Effect of labelled information and sensory attributes on consumers' intention to purchase milk

Mohammed Ziaul Hoque
Business and Economics, University of Tromsø, Tromsø, Norway and Finance, University of Chittagong, Chittagong, Bangladesh
Jinghua Xie
Economics, University of Tromsø, Tromsø, Norway, and
Suraiya Nazneen
Finance, University of Chittagong, Chittagong, Bangladesh

Received 24 February 2018
Revised 26 May 2018
13 July 2018
31 July 2018
Accepted 2 August 2018

Abstract

Purpose – The purpose of this paper is to examine the influences of consumer perceptions of labelled information and sensory attributes on consumers' intention to buy fresh milk.
Design/methodology/approach – An experiment was conducted on 117 consumers in a lab at a university. After closely inspecting the labels' information and tasting two types of milk, participants were asked to fill in a questionnaire, using the direct interview method. Exploratory factor analysis, confirmatory factor analysis and structural equation modelling were applied to analyse the data.
Findings – The results show that products' labelled information and the sensory perceptions increase the buying intention of both ultra-high temperature treated fresh milk (UFM) and pasteurised fresh milk (PFM). The sensory perceptions of PFM can mediate the relationship between products' labels and consumer buying intentions, but this relationship is not true for UFM. According to our results, nutritional facts and taking responsibility for one's health are the keys to fresh milk commercialisation in terms of higher relative weights and commonness.
Originality/value – Although the sensory aspects of milk have been rigorously evaluated in the food science literature, to the best of the authors' knowledge, few studies have focussed on the sensory perceptions of fresh milk incorporating process categories (UFM and PFM) and their mediating effect between labelled information and buying intention in the social sciences. The study is pioneering in that it investigates the perceptions of sensory attributes affecting consumer purchasing decisions for fresh milk in an emerging market.

Keywords Labelled information, Sensory attributes, Buying intention, Fresh milk, Bangladesh
Paper type Research paper

1. Introduction

The major source of fresh milk, like other fresh foods, is from local producers and it is sold as a common product (Van Dam and Van Trijp, 2007). Evidence has shown that having purchase experience and being curios about new items, consumers seek new goods within a particular product category (Morgan, 1978). Thus, product category, such as the type of fresh milk categorised by processing technique (e.g. UHT or conventional pasteurisation), has been considered as an important variable for consumers' evaluation (Raghunathan and Irwin, 2001) and finding and understanding differences in product labelling (Trijp and Meulenberg, 1996). Therefore, consumers with previous knowledge of a particular food, hereafter the process category of fresh milk, are more likely to use label information effectively in evaluation (Miller and Cassady, 2015). Additionally, consumers' adoption of product-process pattern[1] is higher than a process–product pattern (Damanpour and Gopalakrishnan, 2001); thus, information regarding products' processing characteristics is vital for consumers (Banterle *et al.*, 2012).

Product labels convey information regarding the product category and a variety of product-specific attributes (Morris, 1997) that lead to increased buying behaviour

South Asian Journal of Business Studies
Vol. 7 No. 3, 2018
pp. 265-286

2398-628X
DOI 10.1108/SAJBS-02-2018-0021

(Hussin *et al.*, 2013; Khuong and Nguyen, 2015). Even in the complex retail-choice environment, product labels influence shoppers' purchase decisions by offering cues to simplify their evaluative and choice processes (Bettman *et al.*, 1998). Consumers use labels, and intrinsic and extrinsic attributes, of food products as cues in forming their opinions regarding quality (Veale *et al.*, 2006; Bandara *et al.*, 2016). Currently, with the help of cues, consumers make 82 per cent of their purchase decisions inside the store (Point of Purchase Advertising International, 2014). Previous research has shown that consumers are heterogeneous in their reliance on both intrinsic and extrinsic cues as well as in their ability to assess product cues accurately (Alba and Hutchinson, 1987; Kardes *et al.*, 2001). Veale *et al.* (2006), therefore, concluded that marketing practitioners need to understand the respective influences of product category and companies should strive to understand consumers' perceptions of their food products (see also Varela *et al.*, 2010).

Troye and Supphellen (2012) concluded that consumers bias their sensory perceptions in self-producing products (e.g. perceived level of saltiness of a homemade vegetable soup) so that they match a positive evaluation of the outcome. Milk is a functional food (Bhat and Bhat, 2011) but not self-producing; therefore, we argue that consumers do not bias their sensory perceptions when drinking milk. Consumers have to trade the sensory (e.g. taste) and health factors over its intrinsic and extrinsic attributes (Ares *et al.*, 2010). The literature suggests that consumers' impressions of the sensory attributes of foods affect their food choice (Sørensen *et al.*, 2003). However, the influences of non-sensory and sensory factors on consumers' perceptions of functional foods have been little studied. As a functional food, most of the previous studies on milk have focussed on, for example, assessing the microbiological quality of milk (Islam *et al.*, 2018), evaluating fermented caprine milk's perceptions (Bessa *et al.*, 2016), the effects of TV commercials on customers' buying behaviour (Khuong and Nguyen, 2015), production sustainability (Asselt *et al.*, 2015), demand and market opportunities (Kuma *et al.*, 2012; Cheng *et al.*, 2014), demand and supply (Chavas and Klemme, 1986; Popescu, 2015), comparing flavour and texture (Oupadissakoon *et al.*, 2009), consumption frequency and patterns (Grebitus *et al.*, 2007), and consumers' perceptions and attitudes towards milk (Perkins and Deeth, 2001). Little literature has measured the consumers' perceptions of attributes like labelling information (extrinsic cue) and sensory (intrinsic cues) on purchase intentions for milk. This study aims to fill in this knowledge gap.

Kathuria and Gill (2013) and Sijtsema *et al.* (2012) argued that evaluating the quality of fresh food is difficult before consumers taste it. However, in this study, an experimental design was used in which participants were exposed as consumers and tasted two different categories of fresh milk (UHT and conventional pasteurised) to evaluate their perceived value of sensory attributes but quality. After they had closely inspected the labelled information and tasted the milk, they were asked to fill in a questionnaire including questions about the perceptions of sensory attributes and labelling information of the tasted milk. Confirmatory factor analysis (CFA) and structural equation modelling (SEM) were the main research methods employed.

The structure of the study is as follows. A review of the literature is followed by the development of hypotheses and a conceptual model. The empirical model and data collected are then discussed. Subsequently, the research results are discussed, followed by concluding remarks, managerial implications and directions for further research.

2. Literature review

Choice is the bedrock of human beings' identity: what previous generations viewed as matters of birth, luck and social rank are now areas of choice, e.g. the choice of goods to consume (Gabriel, 2015). Consumers are becoming more educated, health conscious, and thus have begun to consider food attributes more carefully when choosing food items (Quah and Tan, 2010), with cognitive and affective factors acting as predictors of product choices (Yoo and MacInnis, 2005).

From an interdisciplinary perspective, consumer choice covers everyday purchasing to extreme forms of compulsive and addictive consumption. Thus, a simple multidimensional model that eclectically incorporates variables is insufficient. The required framework should incorporate explanatory variables, e.g. social, psychological, economic, neurophysiological, etc., that influence choice (Foxall, 2010). Again, the presentation of decision elements may have important effects on consumers' choice (Thaler and Sunstein, 2008).

Consumers search for products by using product labels relating to each dimension of the representation (Morris, 1997). In the case at hand, as per choice rules, we believe that consumers understand the two process dimensions of fresh milk by considering the products labels (Trijp and Meulenberg, 1996) and use intrinsic and extrinsic attributes as cues in forming their opinions regarding quality (Veale *et al.*, 2006) that influence consumers' choice of fresh milk category: UHT or pasteurised (Orquin and Scholderer, 2011). If their first choice is unavailable, consumers also reject their second choice if their perceived value of that product' attributes is not strong (Wendy *et al.*, 2012). Thus, the quality of fresh food is vital and is affected by external factors (Riezebos and Zimmermann, 2005). The behavioural learning theory indicates that learning is a result of a response to external factors. Products labels convey information regarding a variety of product-specific attributes as external cues and sensory attributes convey information as external cues. Furthermore, abstract construal cues, whether internal or external, can dominate concrete cues in shopping (Lamberton and Diehl, 2013).

A label can be expressed as the information attached to a product that can help in establishing a positive attitude. The attitudes and beliefs of a particular product influence the buying intention of that product (Fishbein and Azjen, 1975). Lancaster (1966) reported that consumers maximise their utility by accumulating bundles of product characteristics. Therefore, like other external and internal attributes, consumers look for process attributes that also work as signals of product quality (Roosen, 2003). However, labelling of product attributes can be costly if expensive tests are necessary to confirm a food's safety characteristics. Responding to these difficulties, firms and regulators have extended their labelling and product differentiation efforts to process attributes (Roosen, 2003). Examples include the labelling of UHT for extended shelf life. This categorisation influences the label's perception and consumers' buying intentions (Jeddi and Zaiem, 2010). Thus, consumers rely heavily on product labels both to distinguish between separate categories of product and to distinguish between products within categories (Smith and Houston, 1985).

As a fundamental ingredient of dairy products, milk is considered a fundamental food element for all mammals (Kurajdova and Petrovicova, 2015). Milk can be of different types: raw liquid milk (RLM); powdered, condensed and processed. RLM can be collected and processed using several techniques such as ultra-high temperature treatment (UHT), pasteurisation (conventional) and sterilisation. Although RLM is processed by UHT or pasteurisation to kill bacteria, it is still fresh milk (Lederman, 2004; Charles, 1992) and treated as a product (Nijssen and Van Trijp, 1998). Any dairy product can theoretically be graded and this has traditionally been conducted on Cheddar cheese, butter and skim-milk powder (Karagul-Yüceer and Drake, 2013). In Cheddar cheese grading, the sensory attribute "mealy" is usually used (Clark *et al.*, 2008) and milk fermented by a probiotic organism has been found to be comparable in sensorial attributes to commercial dairy products (Trivedi *et al.*, 2014). Among the sensory methods, the descriptive sensory analysis has been extensively employed in dairy products' evaluation to identify and measure those attributes that best characterize their sensory properties. For instance, descriptive sensorial analysis has recently been applied to yoghurts (Cliff *et al.*, 2013). Among all the sensory characteristics of milk, flavour is one of the most important attributes for acceptability and preference by consumers (Thomas, 1981; Kim and Morr, 1996) and documented descriptive terms include cooked, brothy, cheesy, tortilla and malty (Smith *et al.*, 2016).

As brands are not significant in fresh milk, search attributes, rather than experience attributes, are the most important means of evaluation in this situation. Taste and texture are experience attributes, while shape and colour are search attributes. Search attributes are comparatively less brand-sensitive than experience attributes. In addition, brand sensitivity is influenced by the functional characteristics of products. As fresh foods are functional products, a brand will not add much weight or value (Riezebos and Zimmerman, 2005). Therefore, texture is a key quality attribute used in the fresh and processed-food industry to assess product quality and acceptability (Chen and Opara, 2013). In food choices, the taste of the product is crucial (Sijtsema *et al.*, 2012), represented by five basic tastes: sweet, sour, salty, bitter and umami (a savoury, meaty kind of taste) (Sijtsema *et al.*, 2012). Although fresh milk is the most consumed, marketed and processed dairy food product (FAO, 2013), there is a lack of research on the influence of labels and product cues on consumers' intention to buy.

3. Hypotheses and conceptual model

Literature has shown that the product label is valuable to consumers since it increases their level of product involvement, allowing them to distinguish one product from others (Fernández-Barcala and González-Díaz, 2006). Therefore, we propose the following hypotheses:

H1a. The perception of labels' information of pasteurised fresh milk (PFM), e.g. nutritional facts, increases consumers' intention to buy.

H1b. The perception of labels' information of UHT fresh milk, e.g. nutritional facts, increases consumers' intention to buy.

Texture, appearance and taste are regarded as the most important attributes in assessing the quality of food products (e.g. Chen and Opara, 2013). Although there are no specific taste, appearance or texture components of sampled milk, a mix of sensory attributes, e.g. sweet, sour, salty, umami, heating, frying, odour and colour, are nevertheless important to assess the quality of milk. Blair (2012) stated that, in the purchase decision, the odour and appearance of food products are two important sensory attributes. This lead us to believe that purchase intention is higher for fresh milk with a higher perception of sensory attributes. Therefore, the second hypothesis of the study is:

H2a. The perception of sensory attributes of PFM influences consumers' intention to buy.

H2b. The perception of sensory attributes of UHT fresh milk influences consumers' intention to buy.

Literature has also revealed that the product label has impacts on consumers' taste perceptions (Cavanagh and Forestell, 2013). As intrinsic cue, taste is one of the most important sensory attributes. Thus, the third hypothesis of the study is:

H3a. The perceived labels' information of pasteurised fresh milk has positive influences on sensory perception.

H3b. The perceived labels' information of UHT fresh milk has positive influences on sensory perception.

In "causal effect modelling", one should simply discuss the direct, indirect and total effects among latent variables following the theory or the conceptual model (Schreiber *et al.*, 2006). Hence, an indirect effect implies the effect of an independent variable (IV) on a dependent variable (DV) through a mediating variable (Baron and Kenny, 1986). In food products, informed liking (consumers' blind liking, evaluation of packaging, brand, product variety, region, etc.) can mediate the relationship between cues and buying intention (Mueller and Szolnoki, 2010). As the sensory attributes are intrinsic cues, the literature leads us to believe

that the sensory attributes of fresh milk can mediate the association between the product's labelled information and buying intention. The following hypothesis is proposed:

H4a. The sensory perceptions of PFM mediate the relationship between the product labelling and buying intention.

H4b. The sensory perceptions of UHT fresh milk mediate the relationship between the product labelling and buying intention.

This paper's conceptual model, including these four hypotheses, is presented in Figure 1.

4. Data and methods

The study used an experimental design to evaluate the effect of product labels' information and sensory attributes on purchase intentions for two milk categories (UHT and pasteurised). An experimental approach was developed adopting a within-subject design in which each respondent was exposed to two separate treatments: the same subjects were not tested twice using the same type of treatment or test. There was no control or treatment group; participants directly responded with textual information by completing a survey regarding demographic variables and general knowledge about fresh milk. In the second stage, they were offered two types of milk and asked to taste them; they were then asked complete the questionnaire about their taste perceptions. There was no comparison between before and after the experiment; only an evaluation of two fresh milk categories was sought. Thus, the framework of the study is context driven, i.e. fresh milk products (UHT and pasteurised milk). In our study, only UHT and pasteurised milk were selected because they are dominant milk categories in the Bangladeshi milk market. Furthermore, since it was not realistic to include all the UHT and pasteurised milk products in the experiment, we only presented to the participants the most popular product with no label (manipulated) from each category: UHT milk from the PRAN company, and pasteurised milk from the ARONG company.

The experiment was designed and conducted in a lab at the University of Chittagong in Bangladesh. The faculty, staff and master's students of the university participated in this experiment. Respondents were randomly selected. A pre-test of the experiment with ten participants was performed to improve the questionnaire and experimental design. The ratio of the ten participants was five master's students, three faculty and two non-academic staff from the Faculty of Business Administration. Based on their responses, we improved the clarity of the questionnaire, the suitability of the participants, the time required. As we did not find any major obstacles, we decided to keep the same settings for the final experiment. A total of 117 individuals participated in the final experiment, which was carried out between 15 September and 10 October 2016. Each session was run with

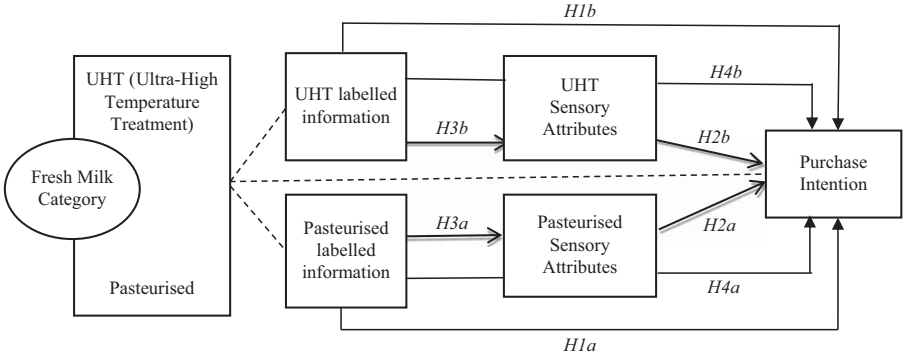


Figure 1.
Conceptual model for consumers' buying intention

around ten respondents after the lunch period (between 14.00 hours to 15.00 hours) over 12 days. For strong intercorrelations, a sample size of 150 observations should be sufficient for reliable exploratory factor analysis (EFA) (Guadagnoli and Velicer, 1988). For CFA, a minimum sample size of 100 is recommended (Bollen, 1989). Sekaran (2003) considered the appropriate size of a sample to be between 30 and 500. Minimum requirements were, therefore, satisfied in the current study.

During the experiment, the labelled information was written down on a piece of paper and first presented to the respondents (Table AI). After closely inspecting the milk labels, participants were asked to fill in the questionnaire using the direct interview method. The order in which labels were presented (PFM vs UFM) was randomised and reflected in the questionnaire. Then, a bag was given to each participant containing the two kinds of fresh milk (PFM and UFM), both in 200 ml neutral bottles with only information regarding UHT or pasteurised presented to avoid participants' biased judgement on sensory attributes that might be induced by product labels. During the experiment, the aseptic condition was maintained carefully. Both types of milk were preserved at the same temperature. To control bacteria, personal protective equipment was worn, bottles were checked to be intact and two candles were lit within 10 cm while one type of milk was poured from a bottle to a disposable glass for tasting. Water and crackers were provided to neutralise taste and flavour before the other type of milk was tasted.

Descriptive analysis, EFA, CFA and SEM were used in the study. As EFA helps in summarizing the information received from a data set, it is extremely useful to conduct EFA (Hair *et al.*, 2009). Here, EFA was used to determine an optimum number of dimensions, their mutual associations based on responses on particular items, and to form a pattern matrix. Based on the pattern matrix of EFA, CFA was used to justify the fitness of our model. SEM was used to measure the cause-and-effect relationship between the factors. For instance, to test *H1a–H1b* and *H2a–H2b*, intention to buy was the DV and the consumer's perception of labelled information and sensory attributes were IVs. To test *H3a* and *H3b*, the perception of sensory attributes was the DV and perceptions of labelled information were the IV. The normality and multicollinearity of the data was also checked. To address concerns of confounding from the carryover and demand effect of the design, the paired sample correlation and the repeated measures of ANOVA were employed (see Figure A1, and Tables AII–AIV).

4.1 Measures and questionnaire

The items for questions included in the questionnaire were developed based on the literature review. The questionnaire had three sections. Section 1 consisted of consumers' consumption frequency and their attitude towards milk. Section 2 consisted of perceptions of labelled information, sensory information and purchase intention, separately. The label information covered nutrition, fat, weight, shelf life, price, safety inspection, instructions, etc., which are typically presented on the product package. For instance, participants were asked to answer to what extent they agreed with a statement like "It displays standardized nutritional facts of milk". The sensory attributes included intrinsic attributes such as tasty, cheesy, colour, textural, flavour, etc. The respondents were asked to answer to what extent they agreed with statements like "It has a good flavour". Purchase intention incorporated consumers' buying information was measured by questions such as: "To what extent are you willing to buy the pasteurised liquid milk at this time?", "To what extent are you willing to buy the UHT liquid milk at this time?" (a five-point Likert scale, from "not at all" (1) to "totally agree" (5) was used); and "What do you think of Pasteurised liquid milk?", "What do you think of UHT liquid milk?" (a five-point Likert scale, from "This milk does not please me totally" (1) to "I really like this milk" (5) was used. Section 3 covered personal information, including age, income, education, gender and

living status. A total of 8 questions concerning product labels and 13 questions regarding consumers' perceptions of sensory attributes were asked; EFA considered three and six questions for labels and sensory attributes, respectively, explaining 46.62 per cent of total variance in the UFM model. In the PFM model, EFA considered two questions on labels and three questions on sensory attributes, explaining 57.10 per cent of total variance.

The Kaiser–Meyer–Olkin (KMO) test and Bartlett's test of sphericity (BTS) were used to verify the factorability of data (Pallant, 2007), and the value of the KMO (in the first test) ranged from 0 to 1. For an appropriate analysis, the value should be at least 0.60 with a BTS significant at $p < 0.05$) (Tabachnick *et al.*, 2001). The results of the EFA are shown in Table I.

In our data set, the KMO for PFM and UFM were 0.65 and 0.82, respectively, indicating mediocre suites of data for factor analysis where the minimum required score is 0.60. The models' BTS were satisfied, showing sample adequacy. Hair *et al.* (2009) recommended a score of > 0.50 for loadings to demonstrate practical significance. From EFA, 14 items were derived with a value > 0.60, showing the constructs were practically significant (Table I). Reliability was tested using Cronbach's α. The cut-off rate of Cronbach's α was set at 0.60 (Hair *et al.*, 2010). The Cronbach's α value for the perceived label's construct for the PFM model was 0.67 and 0.68 for the UFM model. The Cronbach's α values for other constructs used in the model were either 0.80 or more (Table I). We established convergent validity by examining the *t*-tests ($p < 0.01$) for factor loadings, and all were significant (Matthew *et al.*, 2005). We also established discriminant validity using the confidence interval test ($p < 0.05$) of the mean score of perceived labelled information and sensory attributes (Hatcher, 1994). The average real factor loading score was 0.7. Factor loadings scores higher than 0.6 plus zero cross-loading also ensured the convergent and discriminant validity, respectively. Furthermore, the theory also supports the validity of the constructs. Two most popular methods, variance inflation factor (VIF) and tolerance (TOL) have been used to detect the occurrence of multicollinearity problems for explanatory variables (Verbeek, 2008). A general rule of thumb is that a VIF of 10 or greater and a TOL of 0.10 or less may indicate the presence of multicollinearity. Test results suggested no multicollinearity problems in our data set (Table AIII). Furthermore, a value higher than 0.001 for the determinant of the

	PFM model Latent variable		UFM model Latent variable	
Observed variable	Label	Sensory	Label	Sensory
Nutritional facts	0.80		0.70	
Taking responsibility for one's health	0.61		0.75	
Get answers to questions			0.69	
Dietary information			0.68	
Fat information			0.65	
Health claims			0.60	
Taste		0.89		
Flavour		0.73		
Hedonic		0.65		
Fermented				0.63
Mealy				0.68
Umami				0.60
Cronbach's α	0.67	0.80	0.84	0.68
KMO score	0.65		0.82	
Bartlett's test of sphericity	$p < 0.05$		$p < 0.05$	
Total variance explained (%)	46.62		57.10	
Determinant of correlation matrix	$0.232 > 0.001$		$0.056 > 0.001$	

Note: Extraction method: principal axis factoring

Table I. Outcome of EFA

correlation matrix of 0.001 in both models was found (PFM, determinant = 0.056; UFM, determinant = 0.232), also showing no multicollinearity problems (Field, 2000, p. 445).

In a within-subject analysis with a series of questions, order-response correlations analysis can help understand whether questions were answered independently (Charness *et al.*, 2012). As this is the case in our study, we verified the modes of respondents' answers using paired sample correlation and results revealed that, for the PFM model, $r = 0.26$ ($p = 0.005$), and for the UFM model, $r = 0.24$ ($p = 0.009$), indicating respondents' independence (no experimenter demand effects) in answering the questions. Smith *et al.* (1989) applied a similar method and their results yielded a within-confidence accuracy correlation of 0.17. Additionally, to test if the mean of the two treatments was significantly different from each other, we ran tests of within-subjects contrasts under the repeated measures of ANOVA in SPSS. The results showed that the mean value of two treatments were significantly different from each other ($F = 5.611$, $p = 0.019$ for PFM; $F = 24.912$, $p = 0.000$ for UFM) showing minimum learning effects.

5. Results and analysis

Participants' demographics are presented in Table II. The majority of the respondents were male (72 per cent), 50 per cent of the respondents were between 25 and 30 years old, and 51 per cent of the respondents lived with their parent(s). Only 21 per cent of respondents lived together with their partner (9 per cent living with parent(s), partner and children). The average monthly income of 50 per cent respondents was equal to or less than BDT 5,000 (c. US$82).

On average, the participants drank fresh milk once in a day and bought milk three times per week. The tendency to buy fresh milk was high. The mean of familiarity with UFM was 3.15 and with PFM was 3.98, indicating that PFM was more familiar to customers than UFM.

Table III presents the sources of the variables used in the study for labelled information and shows descriptive statistics for self-reported scores for the eight types of labelled information. The list is topped by information on nutrition and fat information, followed by taking responsibility for one's health, proof of health claims, sales and usage information, and dietary information, based on the combined average of the self-reported scores for both types of fresh milk. Providing information enabling consumers to find answers to all their questions, and the ability to reproduce factsheets, came out last.

Table IV provides the sources of variables used in the study for sensory attributes and shows descriptive statistics of self-reported scores for 13 different types of sensory attributes. The list is topped by colour, freshness and flavour, followed by taste, concentration, textural, hedonic, cheesy, dilute, mealy, umami and fermented. The sensory attribute "malty" came out last by a significant margin. Finally, only two factors, nutritional

Table II.
Descriptive statistics of demographic variables and general knowledge about fresh milk

	Valid	Missing	Mean	SD	Skewness	Kurtosis
Drinking frequency daily (times)	117	0	0.95	0.60	0.75	2.62
Buying frequency weekly (times)	117	0	3.81	2.29	0.32	1.27
Know UFM variety[a]	117	0	3.15	1.03	−0.29	−0.33
Know PFM variety[a]	117	0	3.98	1.00	−0.80	0.09
Gender ("M" = 1, "F" = 2)	117	0	1.28	0.45	0.98	−1.05
Occupation ("S" = 1, "P" = 2)	117	0	1.16	0.37	1.85	1.46
Income[b] (1 = < 5; 2 = 5–25; 3 = > 25)	117	0	1.91	1.22	1.58	2.11
Age (1 = 20–25; 2 = 25–30; 3 = > 30)	117	0	1.79	0.75	0.85	0.81
Living status[c]	117	0	3.84	1.75	−0.69	−1.14

Notes: [a]"Very unknown" (1) to "very famous" (5); [b]income in BDT × 1,000; [c]1 = roommate; 2 = alone; 3 = me and my husband/wife; 4 = me and my husband/wife with children; 5 = me with parents; 6 = me, my husband/wife, children and parents

Milk labels' information and references	Descriptors	Mean and SD of score PFM	UFM
Nutrition (Kurajdova and Petrovicova, 2015)	It displays standardized nutritional facts	3.68 ± 0.77	3.74 ± 0.814
Fat (Kurajdova and Petrovicova, 2015)	It provides necessary information about fats	3.51 ± 0.837	3.77 ± 0.770
Taking responsibility for one's health (Mannerbro and Wallin, 2007)	Its ingredients help me to take responsibility for my health	3.50 ± 0.750	3.51 ± 0.847
Health claims (Bonaventure and Umberger, 2012)	Health claims are defined and approved	3.54 ± 0.737	3.36 ± 0.914
Usage (Hatirli *et al.*, 2004)	It provides usage information	3.43 ± 0.711	3.56 ± 0.759
Dietary (Krešić *et al.*, 2010)	It gives a dietary supplement	3.30 ± 0.802	3.47 ± 0.877
Questions (Bonaventure and Umberger, 2012)	I find answers to all questions on the label	3.21 ± 0.90	3.39 ± 0.900
Factsheets (Andrews *et al.*, 2014)	I can reproduce factsheets and other materials found in the label	3.21 ± 0.680	3.38 ± 0.807

Notes: $n = 117$. 1 = "strongly disagree" and 5 = "strongly agree"

Table III. Self-reported perceptions of labelled information

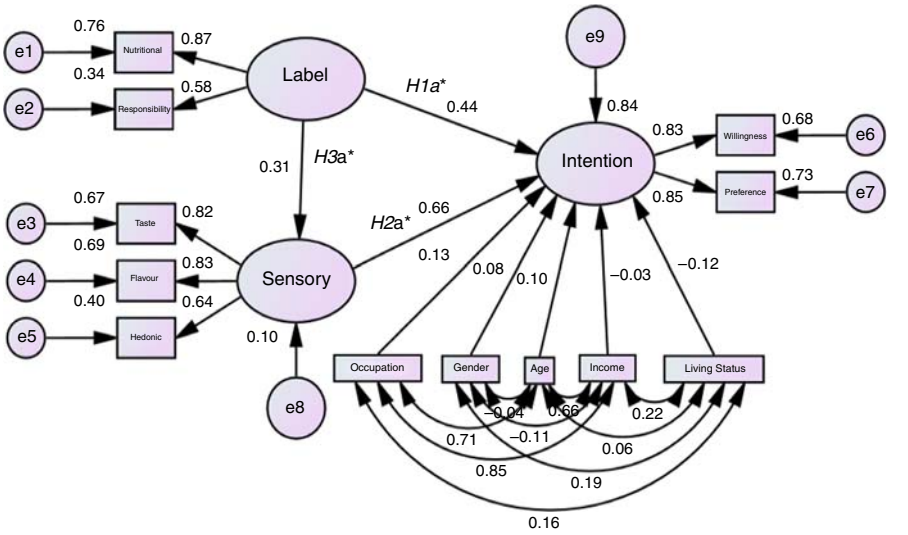
Sensory attributes and references	Description This milk	Mean and SD of score PFM	UFM
Colour (Blair, 2012; Clark *et al.*, 2008; Croissant *et al.*, 2007)	Has good colour	3.73 ± 0.72	3.68 ± 0.76
Aroma (Kurajdova and Petrovicova, 2015)	Has a fresh aroma	3.70 ± 0.73	3.64 ± 0.87
Flavour (Cavanagh and Forestell, 2013; Clark *et al.*, 2008)	Has good flavour	3.54 ± 0.89	3.54 ± 0.98
Tastes (Cavanagh and Forestell, 2009, 2013; Croissant *et al.*, 2007)	Tastes better	3.41 ± 0.93	3.57 ± 0.99
Concentration (Karagul-Yüceer and Drake, 2013; Al-Kadamany *et al.*, 2003)	Is concentrated	3.31 ± 0.95	3.44 ± 0.91
Textural (Oupadissakoon *et al.*, 2009; Sijtsema *et al.*, 2012; Blair, 2012)	Is textural	3.19 ± 0.66	3.40 ± 0.77
Hedonic (Clark *et al.*, 2008)	Is hedonic	3.25 ± 0.87	3.29 ± 0.88
Cheesy (Karagul-Yüceer and Drake, 2013)	Is cheesy	3.22 ± 0.82	3.31 ± 0.83
Dilute (Drake *et al.*, 2003; Smith *et al.*, 2016)	Is diluted	3.35 ± 0.81	3.12 ± 0.92
Mealy (Clark *et al.*, 2008)	is mealy	3.26 ± 0.82	3.21 ± 0.88
Umami (Sijtsema *et al.*, 2012; Yamaguchi and Ninomiya, 2000)	Is umami	3.13 ± 0.82	3.22 ± 0.91
Fermented (Karagul-Yüceer and Drake, 2013; Trivedi *et al.*, 2014)	Is well fermented	3.18 ± 0.81	3.05 ± 0.83
Malty (Smith *et al.*, 2016; Oupadissakoon *et al.*, 2009)	Is malty	2.88 ± 0.92	2.79 ± 0.80

Notes: $n = 117$. 1 = "strongly disagree" and 5 = "strongly agree"

Table IV. Self-reported perceptions of sensory attributes

facts and taking responsibility for one's health, for both milk types were weighted as common factors and, in taste-testing, respondents could not perceive any common sensory attributes of milk indicating their heterogeneous perceptions (see Table I).

To know whether labelled information and sensory attributes are important in consumer decision making, the hypotheses presented in Figure 1 were tested. To test the hypotheses, the study developed two SEMs based on the pattern matrix (Table I), one for UHT milk and the other for pasteurised milk. The model results for UHT milk and pasteurised milk are presented in Figures 2 and 3, respectively. SPSS and AMOS Graphics, 24.00 version, were used for factor analysis and the path model analysis. The indices used to measure the goodness of fit are presented in the top-right corner of each figure. The results of all indices for each category (absolute fit measure, incremental fit measure, and parsimonious fit measure) meet the requirements for adequate evidence of model fit, indicating construct validity (Haque *et al.*, 2015). The results of the hypotheses for the PFM and UFM models are



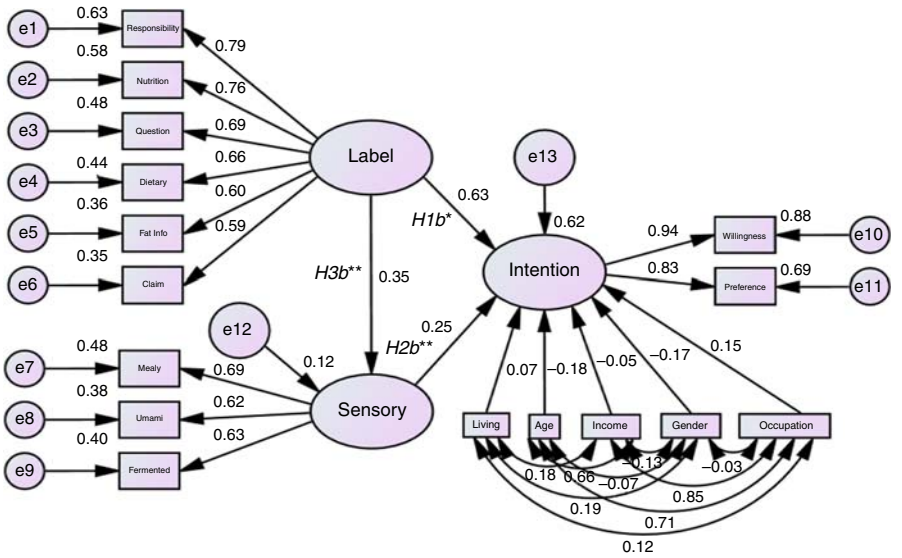
Notes: GFI, goodness of fit index; AGFI, adjusted goodness of fit index; PGFI, parsimony goodness fit index; χ^2/df, normed χ^2; IFI, incremental fit index; PNFI, parsimony normed fit index; CFI, comparative fit index; RMSEA, root mean square error of approximation. χ^2/df=1.33; GFI=0.96; NFI=0.95; AGFI=0.92; RMSEA=0.00; PNFI=0.60; IFI=1.02; CFI=1.00; PGFI=0.52. In the model, e1 … e7 indicate their adequacy in assessing the related unobserved factors and e8 and e9 measure residual error or disturbance in the prediction of unobserved factors. The outcome of EFA provides two and three scale items of label and sensory respectively based on the respondents' higher relative weights. *Significant at 0.01 level, respectively

Figure 2.
Tested model of label, sensory attributes and buying intention for PFM

also presented in Figures 2 and 3, respectively. These figures represent direct and indirect effects of dependent and IVs. Milk information as labelled facts (Label) has a direct effect on buying intention (Intention), as does the perceptions of sensory attributes (Sensory) and an indirect effect (through estimating the perceptions of sensory attributes) on buying intention. The total effect for milk information as "Label" is the summation of the direct and indirect effect on "Intention".

The results suggest label information has a significant influence on consumers' intention to buy for both PFM and UFM. This supports *H1a* and *H1b*. The model results also show that the label of UFM has a stronger effect (0.63) on buying intention than that of PFM (0.44) and that respondents weighted only two observed variables (nutrition and health responsibility) to the construct "Label" in the PFM model, while there are six in the UFM model. According to our results, nutritional facts and taking responsibility for one's health are key to fresh milk commercialisation in terms of higher relative weights and commonness. For these two common variables, the factor loadings for nutrition were greater in the PFM model than in the UFM model, while the opposite was true for the loadings for taking responsibility for one's health. Besides nutrition and taking responsibility for one's health, there were more information variables in the UFM model, including the getting answers to all question, dietary information, fat information and health claims (Table AI). These results indicate that consumers give different values to the label information presented by the two milk products.

Results suggest that sensory attributes significantly affect consumers' intention to buy both for PFM and UFM, supporting *H2a* and *H2b*. PFM and UFM models both included three



Notes: GFI, goodness of fit index; AGFI, adjusted goodness of fit index; PGFI, parsimony goodness fit index (PGFI); χ^2/df, normed χ^2; IFI, incremental fit index; PNFI, parsimony normed fit index; CFI, comparative fit index; RMSEA, root mean square error of approximation χ^2/df = 1.02; GFI = 0.91; NFI = 0.89; AGFI = 0.87; RMSEA = 0.01; PNFI = 0.68; IFI = 1.00; CFI = 0.997; PGFI = 0.62. In the model, e1 … e11 indicate their adequacy in assessing the related unobserved factors and e12 and e13 measure residual error or disturbance in the prediction of unobserved factors. The outcome of EFA provides six and three scale items of label and sensory, respectively, based on the respondents' higher relative weights. *,**Significant at 0.01 and 0.05 levels, respectively

Figure 3.
Tested model of label, sensory attributes and buying intention for UFM

sensory attributes variables based on the respondents' higher relative weights. However, we found no common sensory-attribute variables between two models. This indicates consumers' perceived values of sensory attributes are heterogeneous. In the PFM model, consumers weighted the sensory perceptions taste, flavour and hedonic feelings. In the UFM model, consumers weighted three different attributes (mealy, umami and fermented), indicating reduced flavour and taste in UHT milk. Results of the perceptions of labelled information suggest labelled information significantly affects consumers' sensory attributes both for PFM and UFM, supporting *H3a* and *H3b*. The effects of labelled information on the sensory attributes both for PFM (0.31) and UFM (0.35) were not large. This indicates consumers' higher perceived values of label information may not lead to higher perceptions to sensory attributes. The results for sensory attributes also suggest that sensory attributes for PFM can mediate the relationship between product labelling and buying intention, indicating an indirect effect of "Label" on "Intention", supporting *H4a*. This mediating effect implies that sensory attributes are able to explain the relationship between labelled information and buying intention. However, this relationship is not true for UFM, therefore not supporting *H4b*. In both models, willingness to buy and preference have a much greater importance in explaining the buying intention of milk. This implies that consumer satisfaction and willingness to buy lead to increased consumer buying intentions for both types of fresh milk.

From the results shown in Figure 2, we found evidence to support *H1a*, indicating that a distinct product label increases the consumers' buying intention for PFM (standardized regression weight = 0.44; standard error (SE) = 0.227; critical ratio (CR) = 4.143; significant

at the 0.000 level). *H2a* posited that consumers' sensory perceptions have a significant positive influence on consumer buying intentions for PFM. This hypothesis was supported (standardized regression weight = 0.301; SE = 0.158; CR = 2.468; significant at the 0.005 level). The structural-path estimates for *H3a* (standardized regression weight = 0.662; SE = 0.204; CR = 5.430; significant at the 0.05 level) led to *H3a* not being rejected.

To confirm the mediating effect of sensory perceptions, the path coefficients of label perception to sensory perceptions and sensory perceptions should be multiplied by the path coefficient of sensory perceptions to buying intention. At the same time, the multiplied value should be equal or greater than the threshold value (0.08) (Haque *et al.*, 2015) and statistically significant (Rucker *et al.*, 2011). For PFM model, the corresponding multiplied coefficient was 0.20 (0.31×0.66 = 0.2046), which is greater than the threshold value (0.08). Sobel's test also showed the *p*-value was 0.024, suggesting statistical significance at the 5 per cent critical level. These results provide evidence to support *H4a*: sensory perceptions mediate the relationship between labelled information and buying intention in consumers' purchase of PFM. We also found that controlling variables like gender, income, age, occupation and living status have no significant effect on the buying intention of PFM.

We found evidence from Table IV and Figure 3 to support *H1b*: a distinct product label increases the consumers' buying intention of UFM (standardised regression weight = 0.631; SE = 0.231; CR = 5.153; $p = 0.000$). *H2b* (consumers' sensory perceptions have a significant positive influence on consumer BI of UFM) was also supported (standardized regression weight = 0.252, SE = 0.204; CR = 2.393; $p = 0.017$). Finally, we do not reject *H3b*, which posited that consumers' positive perceptions with UFM have a positive and significant effect on the consumer's sensory perceptions (standardized regression weight = 0.348; SE = 0.133; CR = 2.546; $p = 0.011$).

As in the PFM model, we further tested the mediating effect of sensory attributes in the UFM model. We found the multiple coefficient to be 0.087 (0.35×0.25 = 0.087), which is equal to the threshold value (0.08). However, the *p*-value of the multiplied coefficient suggested that it was not statistically significant at any reasonable level. This means sensory perceptions cannot mediate the relationship between labelled information and buying intention of UFM rejecting *H4b*. Therefore, the mediating effect of sensory perceptions for the two milk categories is inconsistent. Similar to results in the PFM model, we found that variables like gender, income, age, occupation, living status, etc., had no significant effect on the buying intention for UFM.

6. Discussion and conclusion

The research has examined the influence of the perceptions of products' labelled information and sensory attributes on consumer's buying intention for fresh milk. To address this research question, four hypotheses were generated and tested. An experimental design was conducted to collect the relevant data. The products' labelled-information scale was formed then regressed with SEM to see if the labelled information increased consumers' buying intention. The results support *H1a* and *H1b*: products' labelled information increases consumers' buying intention to buy fresh milk (pasteurised and UHT). Furthermore, consumers' perceived value also indicates that they like to view detailed information about milk on labelling.

H2a and *H2b* posited that the perception of sensory attributes positively influences consumers' intention to buy and was supported both for PFM and UFM, implying that the perception of sensory attributes of fresh milk positively influences consumers' intention to buy. Our findings are similar to those of Espejel *et al.* (2008), who found that sensory attributes like colour, taste, and smell enhance consumers' perceptions and increase repurchase intention through higher loyalty and a more positive attitude. The present study also found that consumers' perceptions of sensory attributes for PFM and UFM were different in that the perceived value of flavour in UFM was negligible. Steiner (1993) also

found that consumers perceive products in highly commoditised product categories as particularly fungible. *H3a* and *H3b* asserted that perceived product labelled information has a positive influence on sensory perception and was not rejected: labelled information and consumers' sensory perception are positively significantly related. Our finding is consistent with that of Aaron *et al.* (1994), who found a consistent interactive effect between consumers' sensory perceptions and product labelled information.

H4a and *H4b* posited that sensory perceptions mediate the relationship between the product label and buying intention. The results led to *H4a* being accepted for PFM and indicated that the labelled information of PFM has a positive and significant indirect effect on buying intention, but this effect is not true for UFM. Mueller and Szolnoki (2010) found consumers' informed liking mediated the effect of intrinsic and extrinsic cues and the buying intention. In our study, sensory attributes were intrinsic cues and the results demonstrated that level of consumers' informed liking was weaker in UFM than PFM. Furthermore, sensory attributes are more dependent on the individual manufacturing practices and the levels of heat treatment (Oupadissakoon *et al.*, 2009). In the manufacturing process, UFM receives more heat treatment that leads to low-quality flavour, although flavour is considered the key attribute in milk. The findings of the study revealed that the reduced flavour and lower informed liking of UFM are not supportive in mediating the association of labelled information and buying intention, and the ultimate result is less acceptability. Other studies have also shown that flavour is a persistent problem for UHT milk in Australia (Perkins and Deeth, 2001) and the UK (Anon, 1994).

Our results indicate that the most important attributes when explaining perceived label information in fresh milk are "standardized nutritional facts" and "information relating to taking responsibility for one's health". With regard to using "usage information" and "ability to reproduce factsheets" as indicators of the perceived label information of milk, both models suggested the elimination of these variables from the model for perceived label information. These findings explain that, as a functional food, consumers are concerned only with the significance fresh milk in terms of nutrition and health. They are not interested in excess information, e.g. to reproduce factsheets, that may create a cognitive load. When explaining perceived sensory attributes in fresh milk, the most important attributes are taste, flavour, hedonic, mealy, umami and fermentation. Regarding the perceived value of PFM, consumers value the sensory attributes of taste and flavour more than other attributes. As they are not fully satisfied with the PFM and they recommend fresh milk for their children (Hatirli *et al.*, 2004), they thus consider the PFM as a hedonic product. Hedonic products are experiential and sensational and people feel more guilt when they contemplate engaging in hedonic consumption than engaging in utilitarian consumption. Additionally, consumers making choices for others are also more likely to choose hedonic over utilitarian options than when deciding for themselves (Lu *et al.*, 2016). Regarding the perceived value of UFM, consumers gave more weight to the sensory attributes of umami and fermentation than other attributes. The respondents experienced monotony and were not happy with a taste experienced and they considered UFM as the most mealy product (the texture defects of dairy products or the grainy textures are described by the attribute "mealy"; Chandan *et al.*, 2016). Finally, neither model suggested that the attributes of texture, cheesy, malty, aroma, dilution or concentration were important in the sensory perception of fresh milk.

6.1 Managerial implications and further research

This paper's main theoretical contribution is it the conceptualising and modelling of the factors influencing consumers' purchase intention for fresh milk categories (UHT and pasteurised), based on an experimental design, including perceived product labelled information and sensory attributes. The results of the study demonstrate that useful

product label information does have a positive significant effect on purchase intention for fresh milk. Evidence shows that UFM provides more useful information than PFM (Table AI), and the ultimate result is that consumers' perceived value for UFM labels is higher than that for PFM labels (Figures 1 and 2). Veale *et al.* (2006) concluded that marketing practitioners need to understand the respective influence of product category and companies should strive to understand consumers' perceptions of their food products to assure their products' success (see also Varela *et al.*, 2010). The energy content of food products also plays a role in sensory-specific satiety (Sørensen *et al.*, 2003); therefore, it is recommended that marketers should incorporate relevant and useful information regarding energy on milk product labels to increase sensory satiety. Considering the strong influence of a positive perception of the sensory attributes of milk on purchase intention, marketers should focus on strengthening sensory attributes. In doing so, a producer should ensure the quality and safety of milk; consequently, the marketer should engage in communication on their product label to further their recognition. Some actions to be taken could be creating higher levels of sensory perceptions such as: establishing a good savoury taste, e.g. umami; ensuring a pleasant overall flavour, which is determined by the sense of taste, smell and mouthfeel (Sørensen *et al.*, 2003), and a balanced degradation of protein (caseins) (Smit *et al.*, 2005), ensuring effective fermentation and making milk non-hedonic and not mealy.

The findings are useful for marketers of fresh food products, especially the sellers of both categories of milk, and the product managers of PFM. It is surprising that sensory perceptions of UFM cannot mediate the relationship between labelled information and purchase intention. The analysis shows that consumers prefer adequate labelled information of food products and desire a positive sensory perception. Thus, marketers of UFM can try to improve the quality of the flavour, encourage informed likings and reduce the degree of heating during processing to maintain a good flavour. The benefits of tetra packs and excess heating give UFM an extended shelf life (180 days vs 7 days for PFM; see Table I) but impair flavour. Smit *et al.* (2005) found a balanced formation and breakdown of protein (caseins) is important to prevent the accumulation of bitter-tasting peptides, adding that the components of a typical flavour are derived from the activity of amino-acid-converting enzymes. With effective fermentation (e.g. an optimum level of heat) and the presence of adequate levels of amino acids lead to the formation of the key flavour components, which contribute to the sensory perception of dairy products (Smit *et al.*, 2005), the sensory perceptions of milk could mediate the association between product label and buying intention.

The study also helped to fill the gap in the literature regarding how buying intentions' determinants can influence product-development management of fresh milk through its experimental design. Finally, the study has identified that nutritional facts and taking responsibility for one's health are the keys to fresh-milk commercialisation. Thus, marketers should provide standardised nutritional facts on product labels and can incorporate information regarding calories, protein, lactose, minerals, sodium, calcium, fat and shelf life so that consumers understand how a particular milk category is able and ready to meet their needs regarding taking responsibility for one's health. Many existing fresh-food policies, based on direct controls dealing with the nutrition, health benefits and risks, and quality control of the growing, processing and storing are not complete because the incorporated controlling techniques have not been thoroughly examined with consumers (Liu *et al.*, 2013). However, in this study, consumer perceptions towards products' labelled information and sensory attributes and the effects of these perceptions on consumers' purchase intentions have been examined by consumers through the experimental design, which can help shape dairy policies and allow marketers to develop more creative solutions.

However, the sample for the study was small. The proposed method of the study would be more effective and would allow the generalisation of our findings with a larger strategic sample. Also, the present study collected the data using a within-subject design, which may

encourage respondents to be non-independent in questions and tasks (Grice, 1966), and the study may be confounded by range effects (Poulton, 1973). However, the study has employed random assignment of treatments in the design, which is a powerful tool and suggests that its results are reliable and useable (Charness *et al.*, 2012). Our study was conducted in Chittagong, Bangladesh, and future research should assess other developing economies to verify the validity of the model established in the present study. It would be interesting to verify the model on other functional food product categories, which would also provide external validity. It would be also exciting to test why the perceived value of sensory attributes for UFM was not strong. Finally, we have to note that product labelled information, sensory attributes, and consumers' buying intention may be conditioned by more variables not included in the model, such as perceived health benefits, price or willingness to pay a premium.

Note

1. In a product-process pattern, firms adopt product innovations first and process innovations later.

References

Aaron, J.I., Mela, D.J. and Evans, R.E. (1994), "The influences of attitudes, beliefs and label information on perceptions of reduced-fat spread", *Appetite*, Vol. 22 No. 1, pp. 25-37.

Alba, J.W. and Hutchinson, J.W. (1987), "Dimensions of consumer expertise", *Journal of Consumer Research*, Vol. 13 No. 4, pp. 411-454.

Al-Kadamany, E., Khattar, M., Haddad, T. and Toufeili, I. (2003), "Estimation of shelf-life of concentrated yogurt by monitoring selected microbiological and physicochemical changes during storage", *Lebensmittel Wissenschaft Technologie*, Vol. 36 No. 4, pp. 407-414.

Andrews, J.C., Chung-Tung, J.L. and Alan, S.L. (2014), "Consumer research needs from the food and drug administration on front-of-package nutritional labeling", *Journal of Public Policy & Marketing*, Vol. 33 No. 1, pp. 10-16.

Anon (1994) (as cited in Perkins, M.L. and Deeth, H.C. (2001)), "UHT tastes good but fails to win favour", *Dairy Industries International*, Vol. 59, p. 6, available at: file:///C:/Users/mho138/Downloads/Perkinsetal2001.pdf (accessed 14 June 2017).

Ares, G., Besio, M., Giménez, A. and Deliza, R. (2010), "Relationship between involvement and functional milk desserts intention to purchase: influence on attitude towards packaging characteristics", *Appetite*, Vol. 55 No. 2, pp. 298-304.

Asselt, E.D., Capuano, E. and van der Fels-Klerx, H.J. (2015), "Sustainability of milk production in the Netherlands: a comparison between raw organic, pasteurised organic and conventional milk", *International Dairy Journal*, Vol. 47, pp. 19-26.

Bandara, B.E.S., Silva, D.A.M. and Warunasinghe, W.A.A.I. (2016), "Impact of food labeling information on consumer purchasing decision: with special reference to faculty of agricultural sciences", *Procedia Food Science*, Vol. 6, pp. 309-313.

Banterle, A., Cavaliere, A. and Ricci, E.C. (2012), "Food labelled information: an empirical analysis of consumer preferences", *International Journal on Food System Dynamics*, Vol. 3 No. 2, pp. 156-170.

Baron, R.M. and Kenny, D.S. (1986), "The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations", *Journal of Personality and Social Psychology*, Vol. 51 No. 6, pp. 1173-1182.

Bessa, M.E.D., Miriam, P.R., Marcelo, H.O., Paulo, C.S., Juliana, M.O., Jucélia, S.B. and Miriam, A.O.P. (2016), "Sensory perception of the fermented goat milk: potential application of the DSC method", *Food Science and Technology (Campinas)*, Vol. 36 No. 3, pp. 406-412.

Bettman, J.R., Luce, M.F. and Payne, J.W. (1998), "Constructive consumer choice processes", *Journal of Consumer Research*, Vol. 25 No. 3, pp. 187-217.

Bhat, Z.F. and Bhat, H. (2011), "Milk and dairy products as functional foods: a review", *International Journal of Dairy Sciences*, Vol. 6 No. 1, pp. 1-12.

Blair, R. (2012), "Is organic food more nutritious and 'tasty'?", in Blair, R. (Ed.), *Organic Production and Food Quality: A Down to Earth Analysis*, Wiley-Blackwell, Oxford, 282pp.

Bollen, K.A. (1989), *Structural Equations with Latent Variables*, John Wiley & Sons, New York, NY.

Bonaventure, B. and Umberger, W. (2012), "Factors influencing Malaysian consumer´s consumption of dairy products", Contributed paper prepared for presentation at the 56th AARES annual conference, Fremantle, 7–10 February.

Cavanagh, K.V. and Forestell, C.A. (2013), "The effect of brand names on flavor perception and consumption in restrained and unrestrained eaters", *Food Quality and Preference*, Vol. 28 No. 2, pp. 505-509.

Chandan, R.C., Kilara, A. and Shah, N.P. (2016), *Dairy Processing and Quality Assurance*, 2nd ed., John Wiley & Sons, Sussex, p. 474.

Charles, P. (1992), "Calcium absorption and calcium bioavailability", *Journal of Internal Medicine*, Vol. 231 No. 2, pp. 161-168.

Charness, G., Gneezy, U. and Kuhn, M.A. (2012), "Experimental methods: between-subject and within-subject design", *Journal of Economic Behavior & Organization*, Vol. 81 No. 1, pp. 1-8.

Chavas, J. and Klemme, R. (1986), "Aggregate milk supply response and investment behavior on U.S. dairy farms", *American Journal of Agricultural Economics*, Vol. 68 No. 1, pp. 55-66.

Chen, L. and Opara, U.L. (2013), "Texture measurement approaches in fresh and processed foods – a review", *Food Research International*, Vol. 51, pp. 823-835.

Cheng, L., Yin, C. and Chien, H. (2014), "Demand for milk quantity and safety in urban China: evidence from Beijing and Harbin", *Australian Journal of Agricultural and Resource Economics*, Vol. 59, pp. 275-287.

Clark, S., Costello, M., Drake, M. and Bodyfelt, F. (Eds) (2008), *The Sensory Evaluation of Dairy Products*, 2nd ed., Springer-Verlag, New York, NY, available at: www.springer.com (accessed 10 March 2018).

Cliff, L., Fan, K., Sanford, K., Stanich, C. and Doucette, N.R. (2013), "Descriptive analysis and early-stage consumer acceptance of yogurts fermented with carrot juice", *Journal of Dairy Science*, Vol. 96 No. 7, pp. 4160-4172.

Croissant, A.E., Washburn, S.P., Dean, L.L. and Drake, M.A. (2007), "Chemical properties and consumer perception of fluid milk from conventional and pasture based production system", *Journal of Dairy Science*, Vol. 90 No. 11, pp. 4942-4953.

Damanpour, F. and Gopalakrishnan, S. (2001), "The dynamics of the adoption of product and process innovations in organizations", *Journal of Management Studies*, Vol. 38 No. 1, pp. 45-65.

Drake, M.A., Karagul-Yuceer, Y., Cadwallader, K.R., Civille, G.V. and Tong, P.S. (2003), "Determination of the sensory attributes of dried milk powders and dairy ingredients", *Journal of Sensory Studies*, Vol. 18 No. 3, pp. 199-216.

Espejel, J., Fandos, C. and Flavian, C. (2008), "Customer satisfaction: a key factor of consumer loyalty and buying intention of a POD food product", *British Food Journal*, Vol. 110 No. 9, pp. 865-881.

FAO (2013), "Milk and dairy products in human nutrition", available at: www.fao.org/docrep/018/i3396e/i3396e.pdf (accessed 12 January 2016).

Fernández-Barcala, M. and González-Díaz, M. (2006), "Brand equity in the European fruit and vegetable sector: a transaction cost approach", *International Journal of Research in Marketing*, Vol. 23 No. 1, pp. 31-44.

Field, A. (2000), *Discovering Statistics Using SPSS for Windows*, Sage Publications, London, Thousand Oaks, CA and New Delhi.

Fishbein, M. and Azjen, I. (1975), "Belief, attitude, intention and behavior", in Addison-Wesley, P. (Ed.), *Introduction to Theory and Research*, Hardcover, Reading, MA, 480pp.

Foxall, G.R. (2010), "Accounting for consumer choice: inter-temporal decision making in behavioural perspective", *Marketing Theory*, Vol. 10 No. 4, pp. 315-345.

Gabriel, Y. (2015), "Identity, choice and consumer freedom – the new opiates? A psychoanalytic interrogation", *Marketing Theory*, Vol. 15 No. 1, pp. 25-30.

Grebitus, C., Yue, C., Bruhn, M. and Jensen, H.H. (2007), "Milk-marketing: impact of perceived quality on consumption patterns", Contributed Paper prepared for presentation at the 105th EAAE Seminar *'International Marketing and International Trade of Quality Food Products'*, Bologna, 8–10 March.

Grice, G. (1966), "Dependence of empirical laws upon the source of experimental variation", *Psychological Bulletin*, Vol. 66 No. 6, pp. 488-498.

Guadagnoli, E. and Velicer, W.F. (1988), "Relation of sample size to the stability of component patterns", *Psychological Bulletin*, Vol. 103 No. 2, pp. 265-275.

Hair, J.F., Bush, R.P. and Ortinau, D.J. (2009), *Marketing Research: In a Digital Information Environment*, 4th ed., McGraw-Hill, New York, NY.

Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2010), *Multivariate Data Analysis*, 7th ed., Pearson Prentice Hall, Upper Saddle River, NJ.

Haque, A., Naila, A. and Farzana, Y. (2015), "Purchase intention of foreign products: a study on Bangladeshi consumer perspective", *SAGE Open*, pp. 1-12, doi: 10.1177/2158244015592680.

Hatcher, L. (1994), *A Step-by-Step Approach to Using the SAS System for Factor Analysis and Structural Equation Modeling*, SAS Institute, Cary, NC.

Hatirli, S., Ozkan, B. and Aktas, A. (2004), "Factors affecting fluid milk purchasing sources in Turkey", *Food Quality and Preferences*, Vol. 15 No. 6, pp. 509-515.

Hussin, S.R., Hashim, H., Yusof, R.N. and Alias, N.N. (2013), "Relationship between product factors, advertising, and purchase intention of halal cosmetic", *Pertanika Journal of Social Sciences & Humanities*, Vol. 21 No. S85, pp. 85-100.

Islam, M.A., Roy, S., Nabi, A., Solaiman, S., Rahman, M., Huq, M., Siddiquee, N.A. and Ahmed, N. (2018), "Microbiological quality assessment of milk at different stages of the dairy value chain in a developing country setting", *International Journal of Food Microbiology*, Vol. 278, pp. 11-19.

Jeddi, N. and Zaiem, I. (2010), "The impact of label perception on the consumer's purchase intention: an application on food products", *IBIMA Business Review*, Vol. 10, pp. 1-15.

Karagul-Yüceer, Y. and Drake, M.A. (2013), "Manufacturing yogurt and fermented milks", in Chandan, R.C. and Kilara, A. (Eds), 1st ed., John Wiley & Sons Ltd, Chichester, pp. 353-365.

Kardes, F.R., Kim, J. and Lim, J.S. (2001), "Consumer expertise and the perceived diagnosticity of inference", *Advances in Consumer Research*, Vol. 19, pp. 409-410.

Kathuria, L.M. and Gill, P. (2013), "Purchase of branded commodity food products: empirical evidence from India", *British Food Journal*, Vol. 115 No. 9, pp. 1255-1280.

Khuong, N.M. and Nguyen, D.T. (2015), "The effects of television commercials on customers purchase intention – a study of milk industry in Ho Chi Minh City, Vietnam", *Journal of Economics, Business and Management*, Vol. 3 No. 9, pp. 851-857.

Kim, Y. and Morr, C. (1996), "Dynamic headspace analysis of light activated flavor in milk", *International Dairy Journal*, Vol. 6 No. 2, pp. 185-193.

Krešić, G., Herceg, Z., Lelas, V. and Režek Jambrak, A. (2010), "Consumers' behaviour and motives for selection of dairy beverages in Kvarner Region: a pilot study", *In Mliekajstvo*, Vol. 60 No. 1, pp. 50-58.

Kuma, B., Baker, D., Getnet, K. and Kasa., B. (2012), "Factors affecting packed and unpacked fluid milk consumption in Wolaita Zone of SNNP Regional State, Ethiopia", *Ethiopian Journal of Applied Science Technology*, Vol. 3 No. 1, pp. 23-31.

Kurajdova, K. and Petrovicova, J. (2015), "Literature review on factors influencing milk purchase behavior", *International Review of Management and Marketing*, Vol. 5 No. 1, pp. 9-25.

Lamberton, C.P. and Diehl, K. (2013), "Retail choice architecture: the effects of benefit and attribute-based assortment organization on consumer perceptions and choice", *Journal of Consumer Research*, Vol. 40 No. 3, pp. 393-411.

Lancaster, K. (1966), "A new approach to consumer theory", *Journal of Political Economy*, Vol. 74 No. 2, pp. 132-157.

Lederman, S.A. (2004), "Influence of lactation on body weight regulation", *Nutrition Reviews*, Vol. 62 No. 7, pp. 112-119.

Liu, P.J., Wisdom, J., Roberto, C.A., Liu, L.J. and Ubel, P.A. (2013), "Using behavioural economics to design more effective food policies to address obesity", *Applied Economic Perspectives and Policy*, Vol. 36 No. 1, pp. 6-24.

Lu, J., Liu, Z. and Fang, Z. (2016), "Hedonic products for you, utilitarian products for me", *Judgment and Decision Making*, Vol. 11 No. 4, pp. 332-341.

Mannerbro, C. and Wallin, G. (2007), "Determinants of the demand for eco-labelled milk and fair trade coffee", Stockholm School of Economics, Department of Economics, Master's thesis in International Economics, available at: http://arc.hhs.se/download.aspx?MediumId=323 (accessed 9 March 2018).

Matthew, L.M., Bitner, M.J., Ostrom, A.L. and Brown, S.W. (2005), "Choosing among alternative service delivery modes: an investigation of customer trial of self-service technologies", *Journal of Marketing*, Vol. 69 No. 2, pp. 61-83.

Miller, L.M.S. and Cassady, D.L. (2015), "The effects of nutrition knowledge on food label use: a review of the literature", *Appetite*, Vol. 92, pp. 207-216.

Morgan, C. (1978), *A Brief Introduction to Psychology*, Mcgraw Hill, New York, NY.

Morris, J. (1997), "Green goods? Consumers, product labels and the environment", The Environment Unit, London.

Mueller, S. and Szolnoki, G. (2010), "The relative influence of packaging, labelling, branding and sensory attributes on liking and purchase intent: consumers differ in their responsiveness", *Food Quality and Preference*, Vol. 21 No. 7, pp. 774-783.

Nijssen, E.J. and Van Trijp, H.C. (1998), "Branding fresh food products: exploratory empirical evidence from the Netherlands", *European Review of Agricultural Economics*, Vol. 25 No. 2, pp. 228-242.

Orquin, J.L. and Scholderer, J. (2011), "Attention to health cues on product packages", *Journal of Eyetracking, Visual Cognition and Emotion*, Vol. 1 No. 1, pp. 59-63.

Oupadissakoon, G., Chambers., D.H. and Chambers, E. (2009), "Comparison of the sensory properties of Ultra-High-Temperature (UHT) milk from different countries", *Journal of Sensories Studies*, Vol. 24, pp. 427-440.

Pallant, J. (2007), *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using SPSS*, 3rd ed., Open University Press, Berkshire.

Perkins, M.L. and Deeth, H.C. (2001), "A survey of Australian consumers' attitudes towards UHT milk", *Australian Journal of Dairy Technology*, Vol. 56 No. 1, pp. 28-34.

Point of Purchase Advertising International (2014), "Mass merchant shopper engagement study", available at: http://memberconnect.shopassociation.org (accessed 29 March 2018).

Popescu, A. (2015), "The trends in milk production and consumption in Romania", *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, Vol. 15 No. 1, pp. 387-592.

Poulton, E.C. (1973), "Unwanted range effects from using within-subjects experimental designs", *Psychological Bulletin*, Vol. 80 No. 2, pp. 113-121.

Quah, S.H. and Tan, A.K.G. (2010), "Consumer purchase decisions of organic food products: an ethnic analysis", *Journal of International Consumer Marketing*, Vol. 22 No. 1, pp. 47-58.

Raghunathan, R. and Irwin, J. (2001), "Walking the hedonic product treadmill: default contrast and mood based assimilation in judgments of predicted happiness with a target product", *Journal of Consumer Research*, Vol. 28 No. 3, pp. 355-368.

Riezebos, R. and Zimmermann, K. (2005), "Merken in de tuinbouwsector: positioning paper tuinbouw", available at: http://edepot.wur.nl/26023 (accessed 9 August 2016).

Roosen, J. (2003), "Marketing of safe food through labeling", *Journal of Food Distribution Research*, Vol. 34 No. 3, pp. 77-82.

Rucker, D.D., Preacher, K.J., Tormala, Z.L. and Petty, R.E. (2011), "Mediation analysis in social psychology: current practices and new recommendations", *Social and Personality Psychology Compass*, Vol. 5 No. 6, pp. 359-371.

Schreiber, J.B., Nora, A., Stage, F.K., Barlow, E.A. and King, J. (2006), "Reporting structural equation modeling and confirmatory factor analysis results: a review", *The Journal of Educational Research*, Vol. 99 No. 6, pp. 323-338.

Sekaran, U. (2003), *Research Methods for Business: A Skill Building Approach*, 4th ed., John Wiley & Sons, New York, NY.

Sijtsema, S.J., Reinders, M.J., Hiller, S.R. and Guàrdia, M.D. (2012), "Fruit and snack consumption related to sweet, sour and salty taste preferences", *British Food Journal*, Vol. 114 No. 7, pp. 1032-1046.

Smit, G., Smit, B.A. and Engels, W.J. (2005), "Flavour formation by lactic acid bacteria and biochemical flavour profiling of cheese products", *FEMS Microbiology Reviews*, Vol. 29 No. 3, pp. 591-610.

Smith, R.A. and Houston, M.J. (1985), "A psychometric assessment of measures of scripts in consumer memory", *Journal of Consumer Research*, Vol. 12 No. 2, pp. 214-224.

Smith, T.J., Campbell, R.E., Jo, Y. and Drake, M.A. (2016), "Flavor and stability of milk proteins", *Journal of Dairy Science*, Vol. 99 No. 6, pp. 4325-4346.

Smith, V., Kassin, S. and Ellsworth, P. (1989), "Eyewitness accuracy and confidence: within-versus between-subjects correlations", *Journal of Applied Psychology*, Vol. 74 No. 2, pp. 356-359.

Sørensen, L.B., Møller, P., Flint, A., Martens, M. and Raben, A. (2003), "Effect of sensory perception of foods on appetite and food intake: a review of studies on humans", *International Journal of Obesity*, Vol. 27 No. 10, pp. 1152-1166.

Steiner, R.L. (1993), "The inverse association between the margins of manufacturers and retailers", *Review of Industrial Organization*, Vol. 8 No. 6, pp. 717-740.

Tabachnick, B.G., Fidell, L.S. and Osterlind, S.J. (2001), *Using Multivariate Statistics*, 4th ed., Allyn & Bacon, Needham Heights, MA.

Thaler, R.H. and Sunstein, C.R. (2008), *Nudge: Improving Decisions About Health, Wealth and Happiness*, Penguin, New York, NY.

Thomas, E. (1981), "Trends in milk flavours", *Journal of Dairy Science*, Vol. 64 No. 6, pp. 1023-1027.

Trijp, V.H.C. and Meulenberg, M.T. (1996), *Marketing and Consumer Behaviour with Respect to Foods Food Choice, Acceptance and Consumption*, Springer, pp. 264-292, doi: 10.1007/978-1-4613-1221-5_7.

Trivedi, J.B., Jashbhai, P., Nair, B., Baboo, M., Oste, R. and Aparnathi, K.D. (2014), "Fermentation kinetics and sensory attributes of milk fermented by probiotic bacteria", *International Journal of Fermented Foods*, Vol. 3 No. 1, pp. 75-84.

Troye, S.V. and Supphellen, M. (2012), "Consumer participation in coproduction: 'i made it myself' effects on consumers' sensory perceptions and evaluations of outcome and input product", *Journal of Marketing*, Vol. 76 No. 2, pp. 33-46.

Van Dam, Y.K. and Van Trijp, H.C.M. (2007), "Branding and labelling of food products", in Frewer, L. and Van Trijp, H. (Eds), *Understanding Consumers of Food Products*, CRC Press, Cambridge, pp. 153-180.

Varela, P., Ares, G., Gimenez, A. and Gambaro, A. (2010), "Influence of brand information on consumers' expectations and liking of powdered drinks in central location tests", *Food Quality and Preference*, Vol. 21 No. 7, pp. 873-880.

Veale, R., Pascale, Q. and Amal, K. (2006), "The role of intrinsic (sensory) cues and the extrinsic cues of country of origin and price on food product evaluation", *3rd International Wine Business & Marketing Research Conference, Montpellier, 6–8 July*, Refereed paper.

Verbeek, M. (2008), *A Guide to Modern Econometrics*, John Wiley & Sons Ltd, Chichester.

Wendy, A.B., Brucks, M. and Nielsen, J.H. (2012), "The attribute carryover effect: what the 'runner-up' option tells us about consumer choice processes", *Journal of Consumer Research*, Vol. 38 No. 5, pp. 872-885.

Yamaguchi, S. and Ninomiya, K. (2000), "Umami and food palatability", *The Journal of Nutrition*, Vol. 130 No. 4, pp. 921-926.

Yoo, C. and MacInnis, D. (2005), "The brand attitude formation process of emotional and informational ads", *Journal of Business Research*, Vol. 58 No. 10, pp. 1397-1406.

Appendix 1

Full cream liquid milk		
Information	Pasteurised fresh milk (PFM)	UHT fresh milk (UFM)
Fat	3.50% (min.)	3.50% (min.)
Solids no fat	8.00% (min.)	8.00% (min.)
Protein	3.30% (min.)	3.2 g
Lactose	4.40% (min.)	
Minerals	0.70% (min.)	
Total fat		3.5 g
Saturated fat		1.2 g
Carbohydrate		4.7 g
Sodium		41 mg
Calcium		122 mg
Cholesterol		Less than 3 mg
Energy		63.1 kcl
Other information		
Batch number	XXXX	XXXX
Mfg. date	XXXX	XXXX
Exp. date	7 days	180 days
MRP	Tk. 62/Litre	Tk. 80/Litre
Processed by	XXXX Inc	XXXX Inc
Barcode	Yes	Yes
BSTI logo	Yes	
ISO certified	Yes	
Weight	1 Liter	1 Liter
Type of pack	Poly	Tetra
Needs no boiling before use		Yes
Needs no refrigeration till opened		Yes
No preservative added		Yes
Instructions		
Keep refrigerated below 4°C	Yes	
Keep refrigerated after opening		Yes
Keep in cool and dry place		Yes
Do not buy puffed or leaky packs		Yes
Cut here to pour		Yes
Keep your country clean		Yes

Table AI. Product labelled information (PLI) in a piece of paper

Notes: The word "yes" indicates that this information is exist on the product label and the symbol "XXXX" indicates original figure has deleted to keep the respondents neutrals. The empty space indicates, no information in the original label

Appendix 2

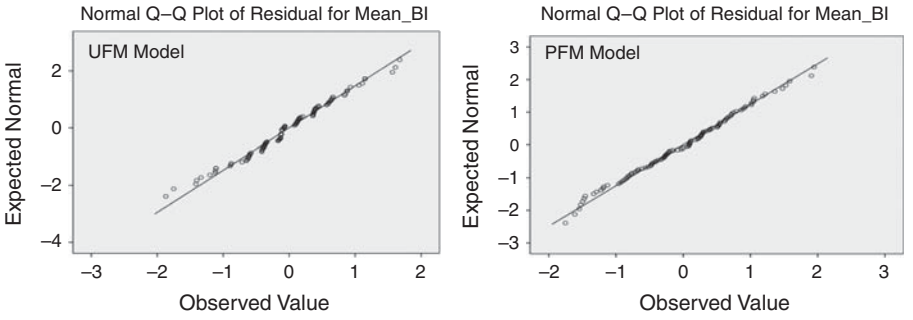


Figure A1. Normal Q-Q plot of UFM and PFM model

Tests of normality	Kolmogorov–Smirnov[a]			Shapiro–Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Residual for Mean_BI	0.085	117	0.038	0.987	117	0.305
Normality test for UFM						
Residual for Mean_BI	0.061	117	0.200*	0.991	117	0.610

Notes: [a]Lilliefors significance correction. *This is a lower bound of the true significance

Table AII. Normality test

Appendix 3

Panel 2(a): PFM

Tests of within-subjects contrasts
Measure: MEASURE_1

Source	Treatment	Type III sum of squares	df	Mean square	*F*	Sig.	Partial Eta squared
Treatment	Linear	2.132	1	2.132	5.611	0.019	0.046
Error (treatment)	Linear	44.063	116	0.380			

Paired samples correlations

		n	Correlation	Sig.
Pair 1	MLabel_PFM & MSensory_PFM	117	0.258	0.005

Panel 2(b): UFM

Tests of within-subjects contrasts
Measure: MEASURE_1

Source	Treatment	Type III sum of squares	df	Mean square	*F*	Sig.	Partial Eta squared
Treatment	Linear	8.336	1	8.336	24.912	0.000	0.177
Error (treatment)	Linear	38.816	116	0.335			

Paired samples correlations

		n	Correlation	Sig.
Pair 1	MLabel_UFM & MSensory_UFM	117	0.240	0.009

Table AIII. Test of treatment of the experimental design

Appendix 4

Table AIV. Multicolliniarity analysis

Coefficients[a]

UFM

Model		Collinearity statistics	
		Tolerance	VIF
1	Nutrition	0.512	1.955
	Question	0.525	1.905
	Claim	0.660	1.516
	Responsibility	0.481	2.080
	Fat info	0.607	1.649
	Dietary	0.592	1.688
	Mealy	0.665	1.503
	Umami	0.737	1.357
	Fermented	0.700	1.429

PFM

Model		Collinearity statistics	
		Tolerance	VIF
1	Nutritional	0.706	1.416
	Responsibility	0.708	1.413
	Taste	0.449	2.226
	Flavour	0.502	1.993
	Hedonic	0.648	1.543

Note: [a]Dependent variable: Mean_BI

Corresponding author
Mohammed Ziaul Hoque can be contacted at: mohammed.z.hoque@uit.no