The Outstanding Features of Innovative Riceberry Product Influence on Purchasing Intention of Elderly Consumers in Thailand

Pensri Jaroenwanit*, Supot Deeboonmee, and Wananya Thongthip

***Abstract*— *This research aims to determine the features of innovative Riceberry products that consumers required new-products for the elderly should be an ingredient. Especially, the outstanding features of Riceberry are nutritious, carbohydrates, proteins, fats, fibers, vitamins, and essential minerals for the body. Moreover, including linolenic acid (Omega 3) to nourish the brain and Gamma-Oryzanol reduces cholesterol levels in the blood vessels. In the development product, the researcher used qualitative research through group interviews to find the features in elderly products. The Riceberry ready to drink powder be should and use a survey questionnaire by collecting data from 418 consumers in Thailand. Then, using multiple regression analysis techniques to determine are features of the Riceberry product for the elderly that the customer's concern. In summary, the result found that the factors that statistically significant and consumers concern to purchasing intention Riceberry product are; relief from digestive problems (β = 0.264), penetrates the cells to brighten and lighten dull (β = 0.141), and reduce the risk of diabetes, blood pressure, and blood sugar levels (β = 0.125) respectively. The benefit of research for business commercially, which interested in Riceberry ready to drink powder concept, should component three features that influence on purchasing intention of elderly consumers will have opportunities to succeed in investment.*

***Keywords*— Innovation Riceberry product, Riceberry ready to drink powder, purchasing intention, elderly consumers.**

1. INTRODUCTION

The world is now entering an aging society, in 2017 people age over 60 years are approximately 1,000 million, 13.3% of the total population. Also, in ASEAN countries which has a total population of over 665 million people. The population aged over 65 years and 36.9 million people, accounting for 5.89 percent of the total population in ASEAN [1] . The highest of the elderly population in ASEAN first is Singapore and Thailand is the second-ranking. Accordingly, Thailand, there are more than 69 million people, which 9,9 million elder populations aged over 60 years, representing 14.4 percent. Thailand is incoming the aging society, which in the year 2020 [2].

Thailand touched the demographic criteria for being labeled an "aged society" since 2005 when the proportion of the total population aged over 60 years reached 10%. In 2021, Thailand will achieve the status of a "complete aged society" the elderly proportion up to 20%.

Also, Thailand will achieve a "super-aged society" status that elderly proportion up to 28% in the next 20 years [3].

The increase of the elderly population (aged 60 years and over) is a result of technological and advancement in the medical field, resulting in a higher average-age while mortality rates decline [4]. In 2014, Thailand has 5.6 million elderly people (or 8.6% of the population), that the elderly population will increase doubled in 2040, the rate of increase is higher than the other two age groups of the elderly (see Fig.1).

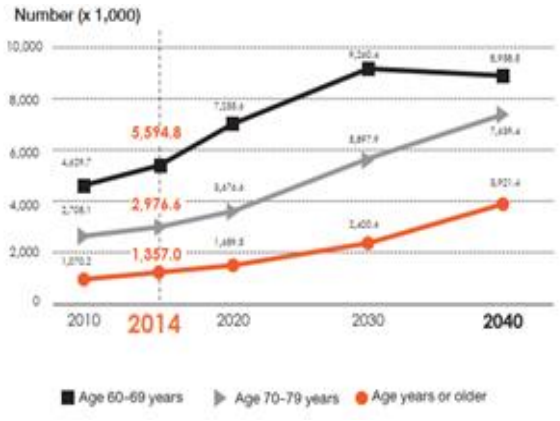

Fig. 1. Number of the early-, mid- and late-elderly population *(Source: Population Projections for Thailand, 2010 – 2040. NESDB)*

Consequently, the number of elderly people increases that they need to consume more healthy-food products. In addition, the consumer health love trend is growing up that healthy-food products are attractive widespread. In the previous years has seen significant growth and forecast that the trend of health-conscious people will continue to increase continuously. The elderly people

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whose body begins to deteriorate with age will try to maintain their health. In addition, people in the working-age are more aware of their health that new-product should meet their nutritional needs [5]. According to Chulalongkorn University reports, Thai market value of the healthy-food product over 100 billion baht per year. The consumers most want healthy-food such as low-fat foods, no cholesterol, no sugar at all products that protect or reduce the risk of diseases such as cardiovascular disease, cancer, diabetes, and digestive systems, etc. The most popular healthy-food products are supplements, food, and beverages that ingredient vitamins and dietary supplements with good for health. As a result, it is an opportunity for entrepreneurs to be able to creation healthy-food products with meet customer targets.

This research focus on new concopt healthy-food product from Thai-rice name is Riceberry. Riceberry is a new rice variety that obtained from crossbreeding between Hom-Nil rice and Khao-Dok-Mali 105 rice, which characterized dark purple rice and slender seed shape. Riceberry has been bred from the Rice Science Center in collaboration with the National Research Council of Thailand and Kasetsart University. Outstanding of Riceberry are nutritional properties that high in antioxidants such as beta carotene, gamma oryzanol, vitamin E, tannins, zinc and folate, with a low-medium glycemic index. In addition, rice bran oil have usefulness of antioxidant, enhance good health, reduce the risk of cancer [6].

Previous research focuses on searching for special characteristics of Riceberry in treating and preventing various diseases caused by extracting substances, such as the anti-cancer properties from rice-bran extract [7]. In addition, the study of changes in protein content of adenine, guanine, xanthine, and hypoxanthine in germinated brown-rice [8]. In Riceberry products, there are development the process of bran Riceberry supplements that have high nutritional value and test for acceptance in assessing the sensory test [9]. While, Nanthachai et al (2018) [10], studied the properties of Riceberry flour pregelatinized with circumcision on the chemical-physical and sensory properties of low-fat ice cream [11]. Moreover, the development of dried-rice noodles mixed with Riceberry [12], and the development of Riceberry product for elderly, vegetarian, high-protein, and high-energy rice jelly for seniors with swallowing problems [13]. From previous research, demonstrates no studies regarding the distinctive characteristics of Riceberry, which affects the purchasing intention of consumers in the elderly. This research is interested to study the outstanding features of Riceberry that influence purchase intention to buy Riceberry products for elderly people. Since the outstanding of Riceberry, the study aims to test the features of healthy-food products what factors that encourage the customers on purchasing intention of elderly consumers in Thailand.

2. THEORETICAL BACKGROUD

Consumers Purchase Intention

Consumers' purchasing intention is connected with their perception and their attitude that is the main key for consumers through considering and evaluating the product [14]. The purchase intention is an actual tool use in forecasting the purchasing process that will be motivated by their goal [15]. Nevertheless, purchase intention might be the influence of price, quality perception and value awareness [16]. In addition, the purchase intention of consumers based on quality goods, brand evaluations, and service [17] [18] [19].

The influencing consumers' purchase intention consists of extrinsic factors of the product and intrinsic factors of the product. First, the extrinsic factors are defined as the outside characteristics that consumers concern for example price, packaging, store image, and advertisement [20] [21]. In addition, Munusamy and Wong (2008) [22] found that consumers' motivations towards buying private label product. Besides, packaging is important for the decision-making process by looking at the material providing [23]. On the other hand, intrinsic factors are defined as physical product features where customers perceived value, benefits, and risk. Nowadays, food safety is an important topic, where consumer is awareness of welfare especially related to organic-food product. The features of products are high risks that are lack confidence and doubtful the quality from consumers, they will afraid and avoiding mistakes led to unintentional purchasing [24].

Since the principle of consumers' purchase intention above is analyzed the context of new-product for elderly people that focus on outstanding features Riceberry. Many features of Riceberry should be present with products, how to know what features of innovative Riceberry product (FIRP) influences purchasing intention on customers. Multiple regression analysis was analyzed causal factors with internal factors of Riceberry features that influence the FIRP. The linear regression analysis the consumers expect properties (CEP) of innovative Riceberry product influence on purchasing intention of elderly consumers in Thailand as follows.

$$Y_{FIRP} = \beta_0 + \beta_1 X_{CEP1} + \beta_2 X_{CEP2} + \beta_3 X_{CEP3} + \beta_4 X_{CEP4} + \beta_5 X_{CEP5} \ldots\ldots\ldots\ldots + \beta_n X_{CEPn} \quad (1)$$

where,

FIRP = internal factors of new-product, which consumers expect properties such as, relieve digestive problems, neutralize free radicals, reverse the effects of aging, etc.

FIRP = features of innovative Riceberry product

β_0 = the point at intersects *FIRP* axis, Y_{FIRP}

$\beta_1, \beta_2, \beta_3 \ldots \beta_n$ = the slopes of the regression plane in direction of the consumers expect properties factors.

Innovative Product Composition and acceptance

The innovation product concept gives from two parts; inside the organization which depends on the knowledge, funds, resources, and technology used in the company;

outside organization which focuses on consumers need [25]. The ways to give innovation product compound; creative products, innovative products, new packaging of existing products, reformulation of existing products, new forms of existing products, repositioned existing products, and line extensions [26] [27]. The summarize components of product innovation that will create value for customers, which are core product with nutrition's value and quality, packaging, brand, and expected product.

The innovation acceptance is a decision-making process that resulted from the use of knowledge and creativity. The acceptance process has applied extensively with product development and product testing based on five characteristics which are relative advantage, compatibility, complexity, trialability, and observability. The positive results of innovation are due to many factors, such as effective marketing and technology links, which help the company successfully connect consumers' needs with product characteristics and lead to positive acceptance decisions [28] [29].

Researches on elderly product

Narinphop Chuaykanang et al. (2013) [30] found that consumer influence of Riceberry-flour product are chemical, physical and sensory properties of low-fat ice cream. The factor influences of Riceberry-flour (RF) product on low-fat ice cream, which indicated ice cream using 5% rice-flour. The acceptance score of purple color, flavor, and texture, which the highest acceptance score. While Thippawan Suwannarak (2017) [31] presented the innovation of health-food product for elderly people that have a problem in the deterioration of their teeth with less ability. The deterioration problem, which affect the diet of meat and vegetables that choose the type of protein easy to chew. There are complete amino acids and low fat, such as eggs and fish, 0.8 grams/day/1 kg of body weight, vegetables should be boiled and fruits must be careful about sugar to reduce constipation. Likewise, brown rice should be chosen instead of white rice to increase fiber, should eat foods that are high in nutrients and calcium, such as dairy products, dark green leafy vegetables, and small fish. As a result of these problems, healthy-food supplements are one option that the elderly people will choose to consume to receive less nutrition from eating food.

3. RESEARCH METHOD

These studies use qualitative research with a focus group of 5 scholars, 5 entrepreneurs, and 10 elderly consumers. The conclusion to found the outstanding features that consumers need and meet the approximately manufacture product. In summary, a new concept of Riceberry-product for elderly people is ready to drink powder. The package and brand name were designed to get along with the development of Riceberry-product (Fig. 2). The outstanding features of the new products are serving the digestive system to be normal, antioxidant based on polyphenols, slowing down aging, brightening the skin, giving appetite, strengthening the immune system, circulatory system, and the heart. In addition, reduces the risk of cancers and relieves diseases such as diabetes, heart disease, high blood pressure detail in Table 1. Then, used features of Riceberry-product develop questionnaires to collect data. The convenience survey of questionnaires with 418 samples (Bangkok province 217, and Khonkaen province 210) of Thai elderly consumers who have consumed health-food products. The Likert scale be used in design the questionnaire that applied from Chaniotakis, Lymperopoulos & Soureli 2010 [32] and Jaafar & Laip 2012 [33], with a 5–point (very low, low, moderate, high, and very high). The data collection was to test the Riceberry ready to drink powder what the features influence consumers purchase intention.

The multiple regression techniques used to analyze with linear regression equation, the researcher input nine items of independent variables are the features Riceberry ready to drink powder. The dependent variable is the consumers' purchase intention (CPI) that tested significantly inside each feature of the new product concept.

Fig. 2 Riceberry ready to drink powder packed in sachet and box form with brand name design.

4. RESULT

The respondents agreed that the properties of health-supplements the Riceberry ready to drink powder for the elderly. First, the Riceberry ready to drink powder product should be Reduce the risk of cancer with an average of 4.010. Following, Reduce the risk of diabetes, blood pressure, blood sugar have an average of 3.964, the healthy immune system protects with an average of 3.945, and circulatory system relief with an average of 3.914, respectively. In the case of the standard deviation of variables, which minimum value is 0.582 and the maximum value is 0.885, it shows that the data are quite-well structured. Besides, the normality test dependent variable (consumers purchasing intention, CPI) that the Multiple Regression requirements, the CPI must have a normal distribution. The Normality test used value coefficient of Skewness /SE., and Kurtosis/SE., should more than ± 1.96 (Wilkinson, 1999). The calculated values found that Skewness/SE. = -1.824 and Kurtosis/SE. = +1.920, which the calculated values are less than the specified criteria, indicating that they could analyze with multiple regression methods, more detail in Table 2.

Table 1. The consumers expect properties of health-food products from Riceberry

Variable	Observe
Independent Variables **Features of innovative Riceberry product (FIRP)**	
- Relief from digestive problems	**CEP1**
- Neutralize free radicals	**CEP2**
- Reverse the effects of aging	**CEP3**
- Penetrates the cells to brighten and lighten dull	**CEP4**
- Relief appetite	**CEP5**
- Reduce the risk of diabetes, blood pressure, and blood sugar levels	**CEP6**
- Circulatory system relief	**CEP7**
- The healthy immune system protects	**CEP8**
Dependent Variables **Consumers purchasing intention (CPI)**	
- I would buy healthy-food products from Riceberry to good health.	**CPI1**
- I consider purchasing the healthy-food products from Riceberry.	**CPI2**
- I will intention to buy healthy-food products from Riceberry.	**CPI3**

Table 2. Verification validity of the questionnaire

Variables	Mean	S.D.	Skewness		Kurtosis	
			Statistic	Std.	Statistic	Std.
CEP1	3.297	0.875	0.097	0.119	-0.248	0.238
CEP2	3.452	0.745	-0.185	0.119	0.394	0.238
CEP3	3.556	0.804	0.072	0.119	-0.074	0.238
CEP4	3.646	0.839	-0.406	0.119	0.225	0.238
CEP5	3.696	0.857	-0.681	0.119	0.508	0.238
CEP6	3.964	0.885	-0.639	0.119	0.067	0.238
CEP7	3.919	0.827	-0.486	0.119	0.033	0.238
CEP8	3.945	0.777	-0.428	0.119	-0.124	0.238
CEP9	4.010	0.780	-0.473	0.119	0.005	0.238
Mean CPI	3.667	0.582	-0.217	0.119	0.457	0.238

Normality test CPI, Skeness/SE. = -0.217/0.119 = -1.824

Kurtosis/SE. = 0.457/0.238 = +1.920

Remark: Normality test coefficient of Skeness/SE., Kurtosis/SE. < ± 1.96

In the case of patterned the assumptions of Multiple Regression that the variable is more relevant than the requirement. The multicollinearity problem, which, if there are more relationships between independent variables that should be merge together. First, consider the value of Tolerance, the lowest is CEP4 = 0.428, and the highest is CEP9 = 0.701, which the values all independent variables greater than 0.150, no problem with multicollinearity. Furthermore, the VIF value that all independent variables should be lower than 10 (Hair et al., 1995). The values of VIF, which minimum is CEP9 = 1.427, and the maximum is CEP4 = 2.337, that the calculated value all CEP1-CEP9 lower than 10, with a pass of the requirement of multicollinearity (see Table 3).

Table 3: Pattern Assumption of Multiple Regression

Variables	Tolerance	VIF	Confidence Interval	
			Upper	Lower
CEP1	0.670	1.492	0.140	0.247
CEP2	0.538	1.859	-0.034	0.153
CEP3	0.509	1.969	-0.163	0.015
CEP4	0.428	2.337	0.005	0.190
CEP5	0.542	1.844	-0.094	0.068
CEP6	0.664	1.507	0.011	0.153
CEP7	0.527	1.896	-0.068	0.101
CEP8	0.506	1.975	-0.013	0.172
CEP9	0.701	1.427	-0.096	0.060

The validation of the model summary considers appropriated with multiple regression of the outstanding features of innovative Riceberry product influence on the purchasing intention of elderly consumers in Thailand. The model fits with F change statistic has a value of 10.518, which greater than 1.96 and has a significant at level 0.05 indicating that the linear regression of this research is correlated with predictive values. The purchase intention of the sample was 18.8% (0.188) and the standard error of estimating from the forecasting is 0.53. The autocorrelation of standard error was tested by the value of Durbin-Watson = 1.766, which values in the range of 1.55-2.5 show that the tolerances are not related, no problem with this regression. According to preliminary testing, found that the linear regression model of the research is appropriate. The linear regression prediction on purchasing intention shows that when determining the features of Riceberry ready to drink powder in 9 items, the prediction value of purchasing intention of consumers equal to 18.8% (see Table. 4).

Table 4. Model Summary of the outstanding features of innovative Riceberry product influence on the purchasing intention

Model	R Square	Adjust R Square	Std. Error	R Square change
1	0.188	0.187	0.530	0.188

F Change	df1	df2	Sig. F Change	Durbin-Watson
10.518	9	408	.000	1.766

Table 5. Standard coefficient of multiple regression the outstanding features of innovative Riceberry product influence on the purchasing intention

Variables	Unstandard Coefficient		Standard Coefficient	t	Sig.
	B	Std. Error	Beta		
constant	2.209	0.191		11.549	.000*
CEP1	0.176	0.036	0.264	4.848	.000*
CEP2	0.059	0.047	0.076	1.256	.212
CEP3	0.074	0.045	0.103	1.641	.102
CEP4	0.097	0.047	0.141	2.061	.040*
CEP5	0.013	0.041	0.019	0.309	.758
CEP6	0.082	0.036	0.125	2.276	.023*
CEP7	0.016	0.043	0.023	0.381	.703
CEP8	0.080	0.047	0.106	1.695	.091
CEP9	0.018	0.040	0.024	0.460	.646

The values of the standard coefficient in Table 5 show that the features items CEP1-CEP9 of Riceberry ready to drink powder that influence the purchasing intention to consumers. Especially, the features, which have significance are three factors CEP1 ($\beta = 0.264$), CEP4. ($\beta = 0.141$) and CEP6 ($\beta = 0.125$). In summary, the samples are most concerned about the properties of Riceberry ready to drink powder should relief from digestive problems, penetrates the cells to brighten and lighten dull, and reduce the risk of diabetes, blood pressure, and blood sugar levels.

5. CONCLUSION

The equation of the outstanding features influence on purchasing intention of elderly consumers in Thailand shown with standard coefficient (β);

$$Y_{FIRP} = 0.264X_{CEP1} + 0.076X_{CEP2} + 0.103X_{CEP3} + 0.141X_{CEP4} + 0.019X_{CEP5} + 0.125X_{CEP6} + 0.023X_{CEP7} + 0.106X_{CEP8} + 0.024X_{CEP9}$$

(value adjust R square = 0.187)

From the equation, it is found that the features of Riceberry ready to drink powder that effects on purchasing intention of elderly consumers. The application of the entrepreneur who will develop a product to commercial the outstanding properties should have relief from a digestive problem, penetrates the cells to brighten and lighten dull, and reduce the risk of diabetes, blood pressure, blood sugar. Also, properties are reverse the effects of aging properties and the healthy immune system protects, also interesting because of the magnitude of influence too high. In contrast, the R square shows that the predictive power is only 18.8%, indicating that there are other independent variables, which not yet to take in regression. Other factors should have studied in the regression are packaging, the communication channel with customers, channels of distribution, price of the product, etc., as well as be able to be a prototype for the development of innovative Riceberry product for elderly people.

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