

The Consumer Acceptance of Novel Foods on Potential Markets using An Extended Behavior Model

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Abstract. This research aims to determine the purchase intention of cultured meat using an expanded planned behavior theory approach. The development of science has encouraged scientists to look for the latest innovations known as novel foods with the aim of alternative food in the future. Research on consumer acceptance of cultured meat has been carried out in many developed countries by looking at the potential for various consumer acceptance of cultured meat. Indonesia, as one of the potential markets for novel foods, is necessary to also look at the potential for consumer acceptance of novel foods, especially on cultured meat. This research used an online survey method on 231 young respondents in Indonesia. The results show that constructive attitudes and subjective norms significantly affect the purchase intention of cultured meat. Environmental beliefs also significantly affect the purchase intention of cultured meat. The results of this research can be used as a reference for marketing strategies for cultured meat in the future, especially in the young age segment in potential markets in developing countries.

1 Introduction

At the end of 2100, the world population is estimated to reach 10.4 billion [1]. Raise the question how agriculture can fulfil human needs, especially in the food sector. Agriculture, as the primary support for the food sector, will face global climate change and be affected by their productivity and sustainability. On the other hand, livestock as a subsystem of agriculture fulfilling human protein needs has contributed to environmental pollution and greenhouse gas emissions and using enormous resources to produce livestock products like meat, eggs and milk [2, 3]. The drawbacks of the livestock sector are that it is generally quite vulnerable to various problems in the production sector, such as fluctuations in productivity, the spread of livestock diseases, as well as effects on the environment with issues of high GHG emissions [2, 4], and the significant use of natural resources such as land use and water use [3]. Moreover, the livestock sector is also known as the sector that contributes the most

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to pollution especially in meat production [2]. Therefore, the researchers are looking for alternative ways to meet human needs by creating novel food products.

The development of medical science, especially in cartilage tissue, engineered tissue, fibrous tissue, and skeletal muscle technology sectors, has been adopted by several scientists to create new food alternatives called cultured meat [5]. The cultured meat idea was created one century ago and released in 2013 where the demonstration of cooking burgers from cultured meat in London successfully and reviewed by experts and the media [6]. The cultured meat design by modern technology as a mention above where its addressed for answer the several issues faced by conventional meet and doesn't compete with conventional meet production especially in environmental issues [7]. Research on consumer preferences for cultured meat, particularly in develop countries, is being conducted increasingly cause of technological developments.

The research conducted in two big cities of china observed the customer segmentation and motivation for cultured meat revealed that 73,4% consumer are accepted and become pioneers for cultured meat [8] meanwhile the Chinese consumer are recognise that cultured meat are given benefits for environmental impacts and animal welfare [9]. the study on several countries focused on novel food technologies showed that the Indian consumer are more positively for novel food technologies compare to USA consumers especially on environmental concerns [10]. The study conducted by Mancini in Italy focused on consumer acceptance of cultured meat stated that 54% of consumers are willing to try cultured meat and concern of positives externality of cultured meat [11]. In New Zealand, the consumer perception of cultured meat performed by using theory of planned behaviour, showed that the environmental variables have a strong relationship towards in-vitro meats purchase and consumer behaviour [12]. Studies on consumer acceptance of cultured meat have been carried out in many developed countries. Furthermore, study also needs to be carried out in developing countries such as Indonesia which has quite large potential in terms of population, especially young people who have the potential to become a market for cultured meat in the future. Using the theory of planned behaviour, this study seeks to address the gap in the literature about consumer behaviour, particularly as it relates to novel foods.

2 Methodology

2.1 Theoretical Framework

Numerous behavioural theories and models exist to explain and predict mitigation and adaptation actions. The theory of planned behavior [13] are most commonly applied to mitigation behaviors. The TPB, originating in broader social psychology research, predicts intentional behavior by attitudes, social norms, and perceived behaviour control (PBC). According to [14], the general attitudes toward cultured meat significantly affected the willingness to consume a cultured meat burger and subjective norms towards a cultured meat burger significantly affect the willingness to consume a cultured meat burger. Carfora et al., [15] in a study of intention to purchase natural food, the attitude turns out to be the most important predictor of Italians' intention to buy natural food and subjective norms significantly affected the intention to purchase natural food. Perceived behavioral control Is defined as the perceived degree of ease or complication one experiences when performing a specific behaviour [13]. In studies about cultured meat, the studies conducted by Dupont et al., [16], the perceived behavior control has a significant effect and is the most potent predictor of willingness to consume a cultured meat burger. Several literature reviews show that the environmental benefits as one of the major perceived benefits of cultured meat, particularly in terms of reducing greenhouse gas emissions [17]. Consumers who have

positive perception on sustainable alternatives and agree that IVM is a sustainable alternative tend to have higher purchase intentions [11, 18]. Thus, the following hypotheses are proposed:

H1: Attitude influences the purchase intention of cultured meat.

H2: SN influences the purchase intention of cultured meat.

H3: PBC influences the purchase intention of cultured meat.

H4: Environmental beliefs influence the purchase intention of cultured meat.

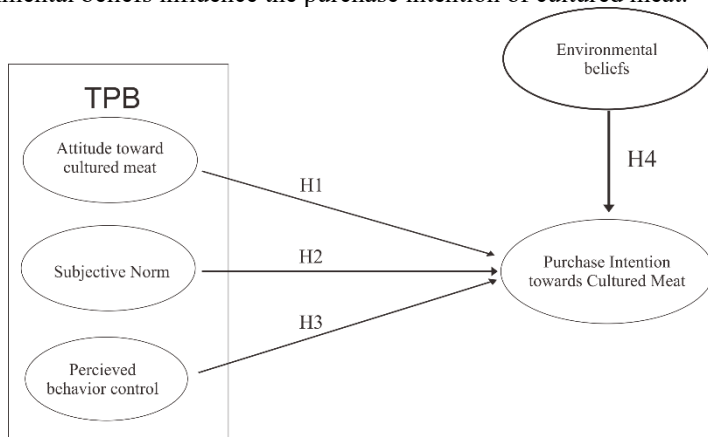


Fig. 1. The theoretical model framework.

2.2 Online Survey

This study uses an online questionnaire survey, which is a standard platform for reaching a large number of respondents. An online survey using Google Forms was used to collect consumer feedback. The poll was focused at Indonesians aged 18 to 35 years old between 1 to 31 January, 2023. The majority of participants were recruited using posts on social media sites. After filtering the incomplete surveys, a total of 213 responses to the questionnaires were retrieved.

2.3 Data Analysis

Statistics Analyses were performed using Data Analysis (STATA) and Analysis of Moment Structure (AMOS). STATA v15 was used to evaluate the descriptive statistics in terms of means and standard deviation. Confirmatory Factor Analysis (CFA) was then used to test the construct's reliability and validity in measurement models using STATA v15 and AMOS v24. Finally, for the model used in this work, the structural equation model (SEM) was run using AMOS V24 to assess the hypotheses between constructs.

3 Results and Discussion

The results show that all factor loading constructs range from 0.737 to 0.941, all the score above the considerable acceptable 0.6 [19]. The average variance extracted (AVE) value for the model ranged from 0.568 to 0.880. The AVE values are higher than 0.5 suggesting that the variation explained by the latent variables exceeds the measurement errors [19]. The goodness-of-fit where the chi-square/d.f. ratio is less than 3; the root mean squared error approximation (RMSEA) is 0.065; and the comparative fit index (CFI), normed fit index (NFI), non-normed-fit index (NNFI), and goodness-of-fit (GFI) are all greater than 0.90 [19,

20]. All of the values are acceptable, indicating that both models have a decent goodness-of-fit. The R2 model explained 61.7% of the variation in an average individual's intention to purchase cultured meat.

Table 1. The results of hypotheses

Hypotheses	Standardized weights	Result
H1: ATT→INT	0.302*	Supported
H2: SN→INT	0.323*	Supported
H3: PBC→INT	0.229	Not Supported
H4: ENV→INT	0.275***	Supported

Note: *P<0.10; ***P<0.01; ATT, attitude; INT, intention; SN, subjective norm; PBC, perceived behavior control; ENV, environmental beliefs

Table 1 shows the results of TPM model where two original construct of TPB Attitude and Subjective norm are statistically significant with standardized weights were 0.302 and 0.323, SN are the strongest predictor followed by attitude, thus Hypotheses 1 and 2 supported in TPB model. The PBC were statistically not significant, thus the Hypotheses 3 was not supported in TPB model. Furthermore, the new additional construct of environmental beliefs was statistically significant with standardized weight were 0.275, thus the hypotheses 4 was supported in extended TPB model.

This study found that the TPB model can explain the consumer purchase intention towards cultured meat where the R2 values are 61.7% and the constructs of Attitude and subjective norm are statistically significant, the PBC is not significant towards purchase intention of cultured meat. The new additional constructs of environmental beliefs are statistically significant towards the purchase intention of cultured meat. Hypotheses 1 focused on Attitude influence on the purchase intention of cultured meat are statistically significant toward cultured meat; this study was supported by research in Germany by Dupont et.al [16] where Attitude was a significant predictor toward cultured meat burgers, and Dupont, et.al [14] stated that Attitude becomes the strongest predictor for the willingness to consume burger from alternative protein sources, especially cultured meat. Hypothesis 2, SN positively affected the purchase intention of cultured meat and became the strongest predictor of the TPB model regression weight. This study supported the previous research by Dupont et.al. [16], where SN indicated that influential people around the respondent support purchasing cultured meat. This indicates that a closed person or influential person may already have knowledge of cultured meat. Hypothesis 3 is not significant, contrary to the previous study [11, 12, 16], young people still determine whether they can utilize their resources to support the purchase intention of cultured meat. Young people may be very enthusiastic about attitudes and subjective norms but have yet to reach a stable income level.

Hypotheses 4 supports the TPB model; these results, supported by previous research by Malavalli et al. [12] showed that environmental values are affected by in-vitro meat purchase in New Zealand, and Smetana *et al.* [21] stated that the usage of alternative to meat proteins such as cultured meat has a significant influence on environmental impact with positive and negative effect and causes the increasing of consumption. The research conducted by Mazac *et al.* [22] showed that the novel foods in meals will reduce global warming by 88% less, Potential land use by 83 % less, and freshwater usage by 95 %. The novel future foods are more potentially sustainable in the future. Hypothesis 4 indicates that the young Indonesian customer already knows that environmental issues have become essential and might increase the acceptance of cultured meat if it becomes available in the future because of those environmental advantages attributes.

4 Conclusion

This study aims to determine the purchase intention of cultured meat using the planned behavior theory with additional environmental beliefs constructs. This study was conducted on young people in Indonesia as a potential market in the future. The constructs in the TPB prove that attitude and subjective norms influence the purchase intention of cultured meat. As an implication, the promotional strategy can use a positive attitude approach and essential people to convince potential buyers of cultured meat. Environmental construction has also significantly influenced cultured meat's purchase intention. Based on these results, the young generation in Indonesia knows that environmental aspects are essential and positively influence the decision to purchase cultured meat. With the results of this study, the opportunity for the young generation in Indonesia to receive cultured meat is quite potential from the perspective of the TPB construct as well as positive environmental aspects.

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