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Factors influencing consumers' preferences towards meat and meat products with traceability systems in Malaysia

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Abstract

Majority consumers around the world have become increasingly concern and aware about their health and food safety. Recent food crisis and foodborne illness incidents showed the needs to assure the authenticity and traceability of foods in the market especially meat and meat products. These scandals have led to negative effect and perception to consumers, food companies and both supply and demand chain. Hence, the food industry needs an excellent and reliable traceability system to ensure that consumers are persistently well protected from unconscious consumption of unsafe foods. Therefore, traceability systems can support the claims by making it verifiable. However, the awareness among Malaysian consumers is still lacking due to the inadequate exposure towards concept and the importance of traceability systems particularly in meat and meat products. The aim of this study is to determine factors influencing consumers' preferences towards traceability systems of meat and meat products in Malaysia. Primary data were collected using structured questionnaire via face to face interview with 503 respondents in Klang Valley, Malaysia. Data collected were analyzed using descriptive and factor analysis. The findings of descriptive analysis showed that most of the consumers preferred using traceability systems and aware of its importance when buying meat and meat products. Meanwhile, the factor analysis results discovered six factors that influenced consumers' preferences towards meat and meat products with traceability systems namely *Halal certificate, transparency, quality, confidence, food safety* and *knowledge*. Therefore, implementation of traceability systems could raise standards of food safety throughout the meat production supply chain. Furthermore, the society will become more confident and they can benefit from the quality of purchase and consumption. The findings from this study are also able to contribute to the body of knowledge to the producers or marketers towards food safety issues and foodborne illness that recently happened in Malaysia.

Introduction

In this era of globalization, majority of the consumers in both developed and developing countries are genuinely concerned towards food safety, which raises the awareness on health issues among the consumers. The awareness of food safety has become particularly serious due to the food scandal and countless cases occurring around the world (Giraud and Halawany, 2006). Such publicized issues and cases that occurred globally include Bovine Spongiform Encephalophaty (BSE) in Europe, the milk adulteration in China and other foodborne illnesses or diseases are still happening across the globe. These have resulted in decline of assurance in consumers towards the food safety on the quality of food taken, particularly meat and meat products (Hansstein, 2014). Therefore, implementation of traceability system is a good step to overcome these issues as the system is one of the latest technologies that have been developed in this era. The European Law (2007) described that traceability system as the ability to track any food, feed, food-producing animal, or a medium for consumption through all stages of production, processing, and distribution.

In terms of food safety concept, traceability system is necessary to trace the status of each product from farm to fork, whereby the involvements of all the players in the supply chain are important in order to meet the consumer demands for consistent

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supply of top quality, safe and nutritious food products (Khasturi and Sriprada, 2009). The basic characteristic regarding traceability systems is that it can identify units for every batch of all ingredients and products where it can detect when and where the units are moved and transformed. Traceability systems nowadays are basically captivated with animal health, disease and food safety control. According to Downey (1996), the implementation of traceability systems increases due to the rapid development of hardware software and information technology as well as increasing of consumers' health and safety consciousness. There are some countries that have already implemented and developed a system of traceability among consumers namely United States, Spain, China, Australia, Japan, and New Zealand. Generally, consumers are genuinely concerned about their health and safety issues but the awareness level towards traceability systems among consumers in Malaysia is still low. Traceability system of foods for consumers in Malaysia especially meat and meat products are still undeveloped and is under planning. This is due to the implementaton of this sytem throughout the whole supply chain has been proven to be very challenging as it must include all the information involved in the entire supply chain for complete potential functionality (Opara and Mazaud, 2001). Previous research stated that there are various issues in introducing and operating a traceability system where it requires high cost for start up and trained staffs who have applicable skills to operate this systems (Uchida *et al.*, 2009).

Apart from that, since traceability systems is still under developed among consumers in Malaysia, the government should work together with meat and meat products producers to ensure the good and guaranteed quality of meat produced. Every related parties should start to consider the traceability systems as a strategy to avoid any unwanted events to happen such as virus, contaminated meat and meat products, and food poisoning. Furthermore, there have been countless cases and issues discovered by the Malaysian authorities and reported by consumers regarding food safety. For instance, there are several cases occured in Malaysia supermarket and retail store where consumers found non-Halal Deoxyribonucleic acid (DNA) in ingredients produced by the food manufacturer. There are also issues regarding fake Halal logo in premises or product packaging that can lead to distrust and negative perception on the entire local food system (Samsi *et al.*, 2012). These food crisis and all negative cases affected both the supply and demand side of the food chain. Malaysia has created international standards and regulations for all food companies to follow in terms of its ingredients, processing, handling packaging, storage, and distribution especially for export and import of meat and meat products. (Kamaruddin *et al.*, 2013).

Thus, government should take measures to develop a traceability system of meat in the supermarkets as a first step to introduce the system of meat and meat products among consumers. Besides, most of the consumers nowadays have a very high awareness towards food safety but there are certain consumers that have no intention to learn the information on the purchased food products. Instead, these consumers are using the sales person as a substitute of traceability to make a decision in purchasing food products, especially meat and meat products. Meanwhile, the demand of meat and meat products in Malaysia are increasing significantly every year especially for chicken meat, beef meat and lamb meat (Ministry of Agriculture, 2011). With the increasing demand of meat and meat products in Malaysian market, information related to traceability is becoming more important. Thus, the aim of this study is to determine factors influencing consumers' preferences towards traceability systems of meat and meat products in Malaysia.

Materials and methods

A survey was conducted in order to gather information about consumers' preferences towards traceability systems of meat and meat products in Malaysia. The questionnaire consisted of four sections and was designed with a Likert Scale of 1 to 7 (1 representing strongly disagree and 7 standing for strongly agree) to measure the consumers' preferences towards traceability systems of meat and meat products with 28 items. Primary data were collected using structured questionnaire via face to face interview with 503 respondents in Klang Valley that was selected using simple random sampling. Klang Valley was chosen as the study area because of its varying socio-demographic characteristics among potential consumers with a population of about 7.2 million as of 2016. Furthermore, Klang Valley was also chosen because consumers from all works of life hardly do their shopping there and most shopping malls and supermarkets are located within the Klang Valley area. Past studied from Wu *et al.* (2012) stated that urban or cities areas were selected because of the level of economic and technology development among consumers becoming increases. Therefore, Klang Valley is considers appropriate to be chosen as the study area. The data collected were analyzed using descriptive analysis and chi square analysis to

describe the basic features of the data in this study. The analyses also described the respondents' profile and their preference regarding traceability systems. Meanwhile, factor analysis was also applied to identify factors that influence consumers' preferences towards meat and meat products with traceability systems. These elements are crucial for the implementation of traceability systems in Malaysia.

Results and discussion

Descriptive analysis

Descriptive analysis was used to describe the sample and the results of the socio demographic profile of the respondents of this study. The demographic profile included gender, race, marital status, occupation, educational level, religion, age and income. Based on the Table 1, majority of the respondents were females, 56% compared to males, 44%. Majority of the respondents were Malay (54.6%), followed by Chinese (24.5%). Respondents aged between 31 to 40 years old composed as majority (42.5%) being interviewed. Only 7.4% of respondents aged more than 60 years old. From five categories of educational level, respondents possessed bachelor's degree with 47.1%, followed by master's degree (18.5%). More than half of respondents were married with monthly income earning more than RM9000 with 2.6%. The lowest monthly income earning was below RM3000 with 29.4%.

Table 1: Respondents' Socio-Demographic Profiles

Profile	Frequency (n)	Percentage (%)
Gender		
Male	221	44.0
Female	282	56.0
Race		
Malay	275	54.6
Chinese	123	24.5
Indian	100	19.9
Others	5	1.0
Marital Status		
Single	121	24.0
Married	346	69.0
Widow/Widower	36	7.0
Occupation		
Fulltime working	147	29.2
Self employed	103	20.5
Professional	159	31.6
Retired	48	9.5
Housewife	25	5.0
Student	21	4.2
Household Size		
1 to 3	176	35.0
4 to 6	266	52.9
Educational Level		
PMR, SPM, STPM	22	4.37
Sijil	58	11.5
Diploma	60	11.9
Bachelor	237	47.1
Master	93	18.5
Doctorate	33	6.56

Meanwhile, Table 2 showed that majority of the consumers in Malaysia have never heard about traceability systems with 36.6%, while only 13.3% are well informed about traceability systems and regarded it as important when buying meat and meat products. In addition, Halal Certification is often considered as one of the main factor when buying meat and meat products with 43.6 percent. Therefore, the consumers would have preferred using traceability system if it can provide them Halal certification information. Furthermore, they also chose to use traceability systems if quality standard of meat and meat products are provided (43.0%). Other than that, they chose ingredients and nutrition as one of the important reasons to use traceability systems (38.6%), followed by country of origin (33.0%) and transparency (28.8%). Next, majority of the respondents were planning to use traceability systems in future if all the information was provided with 418 of respondents (83.6%) compared to respondents who declined to use it in future (13.4%).

Table 2: Respondents' Awareness and Preferences towards Traceability Systems of Meat and Meat Products

Statements	Frequency	Percentage (%)
Awareness towards Traceability Systems		
Never Heard	181	36.2
Heard about it but known a little	131	26.4
Heard about it but not sure	121	24.2
Know very well	67	13.4
Important of Traceability Systems		
Country of origin	165	33.0
Ingredients and nutrition	193	38.6
Halal certificate	218	43.6
Date information	156	31.2
Quality	215	43.0
Transparency	144	28.8
Planning to use in future		
Yes	418	83.1
No	82	16.9

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.763
Bartlett's Test of Sphericity	
Approx. Chi-Square	4449.82
df	253
Sig.	0.000

Factor analysis

As shown in Table 3, the Kaiser-Mayer-Olkin (KMO) test was 0.736 implying that the sampling adequacy was excellent, implying an excellent inter-correlation between the factors. For the Bartlett's test of sphericity χ^2 (253) = 4449.824, p< 0.05 for this data was significant (p=0.000), implying correlation between items were sufficiently large for Principal Component Analysis (PCA). The result of factor analysis presented in Table 4 showed that seven factors influenced consumers' preferences towards meat and meat products with traceability systems. The seven factors identified explained 65.801% of the variance in the data, which is in the acceptable range as indicated by Hair *et al.* (1998). The factors were labeled as *Halal certificate, transparency, confidence, quality, food safety, country of origin and knowledge*. There are four factors that only consisted of two variables which are still considered as acceptable. According to Yong and Pearce (2013), a factor with two variables is only considered reliable when the variables are highly correlated with each other. It should be anticipated that approximately one half of the items created using the methods described here will be retained for use in the final scales, and that at least twice as many items needed in the final scales should be generated to be administered in a questionnaire (Swanson and Holton, 2005).

Halal certificate was labeled as the first factor that influenced respondent's preference towards meat and meat products with traceability systems with an eigenvalue of 5.533. This factor consisted of three variables which explained a total variance of 24.057%. Halal certificate was the main attribute for consumers in Malaysia when making a purchase of meat and meat products and this characteristic cannot be observed or valued easily by consumers during purchasing stage (Grunert, 1997). Hence, they put their trust and confidence towards Halal labeling provided by manufacturer in every product packaging that they purchase especially among Muslim consumers (Rezai, 2008).

The second factor that influenced respondent's preference towards meat and meat products with traceability systems was labeled as *confidence*. The factor was extracted by five sub-variables as well. All the items for confidence explained 34.216% of the total variance, with eigenvalue score of 3.337. In order to avoid food safety issues and foodborne illness problem especially food poisoning, traceability systems enable tracing back the problem occurred along the food chain as well as withdrawing the contaminated food from the market (Hobbs *et al.*, 2005).

The third factor was labeled as *transparency*. This factor was extracted by four items. All the items for this factor explained a total variance of 42.215% with eigenvalue of 1.804. This finding is in line with Dickinson and Bailey (2002), who stated that one of the major factors that consumers considered when purchasing of meat and meat products is transparency of those products. Transparency is the availability of information regarding the processes used during each phase of the meat and meat products chain. Rana (2010) revealed that consumers preferred if the products are provided with information related to the processes along the meat supply chain and information records in the food chain.

Food safety was labeled as the fourth factor with an eigenvalue of 1.577. This factor explained a total variance of 6.857% and consisted of three sub-variables. The food crisis and foodborne illness that recently occurred in Malaysia are mainly related to food safety problems. As a result, consumers already lost their trust and confidence in the food chain and they demanded for safety and guarantees (Giraud and Halawany, 2006). Consumers who considered food safety as serious matter and health consciousness would have preferred purchasing and consuming traceable foods (Liu and Chen, 2015). Hence, it was necessary for manufacturer and marketer to implement traceability systems for consumer to prevent food safety related problems becoming worse.

The fifth factor that influenced consumer's preference towards meat and meat products with traceability systems was labeled as *quality* with an eigenvalue of 1.458. This factor consisted of three sub-variables, which explained a total variance of 11.174%. Quality is one of major important attributes that consumer would preferred when purchasing meat and meat products. Moreover, traceability systems is also useful to improve quality of foods especially meat and meat products which could benefit the consumers with extra quality grade of meat. It also assured the consumers that the meat and meat products are safe to eat (Soon and Aris, 2014). Consumers were also more likely to buy traceable meat when they were guaranteed with high quality meat and meat products.

Table 4: Factors Influencing Consumers' Preferences towards Meat and Meat Products with Traceability Systems

Items	Factor Loading
Factor 1 : Halal Certificate	
• Traceability systems will ensure the meat that I purchase has original Halal certificate.	0.892
• It would be great if there is Halal information provided by traceability systems about the slaughtering process.	0.835
• Halal certificate is one of the most important factors considered by consumers when purchasing meat and meat products.	0.813
Eigenvalues	5.533
Percentages of Variance	24.057
Cumulative Percentage of Variance	24.057
Factor 2 : Confidence	
• I am confident to buy meat and meat products that are provided with the data of process to produce meat and meat products.	0.837
• I feel confident if traceability systems can provide information regarding transparency of meat and meat products.	0.771
• Meat and meat products with traceability systems are safer to eat and purchase compare to meat and meat products without traceability systems because have all details information.	0.671
• I am confident to purchase meat and meat products with traceability systems because hygiene is more guaranteed.	0.534
• I am confident meat and meat products with traceability systems are free from dirt and impurities.	0.530
Eigenvalues	3.337
Percentages of Variance	10.159
Cumulative Percentage of Variance	34.216
Factor 3 : Transparency	
• I will support and use the traceability system if it is developed and applied in Malaysia.	0.828
• Information about traceability systems must be disseminated by both the private and government institutions to public	0.726
• I would feel very confident to buy meat and meat products that provide transparency by using traceability systems.	0.719
• It would be good if the government started to develop a traceability system that will provide many benefits to the consumers.	0.556
Eigenvalues	1.804
Percentages of Variance	7.846
Cumulative Percentage of Variance	42.215
Factor 4 : Food Safety	
• I am concerned about the ingredients and nutrients in the meat products that I purchased.	0.768
• The perceived attributes (e.g. healthier, safer to eat and purchase hygiene) influence consumers to purchase meat and meats products.	0.741
• Traceability systems give me confidence to purchase a good quality meat and meat products because it can guarantees food safety	0.679
Eigenvalues	1.577
Percentages of Variance	6.857
Cumulative Percentage of Variance	48.919
Factor 5 : Quality	
• I care about quality of the meat and meat products that I have purchased.	0.836
• Quality of meat and meat products is one of the most important factors that influence me when purchasing.	0.769
• Meat and meat products with traceability systems have extra guaranteed quality assurance	0.793
Eigenvalues	1.458
Percentages of Variance	6.341
Cumulative Percentage of Variance	55.260

Table 4. (Cont.)

Factor 6 : Knowledge	
• It would be good if I have more knowledge about the benefits of traceability systems.	0.672
• In my opinion, traceability systems have a potential to be well developed in Malaysia	0.668
Eigenvalues	1.315
Percentages of Variance	5.719
Cumulative Percentage of Variance	60.980
Factor 7 : Country of Origin	
• Consumers are willing to purchase meat and meat products with traceability systems if it produce by local	0.688
• I feel confident if traceability systems can provide information regarding country of origin of meat and meat products.	0.668
• It is important for me to know where the meat and meat products I buy is produced	0.655
Eigenvalues	1.109
Percentages of Variance	4.822
Cumulative Percentage of Variance	65.801

Next factor that influenced consumer's preference towards meat and meat products with traceability systems was *knowledge* with an eigenvalue of 1.315. This factor consisted of two sub-variables and explained a total variance of 5.719%. According to Kamaruddin *et al.* (2013), if the government and the meat market can provide accurate and complete information to customers regarding the processing of meat and meat products such as the Halal certificate and quality assurances, it can actually help Malaysian meat market to develop rapidly in terms of exports and imports. Consumer nowadays put more concern on further information related with process characteristics of meat as all the information gathered can be simplified in labeling of the meat and meat products (Smith *et al.*, 2005).

The last factor that influenced consumer's preference towards meat and meat products with traceability systems was named as *country of origin* with an eigenvalue of 1.109. This factor consisted of three sub-variables and explained a total variance of 4.822%. There are a few factors that influenced country of origin preferences for a consumer where local meat and meat products are more economical in terms of price instead of imported meat. Besides, consumers are feeling more confident if they are provided with information regarding the origin of the meat and meat products that will be purchased. In US, consumers had higher preferences toward imported meat especially New Zealand and Australia since they are well known producers of good quality meat compared to other countries (Umberger, 2004). This is also supported from Mennecke *et al.* (2007) that the consumers are also willing to pay due to their affordable living cost and higher income. Furthermore, U.S. consumers have more trust to purchase their locally produced meat as they feel more confident towards their country meat production. This is also supported by a study from Lim *et al.* (2013) where consumers preferred and willing to pay towards domestic steaks rather than imported steaks.

Internal reliability tests were conducted to check the internal consistency of measurement item and Cronbach's alpha of each variable of seven factors. The alpha score in this study ranged from 0.871 to 0.587 as shown in Table 5. It shows that the alpha score for each factor meets guidelines by Nunnally (1978) of explanatory research which required Conbach's alpha score above 0.5. Factor with the highest reliability was Halal certificate (0.871), which indicates good internal consistency among the items representing each factor. This was followed by confidence (0.794), confidence (0.849), transparency (0.784), food safety (0.784), quality (0.669), knowledge (0.612) and country of origin (0.587).

Table 5: Internal Reliability Analysis

Factor	Number of Items	Cronbach's Alpha
Halal certificate	3	0.871
Confidence	5	0.792
Transparency	4	0.849
Food safety	3	0.784
Quality	3	0.669
Knowledge	2	0.612
Country of origin	3	0.587

Conclusion

The result of the study shows that some of the respondents had never heard about traceability systems whereas some had heard about it with different levels of knowledge and awareness. The respondent's level of awareness was low as indicated by the results of the study. Even though there is still a limited awareness on traceability system, the attitude of respondents towards traceability systems of meat and meat products is generally positive. Seven factors were developed to identify which factors influenced consumers' preferences towards meat and meat products with traceability systems namely *Halal certificate, transparency, confidence, quality, food safety, knowledge* and *country of origin*. Therefore, consumers nowadays can demand for healthier and better quality of meat and meat products in the market. The development of food traceability systems should be combined with a labeling system for quality certification. Moreover, domestic and international third-party certification should be introduced for quality certification of traceable food in a timely manner to meet the different preferences of different consumer groups. In addition, producers should be encouraged and supported to produce traceable food with different traceability levels and different quality certification types to meet the diverse demands of consumers to promote the construction of traceable food market systems step by step.

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