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Model of Factors Influencing the Intention to Purchase Lactose-free Milk for the Population of Bangkok

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ABSTRACT

Milk is an important source of protein, fat, lactose, vitamins and minerals. The nutritional value of milk from various animals, such as the highly popular cow milk, contains many useful nutrients. However, milk consumption is restricted for some consumers because they are allergic to milk. Milk allergy can be found in children and adults alike. In children, allergy symptoms include diarrhea and vomiting while the symptoms in adults include flatulence, indigestion and stomach gas. These symptoms are a result of the body's inability to digest lactose in milk due to the lack of necessary enzymes that can digest milk. A study discovered that East Asian and North American populations have the highest rate of lactose intolerance of 80-100%, followed by the Middle Eastern population at 80%. The United Kingdom population has the lowest rate of lactose intolerance at 5-15%. Lactose-free milk for adults is not yet commercially available in Thailand. Therefore, the researchers are interested in studying the level of knowledge on lactose-free products and factors influencing the intention to purchase lactose-free milk for the population of Bangkok. The researchers hope that these findings will be used to develop a guideline for suitable marketing strategies of lactose-free milk in Thailand. These findings can also provide basic information for the government sector to formulate appropriate public health plans for populations with lactose intolerance. This research used both quantitative and qualitative approaches. The scope of the research was limited to consumers over 18 years in Bangkok with total study samples of 500 subjects. The quantitative techniques used were Path Analysis and Partial Least Square (PLS-Graph program) while the qualitative technique used was in-depth interview with individuals in the related fields of nutrition and food and beverage marketing. There were a total of 10 interviewees who were physicians, nutritionists and marketing experts. The research found that the factors influencing the intention to purchase lactose-free milk include consumer characteristics (age and health conditions), knowledge of lactose-free milk (consumer knowledge, public relations and brand reputation) and milk consumption behavior (milk quality and price acceptance).

Key words: Food and beverage business, purchase intention, management, consumer behavior

INTRODUCTION

Milk is an important source of nutrients such as proteins, fat, lactose, vitamins and minerals. People of all genders and ages can drink milk and they can choose from a large variety of available milk products such as milk powder, ready-to-drink milk, milk tablets and dairy products such as yogurt, drinking yogurt butter, cheese, ice cream, etc. Thailand has seen a gradual increase in local

dairy processing plants which include private and government-supported plants. Past governments have promoted dairy farming and supported the dairy processing industry, as well as introduced campaigns to promote milk drinking in schools. Such policies have significantly contributed to the advance of domestic dairy industry.

A major component of milk from mammals is lactose, a disaccharide which is formed from glucose and galactose molecules. The absorption of lactose into the small intestine wall requires the enzyme lactase. If the lactase enzyme is not present or present at reduced amounts, lactose cannot be digested and absorbed. The undigested sugar enters the large intestine and is fermented by bacteria. This produces various gasses within the intestines including hydrogen, carbon dioxide and methane causing various symptoms. Apart from the large amount of gas, the fermented sugar creates osmotic pressure. Scientifically, high osmotic pressure causes water to be drawn from low to high osmotic pressure areas which are usually the large intestines. The increased amount of water in the large intestines usually leads to diarrhea. This symptom of milk allergy is a result of the body's inability to digest lactose in milk because it lacks the lactase enzyme necessary for digestion (Casellas and Malagelada, 2003). A study by Itan *et al.* (2010) discovered that East Asian and North American populations have the highest rate of lactose intolerance, at 80-100%, followed by the Middle Eastern population at 80% and the United Kingdom population with the lowest rate of lactose intolerance at 5-15%. Thailand is part of the Asian populations that have a very high rate of lactose intolerance at 98% (Kretchmer, 1972). There has yet to be any lactose-free dairy products for adults available commercially in the country. At present, only lactose-free dairy products are available to children in the form of imported milk powder but there are no alternative dairy products for lactose intolerant adult consumers. Some consumers are unaware of the causes of milk allergy and do not know about the benefits of lactose free dairy products.

The researchers have, therefore, decided to conduct a research under titled "A model of factors influencing the intention to purchase lactose-free milk for the population of Bangkok" whose primary objectives are: (1) To study the level of knowledge about lactose-free products of consumers in Bangkok (2) To study the relationship between consumer's personal data and knowledge of dairy products and the purchase intention of lactose-free dairy products of consumers in Bangkok; and (3) To study the marketing factors of lactose-free dairy products influencing lactose-free dairy products purchase intention of consumers in Bangkok. The researchers believe that the findings of this research will reveal significant information on two aspects of this topic: (1) The level of knowledge about lactose-free dairy products among consumers in Bangkok; (2) The factors influencing the purchase intention of lactose-free milk products of target consumers in Bangkok. These data can be subsequently used to formulate marketing strategies for lactose-free dairy products in Thailand and can provide basic information to the government sector in planning health measures for people with lactose intolerance.

CONCEPTUAL DEVELOPMENT

Purchase intention/model factors: Ostrom and Lacobucci (1995) stated that consumer satisfaction and repeated purchase intention have different structures. There are two dimensions in consumer satisfaction, cognitive and affective while repeated purchase intention has the additional dimension of behavior. Normally, consumers will make a repeat purchase when the purchased product or service works well or has the required qualities. A study by Chen (2007) titled "Consumer attitude and repeated purchase intention of organic food in Taiwan: A case study of the

mitigating effect of food on personality” concluded that the purchase intention of consumer products are affected by many factors such as health or an individual's genetic makeup (Chantasophon and Leelawacharamas, 2007). The need for different minerals for nourishment differs with each individual's health, mood or incentive. This finding is congruent with Ajzen's Theory of Planned Behavior (TPB) which states that incentive will generate consumer's interest which will lead to data acknowledgement and understanding of the product as well as the benefits of its consumption. Product information and knowledge generate curiosity and the desire to try the product. Consumers will choose the product that satisfies the body's needs for nutrients (Chantasophon and Leelawacharamas, 2007). Price is also an influential as it must be reasonable and consistent with the provided service and quality. It is an important factor that has been widely used in management strategy (Barsky and Labagh, 1992).

Characteristic population: Published in the Journal of Food and Medicine, Volume 6, Issue 1/2542 was an article titled “On the Subject of Milk” which stated that the national nutrition plan mentioned that when the 2001 National Economic and Social Development Plan was introduced the government supported the food supplement program (milk) for the reason that people who disliked or lacked the opportunity to drink milk did not get enough calcium in their diet. Therefore, people of all genders and ages should regularly drink milk. Children need calcium to build bones while adults and the elderly need calcium to control or slow the degradation of bone mass. There are many types of milk such as low fat milk, fat free milk or lactose milk. It is, therefore, necessary for consumers to have knowledge about milk and its benefits in order to be able to choose the right type of milk for their individual characters. Different groups of consumers have different dairy needs and is influenced by different factors such as age, gender, race and health problems (Hodges, 2008). For these reasons, business operations should take consumer's differences into consideration and provide different types of products to suit the needs of each consumer group (Johnson and Fornell, 1991).

Milk knowledge: In the food business, managers must study the consumer needs and lifestyles in order to create a product that satisfies such needs. Since consumer needs constantly shift with the changing situation, the market always has a need for novel and unique products. The current trend in the field of food product development is functional foods. Consumers search for information or knowledge about the product its qualities and benefits; they are the influencing factors for purchase decision (Shafiq *et al.*, 2011). Consumers must be made aware of the benefits and safety of a product (Zhou and Wang, 2011). For consumers to have that awareness or knowledge of a food product, manufacturers must advertise the product through various media outlets to reach consumers (Satrawaha *et al.*, 2011). Television is an influential media for consumer's purchase decision. The type of milk we choose to drink is associated with the belief that drinking milk is good for one's health (Tarawanich, 1996). There have been promotion appeals to increase consumer's awareness on organic foods (Chen, 2007). The information provided to consumers depends on the level of education and the awareness of target consumers; different levels of education and awareness result in different styles of advertising (Saengwaree and Noiya, 2009). Another communication channel with consumers is the packaging design. Packaging design and improvement aiming to reach a wider base of target customers is the strategy used to maintain and increase customer bases. This strategy has been an important driving force in the growth of the

dairy products market (KTRC, 2006). A study by Klockner and Ohms (2009) found that the purchase intention of organic milk depends on the knowledge that consumers obtained from milk labels or packaging media which make the consumers aware of the benefits and different types of milk. Brand or business reputation also reflects the awareness of product distinction (Farquhar, 1990) and increases customer confidence (Randall, 1997).

Customer behavior: Today's consumers pay more attention to what they consume and focus more on nutritional and healthy consumption for body benefits. Therefore, food products should be nutritional for both healthy and ill persons (Sarkar, 2007a). For instance, the high nutritional value and convenience of consumption of soy milk makes purchase decision easy for consumers. In a study titled "Potential of acidophilus milk to lower cholesterol" it was shown that the presentation of the product must offer alternatives to suit customer needs and to increase its value (Satrawaha *et al.*, 2011). This is because different satisfaction levels are determined by customer behaviors (Yang *et al.*, 2011). Consumers will make repeated purchase when the product is different or has better qualities than previous products. Products with standard quality create trust and confidence in consumers which in turn influence their repeated purchase intention (Chung and Lee, 2003; Ha *et al.*, 2010; Kim *et al.*, 2010). Furthermore, differences in product qualities and price factor are important influencing factors in purchase intention. Product price should be reasonable (not too much different from competitors), consistent with the product quality as well as fair and transparent (Boniface *et al.*, 2012). These elements should provide a guideline for the development of price acceptance; product price should be the price that consumers are willing to pay (Fearne and Bates, 2003). Prices will vary with each society and different prices can be set for consumers of different social statuses (Zhu and Liu, 2011).

From the above conceptual review and development, the researchers have developed the following hypotheses for the present study:

Hypothesis 1 (H₁): Characteristic population influences milk knowledge

Hypothesis 2 (H₂): Characteristic population influences milk consumption behavior

Hypothesis 3 (H₃): Characteristic population influences purchase intention

Hypothesis 4 (H₄): Milk knowledge influences milk consumption behavior

Hypothesis 5 (H₅): Milk knowledge influences purchase intention

Hypothesis 6 (H₆): Milk consumption behavior influences purchase intention

METHODOLOGY

This research is a combined quantitative and qualitative research. The research population or unit of analysis consists of 500 samples of general consumers and consumers with knowledge of lactose-free milk in Bangkok.

Data collection: For quantitative research, data from questionnaires were collected from groups of general consumers and consumers with knowledge of lactose-free milk in Bangkok. The research's sample size was calculated for large and unknown ratio population and a sample population of 383 at the confidence level of 95% was determined. The researchers collected 500 questionnaires from participants of the focus groups at a seminar on lactose-free milk.

The questionnaires were created as a measurement tool that is consistent with the research's conceptual framework and operational definitions. The 5-point Likert Scale questionnaire was

reviewed by medical, nutritional and marketing specialists. Cronbach's α -coefficient was used to measure the internal consistency of the scale. The α -coefficient was found to be between 0.826-0.853 indicating high reliability of the questionnaire.

Quantitative measurement

Dependent variable

Purchase intention: A measurement tool in the form of a 5-point scale questionnaire was developed to measure consumer's needs, intention and recommendations (Ostrom and Lacobucci, 1995; Chen, 2007; Chantasophon and Leelawacharamas, 2007; Barsky and Labagh, 1992).

Independent variable

Characteristic population: A measurement tool in the form of a questionnaire was developed to measure gender, age and health (Hodges, 2008; Johnson and Fornell, 1991).

Milk knowledge: A measurement tool in the form of a 5-point scale questionnaire was developed to measure knowledge level, public relations activities, manufacturer reputation and packaging (Shafiq *et al.*, 2011; Zhou and Wang, 2011; Satrawaha *et al.*, 2011; Tarawanich, 1996; Chen, 2007; Saengwaree and Noiyai, 2009; KTRC, 2006; Klockner and Ohms, 2009; Farquhar, 1990; Randall, 1997).

Consumer behavior: A measurement tool in the form of a 5-Point scale questionnaire was developed to measure milk attributes, price acceptance and purchase convenience (Sarkar, 2007a; Satrawaha *et al.*, 2011; Yang *et al.*, 2011; Chung and Lee, 2003; Ha *et al.*, 2010; Wennstrom *et al.*, 2008; Kim *et al.*, 2010; Boniface *et al.*, 2012; Fearne and Bates, 2003; Zhu and Liu, 2011).

For qualitative research, the researchers conducted in-depth interviews with 10 specialists who are physicians, nurses, nutritionists and marketing specialists.

ANALYSIS AND RESULTS

The quantitative data were analyzed with the Partial Least Squares statistical tool. The hypotheses were validated with the PLS-Graph program (Chin, 2001). The analysis results were displayed as a model structure to determine manifest and latent variables. The measurement tools' validity and reliability were analyzed and their internal consistency was measured by Cronbach's α -coefficient. The α -coefficient was found to be between 0.826-0.853 which indicates high reliability level.

Reflective model structures were created for this research and tested for convergent validity and discriminant validity. The criteria for convergent validity are as follows: the loading value must be positive, the indicator loading values must be over 0.707 with a statistical significance of ($|t| \geq 1.96$) for all values (Lauro and Vinzi, 2004; Henseler *et al.*, 2009; Piriyakul, 2010). The analysis results are shown in Table 1.

Characteristic population factors consisting of Health and Age had the loading values of 0.9433 and 0.8851 with a statistical significance of 95% ($t\text{-stat} > 1.96$) which indicate that a particular factor had influence over purchase intention.

Milk knowledge factors consisting of knowledge, public relations and reputation had the loading values of 0.8352, 0.7904 and 0.7693 with a statistical significance of 95 ($t\text{-stat} > 1.96$) which indicate that a particular factor had influence over purchase intention.

Table 1: Reflective statistical values indicating convergent validity of the latent variables

Construct/Item	Loading	t-stat
Characteristic population		
Health	0.9433	76.7107
Age	0.8851	24.9579
Milk knowledge		
Knowledge	0.8352	27.7030
Public relations	0.7904	18.5753
Producer reputation	0.7693	21.3351
Customer behavior		
Price acceptance	0.8860	43.2182
Milk qualification	0.7914	10.3754
Intention		
Requirement	0.8952	61.8200
Intention	0.8731	36.2081
Recommendation	0.7969	21.4153

Table 2: Statistical values for discriminant validity of model 5

Construct	CR	R ²	AVE	Cross construct correlation			
				Characteristic population	Milk knowledge	Consumption behavior	Purchase intention
Characteristic population	0.911		0.837	0.914			
Milk knowledge	0.841	0.212	0.638	0.460	0.799		
Consumption behavior	0.827	0.427	0.706	0.234	0.649	0.840	
Purchase intention	0.891	0.408	0.733	0.412	0.586	0.517	0.856

Statistically significant at p = 0.05, Diagonal numbers refer to \sqrt{AVE}

Customer behavior factors consisting of price acceptance and milk qualification had the loading values of 0.8860 and 0.7914 with a statistical significance of 95 (t-stat>1.96) which indicate that a particular factor had influence over purchase intention.

Purchase intention factors consisting of requirement, intention and recommendation had the loading values of 0.8952, .8731 and 0.7969 with a statistical significance of 95 (t-stat>1.96) which indicated that the particular factor had influence over purchase intention.

Discriminant validity: For reliability test of the measurement tools the Composite Reliability (CR) value should not be less than 0.60, the Average Variance Extract (AVE) should not be less than 0.50, the R² value should not be less than 0.20 and the \sqrt{AVE} in the interested columns must be higher than the cross construct correlation of all values in the same column in order to be considered reliable in all constructs (Lauro and Vinzi, 2004; Henseler *et al.*, 2009 cited in Wingwon and Priryakul, 2010) (Table 2).

Analysis results of the model of influencing factors on the purchase intention of lactose-free milk for the population of Bangkok are shown in Fig. 1.

The results of research hypotheses tests are shown in Table 3.

When the direct and indirect influences of these factors were considered it was found that Milk Knowledge was the most influential factor followed by customer behavior and characteristic population.

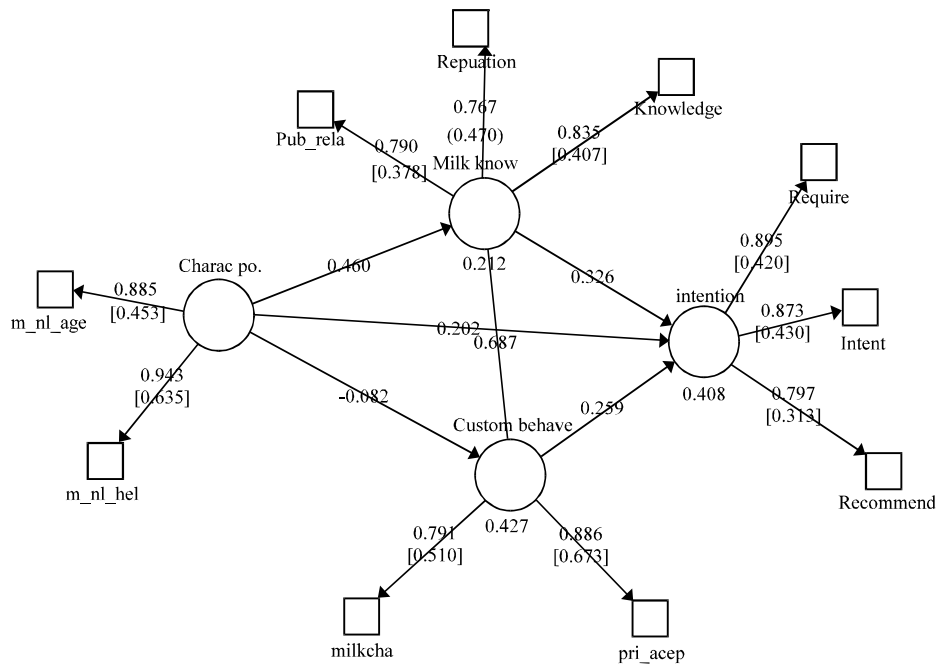


Fig. 1: Final model

Table 3: Research hypotheses test results

Hypothesis	Coefficient	t-stat	Results
H1: Characteristic population influences milk knowledge	0.460	8.3427	Supportive
H2: Characteristic population influences milk consumption behavior	-0.082	1.3427	Unsupportive
H3: Characteristic population influences milk purchase intention	0.202	2.7449	Supportive
H4: Milk knowledge influences milk consumption behavior	0.687	12.5095	Supportive
H5: Milk knowledge influences purchase intention	0.326	3.6862	Supportive
H6: Milk consumption behavior influences purchase intention	0.259	2.9163	Supportive

DISCUSSION AND APPLICATION

This section is the discussion of some interesting findings of the research titled “A model of factors influencing the intention to purchase lactose-free milk for the population of Bangkok”.

Purchase intention of lactose-free milk. The analysis found that indicators of intention to purchase consist of need, intention and recommendation. All three indicators are the product and service outcome that can meet consumer need or create consumer satisfaction. The purchase intention of consumers is associated to knowledge, mood and behavior. All three dimensions are induced by different perception of each individual due to different personal characteristics and different environment. According to the Theory of Reasoned Action (TRA) introduced by Fishbein and Ajzen (1975), the perception of an individual can have influence over their purchase intention and the factors related to perception are the consumer’s belief and cost.

Characteristic population: The indicators of this dimension are age and health. Different consumer’s characteristics influence different needs for the product. For this reason, manufacturers must produce different products to satisfy different consumer needs by dividing them into groups. One of the variables related to purchasing decision is the individual’s personal and demographic factors such as age, health problems, etc. (Hodges, 2008).

Milk knowledge: The indicators of this dimension are consumer knowledge, public relations and manufacturer reputation. The research findings are congruent with a food specialist's statement given at the 6th Annual World Food Technology and Innovation Forum held at Burlington Hotel in Dublin on 20-21 November 2007. Food production must take into consideration consumer's needs and lifestyles and produce products that satisfy such needs in order to create product distinction in the market. Today's trend in the development of food product is functional foods. However, manufacturers must be able to communicate product distinction to their consumers. It is the communication that is carried out to educate consumer because product knowledge influences purchase intention (Shafiq *et al.*, 2011). Consumer communication comes in different forms and combination (Satrawaha *et al.*, 2011) in order to provide accurate and suitable information to target groups. Advertising and news is a communication tool that can influence purchase intention (Tarawanich, 1996). Moreover, the brand or product reputation factor is related to product awareness that can create consumer confidence in a product or a service (Randall, 1997; Shafiq *et al.*, 2011). This finding is congruent with the research by Porncharoen and Porncharoen (2006) which found the main reason for consumer's reluctance to make internet purchases to be a lack of confidence in the product.

Consumer behavior: The indicators of this dimension consist of milk attributes and milk price because they are what consumers use to make the purchase decision that suits their different needs. This finding is congruent with the research by which found that consumers wanted to purchase products with benefits. For food products, they are be interested in healthy and nutritional foods (Sarkar, 2007b). The product must also be better than previous purchases and meet the existing standards in order to generate consumer confidence and make purchasing decision easier (Chung and Lee, 2003). The price must also be acceptable, reasonable and consistent with product quality (Boniface *et al.*, 2012).

CONCLUSION

It can be concluded from the research titled "A model of factors influencing the intention to purchase lactose-free milk for the population of Bangkok" that milk knowledge is most influential factor on the consumer's purchase intention of lactose free milk. This is because such knowledge educates consumers on the value and benefit of drinking lactose-free milk. It is also congruent with the consumer theory that consumers make a purchase and use the product to satisfy their different needs. Before making a purchase decision, consumers have their own practice of seeking product information and knowledge, evaluating existing alternatives as well as making purchase decision and post-purchase evaluation.

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