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Research article

Development of an emotion lexicon and its application in demographic characteristics and behavior of coffee consumers in Thailand

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Abstract

An emotion lexicon was developed and used to investigate the emotions related to coffee consumers' behaviors and demographic characteristics. The 39 emotion terms of the EsSence ProfileTM (ESP) method were translated into Thai. Two focus group sessions were held with coffee drinkers aged 20–40 yr at Kasetsart University, Bangkok, Thailand to generate a list of emotions that occurred before, during and after the coffee drinking experience. Consequently, the terms were increased from 39 to 59. These emotion terms were applied in the next step with 50 consumers who were requested to verify the terms and to indicate which were applicable to themselves. Utilizing the check-all-that-apply (CATA) method, 47 emotions were identified in this step. A consumer survey was conducted to identify the different intensity levels of each emotion term with 437 consumers using a 5-point intensity scale. As a result, 47 emotion terms were eligible for the emotion lexicon related to Thai coffee drinkers. In addition, the survey also revealed that the emotional intensity levels were based on differences in coffee consumer demographic characteristics and consumption behavior which were then investigated in the final comparative analysis of the variables. The results were: female coffee drinkers would feel 'Active' more than males; consumers aged ≤ 40 yr would feel 'Pleasant', 'Pleased', 'Social', 'Alert' and 'Nervous'; drinkers of brewed coffee would feel 'Affectionate', 'Alert', 'Calm', 'Happy', 'Pleased', 'Social' and 'Extravagant' more than instant coffee consumers, whereas consumers whose drinking frequency was ≥ 6 cups/wk would feel 'Active', 'Essential', 'Relaxed' and 'Satisfied'.

Introduction

Numerous studies of consumption have provided valuable information for production, especially in term of the relationship of demographic characteristics and consumers' behavior and emotions. For example, Canetti et al. (2002) revealed that emotions have different effects on consumption behavior based on different individual's characteristics, such as over consumption was influenced by negative emotion. On the other hand, changes in demographic characteristics also affect human physiology and psychology. For example, aging decreased smelling performance which subsequently modified the perception of emotions (den Uijl et al., 2016).

Currently, most similar food products have similar manufacturing characteristics, function, packaging and price; however, the study of sensory properties of food might enhance differentiation (Jiang et al., 2014).

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Flavor in food products depends on both internal and external stimuli. The former are involved in perception of the flavor and taste which are related to the appearance, texture, sound and temperature of the food, while the latter are involved in health information on the label, social influence and the availability of certain foods (Eertmans et al., 2001).

Nevertheless, the benchmark for sale prediction (Thomson and MacFie, 2007) or product success (King et al., 2010) in terms of overall acceptability or hedonic liking is questionable. Moreover, a single measurement of overall acceptability has limited predictive value for liking in the future because people change their performance and choices when the emotions of boredom and aversion take place over time (Köster, 2003).

Furthermore, the decision to purchase food as a merchandise results from intuition and rational thinking. The former is fast, automatic, associative and emotional in nature while the latter is a slow, effortful and control process (Kahneman, 2003). In addition, food price and health claims can be considered as rational thinking.

Emotion is the state of mind and body occurring from both internal and external stimulation (Ferrarini et al., 2010). Stimuli can affect personal reaction differently; therefore, knowledge of the relationship of consumption behavior and emotions is necessary for product development, especially with daily food products and beverages.

An emotion lexicon is a list of words applicable to determine emotion (Mohammed and Turney 2010). Nevertheless, the emotional process is complicated and the interpretation of these words is inconsistent based on different viewpoints, such as behavioral or physiological aspects.

In order to avoid misinterpretation caused by cultural differences, appropriate translation of these words matched with each relevant country is meaningful (Jiang et al., 2014). The current literature regarding food elicited emotion is limited; therefore, establishing an emotion lexicon and quantitative analysis of emotions are crucial to advance the production of such tools.

Coffee has a unique aroma and taste (Farah, 2012) and has remained one of the most popular beverages in Thailand. Since increasing number of younger consumers became interested in coffee, market production of coffee has risen from 26,089 t in 2015 to 32,801 t in 2016 (FAO, 2018). However, this production was relatively low compared with other countries. As a result, to increase consumer demand, Thai coffee products should be improved in parallel with understanding consumers' emotions, perceptions and attitudes. Although the development of an emotion lexicon of coffee and related products has been studied (Bhumiratana et al., 2014; Kanjanakorn and Lee 2017), only a few studies have been capable of generating an emotion lexicon of coffee and its relationships between demographics and the behavior of consumers.

The objectives of this research were to develop an emotion lexicon and to understand the emotions and feelings related to coffee consumers' behavior and their demographic characteristics which would provide useful information for coffee production in order to offer sophisticated coffee products matching the passion of the targeted coffee consumers. In addition, this research investigated Thai coffee drinkers based on their overall demographic characteristics and their consumption behavior; therefore, the development of a hedonic liking score and its evaluation of sensory properties preferences and the elicited emotional responses of the consumers in this study would be useful to represent the current situation of coffee product acceptability in Thailand. Finally, the analysis of emotional response with regard to the elicited emotion terms from this study would help to reveal the latest emotional response profiles in the Thai coffee market.

Materials and Methods

A three-step process was applied to develop the emotion lexicon as suggested by Jiang et al. (2014). In step 1, the EsSense Profile® (ESP; King and Meiselman, 2010) was applied as a platform to identify terms. The emotional responses toward food product were quantified using a standard questionnaire comprising 39 emotion terms (35 positive and 4 negative terms) which has been widely used among other emotional development methods (King and Meiselman, 2010). In step 2, the data were obtained from two sessions of group study and one preliminary consumer survey from a small group of consumers (n = 50). In step 3, all emotion terms from step 2 were applied to the last coffee consumer (recall) survey (n = 437 participants). The steps are detailed below.

Step 1-Focus group discussion

To study the emotions of Thai coffee consumers, 16 nonspecific coffee consumers were recruited and separated into two groups for discussion and interview. Each group consisted of both genders who were categorized into heavy drinker (5–7 cups/wk), moderate drinkers (3–5 cups/wk) and low drinkers (1–2 cups/wk) according to Bhumiratana et al. (2014). Discussions and interviews included the behavioral aspect of related factors, such as the emotional experience before, after and during coffee consumption with respect to various factors, such as the situation, product, living habits, services and selling activity, with questions phrased to encourage the participants to express their emotions which were recorded and presented on a blackboard. Then, group discussion was used to determine which words were meaningful, understood, appropriate and acceptable to the participants. The EsSence profile method was adopted to provide the initial basic terms which were translated into Thai according to the definition of vocabulary in Thai Royal Institute Dictionary 2554 B.E. (Royal Institute, 2013).

Step 2-Emotion term assessment and selection procedure

After obtaining the list of emotion terms from the focus group discussion in step 1, a preliminary consumer survey was carried out using a questionnaire to record Thai coffee consumer responses. This step rechecked and clarified the meaning of and relationship between the terminology and coffee consumers' experience. To recheck these terms, a small group of coffee consumers (n = 50) was

selected using a slightly modified method of Bhumiratana et al. (2014). The participants were aged 16–70 yr, living in Bangkok and had coffee consumption frequency of at least 1 cup/wk; they were recruited and participated in the check-all-that-apply (CATA) method (Dooley et al., 2010; Reinbach et al., 2014). All subjects were instructed to recall and mark their level of feelings by each emotion term during their coffee consumption experiences with coffee products. All terms were then collected to analyze the total count. To enhance the precision of this relationship, each final term in the list had to have a frequency greater than or equal to 50% which was the cut-off level used by Rousset et al. (2005).

Step 3-Consumer survey study of emotion terms list based on demographic characteristics and behavior of Thai coffee consumers from preliminary survey using both English and Thai vocabularies

The consumer survey was conducted to finalize the complete list of emotion lexicon for Thai coffee consumers by randomly selecting 437 consumers who drank coffee at least once a week, were from both genders, were aged 16–70 yr and lived in Bangkok and its suburbs. After explanation of the questionnaire, they were requested to recall and tick the most relevant answer, based on a 5-point intensity scale (1 = 'not at all' to 5 = 'extremely'). These emotion terms were used to analyze the relationship of emotions between attributes of consumers' demographic and consumers' behavior. These attributes consisted of: gender (male, female), age in years (≤30, 31–40, 41–50, ≥51), product selection (brewed coffee, instant coffee), income in USD/mth (≤985, 986–1,970, ≥1,971) based on baht-to-dollar (THB/USD) exchange rate was 30.5 (Bank of Thailand, 2019), number of cups of coffee per week (1, 2-3, 4-5, 6-7, >7), drinking time during the day (morning, before lunch, lunch, afternoon, evening, night), and overall coffee product preferences (taste, aroma, material quality, accessibility, service, atmosphere).

Statistical analysis

Experimental data were analyzed using an independent sample t-test for two-group and analysis of variance (ANOVA) for multiple group comparisons, with the statistical package SPSS® version 12.0 (SPSS (Thailand) Co., Ltd.; Bangkok, Thailand). Duncan's multiple range test was used to evaluate multiple comparisons of mean values. Mean values were considered significantly different at the 95% confidence level ($p \leq 0.05$). Principal component analysis (PCA) and cluster analysis were estimated using the XLstat 2017 software (Addisoft; Paris, France).

Results

Focus group discussion

From the focus group discussion and the interview of coffee consumers to evaluate their daily coffee consumption experience with emotional expression in various factors and conditions, 59 terms, both positive and negative, were identified. Of these terms, 39 were from the ESP template whereas 20 terms were from the focus group. The influence of different coffee products, the product category and the effect of the uniqueness of Thai culture, traditions, lifestyle, demographics and physiographic factors were consequently established as additional terms (Stets and Turner, 2008) which were adopted when the participants mentioned the same terms in both focus groups as shown in Table 1. These terms represented their expectations from the coffee products based on emotions, such as 'Alert', 'Extravagant' and 'Essential'.

Table 1 Emotion terms in English and (Thai) of Thai coffee drinker from the focus group discussion and the preliminary survey (refined check-all-that-apply (CATA) method.

Emotion term		
Active (รู้สึกคล่องแคล่ว/ว่องไว)	Fancy * (รู้สึกไม่ธรรมดา/หรูหรา)	Pleased (รู้สึกพอใจ/ชื่นดี)
Adventurous (รู้สึกผจญภัย)	Free (รู้สึกเป็นอิสระ/เสรี)	Polite (รู้สึกดูสุภาพ/คูมีชาติตระกูล)
Affectionate (เกิดความรักใคร่)	Friendly (รู้สึกเป็นมิตร/เป็นกันเอง)	Proud * (รู้สึกภาคภูมิใจ)
Aggressive (รู้สึกมีความมั่นใจสูง/มีความก้าวร้าว)	Glad (รู้สึกดีใจ/พอใจ)	Quiet (รู้สึกเงียบสงบ)
Alert * (มีความตื่นตัว)	Good (รู้สึกดี/เหมาะสม)	Ready * (มีความพร้อมในการทำงาน)
Annoyed *, ** (รู้สึกรำคาญ)	Good-natured (เกิดความกรุณา/ใจดี)	Relaxed* (รู้สึกผ่อนคลาย)
Awake * (รู้สึกไม่ง่วงนอน/ตื่น)	Guilty ** (เกิดความสำนึกผิด)	Satisfied (รู้สึกพอใจ/ถูกใจ)
Beneficial * (รู้สึกว่ามีประโยชน์)	Happy (มีความสุข/สำราญ/สบาย)	Sick * (รู้สึกไม่สบายตัวและใจ)
Bored ** (รู้สึกน่าเบื่อ)	Humble* (รู้สึกสมถะ/เรียบง่าย)	Secure (รู้สึกปลอดภัย)
Calm (เกิดอารมณ์สงบ)	Impressive *, ** (รู้สึกประทับใจ)	Social* (รู้สึกเป็นส่วนหนึ่งในสังคม)
Comfortable *, ** (สะดวกสบาย)	Interested (รู้สึกสนใจ)	Special *, ** (รู้สึกพิเศษ)
Daring (มีความกล้าหาญ/เสี่ยง)	Joyful (รู้สึกร่าเริง/เบิกบาน)	Steady (รู้สึกมั่นคง/แน่วแน่)
Disappointed *, ** (รู้สึกผิดหวัง)	Jump start *, ** (ฟื้นสภาพ)	Tame (รู้สึกไม่น่าสนใจ/ไม่สนุก)
Disgusted ** (รู้สึกสะอิดสะเอียน)	Loving (รู้สึกรัก/รู้สึกชอบ)	Tender ** (รู้สึกอ่อนนุ่ม/อ่อนโยน)
Eager ** (รู้สึกร้อนรน/ทะเยอทะยาน)	Merry (มีความรื่นเริง/ร่าเริง)	Understanding (มีความเข้าอกเข้าใจ)
Energetic (รู้สึกมีพลัง)	Mild (รู้สึกนุ่มนวล/อ่อนโยน)	Warm (รู้สึกอบอุ่น)
Enthusiastic (เกิดความกระตือรือร้น)	Nervous * (รู้สึกกระวนกระวาย)	Whole (มีความสมบูรณ์)
Essential * (รู้สึกว่าเป็นสิ่งจำเป็น)	Nostalgic (รู้สึกคิดถึงบ้าน)	Wild (รู้สึกดิบๆ/เถื่อนๆ/คะนอง)
Excited * (รู้สึกตื่นเต้น/เร้าใจ)	Peaceful (รู้สึกสันติ/สงบ)	Worried ** (รู้สึกเป็นทุกข์/วิตก)
Extravagant * (รู้สึกฟุ่มเฟือย)	Pleasant (เกิดความรื่นรมย์)	

* = 20 new emotion terms were created in the focus group discussion.

** = 12 emotion terms were discarded by preliminary survey.

Emotion terms assessment and selection procedure

The preliminary survey of 50 Thai coffee drinkers was performed using a questionnaire to obtain meaningful, and unambiguous wording of emotion terms. Using a cut-off point of a voting score greater than 50%, this survey resulted in the reduction of the previous 59 emotion terms from the focus group discussion to 47 terms, with the 39 terms of ESP reduced to 33 terms and the emotion terms from participants in the group discussion were reduced from 20 to 14. The revised emotion terms are shown in Table 1.

Emotion terms list of Thai coffee drinkers from consumer survey

A consumer survey consisting of 47 revised emotion terms was carried out with 437 Thai coffee drinkers. Their feelings on each term were collected using a 5-point intensity scale for their preferences regarding coffee product consumption. The results showed that the positive emotion terms, consisting of 'Awake', Active', 'Good' and 'Pleasant', gained the highest average intensity scores starting from 'very' to 'moderate' with rankings of 3.6, 3.5, 3.4, and 3.3 points, respectively. In contrast, the negative emotion terms, consisting of 'Extravagant', 'Wild' and 'Nostalgic', had the highest average intensity scores of 'slightly' with 2.6, 2.2, and 2.1 points, respectively. The other 40 terms were rated at median scores ('slightly' to 'moderately'). Since 'not at all' for all emotion terms was not selected by more than 50% of consumers, all emotion terms from this survey were used and they could be illustrated by various degrees of average values in the consumer mind as shown in Fig. 1. In summary, this study achieved the development of an emotion lexicon for Thai coffee consumers consisting of 47 terms.

Analysis of evoked feelings and emotions from coffee consumption based on demographic characteristics and behavioral aspects of Thai coffee consumers

Analysis of emotional states based on gender

There was a slight discrepancy of evoked emotions between both genders with the females tending to have stronger emotions. However, the results in this study showed that only 'Active' was significantly associated with a higher score in females (3.6) than for males (3.3), as shown in Fig. 2.

Analysis of emotional states based on consumer age grouping

The age groups of consumers in this study were categorized in years as ≤30 (36.6%), 31–40 (30.7%), 41–50 (18.5%) and ≥51 (14.2%), respectively. 'Alert', 'Nervous' and 'Wild' emotions were significantly associated with the highest rating score in the age groups ≤30 yr and 31–40 yr. In addition, the rating scores were significantly highest for 'Pleasant', 'Pleased, 'Proud' and 'Social' emotions in the age group 31–40 yr and for 'Warm' emotion in the age group ≥51 yr, as shown in Fig. 3.

Analysis of emotional states based on consumer age group and coffee product selection

The coffee preparation process was classified as either brewed (fresh coffee) or instant coffee. Although the results of this study showed that gender was not associated with coffee product selection, most consumers, especially those aged 21–40 yr (43%), preferred brewed to instant coffee (57.2% and 42.8%, respectively).The brewed coffee consumers significantly adopted the terms 'Affectionate', 'Alert', 'Awake', 'Calm', 'Enthusiastic', 'Extravagant', 'Fancy', 'Good', 'Happy', 'Peaceful', 'Pleasant' 'Pleased', 'Quiet' and 'Social' compared to the instant coffee consumers, as shown in Fig. 4.

Analysis of emotional states based on income grouping

The average income of consumers was classified into three groups: less than or equal to 985 USD/mth (68.2%), 986–1,970 USD/mth (24.3%), and greater than or equal to 1,971 USD/mth (7.6%). The highest income group had significantly greater scores for 'Fancy', 'Pleased', 'Pleasant' and 'Polite', as shown in Fig. 5.

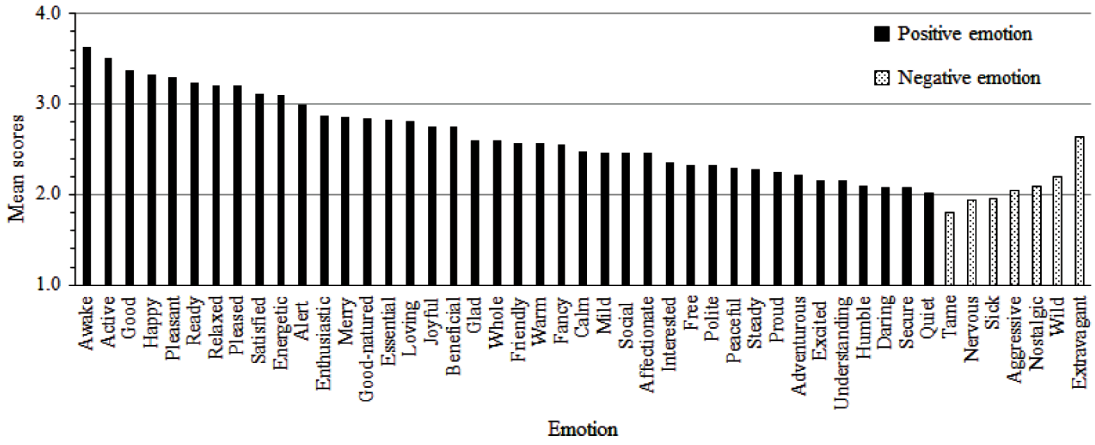

Fig. 1 Evaluation of consumers' feelings on 5-point intensity scale for 47 emotion terms

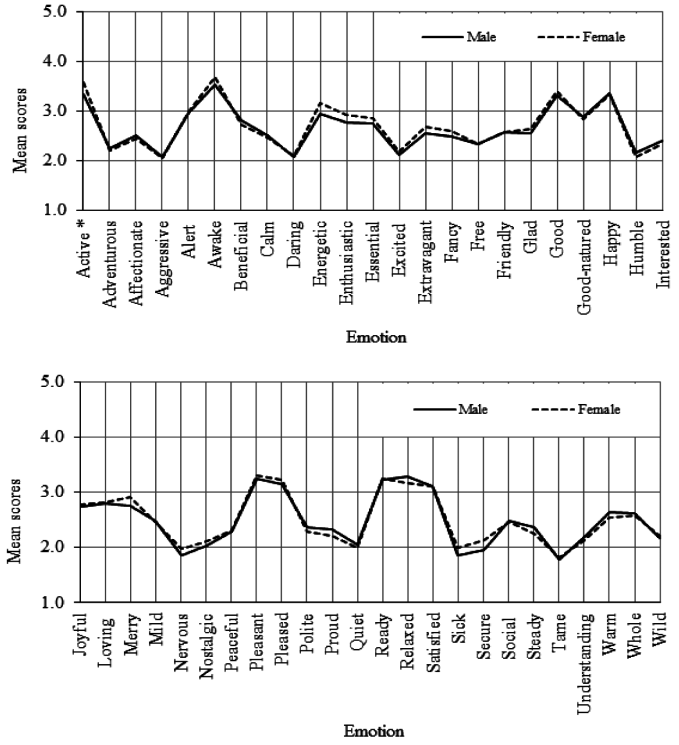

Fig. 2 Emotion terms and rated averages on 5-point intensity scale based on gender, where * = mean of emotion term for females is significantly ($p \leq 0.05$) different from males

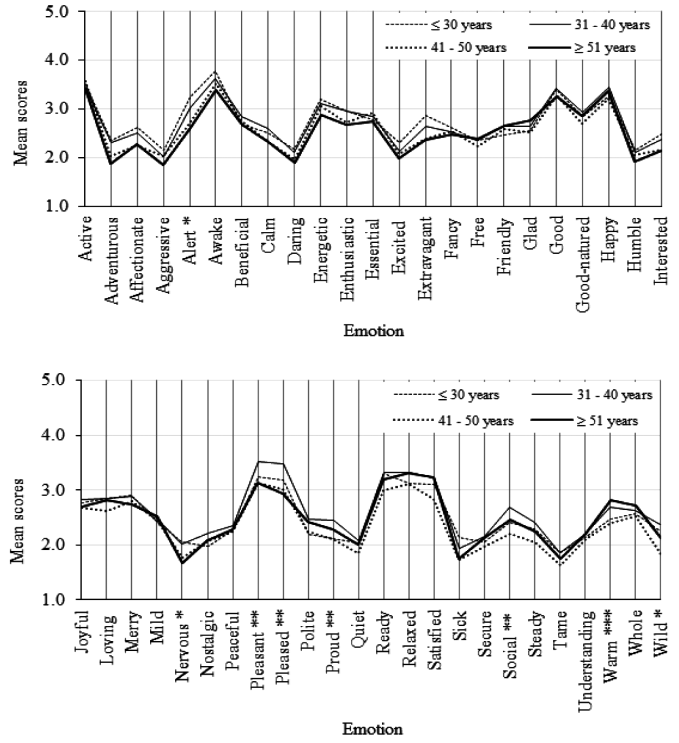

Fig. 3 Emotion terms and rated averages on 5-point intensity scale based on consumer age groupings, where significant differences are tested at $p \leq 0.05$, * = mean of emotion term for coffee consumers aged ≤40 yr is significant, ** = mean of emotion term for coffee consumers aged 31–40 yr is significant, and *** = mean of emotion term for coffee consumers aged ≥51 yr is significant

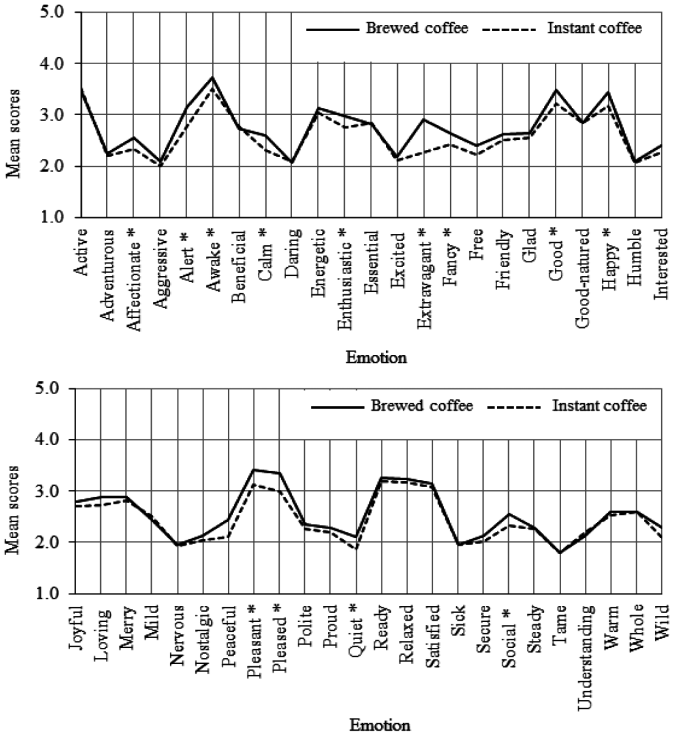

Fig. 4 Emotion terms and rated averages on 5-point intensity scale based on coffee product selection, where * = mean of emotion term for brewed coffee drinkers is significantly ($p \leq 0.05$) different

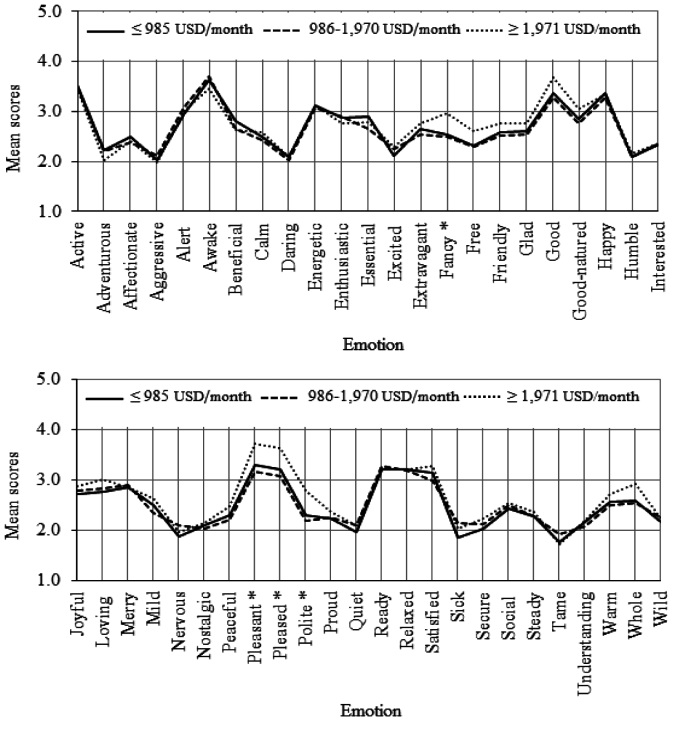

Fig. 5 Emotion terms and rated averages on 5-point intensity scale based on income grouping (income in USD/month; the exchange rate of 30.05 THB/USD (Bank of Thailand, 2019)), where * = mean of emotion term for average income ≥1,971 USD/month is significantly ($p \leq 0.05$) different

Analysis of emotional states based on numbers of cups of coffee/week

The numbers of consumers who drank more than 7 cups/wk and 6–7 cups/wk (54%) were significantly higher than those drinking 4–5 cups/wk, 2–3 cups/wk, and 1 cup/wk (16.9%, 18.5%, and 10.5%, respectively). In addition, the consumers who drank 1–3 cups/wk and greater than or equal to 4 cups/wk had significantly highest scores of 'Extravagant', 'Sick' and 'Beneficial' and 'Happy' emotions, respectively. The five dominant emotion terms 'Active', 'Essential', 'Pleasant', 'Relaxed' and 'Satisfied' were all found with the drinking frequency of greater than or equal to 6 cups/wk, as shown Fig. 6.

Analysis of emotional states based on timing of coffee drinking during the day

The timing of drinking coffee reported by the respondents was most commonly in the morning (47.8%), followed by in the afternoon (20.6%), before lunch (13.7%), at lunch time (12.1%), in the evening (3.5%) and at night (2.4%). Moreover, variation in the consumption time was associated with different emotion terms. For example, nighttime drinking significantly provoked deeper emotions ('Calm', 'Joyful', 'Loving', 'Quiet'), as shown in Fig. 7.

Analysis of emotional states based on respondents' overall coffee product preferences

The rating scores indicated that the most favorite coffee characteristic was its taste (4.3) followed by aroma with scores of 4.1 and 3.9 for material quality (coffee bean/roasting/grinding), accessibility, service and pleasant atmosphere.

Principal component analysis (PCA)

To get a better understanding of the relationships between emotional states and some attributes, the PCA biplot technique was performed for age grouping, and drinking frequency of coffee drinkers.

Age grouping

The PCA biplot revealed that the first principal component (PC1) and second principal component (PC2) explained 88.66% of the cumulative variance, as shown in Fig. 8. Age and emotions could be categorized into three groups. Cluster 1 consisted of drinkers aged ≤40 yr with positive emotions ('Awake', 'Alert', 'Good', 'Ready') and negative emotions ('Aggressive', 'Sick', 'Nervous'). Cluster 2 consisted of drinkers aged 41–50 yr with the mainly positive emotions of 'Active' and 'Essential' and Cluster 3 was associated with drinkers aged ≥51 yr with 'Happy', Relaxed', 'Satisfied' and 'Warm' emotions.

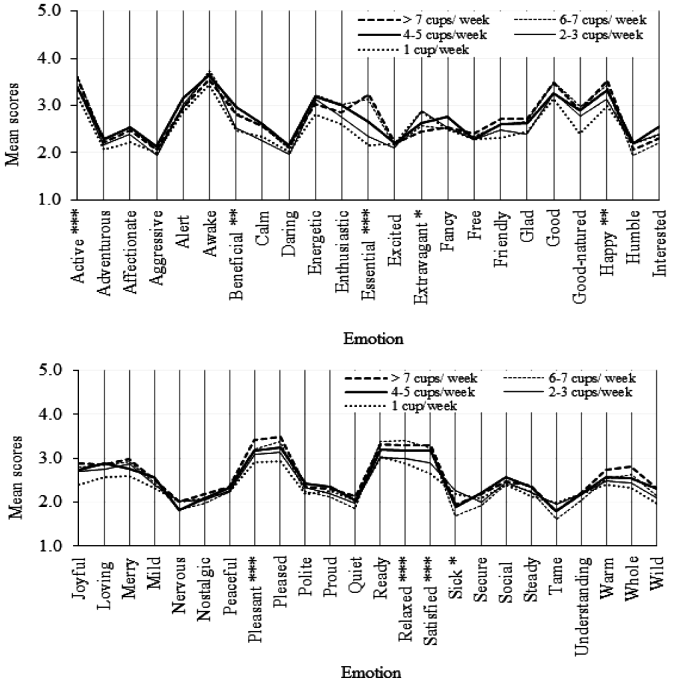

Fig. 6 Emotion terms and rated averages on 5-point intensity scale based on drinker's behavior expression using number of cups of coffee per week, where significant differences are tested at ($p \leq 0.05$), * = mean of emotion term for drinkers with frequency of 1–3 cups/wk is significant ** = mean of emotion term for drinkers with drinking frequency ≥4 cups/wk is significant and *** = mean of emotion term for drinkers with drinking frequency ≥6 cups/wk is significant

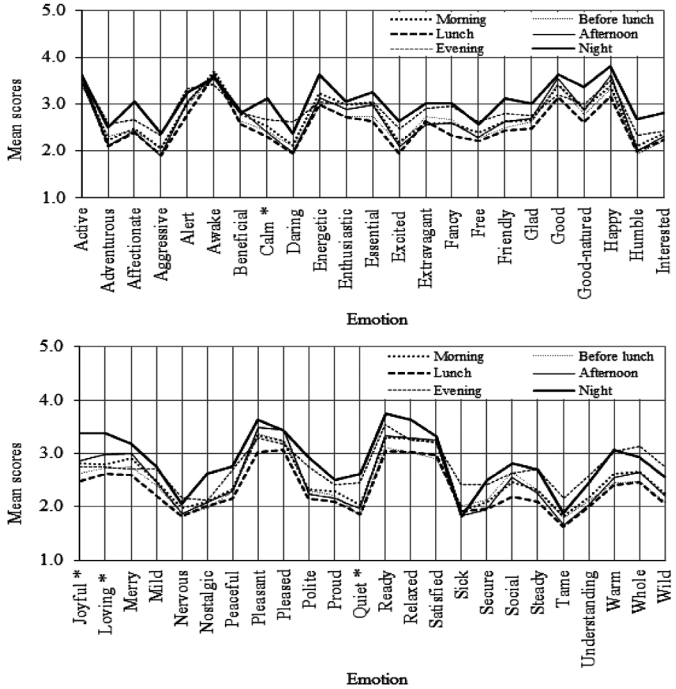

Fig. 7 Emotion terms and rated averages on 5-point intensity scale based on timing of coffee drinking during the day, where * = mean of emotion terms at night is significantly ($p \leq 0.05$) different

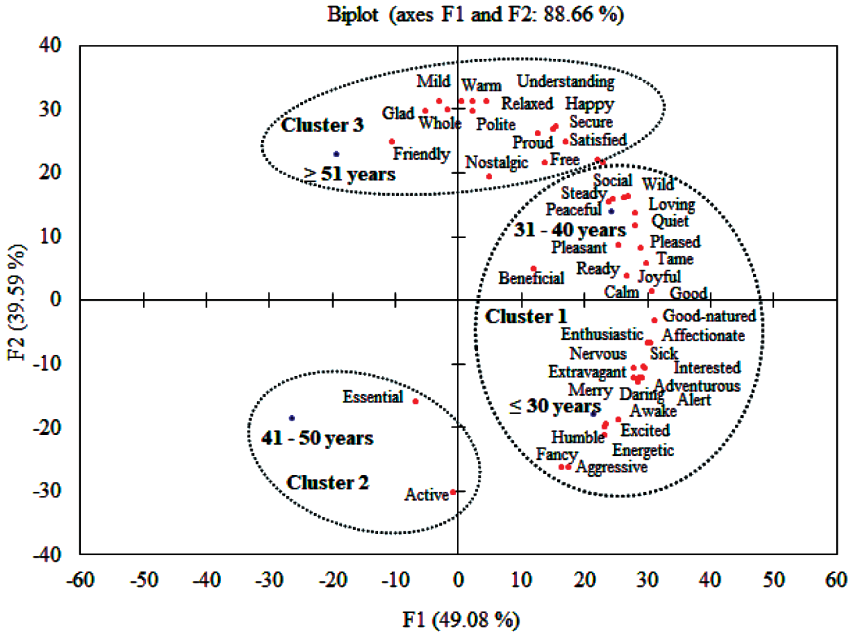

Fig. 8 Biplot after varimax rotation of age grouping and emotion terms: (Cluster 1) drinkers aged ≤40 yr, (Cluster 2) aged 41–50 yr and (Cluster 3) ≥51 yr

Drinking frequency

The PCA biplot revealed that PC1 and PC2 contained 79.16% of the cumulative variance, as shown in Fig. 9. The feelings and emotions could be categorized into three groups. Cluster 1 was composed of negative moods such as 'Extravagant', 'Nervous', 'Tame' and 'Sick'. Cluster 2 consisted of 'Alert', 'Beneficial', 'Daring', 'Steady', 'Mild', 'Wild' and 'Aggressive' and Cluster 3 consisted of 'Awake', 'Essential', 'Friendly', 'Calm', 'Adventurous', 'Good', 'Active', 'Relax', 'Ready', 'Energetic' and 'Warm'. The drinking frequency was associated with clusters: 1–3 cups/wk (Cluster 1), 4–5 cups/wk (Cluster 2) and ≥6 cups/wk (Cluster 3), Cluster 1 was concerned mostly with negative feelings and emotions whereas Clusters 2 and 3 expressed positive high-low energy emotions.

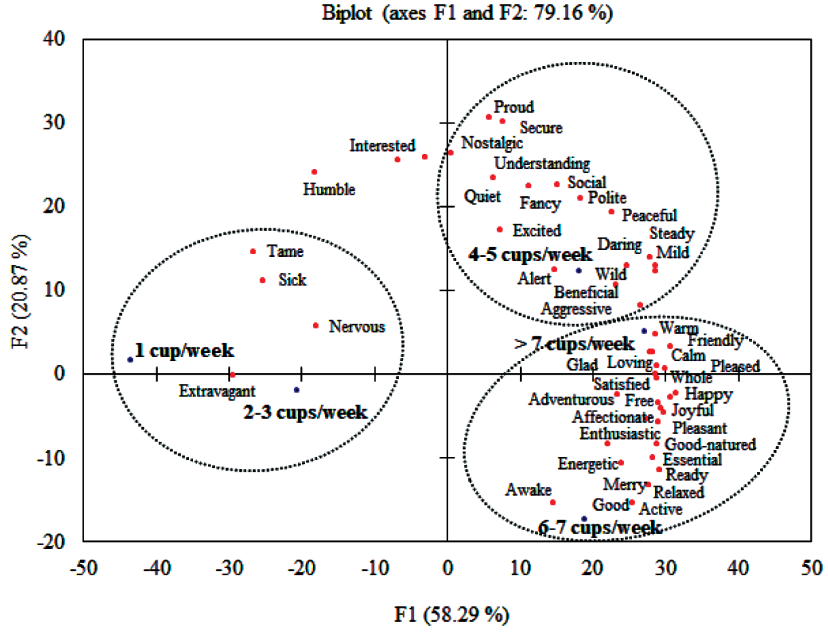

Fig. 9 Biplot after varimax rotation of drinker's behavior expression (number of cups of coffee/week) and emotion terms: (Cluster 1) drinkers with frequency of 1–3 cups/wk, (Cluster 2) 4–5 cups/wk and (Cluster 3) ≥6 cups/wk

Discussion

Although the development of an emotion lexicon has been enthusiastically studied for a long time, it is difficult to establish the precise lexicon for the practical measurement of fondness regarding coffee consumption. According to the experiment conducted by Bhumiratana et al. (2014) who refined the emotion lexicon using six varieties of coffee and 94 coffee drinkers in Manhathan, Kansas, USA, reported that analysis based on six consumer clusters provided inconsistent results between clusters. They reported that the average liking scores for the coffee brand 'Breakfast' rated by consumers in Clusters 1, 3 and 5 were high (7.7, 7.0 and 7.1, respectively) which related to positive high-low energy emotions (empowering, educated, social, peaceful, comfortable, pleasant, warm) whereas the consumers in Cluster 2 had the lowest liking score (4.4) and negative emotions (disappointed, disgusted, bored, annoyed). In light of this result, the differences in characteristics (consumer demographic and consumption behavior) between these two groups (Clusters 1, 3 and 5 versus Cluster 2) had a potential effect on their sensory evaluation regarding the preference of 'Breakfast' and also influenced their elicited emotions toward this sample (only one coffee sample). In addition, this effect would be equally present in the rest of the samples.

Considering coffee sensory properties, the roasted level played a major role in processing the best coffee grounds which is the paramount substance determining the most favorite coffee cup. Based on Bhumiratana et al. (2014), 'Breakfast', 'Nantucket' and 'Kona' were used as light roasted, 'Italian Roast' as medium roasted and 'Sumatra' and 'Newman' as dark roasted. The light roasted level was appreciated with the highest liking scores followed by the medium roasted, and the dark roasted levels. Apart from this, the effect of roasted level was observed in the six consumer clusters of which the preference scores declined with the increment of roasting. Therefore, two major aspects should be further investigated to solve the limitations described above. First, what makes these consumer clusters different from each other or who is the exact target customer? King and Meiselman (2010) stated that a key factor in measuring consumer's emotion regarding a product was whether the consumer was a product user. From this perspective, the product users would have positive emotional responses to products, while non-users had more negative responses. Second, what sensory properties of coffee specifically cause stimulation of emotions in consumers? For descriptive sensory analysis of brewed coffee, Chambers et al. (2016) developed a 'living' lexicon, generated from 110 individual attributes, which might be useful for the evaluation of both the aroma and flavor of each sample. The authors suggested that allocation of this list to a specific study objective, such as evaluation of varietal, processing, fermentation and degree of roasting, into a sub-lexicon could provide more insight and understanding of various product qualities attributes. Hence, to evaluate the strength and weakness of coffee products in the market and avoiding the misunderstanding and confusion in the sensory terms, it is important to organize a trained panel or arrange a short training course for participants so they can understand both the project objective and the meaning of terms so that their ratings of the sensory attributes accurately reflect their preference.

Regarding elicited emotions from coffee drinking experience (CDE), Bhumiratana et al. (2014) revealed that there was a strong relation between higher liking score and the emotions evoked by the coffee drinking experience. Their stepwise regression analysis of data yielded a core list of 44 CDE emotions that were able to illustrate defined distinctions among emotion responses from each coffee sample (six samples) within six consumer clusters. Of these 44 terms, 27 emotions (such as 'Awake', 'Jumpstart', 'Rested' and 'Annoyed') were identified from coffee drinking experience and 17 terms were from the ESP lexicon (such as 'Active', 'Energetic', 'Disgusted' and 'Worried'). Likewise, for the development of the emotion lexicon for Thai coffee drinkers in the current study, 47 emotion terms were recognized of which 14 new emotion terms (such as 'Awake', 'Ready' and 'Relax') were clearly associated with Thai coffee drinker characteristics and 33 terms were obtained from the ESP lexicon. With the 14 new terms (less than the 27 terms from the CDE study), only 4 terms ('Awake', 'Nervous', 'Relax', 'Social') were also in the CDE study, while the other 10 terms were unique and represented Thai coffee drinkers ('Alert', 'Beneficial', 'Essential', 'Excited', 'Extravagant', 'Fancy', 'Humble', 'Proud', 'Ready', 'Sick').

In addition to the consideration of the 47 emotion terms ranging from positive (high average score) to negative (low average score), the relationship between the coffee consumers' demographic characteristics and their coffee consumption behaviors can provide useful information. Therefore, the application of these terms was analyzed in relation to the selected demographic characteristics and behavior of Thai coffee consumers. The significant variables used in this analysis were gender, age, income, frequency and drinking time.

Gender

The results in the current study showed that females (61.9%) had more intense emotions than males (38.1%). Mirmiran et al. (2010) reported that gender significantly influenced the selection of food consumption although coffee drinking originates from multiple factors that differ for each individual. In general, females have more positive feelings and emotions regarding food than males (Kring and Gordon, 1998). Moreover, females were more concerned with food nutrients than males (Du et al., 2010). In the current study, 'Active' was significantly associated with a higher score in females (3.6) than males (3.3), as shown in Fig. 2. This relationship was reasonable because the nature of females requires a longer time to stimulate the emotion and it lasts longer with a much higher intensity than for males (Gard and Kring, 2007).

Age

Aging affected not only emotion but also coffee product selection. This result was compatible with den Uijl et al. (2016) who found that aging and experience affected learning and expressions. As a result, the arousal, potency, and/or violence of emotions tends to reduce over time (Svärd et al., 2014). Montepare and Dobish (2014) stated that younger aged individuals often expressed more positive emotions than older adults. Nevertheless, the seniors were able to appropriately deal with

negative emotions and usually reflected a more positive response to them.

Income

Sosa et al. (2015) studied two different household income groups in large and small cities in Argentina regarding 33 emotions correlated to six food items. Their study showed that the level of income was the key factor for food selection, with the lower income group tending to have more negative emotions. However, there was no difference between the household emotions of small and big cities. From this perspective, Hough and Sosa (2015) reported that low income and uneducated consumers would intake more salty foods than higher income and nutritionally educated consumers. Moreover, the lower income consumers preferred local food brands while medium income consumers often chose the leading brands. Correspondingly, in the current study, the highest income group expressed more positive emotions ('Fancy', 'Pleased', 'Pleasant', 'Polite') regarding coffee drinking.

Drinking frequency

The amount of coffee drinking affected the elicited emotions as was reported also in previous studies. Nehlig (2010) suggested that a low-to-moderate dose of caffeine (2–5 cups of coffee/d) would increase hedonic tone (the degree of pleasantness) and reduce anxiety, nervousness and jitteriness, whereas drinking too many cups per day or a single high dose and concentration would induce negative emotions due to the caffeine effect. In addition, Brice and Smith (2002a) found that 23 male participants (aged 19–23 yr) evoked the same emotions after they had had either a multiple, small dose coffee regimen (4×65 mg during 5 hr) or a single, large dose (200 mg) regimen. Caffeine in both regimens led to increased alertness and anxiety and improved performance of an assigned task.

Timing

Brice and Smith (2002b) reported that drinking time was usually early morning or post-lunch. Breus (2013) mentioned that moderate amount of caffeine consumed in the right quantity and at the right time could be useful and even healthy, stimulating by increasing alertness and energy levels, while the emotions and feelings were not influenced by consumption at other times. On the other hand, Kanjanakorn and Lee (2017) found that the emotion profiles for coffee consumption in the morning and afternoon resulted in strongly positive, high-energy emotion terms ('Active', 'Boosted', 'Energetic', 'Jolted', 'Jumpstart'). In contrast, Smith (2002) reported that most people were able to control their caffeine consumption in order to maximize the positive effects but they avoided consuming too much caffeine later in the day because it affected their ability to sleep. Likewise, the analysis from the current study revealed that drinking time had an effect on emotions in a similar fashion to the studies mentioned above.

Coffee characters

It is important to understand the relationship between basic product characteristics and consumers' expectation to maintain the standards for the qualification of the raw material and production process. In addition, identification of specific product attributes is also crucial for both advancement of production and the development of prospective marketing plans because they reflect an understanding of consumer demand based on their sensations and emotions when drinking coffee. For example, Jang and Namkung (2009) found that coffee product quality, aroma and taste were key factors that created sensory perception and led to the evolvement of emotions and feelings. Similarly, the current study found that Thai coffee consumers paid the most attention to the coffee taste, followed by its aroma and material quality and then accessibility, service and atmosphere.

Emotion has been recognized as an important factor in business and manufacturing. Manufacturers should give priority to applying such available information in synergy with their product development and market plans. The current study identified 47 emotions in the Thai emotion lexicon (33 emotions from the ESP method and 14 new terms from high intensity scores based on the specific characteristics of Thai coffee drinkers). Furthermore, the demographic characteristics and consumption behaviors identified and quantified in the survey were analyzed in relation to the established emotion lexicon. The outcomes from the study were able to provide specific, relevant and meaningful emotions at various intensity levels which varied according to the differences in the demographic characteristics and behaviors of Thai coffee consumers. However, applying these findings to other countries or regions may be misleading because of different cultures, traditions or lifestyles. To ensure product success, it is necessary to identify the most desirable coffee product to offer to consumers. This can be accomplished initially by following the product development process to identify the best coffee bean (raw material) which can attract the desired consumer sensory preferences. Next, awareness is required of the emotional profiles of the target consumers through studying their demographic characteristics and behaviors, to maintain a long-term life cycle of the coffee product. Based on these considerations, a bright future for a coffee product in the market should be assured by using a consumer survey and experimental testing regarding the designed coffee product to obtain both high sensory preference scores and a high intensity of positive emotion levels.

The emotion lexicon developed in the current study should only be considered as identifying coffee consumer responses to coffee consumption in general. When utilizing a study of a specific coffee product category (such as brewed coffee), the terms may need to be verified for their appropriateness and the participants may need to be screened to include only brewed coffee consumers according to the objective of the study.

Conflict of Interest

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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