

A Preliminary Research on Consumer Acceptance in Nanofood towards Purchase Intention: A Pilot Research

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ABSTRACT--- Nanofood is one of food technologies, which can enhance food safety, food taste, shelf life and packaging. The main goal of the study is to recognize the influencing factors impacting consumer acceptance in nanofood towards purchase intention. The study is based upon survey approach to collect the primary data from 65 respondents as preliminary pilot test. This research was fully conducted in quantitative study and implementation of research was conducted in Johor, Malaysia. P3 Sweetener is an example product of the study. The model elicits four influencing factors which are knowledge, trust, perceived benefit and psychological. The findings based upon descriptive analysis and reliability test indicated that knowledge, trust, perceived benefit and psychological are significance in reliability test, [Cronbach's Alpha Coefficient (α) are greater than 0.70]. However, this is the preliminary stage of this research. The study has provided a data based on pilot study. Therefore, it should be considered for further research and addressing the upcoming studies.

Index Terms: Consumer acceptance, nanofood, pilot test, reliability test.

I. INTRODUCTION

Nanotechnology is the comprehension and control of nanoparticles of 1 to 100 nanometres, capable of constructing nano-structures, developing a new system with unique physical and biological features that permit a new application [1]. Nanotechnology has been implemented in several areas such as semiconductor and materials, electronics, pharmaceutical and healthcare, chemical, automotive and defense, food industry and others [2]. Food technology is one of the emerging food industry sectors. In food sectors, nanotechnology has been discovering many aspects of food, including the development of new food formulation, improvement of food packaging materials, advanced food security devices and biosensors to ameliorate food quality indices such as shelf life, sensory characteristics, improve texture of food and build health benefits product [3], [4].

The term of food technology is referring to a branch of food science which deals with the actual produces to make foods [5]. Nanofood was produced through the process of food technology. The term of nanofood is a combination of nanotechnology and food itself. Nanofood is referring to the

food that has been grown, produced, processed or packaged using nanotechnology tools or techniques, or has nanomaterial added into it [6]. In this context, this researcher used the P3 Sweetener product as an example of this study. P3 Sweetener product has been on the market in Malaysia since July 2013. According to [7], the main purpose of this product is to be an alternative and primary sweetener replacing white sugar and synthetic sweeteners. P3 Sweetener is extracted from 100% of Sugar Cane Extract (SCE) in liquid form. This product was investigated and produced in PH 5.5, which is suitable for use in humans. In order to meet the needs of all Malaysian cultures, particularly hypertension, heart problem, kidney, diabetes, and obesity, P3 Sweetener is designed for these problems. This product helps consumers to prevent and reduce diabetes-related oxidative stress while regulating blood and sugar levels to a normal state. The cause of the diseases are unhealthy food, unbalanced diet and excessive daily sugar consumption, which led to the above-mentioned disease.

However, the novel food application remains uncertain in the practice of Malaysia. The importance of nanofood for their health should be understood. Therefore, its importance to enhance consumer understanding of the existence of nanofood and its application in food. Health exposure needs to be emphasized that consumers are aware that eating unhealthy foods and excessive sugars will be invaluable. Hence, switch to healthy eating and proper sugar intake such as P3 Sweetener and start changing the usual routine from white sugar to P3 Sweetener. As the saying, prevent it better than cure it.

II. LITERATURE REVIEW



Fig. 1: Possible application in nanofood

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According to [8], Fig. 1 shown the possible application in nanofood; i) food processing, (e.g.: heat/mass transfer, molecular synthesis, nanoscale reaction engineering) ii) design of materials, (e.g.: nanoparticles, nanocomposite, nanoemulsions, nanostructured material), iii) food product, (e.g.: packaging, delivery, formulation) and iv) food safety and biodiversity, (e.g.: nanosensor, nanotracer). It shown that nanofood can improve food safety and processing, improve food quality, improve taste and nutrition, delivery procedures, broaden pathogen detection, enhance food functionality, protect the environment and cost - efficiency of storage and distribution [9]. However, the result from previous research shown that consumer understanding and knowledge are still limited and some of them are not realized the existence of nanofood [10].

Therefore, it is pivotal for exposing consumers to the benefits of nanotechnology in foods widely. To ensure the successful of nanotechnology idea, the government has to play a crucial role, a successful campaign to promote consumer awareness of the impact of nanotechnology on future economies, societies and the environment must be promoted to disseminate the right information to the consumer. This is to ensure consumers are realized the existing of nanofood and practicing a healthy lifestyle.

Proposed Research Model

The idea of this proposed model was employed from the extension of Technology Acceptance Model (TAM) [11]. This researcher believed that the extension of TAM could determine consumer behavior towards their intentions. Therefore, the extension of TAM is the most appropriate theories utilized in this study since the extension of TAM focused on determinants of perceived usefulness and behavioral intention [12], [13]. In this study, consumer acceptance is the dependent variable, purchase intention is ultimate dependent variable, while cultural difference is moderator variable. There are 4 independent variables as shown below. Detailed justification for the inclusion of each independent variable in the model is specified below.

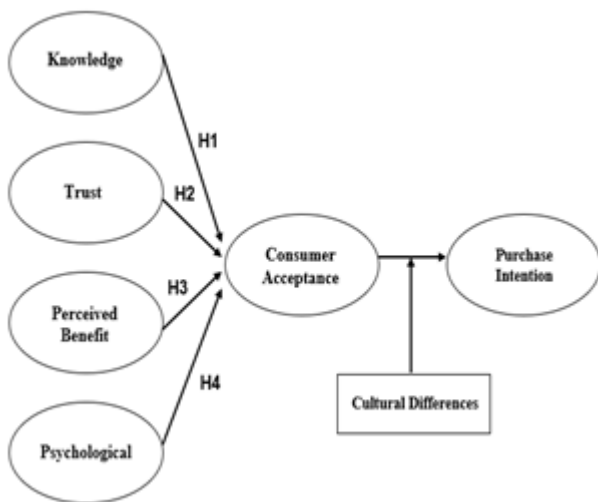


Fig. 2: Proposed research model

Knowledge

A person with a greater knowledge of nanotechnology could this better be able to identify the advantages and disadvantages of nanofood products. Nanotechnology knowledge is defined by this research as the level to be understood by the person [14]. If consumers are aware the existence of nanotechnology, they will learn more about the associated benefits and perhaps more prepared to try the related products. This is stated in the following hypothesis in the context of nanofoods:

H1. Knowledge is positively associated with consumer acceptance.

Trust

Trust is belief on something, belief the product or service can fulfill it is tasks as the buyers understood [15]. According to [16] showed that trust is a solid structure to determine the acceptance of food technologies and science. If people have trust in a product, the product will meet its desire for some level of effectiveness and thus the product is reliable. The next hypothesis is proposed as follows:

H2. Trust is positively associated with consumer acceptance.

Perceived Benefit

According to [17] showed that buyers are assessing perceived benefits based on product's function or performance. Therefore, this researcher assumed that if nanofood provide clear advantages to consumers, consumers would feel that consuming those products meets their related requirements and could also find nanofood more reliable and trustworthy. The following hypotheses are as follows:

H3. Perceived benefit is positively associated with consumer acceptance.

Psychological

Psychological have four factors driving actions in the quest for satisfaction: which is motivation, perception, learning, attitudes and beliefs [18]. In this context, motivation can influence consumer towards purchase behavior. It is very well explained by Maslow hierarchy theory. The following hypotheses are as follows:

H4. Psychological positively associated with consumer acceptance.

III. METHODOLOGY

Design of Instrument

An instrument was developed from the literature review to cover the fundamental research goals. The survey was divided into 4 parts. Part A captured the data about the demographic profile covering individual characteristics such as gender, age, ethnicity, education, know about nanotechnology, received any information about nanotechnology in food and through which platform the information was received.

Part B covers the information about factors that influencing consumer acceptance. Table 1 included items measuring influencing factors on five-point Likert scale. All the information in Table 1 were adapted from previous literature review [19]-[23]. Research confirms that Likert data (and similar scales) are considerably less accurate when the number of scale points is below 5 or above 7 [24].

Part C of the instrument-included items that measure consumer acceptance, shown in Table 2. All items were adapted from [25], [26]. Part D covers the information about individual purchase intention towards nanofood. All items in Table 3 were adapted from [27]. By taking those instruments validated as reference points, this research developed a questionnaire as per below. Thus, all items were reworded to capture information about consumer willingness to purchase nanotechnology in food.

Table 1: Influencing factors

No.	Items	Mean	SD
Knowledge (KN)			
KN1	I know nanometer is a billionth of a meter	4.18	0.864
KN2	I know nanotechnology in food involves materials that are not visible to the naked eye	4.35	0.799
KN3	I know nanofood can extend human life span	4.06	0.768
KN4	I know how to use nanofood and its function	4.00	0.771
KN5	I realized the existence of nanofood in the market (e.g.: P3 sweetener liquid drop and P3 sweetener nanosugar)	4.26	0.815
Trust (TR)			
TR1	I trust the scientific analysis of nanofood	4.15	0.833
TR2	I trust nanofood because of the brand (e.g.: P3 Sweetener)	4.23	0.745
TR3	I trust the product because of awareness toward its quality	4.29	0.723
TR4	I have an experience of using nanofood before	4.12	0.820
TR5	I trust the product because of its safety to consume	4.17	0.802
Perceived Benefit (PB)			
PB1	I believe that nanofoods have extra nutrition	4.15	0.712
PB2	I believe nanofood can enhance the taste of the food	4.05	0.694
PB3	I believe nanofood can extend the shelf life of the food	4.00	0.771
PB4	I believe that nanofoods have the advantage of helping the body absorb nutrition more easily	4.00	0.685
PB5	I believe that nanofood is beneficial	4.18	0.748
Psychological (PS)			
PS1	I believed brand name is very important consideration on purchase decision.	4.34	0.713
PS2	I believed "Word of Mouth" can motivate my decision to purchase	4.15	0.712

No.	Items	Mean	SD
PS3	I believed advertisement and promotional can influence my decision to purchase.	4.00	0.612
PS4	I believed price can influence my decision to purchase	4.02	0.673
PS5	I realized nanofood content can help improve my health	4.17	0.741

*SD = Standard Deviation

Table 2: Consumer acceptance

No.	Items	Mean	SD
Consumer Acceptance (CA)			
CA1	I would eat nanofood	4.17	0.698
CA2	I would serve nanofood to my family and friends	4.05	0.672
CA3	I would purchase foods labelled as containing nanofood in the grocery store.	3.98	0.718
CA4	Nanotechnology in food should be encouraged	4.20	0.814
CA5	I will use nanofood because it is easy to use.	4.11	0.831
CA6	I will buy the nanofood because it is safety to consume	4.17	0.720

*SD = Standard Deviation

Table 3: Purchase intention

No.	Items	Mean	SD
Purchase Intention (PI)			
PI1	It is safe to eat	4.29	0.744
PI2	It provides a variety of nutrients	4.25	0.708
PI3	It reduces health problem	4.18	0.705
PI4	It is better for my health	4.23	0.702
PI5	I follow my family and friend	3.91	0.605
PI6	Society says it as a good choice	4.02	0.673

*SD = Standard Deviation

Instrument Reliability and Validity

A pilot test was conducted by giving out 65 samples of questionnaires to consumer through online survey administrated via Google.Docs. 55 samples of questionnaires were given to real consumers and another 10 samples were given to academicians (experts) to check for grammatical errors and content validity. The questionnaire was answered based on their observations and understanding. The questionnaire was reworded to enhance the clarity. Table 4 shown the result of Cronbach's Alpha Coefficient (α) as a measurement tools in determining the reliability test.

Table 4: Reliability test

No.	Constructs	Mean	SD	Cronbach's (α)
1	Knowledge	4.1723	0.7131	0.971
2	Trust	4.1938	0.7158	0.966
3	Perceived Benefit	4.0769	0.6429	0.963
4	Psychological	4.1354	0.6053	0.964

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5	Consumer Acceptance	4.1128	0.6575	0.961
6	Purchase Intention	4.1462	0.5874	0.966

*SD = Standard Deviation
 *(α) = Cronbach Alpha

Data Collection

The study is based upon survey approach to collect the primary data from 65 respondents that consuming nanofood (P3 Sweetener product) as preliminary pilot test. This research was fully conducted in quantitative method and data collection was distributed in Johor, Malaysia.

IV. RESULTS AND DISCUSSION

About 65 received questionnaires were analyzed for descriptive analysis and reliability test using SPSS version 23, which predict consumer acceptance in nanofood towards purchase intention. Table 5 describes the characteristics of respondents.

Table 5: Characteristics of respondents

Characteristics	Items	Frequency
Gender:	Male	42
	Female	23
Age:	21 – 25 years old	2
	26 – 30 years old	5
	31 – 35 years old	11
	36 – 40 years old	6
	41 and above	41
Ethnicity:	Malay	49
	Chinese	11
	Indian	3
	Other	2
	Education:	SRP
PT3 / PMR		0
SPM		13
A Level / Foundation		0
STPM		4
Diploma		18
Bachelor Degree		7
Master Degree		6
PhD		10
Other		2
Know about nanotechnology:	Technology at the nanoscale	17
	Nanomaterials which have one or more dimensions in the range 1–100 nm.	35
	Creation of functional materials, devices and systems through control of matter on the nanometer length scale.	13
Receive any information:	Yes	65
	No	0
Platform received:	Book	18
	Magazine	5
	Blog	7

	Website	23
	Other	12

According to [28], the perfectly adequate reliability index where the best figure should exceed 0.70. The result of reliability test in Table 4 shown that all constructs (α) are greater than 0.70. Thus, all variables constructed are accepted. As a pilot study, the survey provides a basic understanding based on constructed questionnaires. Therefore, the descriptive analysis results and the reliability test were shown in this paper.

V. CONCLUSION

This preliminary study was based upon a survey of 65 respondents that consumed nanofood. The study identified the significance reliability test for all variables constructed. The result shown that all variables constructed are significance (greater than 0.70) and accepted. However, the study has provided a data based on pilot study of this researcher. Therefore, for further research and the forthcoming studies should be addressed.

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