817	0.076	0.119
less of understanding of the types	0.165	0.799	0.265	0.112
Do not know how to cook	0.044	0.741	0.234	0.132
less information about the various cuisines	0.243	0.629	0.240	0.219
lack of knowlegde	0.149	0.566	0.367	0.245
hard to get	0.241	0.260	0.796	0.056
Little of seller	0.256	0.298	0.763	0.070
less/bad taste	0.247	0.128	0.726	0.065
limited available	0.297	0.239	0.719	0.155
quickly feel hungry if do not eat rice and	0.080	0.028	0.211	0.791
does not feel eat if do not eat rice	0.043	0.055	0.174	0.764
rice is easier obtained	0.077	0.096	0.097	0.730
accustomed as a snack	0.122	0.266	-0.112	0.665
it is just snacks instead of staple foods	-0.021	0.401	-0.131	0.613

Extraction method: Principal component analysis; Rotation method: Varimax with Kaiser normalization; ^aRotation converged in 5 iterations

nutrient. This factor is named knowledge. As mentioned earlier, this study identified three factors supporting behavior change staple food consumption, namely food character, external motivation and knowledge. Overall total explained variance of the third factor is 50.330% that distributed on characteristic factor 23.665%, external motivation factors 14.500 and 12.165% on knowledge. Thus, it can be said that the most dominant factor is the food character. The largest loading factor of the food characters is that there are many kinds of alternative food. Concern with the obstacles in consuming non rice based staple food, the 52 latent variables are reduced into four components. Component 1 is formed by 6 variables, component or factor 2 consists 5 variables in factor 3 there are 4 variables and component 4 is formed by 5 variables. Subsequently, those components are named factor low image of product, factor lack of information, hard to get And habit. Total explained variance of the third factor is 50.330% that distributed on low image of product (17.748%), factor lack of information (15.445%) hard to get (15.226%) and habit (12.873%). The largest loading factor of the low image of product is primitive image of alternative food (Table 6-10). On the basis of the finding, the strategy or intervention model developed should be comprehensive. Some of the elements that must be contained in the strategy or model of intervention

Table 8: Component transformation matrix (obstacle)

Component	1	2	3	4
1	0.581	0.523	0.533	0.325
2	-0.500	0.348	-0.255	0.751
3	0.492	-0.638	-0.240	0.541
4	0.414	0.445	-0.770	-0.193

Extraction method: principal component analysis; rotation method: varimax with kaiser normalization

Table 9: The supporting factors in consuming alternative staple food

Variables	Loading
Factor 1	
Many kinds	0.748
Good taste	0.747
Can be made a wide variety of cuisines	0.727
Easy processed	0.668
Healthy nutrient	0.615
Suitable consumed for various situations	0.594
Factor 2	
Those are aggressively promoted by government	0.763
Much of the information processed and product innovation	0.737
Recommended by doctor/experts	0.668
Some information of the benefits	0.657
Factor 3	
Reproduction fertility/more fertile	0.751
Portability	0.653
Nutrient knowledge	0.506

are: strengthening the positive perception of the character of alternative staple food. Enriching the knowledge of alternative staple food such as the benefits, nutrient

Table 10: The obstacle factors in consuming alternative staple food

Variables	Loading factor
Factor 1	
Primitive	0.800
Unprestigious	0.794
Underprivileged image	0.775
Yet trending	0.615
Can be bored	0.603
Unsuitable for Indonesian	0.585
Factor 2	
Less informed benefits	0.817
Less of understanding of the types	0.799
Do not know how to cook	0.741
Less information about the various cuisines	0.629
Lack of knowledge	0.566
Factor 3	
Hard to get	0.796
The seller was a little	0.763
Less/bad taste	0.726
Limited available	0.719
Factor 4	
Quickly feel hungry if do not eat rice	0.791
Does not feel eat if do not eat rice	0.764
Rice is easier obtained	0.730
Accustomed as a snack	0.665
It is just snacks instead of staple foods	0.613

levels, nutrient availability and the advantages and limitations, especially in comparison with rice. Strengthening the external motivation, either in the form of promotions or calls to reduce the consumption of rice based staple food and increase the consumption of non-rice-based staple food of non grain by utilizing the reference group. Reference group selected from a higher social class than the target group will be intervened. The higher social groups can be determined by the economy class upper middle, educated group or community leaders. This is to strengthen the external drive while enhancing the image of the product. Materials staple food alternatives should be based on local resources so it will be easy to obtain. To reduce barriers because of habit, the intervention model should be designed as a model that lead the target has high involvement in the intervention or are active. Do not just sit and listen to explanations about various things related to alternative staple food items but also need to be given experience through experimentation within a certain period.

CONCLUSION

The study found three factors supporting and four factors obstacle. The three factors that support are the

characters of alternative staple food, external motivation and knowledge. Meanwhile, the four factors obstacle are low image of alternative staple food, lack of information, hard to get and habit. Therefore the strategy or intervention model developed should be comprehensive. Some of the elements that must be contained in the strategy or model of intervention are strengthening the positive perception of the character of alternative staple, enriching knowledge and changing the mindset of community about alternative staple food. It is also important to give habituation-conditioning alternative staple food consumption early.

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