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An Exploratory Factor Analysis on Adoption Factors of P3 Sweetener

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Abstract

Nanofood has progressively became an attractive technology that would radically change the food industry. However, due to limited research in the food industry, it is difficult to identify how nanoparticles and materials are applied into the food and consumers are not realised the existence of nanofood itself. Thus, this research was conducted to recognize the adoption factors of P3 Sweetener effecting on purchase behaviour towards consumer satisfaction. The main samples from 365 of respondents were collected from a survey carried out in Johor, Malaysia. By conducting Exploratory Factor Analysis (EFA), the result has showed that trust, perceived benefit, motivation and knowledge were well structured in the analysis and play an important role in adoption factors. In addition, Cronbach's Alpha Coefficient (α) has indicated that all factors are significantly and greater than 0.70. Finally, this research has managed to reveal four adoption factors of P3 Sweetener effecting on purchase behaviour towards consumer satisfaction

Keywords; *nanofood, adoption factors, P3 sweetener, exploratory factor analysis*

1. INTRODUCTION

Nanotechnology has extremely become an approachable technology in recent years that would vastly improve the food industry. The food industry has viewer the stunning growth in both developed and developing countries in recent years. According to [1], nanotechnology commonly copes with very tiny particles between 1 and 100 nanometres (nm) in at least one element, and nanometre is defined as "one billionth of a metre" [2]. However, the most adopted definition of nanotechnology is "the understanding and controlling of matter at dimension approximately 1 to 100 nanometers (nm), where incredible phenomena enable novel application not feasible when working with bulk material or even with single atoms or molecules. It is also including quantifying, modelling, imaging and controlling the physical substance at this length scale" [3]. In this context, nanotechnology referring to nanofood. Nanofood is characterised as functional food grown by nanotechnology tools that cultivate and specification the process and thus produce valuable materials or techniques that use new attributes and physical laws to create new materials [4]. In addition, it is also known as food which has been modified, generated or manufactured with nanotechnology devices or the food itself that has been integrated with nanomaterials [5].

Utilising this definition as a main context, nanofood referring to P3 Sweetener Liquid Drop. P3 Sweetener Liquid Drop is an example of a nanofood product in Malaysia and has been utilising as case of this research. This product can enhance the flavour, nutritional content, quality, and safety of the food. The main purpose of this brand is to use an alternate solution and main sugar substitute to replace white sugar and

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inorganic sweeteners [6], [7]. Most importantly, to be distinctive from other sugar replacement products, this sweetener still maintains the original taste of our daily sugar (almost 99 %), but it contains "zero" value in artificial sweeteners, carbohydrates, fat, cholesterol, starch, and antioxidants [7]. P3 Sweetener Liquid Drop is a natural sugar sweetener and extraction from sugarcane, which is formulated with sophisticated nanotechnology [8].

However, the awareness of nanofood in food industry towards nanofood has not been discussed and yet has not explored [9]. Although, the application of nanofood is becoming popular among the developed nations, previous studies have shown that public awareness of nanofood or food technologies are still limited [10]. As a result, some community's lack of readiness to adopt this technology leads to fears on the existing uncertainties risks to health and safety of consuming nanofood product on a daily basis [11]. In order to tackle these issues, the role of mass media needs to be further strengthened to the maximum possible extent. According to previous studies done by [12] pointed out that mass media can influencing consumer attitudes towards purchase behaviour, thus it helps to boost consumer understanding and perception. In addition, clear information should be emphasis by the manufacturer of P3 Sweetener. The effort will lead to increased trust between buyers, retailers and investors. Thus, elevating acceptance towards nanofood product [6]. Therefore, this research was carried out to recognize the adoption factors of P3 Sweetener effecting on purchase behaviour towards consumer satisfaction.

2. LITERATURE REVIEW

The purpose of this section is to identify the adoption factors that have been utilised in previous research and determine the research gap addressed by this research. The motivation of this research is drawn from the literature review serves as providing the theoretical and recent development of knowledge relevant to the study. The main purpose of literature review is to identify the problems or gaps in the existing approaches related to the adoption factors effecting on purchase behaviour towards consumer satisfaction. Thus, this section focusses on four factors that have been utilised and tested in previous research. The following are the adoption factors to be tested

Firstly, according to [13], trust can describe as a process and a control mechanism. Trust will be formed at a certain time and will go through a certain process before real trust is achieved [14]. Based on previous study done by [15] showed that trust play an important role in nanofood marketing and branding. Without marketing, clear information about nanofood product cannot be spread widely. Thus, it proved that trust play an important role towards purchase behaviour. Without trust, the product is not reliable and trustworthy. Second factor was perceived benefit. Perceived benefit can be attributed to the effects received by particular action [16]. Based on previous study, perceived benefit structure was mostly applied in the social science research, which helps to measure individual perception and satisfaction towards the outcome or response received [17]. There are differences in how the individual views the benefits in food associated with nanotechnologies. Hence, it important to explicitly communicate the benefits of the product to consumers. This is to ensure consumers are understanding the benefit that will be received and thus elevating acceptance towards nanofood. The third factor was motivation. Motivation is part of psychological construct [18]. Motivation is defined as a behaviour of human towards something or emotional reaction [19]. Motivation can generate more value and leads to a desirable human being that has an effect on the buying behaviour [20].

In addition, research done by [6] pointed out that motivation can influenced consumer behaviour and attitudes towards purchase

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behaviour and leads to satisfaction. Therefore, it can be concluded that motivation can influence emotional and attitudes towards purchase behaviour. Lastly, the role of knowledge. Knowledge is defined as an understanding and perception [21]. Through good knowledge, consumer can make a good decision without doubtful. The role of knowledge also has been highlighted in consumer traits [22]. Moreover, knowledge can explain the truth of the facts, belief in an agreement and justification of facts [23]. Previous research done by [24], has indicated that knowledge was a powerful effect that can influenced consumer perception and attitudes towards acceptance of food technologies or nanofood. People have different levels of thinking, knowledge and opinions on something new [25]. Therefore, knowledge is essential to use. From a good knowledge, consumer can make a good decision towards purchase behaviour.

3. METHODOLOGY

After validation of the survey, the data collection process began. This survey was evolved from a previous literature review to meet the required research objectives [8]. This survey was split into two parts. Part A managed to capture the demographic profile of respondents, while Part B covering about 4 adoption factors effecting on purchase behaviour towards consumer satisfaction. The questionnaire of adoption factors was reworded to boost transparency, as illustrated in Table 1. This research was conducted in quantitatively and a total survey of 365 respondents were collected from Johor, Malaysia based upon stratified random sampling plan. The data collection process begins from February 2017 to July 2017 and took about six months in order to complete this survey. For data analyses, Exploratory Factor Analysis (EFA) was utilised to reduce the large numerous factors to a smaller number of factors, classifying and summarizing the important details of the variables [26], while Cronbach's Alpha Coefficient (α) was utilised to measure the items for each factor evaluated [8], [27].

Table 1. Adoption factors

Item	
Trust (T)	
T1	I trust the scientific analysis of nanofood
T2	I trust nanofood because of the brand
T3	I trust the product because of my awareness toward its quality
T4	I have an experience of using nanofood before
T5	I trust the product because of its safety to consume
Perceived Benefit (P)	
B1	I believe that nanofoods have extra nutrition
B2	I believe nanofood can enhance the taste of the food
B3	I believe nanofood can extend the shelf life of the food
B4	I believe that nanofoods have the advantage of helping the body absorb nutrition more easily
B5	I believe that nanofood is beneficial
Motivation (M)	
M1	I believe brand name is very important consideration on purchase decision.
M2	I believe 'Word of Mouth" can motivate my decision to purchase

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	intention
M3	I believe advertisement and promotional can influence my decision to purchase.
M4	I believe price can influence my decision to purchase
M5	I realise nanofood content can help improve my health
Knowledge (K)	
K1	I know nanometer is a billionth of a meter
K2	I know nanotechnology in food involves materials that are not visible to the naked eye
K3	I know nanofood can extend human life span
K4	I know how to use nanofood and its function
K5	I realized the existence of nanofood in the market

4. RESULTS AND DISCUSSION

4.1. Respondent Profile

About 365 questionnaires obtained were analysed using the Social Science Statistical Package (SPSS) Version 23 to perform Descriptive Analysis, Exploratory Factor Analysis (EFA) and Reliability Test. In this survey, Part A managed to capture the demographic profile of respondent such as gender, age, race and education. Thus, the results were reworded and demonstrated in Table 2.

Table 2. Descriptive analysis

Demographic	Item	(N)	Frequency(s)	Percentage(s)
Gender	Male	365	187	51.2%
	Female		179	48.8%
Age	21 – 25	365	36	9.9%
	26 – 30		44	12.1%
	31 – 35		94	25.8%
	36 – 40		84	23.0%
	40 and above		107	29.3%
Race	Malay	365	278	76.2%
	Chinese		59	16.2%
	Indian		26	7.1%
	Other		2	0.5%
Education	Below SPM	365	45	12.3%
	SPM		78	21.4%
	STPM / Diploma		153	41.9%
	Degree and above		89	24.4%

4.2. Exploratory Factor Analysis (EFA)

Exploratory Factor Analysis (EFA) was utilised to explicate latent variables when evaluating the adoption factors of nanofood from the previous literature reviewed. By conducting the EFA, the variables are minimising to a small number compared to the initial variables [26]. The factors of this research consist of four variables namely trust, perceived benefit, motivation and knowledge. However, after conducting EFA, the

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result showed that only 4 factors were appeared in this research. From 20 items, it reduces to 17 items. Based on the result, (K5, B5, P5) needs to be removed and deleted due to inappropriate cross loading or inconsistent loading strength. The rest factors remain as illustrated in Table 4. On other hand, the Kaiser-Meyer-Olkin (KMO) and Bartlett's test value were reported 0.835 and sphericity of $\chi 2$ (df = 136, n = 365) = 3596.822, p <0.000. as shown in Table 3. In this analysis, Principal Axis Factoring (PAF) was utilised as extraction method, while direct oblimin rotation was employed to identify the technique used and to explore the underlying factor of the instruments. Thus, the overall result showed that the Kaiser-Meyer-Olkin (KMO) values between 0.80 and 0.90 indicate that all variables were recognized in a great value [28], [29].

Table 3. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.845
Bartlett's Test of Sphericity	Approx. Chi - Square	3596.822
	df	136
	Sig.	0.000

Table 4. Exploratory Factor Analysis (EFA)

Code	Items	Components			
		1	2	3	4
T3	I trust the product because of my awareness toward its quality	0.83			
T2	I trust nanofood because of the brand	0.80			
T5	I trust the product because of its safety to consume	0.77			
T1	I trust the scientific analysis of nanofood	0.71			
T4	I have an experience of using nanofood before	0.61			
B2	I believe nanofood can enhance the taste of the food		0.88		
B3	I believe nanofood can extend the shelf life of the food		0.86		
B4	I believe that nanofoods have the advantage of helping the body absorb nutrition more easily		0.85		
B1	I believe that nanofoods have extra nutrition		0.77		
M4	I believed price can influence my decision to purchase			0.83	
M3	I believed advertisement and promotional can influence my decision to purchase.			0.80	
M2	I believed 'Word of Mouth" can motivate my decision to purchase intention			0.74	

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M1	I believed brand name is very important consideration on purchase decision			0.49	
K2	I know nanotechnology in food involves materials that are not visible to the naked eye				0.87
K3	I know nanofood can extend human life span				0.84
K1	I know nanometer is a billionth of a meter				0.92
K4	I know how to use nanofood and its function				0.71

4.3. Reliability Analysis

The purpose of the reliability analysis was utilising to evaluate the extent of the measurement without bias and to ensure the consistency of the items in the instruments [30]. According to [31], if the Cronbach's Alpha values are higher than 0.70, then, the questionnaires are considered reliable. This statements also supported by [32]. Therefore, Table 4 showed that all variables are accepted and acknowledged. Thus, it indicated that all factors are reliable in this research.

Table 3. Reliability analysis

Code	(N)	(α)	Number of Items
T	365	0.86	5
B	365	0.91	4
M	365	0.83	4
K	365	0.91	4

*T=Trust, *B=Perceived Benefit, *M=Motivation, *K=Knowledge, *α =Cronbach's Alpha Coefficient

5. CONCLUSION

The outcome of the analysis has revealed four adoption factors effecting on purchase behaviour towards consumer satisfaction, which are i) trust, ii) perceived benefit, ii) motivation, and iv) knowledge. These factors play an important role in purchase behaviour and making an impact towards consumer satisfaction. Based on the Table 1, there are 20 items representing adoption factors. However, after conducting Exploratory Factor Analysis (EFA), the items have reduced to 17 items. Based on the result, (K5, B5, P5) needs to be eliminated due to inappropriate cross loading or inconsistent loading strength [32]. In this analysis, all loading factors are higher than 0.30 in scale, and if the loading factors are below than 0.30, it must be eliminated from the analysis [29], [32]. However, (K5, B5, P5) have been removed from the analysis due to inappropriate cross loading and not because of inconsistent loading strength. As a conclusion, only 17 items are presenting as adoption factors of P3 Sweetener in this research.

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