CONSUMERS' PREFERENCES FOR EGG ATTRIBUTES WITH TENDENCY PURCHASE ORGANIC EGGS AND WILLINGNESS TO PAY FOR THE PREFERENCES WITHIN CENTRAL REGION AND SOUTHERN REGION OF MALAYSIA

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ARTICLE INFO	ABSTRACT
	Purpose: Egg is one of the few foods consists of complete high quality protein source and as a main protein source in Malaysia. Organic eggs industry is an underdeveloped niche market in Malaysia but exponential grow industry in develop countries. The objectives of the study are examined consumers' preferences toward egg attributes and tendency of consumers choose organic eggs with willingness to pay for the attributes within Central Region and Southern Region of Malaysia. **Theoretical framework:** Based on previous study, Lancaster's theory argue that consumers derive utility not from good directly but from the attributes of the good that satisfy consumer need and wants (Lancaster, 1971). TRA explained the relationship between attitudes and subjective norm that influenced human intention and behavior and this theory is used to predict human reaction towards a subject based on the attitudes and behavioral intentions (Fishbein & Ajzen, 1975). TPB is differ from TRA where it has additional of perceived behavioral control, where together with the attitudes and subjective norm, shaped both intention and behaviors (Ajzen, 1991). **Design/Methodology/Approach:** The target population of this study will focus on consumer adults with the age more than 18 years old and purchase eggs within 3 months. The location of respondents will be within Central Region and Southern Region of Malaysia. The consumers 18 years old above with purchase eggs within 3 months, will be include in the sampling frame from the target population. Any adults not consume eggs within 3 months will exclude in the study. A simple random sampling technique stemmed from probability sampling technique was used to select the respondents (Ajina, 2019), where questionnaires were sent out to all the end-users in the list of sampling frame and all responses will be recorded accordingly. The obtained surveys had gone through a vetting process after the actual data collection. Incomplete questionnaires having a response rate of more than 15% will be deleted from the data set because they compromise the results' reliability and validity. The respondents not purchase any eggs within 3 months will exclude in the conjoint analysis. **Findings:** Total 156 respondents and 149 respondents were purchasing egg within 3 months selected as sample for conjoint analysis. The results of conjoint analysis indicated price is the most important attribute for consumer preferences follow by

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size, production type, color and packaging. The best combination of egg attribute with highest total utilities value is RM 0.4/egg, size A, brown color, 10 eggs per pack and organic production type with total utility value 7.477 and WTP RM0.51/egg. The result indicates tendency of consumer toward organic egg and higher than other production type. This is the first study in Malaysia showed positive preference of consumers toward organic eggs with positive WTP RM 0.11/egg for attribute organic egg alone.

Research, practical & social implications: The finding of relative importance attributes for this study is different from the study by (Hanis, Nasir, Jinap, Alias, & Karim, 2013) where size is the most important attribute follow by size of packaging, color and functional of egg without consider production type and price. This study allows producers have clear picture and direction to produce eggs with low price, bigger brown eggs, organic or conventional with nutrient enrichment and low size of packaging to fulfil consumers' need and want.

Originality/Value: This study is the first finding showed positive tendency of consumers in Malaysia toward organic eggs and more important than other type of production system. In term of Willing to Pay (WTP), consumer WTP for some of the attribute like size A, size B, organic, conventional with nutrient enrichment and brown eggs. The finding gives a clear picture to industry player to strategy planning the products according to consumers' preferences and fulfil their need and want.

PREFERÊNCIAS DOS CONSUMIDORES POR ATRIBUTOS DE OVOS COM TENDÊNCIA A COMPRAR OVOS ORGÂNICOS E DISPOSIÇÃO DE PAGAR PELAS PREFERÊNCIAS NA REGIÃO CENTRAL E SUL DA MALÁSIA

RESUMO

Propósito: O ovo é um dos poucos alimentos consistem em fonte de proteína de alta qualidade completa e como uma fonte de proteína principal na Malásia. A indústria de ovos orgânicos é um nicho de mercado subdesenvolvido na Malásia, mas a indústria em crescimento exponencial nos países desenvolvidos. Os objetivos do estudo são examinados as preferências dos consumidores em relação aos atributos dos ovos e a tendência dos consumidores de escolher ovos orgânicos com vontade de pagar pelos atributos na Região Central e Região Sul da Malásia.

Estrutura teórica: Com base em estudo anterior, a teoria de Lancaster argumenta que os consumidores derivam utilidade não do bem diretamente, mas dos atributos do bem que satisfazem a necessidade e o desejo do consumidor (Lancaster, 1971). TRA explicou a relação entre atitudes e normas subjetivas que influenciaram a intenção e o comportamento humano e esta teoria é usada para prever a reação humana em relação a um sujeito baseado nas atitudes e intenções comportamentais (Fishbein & Ajzen, 1975). O TPB é diferente do TRA, onde tem um controle comportamental adicional, onde, juntamente com as atitudes e a norma subjetiva, moldaram a intenção e os comportamentos (Ajzen, 1991).

Design/Metodologia/Abordagem: A população-alvo deste estudo será focada em adultos consumidores com mais de 18 anos e comprarão ovos dentro de 3 meses. A localização dos entrevistados será nas regiões Central e Sul da Malásia. Os consumidores de idade superior a 18 anos com ovos comprados no prazo de 3 meses serão incluídos no quadro de amostragem da população-alvo. Qualquer adulto que não consuma ovos dentro de 3 meses será excluído do estudo. Foi utilizada uma técnica de amostragem aleatória simples, derivada da técnica de amostragem probabilística, para selecionar os inquiridos (Ajina, 2019), em que foram enviados questionários a todos os utilizadores finais da lista de amostragem e todas as respostas serão registadas em conformidade. Os levantamentos obtidos passaram por um processo de verificação após a coleta de dados. Questionários incompletos com uma taxa de resposta superior a 15% serão excluídos do conjunto de dados porque comprometem a confiabilidade e validade dos resultados. Os respondentes não compram ovos dentro de 3 meses excluirão na análise conjunta.

Constatações: Total de 156 respondentes e 149 respondentes estavam comprando ovos dentro de 3 meses selecionados como amostra para análise conjunta. Os resultados da análise conjunta indicaram que o preço é o atributo mais importante para as preferências do consumidor, seguido por tamanho, tipo de produção, cor e embalagem. A melhor combinação do atributo ovo com o valor total de utilitários mais alto é RM 0,4/ovo, tamanho A, cor marrom, 10 ovos por embalagem e tipo de produção orgânica com valor total de utilitário 7,477 e WTP RM0,51/ovo. O resultado indica tendência do consumidor para o ovo orgânico e maior do que outro tipo de

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produção. Este é o primeiro estudo na Malásia mostrou preferência positiva dos consumidores por ovos orgânicos com WTP RM 0.11 positivo/ovo para o atributo ovo orgânico sozinho.

Pesquisa, implicações práticas e sociais: A descoberta de atributos de importância relativa para este estudo é diferente do estudo por (Hanis, Nasir, Jinap, Alias, & Karim, 2013) onde o tamanho é o atributo mais importante, seguido pelo tamanho da embalagem, cor e funcional do ovo, sem considerar o tipo de produção e preço. Esse estudo permite que os produtores tenham uma visão e uma direção claras para produzir ovos de baixo preço, ovos marrons maiores, orgânicos ou convencionais com enriquecimento de nutrientes e embalagens de baixo tamanho para atender às necessidades e aos desejos dos consumidores.

Originalidade/Valor: Este estudo é o primeiro achado mostrou tendência positiva dos consumidores na Malásia para ovos orgânicos e mais importante do que outro tipo de sistema de produção. Em termos de Willing to Pay (WTP), WTP consumidor para alguns dos atributos como tamanho A, tamanho B, orgânico, convencional com enriquecimento de nutrientes e ovos marrons. A constatação dá uma imagem clara ao setor para planejar os produtos de acordo com as preferências dos consumidores e satisfazer suas necessidades e desejos.

Palavras-chave: Ovos, Ovos Biológicos, Preferências dos Consumidores, Disposição para Pagar.

PREFERENCIAS DE CONSUMIDORES PARA LOS ATRIBUTOS DE HUEVOS QUE TIENDEN A COMPRAR HUEVOS ORGÁNICOS Y ESTÁN DISPUESTOS A PAGAR POR PREFERENCIAS EN LA REGIÓN CENTRAL Y SUR DE MALASIA

RESUMEN

Propósito: El huevo es uno de los pocos alimentos que consiste en una fuente completa de proteínas de alta calidad y una fuente de proteínas principales en Malasia. La industria del huevo orgánico es un mercado de nicho poco desarrollado en Malasia, pero la industria de crecimiento exponencial en los países desarrollados. Los objetivos del estudio son examinar las preferencias de los consumidores en relación con los atributos de los huevos y la tendencia de los consumidores a elegir huevos orgánicos con la voluntad de pagar los atributos en la Malasia central y meridional.

Estructura teórica: Sobre la base de un estudio anterior, la teoría de Lancaster sostiene que los consumidores no obtienen la utilidad del bien directamente, sino de los atributos del bien que satisfacen la necesidad y el deseo del consumidor (Lancaster, 1971). TRA explicó la relación entre actitudes y normas subjetivas que influyeron en la intención y el comportamiento humanos, y esta teoría se utiliza para predecir la reacción humana a un tema basado en actitudes e intenciones conductuales (Fishbein & Ajzen, 1975). El TPB es diferente del TRA, donde tiene un control conductual adicional, donde junto con actitudes y normas subjetivas, han dado forma a la intención y el comportamiento (Ajzen, 1991).

Diseño/Metodología/Enfoque: La población objetivo de este estudio se centrará en los consumidores adultos mayores de 18 años y comprará huevos en un plazo de 3 meses. La ubicación de los entrevistados será en las regiones central y meridional de Malasia. Los consumidores mayores de 18 años con huevos comprados en un plazo de tres meses se incluirán en el cuadro de muestreo de la población destinataria. Se excluirá del estudio a cualquier adulto que no coma huevos en el plazo de 3 meses. Para seleccionar a los encuestados (Ajina, 2019) se utilizó una técnica simple de muestreo aleatorio derivada de la técnica de muestreo de probabilidad, en la que se enviaron cuestionarios a todos los usuarios finales de la lista de muestreo y se registraron todas las respuestas en consecuencia. Las encuestas obtenidas pasaron por un proceso de verificación después de la recopilación de los datos. Los cuestionarios incompletos con una tasa de respuesta superior al 15% se eliminarán del conjunto de datos porque comprometen la fiabilidad y validez de los resultados. Los encuestados no compran huevos en el plazo de 3 meses y los excluyen del análisis conjunto.

Hallazgos: un total de 156 encuestados y 149 encuestados compraban huevos en un plazo de 3 meses seleccionados como muestra para el análisis conjunto. Los resultados del análisis conjunto indicaron que el precio es el atributo más importante para las preferencias de los consumidores, seguido por el tamaño, el tipo de producción, el color y el embalaje. La mejor combinación del atributo de huevo con el mayor valor total de utilidad es RM 0,4/huevo, tamaño A, marrón, 10 huevos por envase y tipo de producción orgánica con valor total de utilidad 7,477 y WTP RM0,51/huevo. El resultado indica una tendencia del consumidor hacia el huevo orgánico y mayor que otro tipo de producción. Este es el primer estudio en Malasia mostró una preferencia positiva de los consumidores por huevos orgánicos con WTP RM 0.11 positivo/huevo sólo por huevo orgánico.

Investigación, implicaciones prácticas y sociales: El descubrimiento de atributos de importancia relativa para este estudio es diferente del estudio realizado por (Hanis, Nasir, Jinap, Alias y Karim, 2013) donde el tamaño es el atributo más importante, seguido por el tamaño del envase, color y función del huevo, sin considerar el tipo de producción y precio. Este estudio permite a los productores tener una visión y dirección claras para producir huevos a bajo precio, huevos marrones más grandes, orgánicos o convencionales con enriquecimiento de nutrientes y embalajes de tamaño bajo para satisfacer las necesidades y deseos de los consumidores.

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Originalidad/Valor: Este estudio es el primer hallazgo que mostró una tendencia positiva para los consumidores en Malasia hacia los huevos orgánicos y más importante que otro tipo de sistema de producción. En términos de Disposición a Pagar (WTP), WTP de consumo para algunos de los atributos como tamaño A, tamaño B, orgánico, convencional con enriquecimiento de nutrientes y huevos marrones. El hallazgo da una imagen clara a la industria para planificar los productos de acuerdo con las preferencias de los consumidores y para satisfacer sus necesidades y deseos.

Palabras clave: Huevos, Huevos Orgánicos, Preferencias del Consumidor, Provisión a Pagar.

INTRODUCTION

Egg is one of the few foods consists of complete high quality protein source and as a main protein source in Malaysia. According to DVS Industry report and information from Federation of Livestock Farmers' Associations of Malaysia (FLFAM), Malaysia produces 12.3 billion eggs in 2021 from 204 layers farm and 2.1 billion eggs export to Singapore as fresh table eggs. With estimate 32 million population in Malaysia, approximate 319 eggs consume per capita per year. The total number of eggs produce in Malaysia increase from 8.9 billion eggs in 2011 to 12.3 Billion eggs in 2021 with Compound Annual Growth Rate (CAGR) 3.06%. Agriculture contributes 7.4% to Malaysia GDP in 2020 and number of livestock increase except for Buffalo, sheep and swine (MAHIDIN, 2021). Poultry eggs continue increase in production although demand decrease due to COVID-19 pandemic and eggs play very important role as a main food source for food security in Malaysia (MAHIDIN, 2021). Food attributes are one of the most important factors that affect consumers' decision making while purchase food products include purchase eggs as well (Jang et al, 2009 as cited by Hanis, Nasir, Jinap, Alias, & Karim, 2013). The total population of Malaysia in 2022 estimated at 32.7 Million and 9 Million from Central Region with 6.2 Million from Southern Region comprise 47% population of Malaysia (Malaysia, 2022) and as target region for the study to represent consumers' preference of Malaysia.

The term "organic" established by National Organic Standards Board of the U.S. Department of Agriculture in December 2000 with produced by farmers who emphasize use of renewable resources and conservation of soil and water to enhance environmental quality for future generation. Organic eggs come from animal without antibiotic, growth hormones, pesticides, synthetic fertilizers, bioengineering or ionizing radiation and certified by recognized certifying body (About the Organic Standards, n.d.).Organic food preferences of consumers demonstrates that health, food safety, environment, nutrition, taste and animal welfare are key factor determine purchasing decision of consumers (Mainardes et al., 2017; Rana and Paul, 2017; Singh and Verma, 2017; Petrescu et al., 2017; Seegebarth et al., 2016; Aertsens et al.,

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2011 as cited in Guney & Giraldo, 2020). Organic eggs come from hens that are free to roam at outdoor area during day and stay safely in shed at night with main different from free range is organic eggs are produced without use of any chemical. Although organic food comprises only small fraction of food market, increase demand of organic food with rapid growth has generate much interest among consumer, business and researchers. The demand of organic food increase in developed countries as well as developing countries like Malaysia. Increase number of countries producing organic food and total sales indicate tendency movement toward organic food (Dardak, Abidin & Ali, 2009 as cited in Somasundram, Razali, & Santhirasegaram, 2016).

Poultry industry play a very important role to support GDP of Malaysia and eggs as one of the important food sources to ensure food security of Malaysia with high quality protein and affordable price. The consumers' preferences for eggs attribute in Malaysia from conjoint survey conclude large size (grade A), omega eggs, brown, and ten per packs in 2013 (Hanis, Nasir, Jinap, Alias, & Karim, 2013) without any latest update of consumer's preferences after 2013. With the continue growing of economy and increase average income of Malaysia from 2013 until now, the consumers' preferences change accordingly. Organic egg is a new market in Malaysia with increase awareness and demand but lack of knowledge of consumer tendency and perception with willing to pay for the organic eggs.

Hence, the objective of research project is examined consumers' preference for eggs attribute and tendency of consumers purchase organic eggs with willingness of consumer to pay for their preference attribute.

LITERATURE REVIEW

Eggs are one of the most important, widespread food products with rich in high quality protein, affordable price and consume in large scale around the world (Lesnierowski & Stangierski, 2017). Egg plays a very important role to ensure food security in Malaysia but information of consumers' preference for egg attribute are scarce. A research done in 2013 concluded most preferred egg profile by Malaysian consumers is large, omega, brown and ten per packed and willing to pay for their preferences (Hanis, Nasir, Jinap, Alias, & Karim, 2013). A review done in United Kingdom regarding consumer behaviour, perception and preferences for eggs conclude lack of investigated consumer behavior, perceptions, and preferences towards eggs in developing countries compare to developed countries, large variety of drivers have been found affect consumer behavior, perception and preferences toward eggs, intrinsic and extrinsic characteristics are the most investigated factors study by researcher with heterogeneous

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preference by consumers (Rondoni, Asioli, & Millan, 2020).Higher income, young educated females consumer prefer cage free eggs and willing to pay higher prices but environmental sustainability issues not pay attention by consumer with price is a key determinant for egg purchases especially in developing countries (Rondoni, Asioli, & Millan, 2020).

Egg industry face critical issues and challenges like social concern toward animal welfare, environmental issue, disease outbreak, transmitted disease from avian to human, human health diseases related to nutritional components of eggs such as allergies and high cholesterol with continue increase demand all over the world by grow of population (Rondoni, Asioli, & Millan, 2020). The combination of critical issues and challenges increase complex consumer demand for healthful sustainable food products (Grunert, Hieke, & Wills, 2014 as cited in Rondoni, Asioli, & Millan, 2020). Despite continue increase demand of eggs in Malaysia but there is a lack of clear understanding about how consumers have responded to these changes and how their behaviour, perception and preferences toward eggs has evolve from 2013 until today.

Health, food safety, the environment, nutrition, taste and animal welfare are the most essential determinants of the purchasing decision of consumers demonstrate by literature on organic food preferences of consumers (Mainardes et al., 2017; Rana and Paul, 2017; Singh and Verma, 2017; Petrescu et al., 2017; Seegebarth et al., 2016; Aertsens et al., 2011 as cited in Guney & Giraldo, 2020). Consumer perceive organic eggs to be safe, healthy, natural, tasty, animal friendly and quality products (Biemans and Tekien, 2017; Mesias et al., 2011; Van Loo et al., 2010; Windhorst, 2005; Armağan and Özdoğan, 2005; Hermansen, 2003; Hovi et al., 2003 as cited in Guney & Giraldo, 2020). However, organic agriculture less productive than traditional agriculture and efficiency gap is negatively from an environmental point of view (Tilman & Clark, 2017). The egg industry has four board production types: cage (conventional), free range, nutritionally enhanced and organic with majority produce by conventional system and rapid growing of nutritionally enhanced, free range and organic eggs with increase income and education level of consumers (Bertechini, 2017 as cited in Guney & Giraldo, 2020).

Worldwide retail sale of organic products grossed 75.7 Billion Euro in 2015 with largest market for organic food was US follow by EU market but the high price of organic products is the most significant obstacle preventing consumers purchase organic food consumption (Ruiz et al., 2018; Singh and Verma, 2017; Rana and Paul, 2017; Tleis et al., 2017; Bryla, 2016;Cavdar and Aydin 2015; Aygen, 2012; Mesias et al., 2011; Aertsens et al., 2009, 2011; Özçelikand Uçar, 2008; Lea and Worsley, 2005; Willer et al., 2017 as cited in Guney & Giraldo,

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2020). Hungarian and Italian consumers, the price is the most important attribute, followed by the nutrition and health claim and the organic production labelling (Yeh, Menozzi, & Torok, 2020). In Malaysia, the price different between organic food and conventional food is huge with range between 100% to 300% compare to 25%-30% price gap in United States (US) and European Union (EU) (Somasundram, Razali, & Santhirasegaram, 2016). How much willing to pay by consumer toward organic eggs need to be investigate and understanding by producer and researcher to fill the gap of organic eggs in the market. Willingness to pay (WTP) was calculated to understand how much consumer willing to pay for their preference and result showed consumers willing to pay higher for the preference of attribute (Krystallis, Fotopoulos, & Zotos, 2006; Hanis, Nasir, Jinap, Alias, & Karim, 2013; Guney & Giraldo, 2020 &Yeh, Menozzi, & Torok, 2020).

Lancaster's theory argue that consumers derive utility not from good directly but from the attributes of the good that satisfy consumer need and wants (Lancaster, 1971). Intrinsic and extrinsic product characteristics, animal welfare and food safety and socio-cultural factors as attribute of the eggs to satisfy consumer need and want (Rondoni, Asioli, & Millan, 2020). Conventional eggs and organic eggs attribute were study with intrinsic and extrinsic characteristics to understand consumer need and wants according to Lancaster's theory to produce desire products for consumer to fulfil consumers need and want (Hanis, Nasir, Jinap, Alias, & Karim, 201Guney & Giraldo, 2020; Yeh, Menozzi, & Torok, 2020).

The Theory of Planned Behavior (TPB) by Icek Azjen (1991) is one of the two main theories for this study and TPB the theory's first construct is behavioral intention, which refers to the psychological elements that impact behavior (Ajzen, 1991; Asare, 2015). The stronger the intention to engage in each behavior, the more likely it is to perform that behavior. The second construct is attitude towards the behavior, that refers to how favorable or unfavorable they think a particular behavior is. Behavioral beliefs and outcome assessment constitute the attitude. The third construct is the subjective norm, which is a social demand to perform or not perform a particular behavior. Subjective norms are composed of a combination of normative beliefs and motivation to comply. Finally, people's views of how easy or difficult it is to perform the desired behavior are termed to as perceived behavioral control (Asare, 2015).

Fractional factorial designs are among the most important statistical contributions to the efficient exploration of the effects of several controllable factors on a response of interest and widely use in various field of experiments to reduce size of experiments with know in advance

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of experimentation to achieve goal of experiment with least cost, shortest time and effective use limited resources (Gunst & Mason, 2009).

Conjoint analysis is a popular method of product and pricing research that examine consumers' preferences and use that result to design products features, assess sensitivity to price, forecast market shares and predict adoption of new products and services. Conjoint analysis work by breaking a product or service down into its attributes and levels, then testing different combinations of these components to identify consumers' preferences. Preference score (utility score) calculate from the survey results to measures how much each attribute and level influenced the respondent's choices. Preference scores are used to build simulators that forecast market share for a set of different products offer to the market which satisfy customers need and want (Conjoint.ly, n.d.). Fraction factorial design and conjoint analysis was use by (Hanis, Nasir, Jinap, Alias, & Karim, 2013) to understand consumer's preferences for egg attribute in Malaysia. Fraction factorial design allow reduce number of eggs profile follow by conjoint analysis to determine egg attribute preference by consumers (Hanis, Nasir, Jinap, Alias, & Karim, 2013; Guney & Giraldo, 2020).

Random parameters logit model is a logit model for which the parameter is assumed vary from one individual to another with heterogeneity of the population. Random parameter logit model also known as mixed logit (ML) model obviates the three limitations of standard logit by allowing random taste variation (the model allows β to be random in addition to ϵ), unrestricted substitution patterns and correlation in unobserved factors over time (Train, 2003 as cited in Guney & Giraldo, 2020). The results of RPL model with utility value and WTP identify consumer attitudes toward organic eggs and WTP estimates for different egg attributes (Guney & Giraldo, 2020). WTP estimates were calculated as the ratio of the partial derivative of the utility function with respect to the attribute of interest, divided by the derivative of the utilty function with respect to the price and each attributes WTP was calculated as the ratio between the estimate attribute and price parameters multiplied by -1 (Guney & Giraldo, 2020).

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METHODOLOGY

Conceptual Framework

Fig 1: The conceptual framework on relationship between egg attributes with consumers' preferences and willing to pay for their preferences
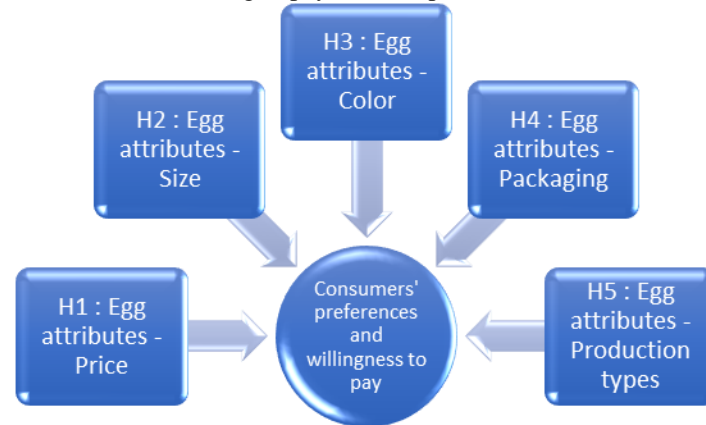
Source: Prepared by the authors (2023)

Lancaster's theory argue that consumers derive utility not from good directly but from the attributes of the good that satisfy consumer need and wants (Lancaster, 1971). TRA explained the relationship between attitudes and subjective norm that influenced human intention and behavior and this theory is used to predict human reaction towards a subject based on the attitudes and behavioral intentions (Fishbein & Ajzen, 1975). TPB is differ from TRA where it has additional of perceived behavioral control, where together with the attitudes and subjective norm, shaped both intention and behaviors (Ajzen, 1991).

Egg attributes with different of size, price, color, packaging and production types influence consumers' preferences toward egg which fulfil consumer need and want. Moreover, various factor will influence consumers preferences and influence human intention and behavior by attitudes, subjective norm and perceived behavioral control. Attributes fulfil need and want of consumers will positively influence consumers' preferences, intervention and perception with willingness to pay for it. The evaluation of consumers' preferences toward eggs attributes with willingness to pay for it can be evaluated by conjoint analysis with random parameters logit model to identify utility and degree of willingness to pay for it.

Egg attributes consist of different in price, size, color, packaging and production types with heterogeneous preference by consumers and derive utility not from good directly but from the attributes of the good that satisfy consumer need and wants. Hence, egg attributes of different combination have direct effect of consumers preference which fulfil their need and want.

Attributes of eggs which satisfy consumer need and want have direct effect of consumers preferences and they willing to pay higher price for their preferences. Various study identify consumer willing to pay higher price for the attributes fulfil their need and want. Hence, consumer willing to pay for the attributes fulfil their need and want with different attributes combination.

H1, H2, H3, H4 and H5: Eggs attributes have direct effect on consumers preference and willingness to pay for their preferences in Malaysia

Consumer perceive organic eggs to be safe, healthy, natural, tasty, animal friendly and quality products which will influence consumer attitude, subjective norm and perceived behavior control to affect customer intention and behavior. Higher education, higher income and aware of quality products with healthy and animal friendly products have direct effect toward consumer perception, intention and behavior. Hence, organic eggs have direct effect of consumers preference and final intention and behaviors

H5: Factor of organic production types have direct effect on consumers preference and WTP in Malaysia.

Sample, Sampling Procedure with conjoint analysis and willingness to paid (WTP)

The target population of this study will focus on consumer adults with the age more than 18 years old and purchase eggs within 3 months. The location of respondents will be within Central Region and Southern Region of Malaysia. The consumers 18 years old above with purchase eggs within 3 months, will be include in the sampling frame from the target population. Any adults not consume eggs within 3 months will exclude in the study. A simple random sampling technique stemmed from probability sampling technique was used to select the respondents (Ajina, 2019), where questionnaires were sent out to all the end-users in the list of sampling frame and all responses will be recorded accordingly. The obtained surveys had gone through a vetting process after the actual data collection. Incomplete questionnaires having a response rate of more than 15% will be deleted from the data set because they compromise the results' reliability and validity. The respondents not purchase any eggs within 3 months will exclude in the conjoint analysis. The retained data will be further analyzed using the Statistical Package for Social Science (SPSS) software version 25 to answer the research questions.

Relevant egg attributes been selected consist of price, size, color, packaging and production types with different combinations of attributes level were constructed as Table 3 in Appendix C. Organic eggs will categorize in the production types consist of conventional,

conventional with enrichment, free range and organic production type. The total 288 possible profiles of eggs able to generate from 5 attributes with different attribute level (3X 4 X 2 X 3 X 4) and is impossible to ask the respondents rate all 288 profiles of eggs from the survey. Fractional factorial design by Statistical Package for Social Science (SPSS) software version 25 help to reduce number of eggs profiles to 16 as Table 1. Respondents rated the eggs profile according to their preferences.

Table 1: 16 egg profiles by Fractional factorial design of Statistical Package for Social Science (SPSS) software version 25

Card ID	PRICE	SIZE	COLOR	PACKAGING	PRODUCTION TYPE
1	1.2	C	WHITE	10	FREE RANGE
2	0.8	B	BROWN	10	CONVENTIONAL WITH NUTIRENT ENRICHMENT
3	0.4	C	WHITE	30	CONVENTIONAL WITH NUTIRENT ENRICHMENT
4	0.8	A	WHITE	20	FREE RANGE
5	0.4	A	WHITE	10	CONVENTIONAL WITH NUTIRENT ENRICHMENT
6	0.4	D	BROWN	10	FREE RANGE
7	0.8	D	WHITE	30	CONVENTIONAL
8	0.4	B	BROWN	30	FREE RANGE
9	1.2	B	WHITE	10	CONVENTIONAL
10	1.2	D	BROWN	20	CONVENTIONAL WITH NUTIRENT ENRICHMENT
11	0.4	A	BROWN	10	CONVENTIONAL
12	0.8	C	BROWN	10	ORGANIC
13	0.4	D	WHITE	10	ORGANIC
14	1.2	A	BROWN	30	ORGANIC
15	0.4	B	WHITE	20	ORGANIC
16	0.4	C	BROWN	20	CONVENTIONAL

Source: Result of the study.

WTP estimates were calculated as the ratio of the partial derivative of the untility function with respect to the attribute of interest, divided by the derivative of the utilty function with respect to the price and each attributes WTP was calculated as the ratio between the estimate attribute and price parameters multiplied by -1 (Guney & Giraldo, 2020).

RESULTS

The complete results of descriptive analysis of respondents as Table 2. From the total 156 respondents, 75 respondents are female and 81 respondents are male with 48.1% female and 51.9% male. The distribution of age group 48.7% from age group between 30- 39 years, 28.8% from age group between 18- 29 years, 19.2% from age group between 40- 49 years and 3.2% more than 60 years and above. Majority of respondents are degree holder with 63.5% follow by Master and above (14.1%), Diploma (11.5%), Secondary (10.3%) and primary (0.6%). For the marital status, 62.8% respondents married, 32.7 % single and never married, 3.8 divorces and 0.6% widowed. From the married respondents, majority household number between 2- 5 and 77.6% of respondents fall into this group. Majority of respondents are employed full time (87.8%) follow by self-employed (8.3%) and the rest of categorize are minority. Majority of respondents household income between RM 58,201 - RM131,508 (42.3%), follow by RM 58,200 and below (36.5%) and RM 131,509 and above (21.2%). Majority of respondents from Selangor (33.3%), follow by Melaka (21.2%), Johor (19.2%), Wilayah Persekutuan (14.1%) and Negeri Sembilan (12.2%). 95.5% of respondents purchase eggs within 3 months while 4.5% of respondents not purchase any eggs within 3 months and excluded for conjoint analysis.

Table 2: Summary result of descriptive analysis of respondentes

Demographic variable	Classification	Frequency	Percentage (%)
Gender	Male	75	48.1
	Female	81	51.9
Age	18 - 29 Years	45	28.8
	30 - 39 Years	76	48.7
	40 - 49 Years	30	19.2
	50 - 59 Years	0	0
	> 60 Years	5	3.2
Level of Education	Primary	1	0.6
	Secondary	16	10.3
	Diploma	18	11.5
	Degree	99	63.5
	Master and above	22	14.1
Marital Status	Divorces	6	3.8
	Married	98	62.8
	Single - never married	51	32.7
	Widowed	1	0.6
Total No of household	1	24	15.4
	2	32	20.5
	3	31	19.9
	4	33	21.2
	5	25	16
	6	5	3.2

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	7	4	2.6
	8	2	1.3
Employment status	Employed full time	137	87.8
	Employed part time	2	1.3
	Retired	2	1.3
	self-employed	13	8.3
	Student	1	0.6
	Unemployed	1	0.6
Annual household income	RM 58,200 and below	57	36.5
	RM 58,201 - RM131,508	66	42.3
	RM 131,509 and above	33	21.2
State	Johor	30	19.2
	Melaka	33	21.2
	Negeri Sembilan	19	12.2
	Selangor	52	33.3
	Wilayah Persekutuan	22	14.1

Source: Result of the study.

The result of important values identifies the attribute from the most important to less important which influence consumers' preference behavior. Higher the average importance score indicated more important attribute for consumers' preference and vice versa. From the conjoint analysis result, price is the most important attribute for consumers with average importance score 41.288 follow by second important attribute which is size, average importance score 40.858, third important attribute is production type with average importance score 12.620, fourth is color with average importance score 4.221 and less important attribute is packaging with average importance score 1.013. Summary of important values of each attribute with average importance score as table 3.

Table 3: Summary of Importance Values

Attributes	Important Value (%)
SIZE	40.858
COLOR	4.221
PRODUCTIONTYPE	12.620
PRICE	41.288
PACKAGING	1.013

Source: Result of the study.

The final utilities value analyses by conjoint analysis summarize as Table 4. For the attribute of price, the utility value showed negative correlation toward consumers' preference where higher the price, lower utility value. The utility value of RM0.40/egg is -0.837 follow by RM0.80/egg is -1.675 and RM1.20/egg is -2.512. The second important attribute is size with highest utility value of size is size A egg with utility value 0.769 follow by size B 0.366, size C -0.247 and size D -0,889. Size A egg and size B egg are positive utility value compare to size

C and size D indicated consumer prefer bigger size egg compare to small size of egg. The third important attribute for consumer preference toward egg is production type. Organic production type is the most preference for consumers with utility value 0.228 follow by conventional with nutrient enrichment with utility value 0.146, free range -0.089 and conventional -0.284 less preference production type by consumer. The result showed positive consumer tendency toward organic egg with highest utility value compare to other type of production system. Conventional with nutrient enrichment is second preference of consumer under type of production system. The major two categorize color of eggs are white and brown in the Malaysia. The result show positive utility value of brown egg compares to white egg with brown egg utility value 0.086 and white egg utility value -0.086. The result indicate consumer more prefer brown egg than white egg and industry player produce egg according to consumer preference with 97% brown eggs and 3% white/tinted eggs (Chua, 2016). Packaging of eggs is less important for consumers and 10 eggs per pack with highest utility value between level of each attribute with -0.021 follow by 20 eggs per pack with uitlity value -0.041 and less prefer is 30 eggs per pack with utility value -0.062

Table 4: Summary of Utilities Value

Utilities

		Utility Estimate	Std. Error
SIZE	A	.769	.138
	B	.366	.138
	C	-.247	.138
	D	-.889	.138
COLOR	BROWN	.086	.079
	WHITE	-.086	.079
PRODUCTIONTYPE	CONVENTIONAL	-.284	.138
	CONVENTIONAL WITH NUTIRENT ENRICHMENT	.146	.138
	FREE RANGE	-.089	.138
	ORGANIC	.228	.138
PRICE	0.4	-.837	.096
	0.8	-1.675	.192
	1.2	-2.512	.287
PACKAGING	10	-.021	.096
	20	-.041	.192
	30	-.062	.287
(Constant)		7.253	.250

Source: Result of the study.

WTP estimates were calculated as the ratio of the partial derivative of the untility function with respect to the attribute of interest, divided by the derivative of the utlty function with respect to the price and each attributes WTP was calculated as the ratio between the

estimate attribute and price parameters multiplied by -1 (Guney & Giraldo, 2020). With the utility value of RM0.4 (-0.837) and RM 1.2 per egg (-2.512), the estimate of 1 unit of utility value equal to RM 0.48. The highest WTP of attribute alone is Size A with utility value 0.769 multiply with RM0.48 equal to RM0.37 WTP for Size A. Consumer with tendency purchase organic egg estimate WTP is RM0.11 with utility value 0.228 for the attribute of organic egg alone. The highest utility value from random combination of egg attribute with size A, brown color, 10 eggs per pack and organic production type is 1.062 * RM0.48 = RM 0.51/egg.

DISCUSSION

Price is the main attribute affect consumers' preferences follow by size, production type, color and packaging quantity. It indicated price is the main factor influence consumers' preferences and action to buy the eggs. Even majority of the respondents are M40 and T20, price is still the main concern affect their preferences with lower the price, higher the preference of consumers. The study in Bangladesh showed impact of Covid-19 translates into higher food stress due to income reduction and increase food prices with reduce food supplier and affect food security of country (Mohammed Fazle Rabbi, Judit Olah, Jozsef Popp, Domician Mate, & Sandor Kovacs, 2021). The same situation faced by Malaysia where decrease income and increase food price led to price become the main concern to the public and affect their preference and action to purchase eggs. Another study found price is very important especially in developing countries and country like Malaysia, Ghana even developed countries like Spain, Poland and Canada consumers consider price is the most important factor for consumers when purchasing eggs (Rondoni, Asioli, & Millan, 2020). Similar finding in Poland indicated price had the most significant mean relative importance in shaping consumers' preferences while other attribute was less important (Zakowska-Biemans & Tekien, 2017).

Size is the second important attribute for consumers' preferences and Size A is the most preference by consumer follow by size B with positive utility value while size C and size D are less preference by consumer with negative utility value. The result contrary with the finding of Turkey which medium size eggs is the most preference by consumer with 58.58% prefer medium size follow by large size (35.78%) and small (2.59%) (Mizrak, et al., 2012) but same as finding in Malaysia during 2013 where consumer prefer bigger size eggs (Hanis, Nasir, Jinap, Alias, & Karim, 2013).

The production type is the third important attributes for consumers' preferences and among the type of production, organic is the most preferences for consumer follow by

conventional with nutrient enrichment with positive utility value. Free range and conventional type of production system are less preference by consumer with negative utility value. This is the first documented research finding identify positive tendency of consumer toward organic eggs. Consumer perceive organic eggs to be safe, healthy, natural, tasty, animal friendly and quality products (Biemans and Tekien, 2017; Mesias et al., 2011; Van Loo et al., 2010; Windhorst, 2005; Armağan and Özdoğan, 2005; Hermansen, 2003; Hovi et al., 2003 as cited in Guney & Giraldo, 2020) compare to other type of eggs. Moreover, the rise of awareness for health and safety eggs especially amongst household with young kids (Ang & Chin, 2022). From the demographic result of respondents, 63% were married and 64.1% of respondents (include divorce and widowed) with more than one kids could be the reason consumers have positive utility value toward organic eggs and conventional with nutrient enrichment eggs. Malaysia consumer aware benefit of organic eggs with tendency to purchase organic eggs but the high price of organic products is the most significant obstacle preventing consumers purchase organic food consumption (Ruiz et al., 2018; Singh and Verma, 2017; Rana and Paul, 2017; Tleis et al., 2017; Bryla, 2016;Cavdar and Aydin 2015; Aygen, 2012; Mesias et al., 2011; Aertsens et al., 2009, 2011; Özçelikand Uçar, 2008; Lea and Worsley, 2005; Willer et al., 2017 as cited in Guney & Giraldo, 2020). Malaysia egg market dominant by conventional eggs with 70% from the total egg production (Ang & Chin, 2022) and industry player should consider shift part of the operation to produce organic eggs with more competitive price and fulfil the niche market but with exponential potential in the future. Like conventional with nutrient enrichment available in the market of Malaysia albeit small in market share compared to conventional eggs but the profit margin is better and consumer much prefer conventional with nutrient enrichment compare to conventional type of production system. Consumer attitude, subjective norm and perceive behavior control will direct influence consumer intention and behavior. Different attitude, subjective norm and perceive behavior control will led to different result of consumer behavior. A study done in Spain indicated higher marginal utility and WTP for a production system ensuring higher animal welfare but consumer showed lower preference for organic eggs and unwilling to pay for this category of eggs (Rahmani, Kallas, Pappa, & Gil, 2019). Free range eggs were the most preference by consumers follow by barn eggs, caged eggs and organic eggs in Spain (Rahmani, Kallas, Pappa, & Gil, 2019). The results were contrary with the finding of Malaysia due to different attitude, subjective norm and perceive behavior control from different region. Plus, subjective norms are related to purchase intention, and purchase intention is related to purchase behaviour (Mohan et al., 2022). On the other hand,

social media platform statistics are far too high -out of the world's approximately 7.5 billion individuals, up to half of them are online. This indicates that more than two-thirds of internet users utilise social media applications, and one in every three uses social media applications. It is projected that social media and social networking will be the most extensively used applications in internet usage as the main factors to influence the customers on buying decision process (Panchanathan et al., 2022).

Beside that, color is the 4th important attribute of consumers' preferences and brown eggs more prefer than white eggs. Malaysia industry players produce according to consumers' preferences where 97% is brown eggs and 3% is white eggs (Chua, 2016). The color preference of egg different from region to region where Malaysia, Ghana, Brazil and United states prefer brown eggs than white eggs but the target respondents from same region could have different preference, example in the United State Heng, Peterson, and Li (2013), found consumer showed preferences for white eggs than brown eggs (Rondoni, Asioli, & Millan, 2020).

Size of packaging is less important among 5 attributes and consumers prefer smaller quantity than big quantity. This could relate with consumer behavior prefer fresh eggs and convenience to purchase eggs in Malaysia. Besides, the number of households will affect consumers' purchase behavior where low number of household prefer less quantity of packaging. The factor of consumer preferences toward size of packaging need to further study to identify correlation between consumer preferences and size of packaging.

From the 16 egg profiles generate by Fractional factorial design Statistical Package for Social Science (SPSS) software version 25, top 5 preference egg profiles all prefer RM0.4/ egg with different combination of other attribute indicate low price per egg is the most important attribute affect consumers' preferences and action to purchase eggs. This is the current strategy of poultry industry players business model with increase efficacy of production, reduce the cost and produce in huge quantity with conventional type of caging system to ensure the cost of production affordable by the consumers. The main obstacle of organic eggs in Malaysia is high cost of production with less productivity compare to conventional type of production system. Poultry industry players need a comprehensive strategy plan and cooperation within the production process and supply chain to lower the cost of production and organic eggs become more affordable to consumer.

From the random combination of egg attributes, RM 0.4/egg, size A, brown color, 10 eggs per pack and organic production type is the most preference combination with total utility value 7.477. Poultry industry player should move toward the direction to produce the products

according to consumers' preferences to fulfil their need and want. Factor related with consumers' preferences not include in this study should further investigate in the future to allow producer produce product and market the product accordingly.

The finding of relative importance attributes for this study is different from the study by (Hanis, Nasir, Jinap, Alias, & Karim, 2013) where size is the most important attribute follow by size of packaging, color and functional of egg without consider production type and price. This study allows producers have clear picture and direction to produce eggs with low price, bigger brown eggs, organic or conventional with nutrient enrichment and low size of packaging to fulfil consumers' need and want.

CONCLUSION

This is the update of consumers' preferences toward egg attributes and include different type of production system in conjoint analysis. The finding showed consumers' preferences is size A, RM 0.4 per egg, brown color, organic and 10 eggs per pack while size A, omega eggs, brown color and 10 eggs per pack is the best combination of consumers' preferences in 2013 (Hanis, Nasir, Jinap, Alias, & Karim, 2013). Size A, brown color, 10 eggs per pack are still consumers' preferences from 2013 until 2022 with tendency of consumers purchase organic eggs. Price is the main attribute influence consumers' preferences and common in developing country where price is most important than other attributes and strongly important when come into the decision to purchase or not to purchase the eggs (Rondoni, Asioli, & Millan, 2020).

This study is the first finding showed positive tendency of consumers in Malaysia toward organic eggs and more important than other type of production system. In term of WTP, consumer WTP for some of the attribute like size A, size B, organic, conventional with nutrient enrichment and brown eggs. The finding gives a clear picture to industry player to strategy planning the products according to consumers' preferences and fulfil their need and want. As per the objective of research project is examined consumers' preference for eggs attribute and tendency of consumers purchase organic eggs. What is the perception of consumers toward organic eggs and willingness of consumer to pay for their preference attribute? From the result of conjoint analysis with target population from central to southern region of Malaysia, price is the top priority concern of consumers follow by size, production type, color of eggs and quantity of packaging. The most preference egg profiles generate by Fractional factorial design Statistical Package for Social Science (SPSS) software version 25 is combination of RM 0.4/egg, A size, white color, 10 eggs per pack, conventional with nutrient enrichment. The total

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utility value from the combination is 7.224. On the other hand, the best random combination of each attribute of egg is RM 0.4/egg, size A, brown color, 10 eggs per pack and organic production type with total utility value 7.477. From the relative important value and utility value of each attributes, price RM0.4/egg, size A, organic production type and brown egg are the main preference for consumer when purchase the eggs. Color and quantity of packaging are less important compare to price, color and production type. Besides, the result of conjoint analysis indicate organic type of production system is the most preference type of production system when compare to conventional, free range and conventional with nutrient enrichment. This is the first finding indicate positive tendency of consumers' preferences toward organic eggs and more preference compare to any other type of production system.

The limitation of the study are, self-administered data gathering is a practical and feasible data collection approach, but it may not reflect reality because respondents may be discouraged from providing honest responses, thus lowering the study's reliability. Additionally, respondents may be unaware of the reasons for any answers made out of boredom or apprehension about declining the request. Besides, the interpretation on each questionnaire and the answers may different from each respondent that will cause unclear data obtained from the survey. Second, this study only focuses on consumers' preferences and analyse by conjoint analysis without take consumer behaviors areas such as brand awareness, customer satisfaction, customer engagement was not included due to limited time and resources. Moreover, the factor influence consumers preferences was not include in this study to understand why price is more important than size, production type, color and packaging. The third limitation is the sample size of this study is too small to represent the overall consumers in Malaysia and focus on central and southern region only. Hence, bigger sample size with long time frame to conduct the study is recommended to collect data from more respondents and from different state of Malaysia not only focus in central and southern region.

Next, for the future study recommendation, qualitative survey can be added by conducting an in-depth interview with target group of consumers purchase eggs and tendency to purchase organic in the future to understand in depth the factor influences their preferences, factor correlate to consumers' behavior and estimate WTP more closely to the exact situation. Besides, price and size are more important than production type but the reason of price and size are more important not include in this study and should consider in the future to give a clear picture why production type of system like organic eggs and conventional egg with nutrient enrichment are more important attributes. WTP is estimate from the utility value and could be

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far from the exact situation. Further study needed to find an alternative way to identify WTP and compare to result of conjoint analysis. This can assist poultry producer to identify opportunity and position organic eggs in better position to set the idea selling price of organic eggs which affordable by the consumers. Moreover, the sampling group should include all state of Malaysia rather than central and southern region to represent consumers' preferences of Malaysia. The demographic of respondents should well represent population of Malaysia not only location but should consider income level, gender, education level, race, married status and education level.

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