Szent István University

PhD School of Management and Business Administration

MARKETING AND RESEARCH + DEVELOPMENT INTEGRATION FOR DETERMINATION OF SUCCESS OF THE PRODUCT

SUMMARY OF PH.D THESIS

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2   RESEARCH BACKGROUND AND OBJEC-
TIVES

The success of a product and the enterprises contributes to the longterm operation and survival of the enterprises. The innovation, the wide product range and the coopertaion between the the border areas should be implemented into the supply chain to develop a succesful and competitive enterprise (GELLYNCK et al. 2012).

We also can state that the food industrial companies' participation in innovation is not adequate, but a compulsory element of the survival. The lack of the innovation or lower level among countries can cause a barrier into successful access into the international market and competition. It was defined as a key, necessary element of their survival, so we can see the evolution at the different sectors (SEBŐK et al. 2013).

The good applied innovation activities have a great influence on the competitiveness and the profit margin of the products and services and also contribute to economic development, the capability of maintaining working places and to satisfy society's needs. According to the NIH (2013) the innovation activity of Hungarian food industry is significantly lower than the European. While the European food industry production value from the R & D spending an average of 0.5% of the output, while the domestic food industry, it is only one to six.

Market success requires to implement marketing and R+D tools into product development even into the existing products. Considering that the current products are satisfying the costumers' needs if they do not, they should be improved (SEBŐK et al. 2013).

Sensorial attributes also contributes to the food product success. In case of the consumers' expectation and the sensory attributes of the product are not corresponding, further evaluations are not necessary (TOURILA and CRDELLO (2002)).

During my research I focused on pralines with defaults to gain a deeper insight into consumers' expectations, the intrinsic attributes of the product and to explore the product development process and the possible modification of the this process.

Pralines are considered as one of the most popular sweet with unique and special flavour. They are related to the chocolate made from bitter cocoa bean. The innovative nature of the chocolate has facilitated to become one of them most popular food in the world even if it is made from bitter cocoa beans. The positive and appealing attributes like the high calorie content, fat content, sweetness and the easy to melt texture contribute to the popularity of the product. With its complex nature is suitable for determining flavour preferences. Furthermore, it can be used to highlight cross-cultural differences as it is less popular on the production areas than in Western areas (MACFIE, 2007).

For confectionery industry, crack formation and surface bloom in filled chocolate / praline-systems are largely relevant. Chocolate bloom is a whitish coating that can appear on the surface of chocolate. This effect is one of the main concerns in the production of chocolate. There are two types of bloom: fat bloom, arising from changes in the fat in the chocolate; and sugar bloom, formed by the action of moisture on the sugar ingredients. Presece of blooming chage some texture and flavour attributes but cause food safety problems. Cracking mostly appears on the bottom of pralines.

It is estimated that 143 000 ton chocolate is affected by quality problems like fat bloom and cracks, which costs the European chocolate industry up to EUR 1.2 million a year (PROPRALINE (2011)). Which is why I focused on to understand the influence of defects on surface on consumers' preference and which attributes should be improved to achieve a higher product acceptability. Furthermore, to determine the suitability of methodological innovations for testing pralines and explore the possibilities if the latest R+D results provide advantages to raise the reliability and practicability/feasability of the results.

My research provides an example for fodd industrial innovation collaboration with marketing tools and sensory assessment.

Most of the research was prepared using data collected in the frame of the PROPRALINE EU FP7. Ghent University and Campden BRI Magyarország Nonprofit Kft. splitted the related taskes between each other and both performed the tasks individually, then the results were discussed.

In my dissertaion I presented Hungarian results which were compared with the Belgian results (PELSMAEKER et. al. 2011).

My aims and hyptheses were the followings:

1. Determining the R+D directions which can be integrated into the praline product development process to enhance the possibility to develop a successful product.
2. Determining the most important sensory attributes according to the quality management and the consumers.
3. Developing a descriptive method for pralines and establishing the pralines flavour wheel.
4. Exploring the praline related consumers' behaviour and determining consumers' perception of quality pralines defects (cracking and blooming).
5. Determining the praline related consumer behaviour.
6. Determining the impact of vision and vision with tasting together on evaluating product defects.
7. Developing a method to measure the product defects of pralines (blooming and cracking).
8. Comparing Hungarian and Belgian praline eaters to determine the differences between the two cultures.
9. Adopting a method for measuring taste sensitivity for the industry.

H1: Flavour is the most important attribute according to consumers and quality management.

H2: If the praline has nice flavour, consumers accept more samples with product defects.

H3: The most important factor for own consumption of pralines was flavour.

H4: Socio demograpic aspects were not suitable angle to describe the consumers' attitude towards the product attributes and defects.

H5: Vision and taste influance the role of desire in consumer behaviour.

H6: Product defects can be measured by consumers.

H7: Blooming was more accepteble than cracking.

H8: Evaluation of blooming and cracking is different in the two countries.

H9: Taste sensitivity influances the perception of product defects.

3 MATERIAL AND METHOD

3.1 Selected pralines

Six variants of model pralines were selected for the research. They were differ from each other in chocolate covertures, flavour of the filling and the concentration of the filling as well. The selected pralines are very similar to the regular SME (Szamos Marcipán Kereskedelmi Kft és Chocolaterie Guylian NV/SA Belgium) pralines which provide the opportunity to provide useful information to the SMEs and to the industry. They were chosen because it is more likely that blooming a cracking appear on these variants.

The Hungarian pralines were produced in Szamos with the help of Campden BRI Magyarország Nonprofit Kft. The Belgian pralines were produced by the UGent Cacaolab in collaboration with Guylian. The ingredients for the variants were delivered by Bühler AG (Switzerland).

The recipes of model pralines were well defined and no variation in the recipe was allowed over the two production places. These are confidential information as the model pralines are similar to the regular products of the producers company.

3.2 Methods and evaluation techniques

Table 1 shows the used methods and evaluation techniques. The online survey will be explained below.

3.2.1 Quantitative research: online survey and tasting session

In Hungary, the experiment included two extra parts-perception and detection considering the rules of Solomon design (BRAVER and SANFORD, 1988). In Belgium only 1-2 and 4-6 parts of the experiment were conducted. In my dissertation I focused on the Hungarian results, and in some steps the comparison of the two countries also presented (PELSMAEKER (2011)).

Characteristic of the target group

In both countries consumers were interviewed making a distinction between heavy, medium and light users of chocolate.

3.3 Methods of data collection and analysing method

Table 1 shows my research goals and the main data collecting methods and evaluation techniques.

Table 1: Summary of research goals and methods

Nr.	Research goal	Method of data collection	Analysing method
1.	Determining the R+D directions which can be integrated into the praline product development process to enhance the possibility to develop a successful product.	**Secondary research** (literature review)	
2.	Determining the most important sensory attributes according to the quality management and the consumers.	**Quantitative research:** Survey with ranking exercise Randomized sampling from 5 countries: Belgium, Sweden, Czech Republic, Hungary and Switzerland, with equal distribution, eighty consumers and quality management member.	Ranking exercise was evaluated by Friedman test following the MSZ ISO 8587:2014 standard (*Global risk 5%*).
3.	Developing a descriptive method for pralines and establishing the pralines flavour wheel.	**Quantitative descriptive sensory analysis** Based on MSZ ISO 6658:2007, standard section: 5.4.3. and MSZ ISO 11035:2001. 12 variations of model pralines were evaluated in two repetitions.	Two-way analysis of variance (ANOVA). The Newman Keuls (NK) multiple comparison test is then applied to determine whether the samples are significantly different for each attribute at a specified level of significance (5%). Generalized Procrustes Analysis (GPA) (KEMP et. al., 2009)
4.	Exploring the praline related consumers' behaviour and determining consumers' perception of quality pralines defects (cracking and blooming).	**Qualitative research:** Focus group with 12 participants (GYULAVÁRI et al. (ed.), 2012) **Quantitative research**: online survey was conducted (quota sampling)	
5.	Determining the praline related consumer behaviour.	**Quantitative research**: online survey Quota sampling N:400 in Hungary and N:456 in Belgium **Consumer behaviour**	**Discriminant analysis** (SAJTOS and MITEV, 2006) **Factor analysis** (SZELÉNYI, 2001; SZŰCS (ed.), 2002) **Cluster analysis** (SZELÉNYI, 2001; SZŰCS (ed.), 2002)

Nr.	Research goal	Method of data collection	Analysing method
6.	Determining the impact of vision and vision with tasting together on evaluating product defects.	**Measuring intrinsic product defects- online survey**	**R**egression analysis – in case of the Extended TPB model. (SAJTOS and MITEV. 2006).
7.	Developing a method to measure the product defects of pralines (blooming and cracking)		**Analysis of variance** (KEMP et. al.. 2009)
8.	Comparing Hungarian and Belgian praline eaters to determine the differences between the two cultures.	**Tasting session** (in sensory laboratory)(Randomized Quota sampling)	**Discriminant analysis** (SAJTOS and MITEV. 2006) **Factor analysis** (SZELÉNYI. 2001; SZŰCS (ed.). 2002) **Cluster analysis** (SZELÉNYI. 2001; SZŰCS (ed.). 2002)
		Quantitative descriptive sensory analysis Based on MSZ ISO 6658:2007. standard section: 5.4.3. and MSZ ISO 11035:2001. The pralines were evaluated in two repetitions and Latin Square design was used.	Two-way analysis of variance (ANOVA). The Newman Keuls (NK) multiple comparison test is then applied to determine whether the samples are significantly different for each attribute at a specified level of significance (5%). (KEMP et. al.. 2009)
9.	Adopting a method for measuring taste sensitivity for the industry.	**Quantitative research** testing taste sensitivity (randomized sampling) **Test with PROP filter papers:** DREWNOWSKI et al.. (1997) and KAMINSKI et al. (2000) **Test with PROP filter solution:** LMS(linear magnitude scale) scale was used according to DREWNOWSKI et al.. 1997 and BARTOSHUK et al. (1994) **Taste sensitivity for basic tastes** 32 out of 120 conducted the sensitivity test for the basic tastes based on the methods of MSZ ISO 3972:2003	Evaluation was performed by DREWNOWSKI et al.. (1997). During the evaluation I used descriptive analysis and procedure of HEGYI - KUTI (2015) and MOLNÁR (ed.) (1991).

3.3.1 Quantitative research: online survey and tasting session

Group A included 120 participants who were chosen randomly from 400 participants. They taste the model pralines and on their second testing occasion they completed the online survey (characterization of consumers intrinsic product attributes, consumer behaviour) again. As they filled twice the questionnaire I was able to evaluate the impact of vision ant tasting together.

Group B did not taste the samples, but they also filled the questionnaire again on the second testing occasion. Group C had to answer the questions related to instrinsic product attributes on their second test occasion.

Group D only filled the survey once.

The online survey consisted of 3 parts:

1. Questions related to the **characteristics of consumer**: A first part of the questionnaire contained personal characteristics as well as socio-demographic. habit, frequency and preference questions.
2. Second part of the questionnaire consisted of questions on **intrinsic properties** of the pralines. The pictures on defected pralines were presented and the consumers evaluated the pictures by using a 9-point liking, disliking scale and JAR scale.
3. Last part focused on **consumer behaviour**. Three main parts could be indentified with the following measuring techniques: FCQ – ordinal category; ACQ - bipolar category and extended theory of planned behaviour (TPB) - bipolar category; and ordinal scale was used.

3.3.1.1 Tasting session

Consumer tests were carried out at Campden BRI Magyarország Nonprofit Kft. and at Sensolab (Belgium). In Belgium. 102 consumers participated in the test and in Hungary there were 120 consumers. During the testing we wanted to minimise the carry over and other psychological effect which is why we only tested 10 samples at the same time following the recommendations of MSZ 20628-1:1986. Because of that we held 3 different test occasions to all 120 consumers were able to participate in the test beside the times when their taste recognition capability and their sensitivity of basic tastes were assessed.

The list of attributes included gloss, colour, chocolate smell, sweet smell, hardness, greasiness, chocolate taste, sweet taste, specific aroma of the filling. These attributes were scored on a JAR-scale[1]. The evaluation contained questions on overall attributes on appearance, smell, texture, taste and smell of filling. These questions had a 9-point scale, just as well the overall impression. Buying intention was scored on a 5-point scale.

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[1] This is a 5-point scale where the middle point means 'just about right'. The left part of the scale means that the attributes is evaluated as too low and the right side of the scale indicates that the intensity of the attribute is too high.

4 RESULTS

4.1 Product development process of the product with modification

I studied the integration of R+D and marketing tools during product development process, focusing on pralines with defects (blooming and cracking). Literature review proved that the steps of product development could be used in cases of products that needed modification, like pralines with defects.

4.2 Idea testing – ranking exercise in the survey

Consumers and quality management responsible for decision making ranked 12 sensory attributes of pralines. Table 2 shows the results.

Table2. : Raking order of the sensory attributes of pralines (*Friedman test. 5%*)

Quality management			Consumer		
Attribute	Group*	Average rank	Attribute	Group *	Average rank
Gloss	A	3.14	Chocolate flavour	A	4.04
Chocolate flavour	B	4.53	Flavour of filling	A	4.48
Flavour of filling	BC	5.62	Colour	B	5.93
Cracking	CD	5.73	Cracking	BC	5.99
Smell of filling	DE	6.77	Chocolate smell	BC	6.20
Chocolate smell	EF	7.09	Hardness	BCD	6.81
Colour	EF	7.21	Sweet flavour	BCD	6.88
Hardness	EF	7.25	Smell of filling	CD	7.08
Greasiness	EF	7.30	Sweet smell	D	7.44
Other	EF	7.60	Gloss	D	7.51
Sweet flavour	EF	7.86	Greasiness	D	7.80
Sweet smell	F	7.91	Other	D	7.85

* Note: The samples that share the same letter are not significantly different (5%).

In summary. it can be stated that H1 was partially proved as flavour was the most important attribute according to both groups. Furthermore the results showed that management quality was more critical during the evaluation of pralines with blooming as they had less shiny surface.

4.3 Idea testing – Results of the focus group

The focus group report in whole details is in the PhD. thesis. This summary concentrate on the main outcomes on comsumers'buying habits, behaviour, attitudes on product defects. The participants mentioned that they buy these products for own consumption or as a gift.

Flavour, brand and the price were the main drivers of product choice in case of own consumption, while if the sample was a gift, the three most important factors were the packaging, the price and the brand beside the flavour, the assortment, alcohol content, piece by piece packaging, producer and quantity.

Pralines are usually giving as a gift for special occasions such as Easter.

The participants' opinion was that age may have an effect on preference for dark or milk chocolate. When getting older, dark chocolate is more preferred than pralines with milk chocolate covertures. Based on the participants' opinion it can be stated that two directions are required: a new, trendy (with vivid colour) direction and a traditional, classical style direction.

The respondents preferred those pralines where they get real information about the pralines through pictures or written information on the pack. e.g.. what kind of fillings in the box. The most preferred fillings are the alcoholic, the marzipan. the coffee cream and the hazelnut cream ones. In terms of filling preference there were no significant differences among the different covertures.

I also examined that in product quality point of view, which attributes are the most important ones. According to the participants, most important attributes of the pralines are taste, then texture, shape, aroma, packaging and colour. However they did not differ from each other significantly (5%).

Cracking was the only one product defect which was mentioned by the respondents. They did not identified blooming as a product defects, however a few respondents connected blooming with drier month-feel and less pronounced flavour.

Half of the respondent mentioned that blooming was not a product defect as most product label highlighted that „the change in the gloss of the product would have not caused food safety problem".

None of the respondents linked cracking and/or blooming to food safety problem. They were rather defined as a quality problem.

The quality problems are only accepted by the respondents if they do not destroy the nice, common flavour profile of the pralines. *„I just unwrap it then eat it right away!"* The quality problems are more accepted for handmade.

The acceptability of product defects was tested by a ranking exercise (1-most appealing, 5- less appealing).

The participants were asked to rank the pictures with pralines which had five different blooming levels.

Table 3 shows the outcome of the ranking exercise. One group of the participants found the bright version more appealing. The other group of the participants preferred the pale one. The two different ways of thinking of the participants might cause no significant differences among the bloomed samples (Figure 1 and Table 3).
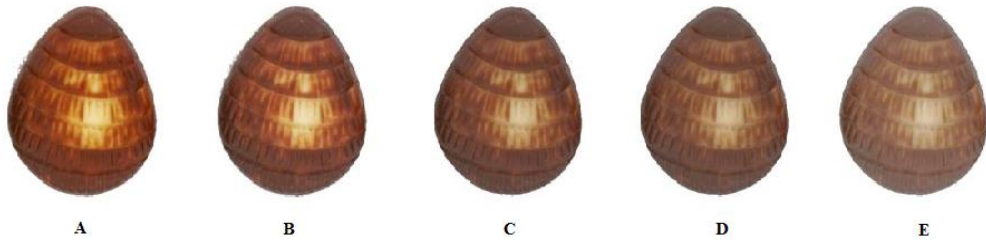
Figure 1: Different bloomed pralines presented to the participants (A-E in order)

Table 3: Ranking of bloomed pralines

Picture	Sum of Ranks	Group*(Difference test at 5%)
D	20	-
B	27	-
C	32	-
E	34	-
A	37	-

Note: Fizz software was used. Friedman test (5%)

The participants were asked to rank the pictures with pralines which had five different cracked levels. This exercise was harder for them. They only noticed the cracking if it had an impact on sensory attributes, for example praline was dry and did not contain any filling.

In summary. it can be stated that H2 and H3 was proved.
H2: The most important factor for own consumption of pralines was flavour**.**
H3: If the praline has nice flavour. consumers accept more samples with product defects.
It is worth to mention that milk chocolate was the most prefer but it can be changed by age and dark chocolate become more preferred.

4.4   Prototype development – Quantitative Descriptive Analysis

4.4.1   Setting up a trained sensory panel and establishing the pralines flavour wheel

Sensory panels in Belgium and in Hungary included 8 panellists who completed all ranking / discriminating exercises and showed overall good discrimination ability.
We had to establish the common procedure to be used in Hungary and Belgium to train the panel. The panel performance of both panels was checked and compared.
During the training lot of different variants were evaluated which provided the opportunity to collect wide range of flavour attributes which were used to establish the flavour wheel of pralines (Figure 2). Until now these kind of assessment was only available for chocolate.

QDA was used to train panellists who would be able to detect the differences and similarities between the pralines attributes. My literature review also confirmed the use of this method (SCHOLLAR (2007).

During the development of the descriptors list, the number of attributes was reduced from 35 to 28 descriptors.

After discussion 7 attributes were deselected because the panellists found them to difficult to understand or to score. The excluded attributes were: melting in the hand, fracturability, adhesiveness, dryness in mouth, residues after chewing, dryness and stickiness of filling.

Figure 2: Flavour wheel of pralines

These 28 attributes were further used in the sensory profiling of the SME pralines.

4.5 Pilot testing – Quantitative research: online survey

4.5.1 Evaluation of the characteristics of Hungarian praline eaters

A first part of the questionnaire contained personal characteristics as well as socio-demographic (age, gender, education, salary category and BMI Index). habit, frequency and preference.

4.5.1.1 Socio – Demographic characteristics of respondents in Hungary

There were 62% female and 38% males involved in the consumer test. There was an age spread from 18 to 60 in Hungary. The consumers had normal heights and weights. This was the same percentage as for the Belgian consumers. Most of the Hungarian people only had an education on the level of high school. Most of the consumers had an income from >90.000-300000 Ft. All respondents lived in the city.

Socio demographic aspects were not suitable angle to describe the consumers' attitude towards the product attributes and defects which is why it can be stated that H4 was not proved.

4.5.1.2 Personal characteristics of Hungarian consumers

In the questions on personal characteristics consumers received a number of bipolar scales in which they indicated how much they are socially active or socially passive. for example. These questions were also used to segment the market or give a more specific description of the segments. All these questions helped to determine the profile of the respondents and enabled linking their behaviour to a certain groups of people.

Hungarian consumers considered themselves as socially active. confident and controlled. Low scores were given on indifferent, unemotional, unstable, unkind, disorderly, inefficient and unhealthy. The Hungarian consumers had a more specific opinion on their personalities than the Belgian consumers.

The factor analysis indicated that the different characteristics could be grouped in four different factors. The first factor was build on indifferent, unemotional, unconcerned and negatively on socially active. This factor was called the **non involved** factor. The second factor contained attributes that were related to **extravert** people. They were confident. bold, experimenting, trusting and prefer to be in group. The third factor was **emotional/confused**. This factor was grouped with four different words that all indicated that the person was lead by emotions and could be chaotic in his thoughts and actions. The fourth factor grouped economical and controlled attributes for **rational** people.

Cluster analysis was done to segment the consumers based on these four factors. Two clusers were determined.

Cluster 1 had a higher attitude towards extravert and rational. These are very **stable people** who like to be in group. These people could be defined.

Cluster 2 had higher values not involved and emotional.This cluster contains unstable people and consumers who are indifferent towards. These are more **solitary people**. A cross-tabulation was done to analyze the socio-demographic characteristics of the different clusters. There was only one characteristic in which these clusters had significant differences. namely net income. Cluster 1 contained 54% of consumers with an income between 90.000 and 300.000 HUF. The second cluster contained more people with a lower income (<300.000HUF). Analysis was done to explore any connection among product attribute, defects and the clusters. The preferences of the consumers for filling and covertures were linked to the clusters. One-way ANOVA indicated that there were no significant differences between the clusters on preference of covertures and preference of filling. The same analyses were done for sensory analysis of the pictures. When the results of these evaluations were compared with the clusters on personal characteristics. one-way ANOVA showed that there were significant differences on all the pictures in the sensory evaluation (Table 4.).

Table 4. ANOVA between sensory analysis and clusters of personal characteristics for Hungarian consumers

	Attributes	Sig.	Cluster 1 rational		Cluster 2 emotional	
			Mean	StDev	Mean	StDev
slightly bloomed	sb_Overall appearance[1]	0.000	7.28	2.08	6.50	2.26
	sb_Presence of blooming[1]	0.000	2.84	2.30	4.11	2.56
	sb_Acceptability of blooming[1]	0.000	7.22	2.35	6.20	2.63
	sb_Presence of cracking[1]	0.000	1.59	1.42	2.66	2.44
	sb_Acceptability of cracking[1]	0.002	8.26	1.73	7.68	2.04
bloomed	b_Presence of blooming[1]	0.000	8.07	1.88	7.11	2.64
	b_Acceptability of blooming[1]	0.007	2.13	1.99	2.69	2.16
	b_Acceptability of cracking[1]	0.010	7.36	2.17	6.73	2.63
slightly cracked	sc_Overall appearance[1]	0.028	3.88	2.00	4.34	2.22
	sc_Presence of blooming[1]	0.029	2.91	1.83	3.35	2.22
cracked	c_Overall appearance[1]	0.000	2.56	1.75	3.58	2.24
	c_Presence of blooming[1]	0.006	3.05	2.24	3.70	2.48
	c_Acceptability of blooming[1]	0.032	6.66	2.36	6.13	2.54
	c_Presence of cracking[1]	0.018	7.81	1.82	7.37	1.89
	c_Acceptability of cracking[1]	0.000	2.49	2.02	3.66	2.40

Note: [1] 9-point scale; [2] 5 – point JAR scale. sb = slightly bloomed. b = bloomed. sc = slightly cracked. c = cracked

Respondents in cluster 1 (rational) detected correctly blooming. However they were very extreme in the evaluation of presence of blooming. They did not like the praline and gave extreme bad scores on these attributes which lead to a very low acceptability. The respondents in cluster 2 had more doubts and wrongly thought that there was cracking on samples without cracking. Cluster 2 recognized the product defaults correctly and their judgement was more moderate.

Results showed that rather than socio-demographic aspects. personal characteristics were much suitable for describing the consumer's attitude towards product defects.
Respondent in cluster 1 recognized well the presented product defects and those samples which had larger defects received lower acceptability scores. While more emotional respondents (Cluster 2) did not always recognize the defects. and sometimes they indicated badly that there was blooming/ cracking visible.
Segmentation based on socio-demographic aspects did not show any significant differences.
- **H6** was proved
    H6: Product defects can be measured by consumers.
It is important to highlight that the personal characteristics influenced greatly the acceptability of the products. In cluster 1 blooming was detected correctly and samples with greater blooming were less acceptable for the respondents.

In cluster 2 with the emotional respondents not just the presented defect were recognized. They were moderate in their judgement in case of larger defects and they detected correctly the presence of cracking.

Rational respondents evaluated correctly the presence of cracking pralines with several cracking received lower acceptability scores. They did not indicate product defects on samples with our product defects.

- **H7 was proved**

H7: Blooming was more acceptable than cracking.

- **H8 was proved**

H8: Evaluation of blooming and cracking is different in the two countries.

The clusters that were found in Belgium and Hungary had different profiles. This meant that the personalities of the consumers were different in both countries.

In every segmentation. there were however significant differences between the clusters on the evaluation of the pictures. For the Belgian people only one attribute was significantly different. namely presence of blooming on the bloomed pralines. The clusters in Hungary differed significant on more attributes and on every presented picture. This indicated that the consumer characteristics had an influence on the sensory preferences towards pralines.

Assessing **personal attributes**. it can be stated that Hungarian consumers considered themselves as socially active, confident and controlled. Low scores were given on indifferent, unemotional, unstable, unkind, disorderly, inefficient and unhealthy. The Hungarian consumers had a more specific opinion on their personalities than the Belgian consumers. The results indicated that the consumer characteristics have an influence on the sensory preferences towards pralines.

4.5.1.1 Assessing the results of the Hungarian consumers' frequency of consumption and habits and preferences

30% of the participant (400 participants) considered as heavy user. 30% medium user and 30% light praline user. More than half of the participating preferred milk chocolate. 36% of them preferred dark and 10% of the participations preferred white chocolate. The main difference between the two nations that Hungarian respondents preferred alcoholic filling more than the Belgians.

Age, gender, weight watch and net income did not correlate significantly with the preference of filling and chocolate covertures.

Most of the respondents bought pralines for own consumption and for their family members. Regarding the frequency of consumption, equal distribution was observed between consumers who eat pralines weekly. monthly basis and the ones who eat pralines with less than a month frequency. Ones who ate pralines every week, consume 2 or 3 pieces at the same time, while respondent who only ate pralines monthly, usually eat 1-2 pieces.

In summary. it can be stated that there was not find correlation between frequency of consumption and the preference of filling and covertures. Furthermore, when we assessed the result by BMI index. there was not detecting any difference between BMI categories. The most preferred filling was hazelnut filling. and in higher BMI categories the preference of hazelnut filling increased. Respondents in all categories preferred alcoholic filling equally, while fillings with other flavours were preferred in lower weight categories.

Milk chocolate was preferred by respondents with higher BMI category.

From the frequency of consumption point of view the results showed that a slight bloom on the surface had a less negative effect on the overall liking of the appearance, while they received lower acceptability points when the defect was more extended. just as we stated in the results of the focus group.

Slight blooming was more acceptable for medium users; they accepted the appearance and the quality of these products. All groups evaluated negatively blooming. Respondents gave lower point for the acceptability of cracking as this type of product defect was easier to understand for them. The cracking as a product defect was more acceptable for the participants who are medium users.

4.5.2 *Evaluation of intrinsic properties*
A second part of the questionnaire aimed to explore the opinion on product defects. Group B evaluated the product defects only on picture. while Group A tasted them as well.

4.5.2.1 *Impact of perception on the evaluation of intrinsic properties and product defects*
Group A and B filled the online questionnaire not he first test occasion, than the member of Group A also tasted the bloomed samples. The online survey included 4 pictures on pralines with product defect (slightly bloomed. bloomed. slightly cracked. and cracked). Only the bloomed pralines were involved into the tasting sessions they presented the main interest of the industry.

During the time the respondents filled the questionnaire; they always could see again the pictures. Questions were related to the appearance, the gloss of the pralines and to the presence of cracking and blooming. I inserted two questions into the questionnaire which did not connect to the presented pictures to prove the fact that consumers wanted to indicate that they see something because they thought it was expected from them. In a certain way they wanted to answer what they think is expected from them.

The results of group A and B were compared by the means of „acceptability of blooming” and „acceptability of cracking”.

Members of group A gave lower scores on the second test occasion during tasting for the presence of blooming than they had given during the first test occasion. Group B gave higher or similar scores on the second time. Product defects were more acceptable for Group B which might lead to the conclusion that consumers realized during tasting the sample that blooming had an effect on quality.

The acceptability of slightly cracked praline did not change between the two test occasions. On the contrary pralines with extended cracking received significantly lower acceptability scores on the second test occasion from both groups. Group A and B recognized well both product defect and indicated their acceptability. Both group accepted pralines with slight blooming while they rejected samples with extended blooming on the surface.

It can be stated that tasting the defected pralines had a negative effect on acceptability of pralines with product defects.

4.5.2.2 Measuring the product defects with liking and disliking scales

Group C only evaluated product defects on picture. but for evaluation they used a liking and a disliking scale as well. The disliking scale was a 9-pint hedonic scale which proved to be the most appropriate to tackle the differences between the samples (WENDER (2011) and JAEGER et al. (2009). GIACALONE et al. (2014)). Bipolar disliking and linking. and unipolar disliking scale were used to evaluate the appearance of samples.

It was examined that the different scale categories differ from each other significantly.

Cracking as a product defect was obvious for the consumers and evaluated it similarly on both scales. They did not like pralines with cracking and they mostly used the disliking scale for evaluation. Disliking scale was more suitable to interpret the rejection of pralines. However this is not that obvious in case of bloomed pralines because of the Hungarian consumers' moderate judgement.

In summary it can be stated that liking of defected products can be measured better with a disliking scale than a bipolar scale. The level of rejection can be determined better.

4.5.2.3 Comparison of the perception of product defects between Belgium and Hungary

The evaluation of the overall appearance of the defected pralines was equal to the degree of defect on the pictures in both countries. Hungarian consumers scored higher pralines with product defects than Belgian consumers. Although the Hungarian consumers observed blooming on the slightly bloomed pralines. The acceptability was still relatively high. The degree of blooming influenced the perception of gloss and colour. When asked for the presence and acceptance of cracking, they indicated that their acceptance was a little higher for the slightly cracked pralines. The degree of cracking was less visible for the Hungarian consumers. The differences between slightly cracked and cracked pralines were lower than the differences between the degrees of blooming.

The picture with the slightly bloomed praline was preferred on overall appearance by Belgian consumers. The bloomed praline received the lowest score. On the presence of blooming, the slightly bloomed picture received a score of 4.42 which increased to 8.21 for a bloomed praline.

The acceptance of the pralines decreased simultaneously with higher level of blooming or cracking. The consumer recognized the increase of the cracking from slight to full cracking and again the acceptance decreased with a higher level of cracking on the product.

An interesting result was that although on the blooming pictures the pralines had no cracking. the consumer indicated that slight cracking was visible. The identical result was found for the pictures of the cracked pralines. The consumer indicated again that blooming was present although these pralines showed no blooming on the pictures. This result can be allocated to the fact that consumers wanted to indicate that they see something because they thought it was expected from them. In a certain way, they wanted to answer what they think is expected from them.

It can be stated that in Hungary and in Belgium as well. the consumers' evaluation for the overall appearance of the defected pralines was equal to the degree of defect on the pictures. Hungarian consumers accepted more the bloomed or cracked pralines.

In summary. H8 was proved.
H8: The cultural differences have any effect on perception of products and product defects.

4.5.2.4 Comparison of the perception of the two product defects

The results are summarized in Table 5 regarding the evaluation of intrinsic attributes. Slightly bloomed pralines received the highest scores while bloomed ones were the least acceptable for the Hungarian consumers.

Table 5: Evaluation of intrinsic properties by the Hungarian consumers

	Slightly bloomed	Bloomed	Slightly cracked	Cracked	Comp. F	Sig.
Overall appearance	6.93 A	2.21 D	4.08 B	3.01 C	559.4	<0.0001 ***
Presence of cracking/ blooming	3.40 B	7.64 A	-	-	409.07	<0.0001 ***
Acceptance of cracking/ blooming	6.77 A	2.38 B	-	-	403.16	<0.0001 ***
Presence of cracking	-	-	6.03 B	7.62 A	718.04	<0.0001 ***
Acceptance of cracking	-	-	4.19 A	3.01 B	479.16	<0.0001 ***

Note: The samples that share the same letter are not significantly different

In summary. it can be stated that H7 was proved.
H7: Consumers accepted more blooming as a product defect than cracking.

4.5.3 Consumer behaviour

As a third part. three existing consumer models were used for segmenting. It consisted of 3 parts: Food Choice Questionnaire (FCQ), Attitude to Chocolate Questionnaire (ACQ) and Extended Theory of Planned Behaviour (ETPB).

4.5.3.1 FCQ in Hungary

The results of the FCQ were analysed first with a factor and cluster analysis.

In case of Hungary. the questions in **FCQ** were reduced to only **eight factors** while in Belgium 9 factors were used. The factor price was no longer included. The respondents were divided in two clusters based on these eight factors. The first cluster contained people that were conscious about their health and weight control. The second cluster consisted of consumers who were driven by the sensory characteristics of a product.

When comparing the answers of these two clusters of people on preference on covertures or filling. they differed significantly on preference of covertures. In **cluster 1 there were 40% of consumers that liked dark chocolate and 50% that liked milk chocolate**. **Cluster 2 consists of 60% milk chocolate lovers and only 30% dark chocolate lovers**. The sensory evaluation of the pictures is significantly different for some attributes. There are differences on the four presented pictures. The product defects were better recorded by the people in cluster 1.

In summary. based on the FCQ questionnaire the consumers were grouped in two clusters. The first cluster contained people who paid more attention to their weight and health; while the second group was more emotional driven and they were influenced by the sensory attributes of the products. These differences in attitude caused the difference in the perception of product defects and the preference of covertures.

It can be concluded that H6 was proved by the FCQ questionnaire.

H6: Product defects can be measured by consumers

It needs to be highlighted that the consumers' characteristics as they belong to health conscious or emotional driven group effected their judgement on product defects. Degree of blooming was described well by both groups while cluster 1 gave lower acceptability scores for defected products. but they did not make psychological errors.

4.5.3.2 ACQ in Hungary

The results of the factor analysis of **ACQ** confirmed that **four factors** are found in Hungary. The four factors were conscious, guilt and negative feelings, craving and functional eating. Factor craving comprised items related to craving and emotional chocolate eating. Conscious was identified as a new factor.

Discriminant analysis with leave-one-out classification was applied to define the different clusters.

Two clusters of consumers were identified. The first cluster consisted of people that were emotionally driven when eating chocolate. They had a high feeling of craving and a positive attitude towards guilt. The second cluster consisted of rational people. They have a negative attitude towards guilt and a high positive value on conscious eating.

A cross-tabulation was done to analyze the socio-demographic characteristics of the different clusters. Only the significant differences between the clusters were presented. namely gender. watch weight. education and people in household. Cluster 2 consisted of equal amounts of males and females. The answers of the two clusters did not differ significantly on preference on covertures or filling. There were significant differences between the clusters on the sensory evaluation of the pictures. Again. differences were detected on all the pictures.

In summary the followings can be concluded. The results of the factor analysis of **ACQ** confirmed that **four factors** are found in Hungary. Two clusters of consumers were identified. The first cluster consisted of people that were emotionally driven when eating chocolate. They had a high feeling of craving and a positive attitude towards guilt. The second cluster consisted of rational people. They have a negative attitude towards guilt and a high positive value on conscious eating.

The answers of the two clusters did not differ significantly on preference on covertures or filling. There were significant differences between the clusters on the sensory evaluation of the pictures. Again, differences were detected on all the pictures.

H6 was proved by the results of the ACQ.

H6: Product defects can be measured by consumers.

It needs to be highlighted that the perception product defects was different between the two clusters as the rational ones recognized correctly the defects.

4.5.3.3 Analysis of the Theory of Planned Behaviour in Hungary

The intention to consume pralines was analysed with the model of Theory of Planned Behaviour (TPB).

The TPB was applied to investigate the cognitive influences by which the rational behaviour of consumers may be predicted. The model was analysed through several interrelated components. Behaviour (B) was predicted by intention to perform this behaviour. Subsequently, behavioural intention (BI) was predicted from three components as follows: first, there was an attitude (ATT). explained as evaluation whether the individual sees the behaviour as bad or good, unpleasant or pleasant. harmful or beneficial. The second component stood for subjective norm (SN). This was the perception by an individual of social pressure from important other people to perform a particular behaviour.

The third construct was called perceived behavioural control (PBC) and can be calculated from 'control belief strength' and 'control belief strength'. The PBC component could also be explained as the degree to which a person felt that she/he was in control of her/his own behaviour.

Literature indicated that desires (D) have an influence on behaviour intention and behaviour of the consumer towards food products. This knowledge was translated into an extension of the TPB. Desire was introduced as a new construct that influences a consumer's behaviour.

Regression analysis was done to determine how much the behaviour intention of a consumer was related to ATT, SN and PBC. Additionally, the correlation coefficients between the three constructs and behaviour intention were calculated.

A second regression analysis determined how behaviour intention is explaining the actual behaviour of a consumer.

Normally, a third regression was done to reveal how the behaviour intention and the perceived behaviour control together explain the behaviour. In this study the calculation was not only done with perceived behaviour control but also with attitude and subjective norm. The innovative part of this model was the new construct called 'desire'. In a second step the influence of desire was calculated with regression analysis. Desire was then put as an extra construct when defining behaviour intention. It also was used to explain actual behaviour together with behaviour intention. The importance of desire was proved by ACQ as well. The results of group A and B were evaluated. Only the summarized results are presented.

The internal consistency of the three factors was checked before the value of the three factors could be calculated. I calculated the Chronbach's alphas for the constructs.

Regression analysis was calculated to explain the BI and the B of the consumers on the first occasion. Regression analysis was done for the Hungarian consumers to explain the behavioural intention and the behaviour of the consumers. The beta coefficients were the regression coefficients of the independent variables. For behavioural intention. attitude and perceived behavioural control were significant with $p<0.001$. Subjective norm was also significant but with $p<0.01$. This indicated that the Hungarian consumer was influenced by the three constructs attitude, subjective norm and perceived behaviour control.

On the second test occasion. the behaviour of group A was influenced by behaviour intention. The value of the three construct of BI was similar. PCB and SN were not significant with $p<0.05$. but attitude was significant with $p<0.01$. Perceived behavioural control had a negative beta value. The regression coefficient of attitude was the highest coefficient and positive. This meant the behaviour of the Hungarian consumer was highly depended on the attitude of the consumer towards the product. Perceived behavioural control had a negative beta value. The explained variance, R^2 was low which indicated that these were only a few factors that explained the intention to buy a product.

The beta value for subjective norm was low but positive. The Hungarian consumer was influenced by his/her partner, family and friends to eat or reject pralines. Again a positive influence from these people increased the behaviour intention of the consumer. Perceived behavioural control had a negative beta value. The explained variance, R^2 was low which indicated that these were only a few factors that explained the intention to buy a product. The correlation coefficients represented the same trends. However these coefficients were positive, which meant that there was a correlation between all constructs and the behaviour.

It can be concluded that when Hungarian consumers see and taste defected product. Their behaviour is explained by behavioural intention. BI is influenced by the attitude. The conclusion here was that Hungarian consumers were only influenced by their perceived behavioural control in actual behaviour of eating pralines and not by attitude or subjective norm.

When including perceived behaviour control. the results indicated that the regression coefficient was significant with $p<0.05$ but the increase of the explained variance was low. Identical to the explanation of the behaviour intention. the perceived behaviour control had a negative regression coefficient. When explaining behaviour with behaviour intention and attitude. The results indicated that attitude was not significantly relevant in explaining this construct. The same result was found when including subjective norm in the regression analysis. The conclusion here was that Hungarian consumers were only influenced by their perceived behavioural control in actual behaviour of eating pralines and not by attitude or subjective norm.

In the next step, the extra construct desire was included. The regression analysis was then executed to indicate how big the influence of this construct was on behavioural intention and behaviour.

The regression analysis to define the behaviour of the consumer indicated that the factor desire was influencing the behaviour together with behaviour intention. A positive desire to eat pralines pushed the consumer to actually eat pralines. The explanation of the variances increased when introducing the desire factor.

The factor desire played a role in behaviour intention as well as in real behaviour, but reduced when the consumers had greater understanding on product defect.

- H5 was proved.

H5: Vision and taste influence the role of desire in consumer behaviour.

4.6 Pilot testing – Tasting session in sensory laboratory

Group A included 120 consumers who were selected out of 400 and tasted these pralines. Group A was involved in test procedure with 4 different tasks: measuring taste sensitivity with 3 types of method (sensitivity for basic tastes, measuring sensitivity towards PROP with filter paper and with solutions). Furthermore this group evaluated the pralines by tasted them, not just the fresh one, the bloomed pralines as well.

4.6.1 Measuring the taste sensitivity of consumers

4.6.1.1 Measuring sensitivity for basic tastes of consumers

During the research I calculated each basic taste's the average recognition concentration based on the data of 451 consumers. These concentrations were lower than the recognition threshold established in the standard and they were also acceptable due to the requirements of ISO 3972:2011 and MSZ ISO 3972:2014 standards.
20% of respondents did not recognized correctly umami and metallic tastes. 16.2% of them did not recognized correctly bitter and 11.1% of them made mistake identifying salty flavour. Regarding gender, the same pattern was detected for all basic tastes, but significant differences were not between the reponses of men and women.

4.6.1.2 Exercises for recognition and detection of basic tastes by Group A

Sensitivity for the 6 basic tastes was determined in case of Group A.
32 out of 120 consumers were involved in exercises measuring basic taste recognition and detection. 15 of them filled the requirements. According to the standard. I divided them into 2 groups. One group included those who filled the requirements. and the second group included those who did not. Cross tabulation was done to analyze the differences between the two groups by gender, preference of covertures and filling, overall liking after tasting the pralines and perception of product defects. Only the last category showed significant differences between the groups. Blooming was detected all pralines which proved that the consumers wanted to indicate that they see something because they thought it was expected from them. Consumers who filled the requirements were not more critical towards product defects. Taste sensitivity affected the perception of product defects and acceptability. but it couldn't be measured directly. The complexity of pralines might explain this statement; furthermore. some of the sensory attributes are more important and overrule the negative perception of product defects.

4.6.1.3 PROP test: Bitter taste recognition test

PROP test was performed by two types of test: first one was with solutions the second one was with filter paper. Based on sensitivity to PROP, consumers were grouped into 3 groups: super tasters, taster, and non-tasters. The results of filter paper test showed the consumers more equal distribution which is why this method was chosen for further evaluation. 50% of the respondents were considered as tasters. The results also revealed that women were more sensitive for PROP than men based on the tests with filter paper and solutions as well. The difference was not significant; just more women were in the super taster category. Results also revealed that younger respondents were more sensitive than older ones. The three PROP categories did not evaluate significantly differently the product attributes and defects. It might be caused the fact that PROP was not sensitive enough to reveal the differences or there was not a strong correlation between the attributes because of the complex nature of pralines. When I corralled PROP status and perception of product defects. it became clear that other sensory attributes of the product overruled the bitter flavour which is why the correlation could not be measured directly. Super taster was not more critical regarding product defects.

Correlation between taste sensitivity and preference of covertures was analyzed. Results showed that most of the consumers preferred milk chocolate covertures regardless the sensitivity status. Connection between taste sensitivity and preference were not proved. In my research I focused on bitter taste and consumers who were more sensitive for bitter taste did not prefer more the dark chocolate covertures. When we analyzed the connection between filling preference and taste sensitivity, significant differences were not finding. regardless the taste sensitivity, most of the consumers preferred hazelnut filling. Furthermore significant correlation was not finding between the overall product liking and taste sensitivity status and between BMI index and sensitivity to PROP. The more sensitive praline eaters belonged to the category of normal BMI index.

<u>In summary.</u> H9 was not proved.
H9: Taste sensitivity influences the perception of product defects.

4.6.2 Extended internal preference map
Belgian and Hungarian consumers tasted V1-V6 fresh and bloomed pralines.
In case of Hungarian consumers unlike the Belgians, nice taste may balance the overall evolution of the pralines, even in the presence of product defects. Product defects such as cracking and blooming were correctly recognized by the consumers. Hungarian consumers preferred pralines which were produced in Hungary and Belgian liked more the Belgian pralines. The Belgian consumers disliked the pralines with alcohol filling. Consumers in both countries preferred fresh pralines. As on milk chocolate covertures. product defects were harder to notice. the scoring was more favourable in these cases and pralines with defects but with nice taste had higher acceptability.

The same cultural differences occurred which were mentioned before. Belgian consumers were more critical as a praline eater nation. The extended internal preference map gave an overall picture about the praline samples and the sensory characteristics that drove consumer preferences (Figure 3).
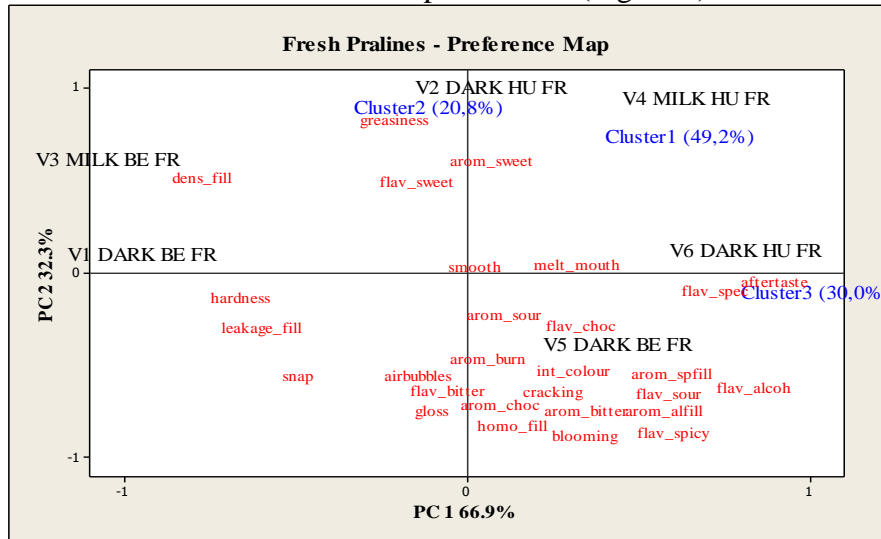

Figure 3: extended internal preference map

Cluster 1 showed high preference towards each examined praline (either dark or milk or alcoholic). the participants who belonged to this cluster especially preferred the pralines with high level flavour intensity of filling.

Cluster 2 preferred samples, which had a high level nut filling and had a more greasy texture. which maybe in connection with the more intense nut flavour. This cluster shows the lowest preference towards the alcoholic samples. The main preference of these people is nut filling.

Cluster 3 preferred the V5 and V6 sample samples, which had alcoholic filling and V4 sample. which was milk chocolate with high level nut filling. The people. who belong to this group. prefer high level of flavour intensity (flavour specific. sour. and alcoholic) and high level aroma.

There was not any specific consumer group. which preferred the V1 and V3 samples. which had low level of flavour intensity and were more dense and harder.

4.6.3   Penalty analysis

This was done using diagnostic attributes against consumer preference liking values. Fresh and stored pralines were involved in the test.

Penalty analysis results suggested that the texture and flavour attributes had a big impact on the liking scores. Main difference can be detected between the two countries in case of samples with alcoholic samples. Both country evaluated different attributes as 'too weak' or 'too strong'. Penalty analysis is a method used in consumer data analysis to identify potential directions for the improvement of products using hedonic and JAR scales.

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5   NEW SCIENTIFIC RESULTS

5.1   Hypothesis testing

H1: Flavour is the most important attribute according to consumers and quality management.
Status: PARTIALLY PROVED
The results of ranking excessive revealed gloss was the most important sensory attribute for the quality management, while flavour was the most important for consumers.

H2: If the praline has nice flavour. consumers accept more samples with product defects.
Status: PROVED
Flavour has a great impact on product choice for own consumption which was proved by FCQ and ranking exercise. Further analysis such as focus group, preference mapping and penalty analysis revealed that beside flavour, texture attributes also affected the perception of product quality.

H3: The most important factor for own consumption of pralines was flavour.
Status: PROVED
The main driver of product choice in case of own consumption was flavour according to focus group. Penalty analyse also heighted the importance of flavour and if the praline has nice flavour consumers accept more samples with product defects.

H4: Socio demographic aspects were not suitable angle to describe the consumers' attitude towards the product attributes and defects.
Status: NOT PROVED
Rather than socio-demographic aspects. frequency of consumption. FCQ and ACQ attitude related questions and personal and emotional characteristics were much more suitable for describing the consumers' attitude towards product defects like blooming and cracking.

H5: Vision and taste influence the role of desire in consumer behaviour.
Status: PROVED
Based on the evaluation, it can be stated that attitudes were not changed by perception. while the acceptability of the product with defect was decreased after the consumer saw the defect. This proved that seeing and tasting had a band effect.
The factor desire was influencing the behaviour together with behaviour intention. A positive desire to eat pralines pushed the consumer to actually eat pralines.

H6: Product defects can be measured by consumers.
Status: PROVED
Cluster analysis was done to segment the consumers based on attitude questions of FCQ and ACQ and socio-demographic questions.
The physiological errors should be measure in future researches made by FCQ's sensory attribute driven and emotional cluster of ACQ.

H7: Blooming was more acceptable than cracking.
Status: PROVED
Consumers accepted blooming more as product defect than cracking.

H8: Evaluation of blooming and cracking is different in the two countries.
Status: PROVED
Several differences occured between the two countries. Belgians disliked pralines with dark chocolate covertures and alcoholic filling. They were more critical on slightly bloomed pralines.

H9: Taste sensitivity influences the perception of product defects.
Status: NOT PROVED
There was not a correlation between perception of pralines with defect and taste sensitivity of consumers. This might be explained by the complex nature of pralines and the facts that consumers accepted more defected pralines which had a nice flavour.
I still believe this hypothesis can be proved by other, more sensitive methods.

5.2   New scientific results

N1: I established praline flavour wheel by using QDA which support the daily work of praline producers.

N2: I also stated recommendations on the tasting threshold. Also revealed the fact that there is no difference between genders in sensitivity for the basic tastes.

N3: I proved that the nice taste balanced the overall evolution of the pralines. even in the presence of product defects (cracking. blooming).

N4: New method and online questionnaire were developed with pictures and disliking scales to measure and describe the perception of praline defects. Te method can be adopted other product defects.

N5: With PROP test, I proved that 50% consumers were capable to identify the bitter taste of PROP. From industry point of view it is important because it proved that a slight change in recipe can be detected by consumers. I also proved that LMS is not a suitable method to measure taste sensitivity.

6 CONCLUSIONS AND SUGGESTIONS

I aimed in my dissertation to present the main steps of product development and explain the method to choose the proper analysis to collect valuable information which leads to product success. I presented these steps through the example of pralines.

After an extended literature review, it became that modified product development process did not differ that much from the traditional product development process.

Modified product development process highlighted that the opinion of the supply chain members should be considered from the beginning of the process to avoid unnecessary costs.

I have the following suggestions:

J1: I suggest that conception testing should be incorporated into the industrial practice and different market members also should be involved.
My experimental plan can be used as a template for the industry, but it needs to be highlighted that steps of the plan should select the most relevant ones such as ACQ, FCQ and extended TPB should not be performed in the same experiment. Also should be considering implementing them method for assessing consumers' personal and emotional characteristics.

J2: I highlight the importance of exploring the personal attributes and the attitudes towards the product.
Opinion of consumers on products and product defects can be very valuable.

J3: During the development processing to avoid product defects. the opinion of consumers should be considered. If the research also analysing the product defects, checking questions should be included to measure the psychological errors.
Pralines were fit to purpose as they have very complex nature. It can be stated that blooming had an effect on flavour and texture.

J4: I suggest applying Quantitative Descriptive Analysis to the sensory analysis of defected products.

J5: I suggest adding more flavour attributes to the praline flavour wheel after a new product launch the market with the cooperation of consumers.
Praline flavour wheel can be a basic for the sensory testing of pralines and it can extend with other attributes.

J6: I suggest the improvement of taste sensitivity test which can be performed by consumers.
An easier method can be applied as the consumers taste solution for all 6 basic tastes which has lower and higher contention than the thresholds.

J7: Sensitivity for basic taste is one of the key elements of sensory panel training which is why I suggest supervising thresholds and comparing them to standard every year.

J8: Preference mapping should be used in cases when the goal is to explore the possible improvement directions and benchmarking. While the aim is to define accurately the possible improvements, penalty analysis should be used.

J9: I suggest including desire to the extended TPB in case of impulse products.
Extended TPB fit for purpose and Benton's questionnaire also suitable for further analysis.

J10: I suggest that if a company wants to enter foreign market the acceptability and preference of a well-know product should be determined.

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