

The Sense of Smell

Chapter 2

Johana Paluchová - Jakub Berčík - Elena Horská

Content of Chapter

- 2.1 How Smell Works
- 2.2 Smell Perception and its Impact on Consumer' Emotions
- 2.3 The Secret to Scent Memories
- 2.4 Odours and Air quality
- 2.5 Deploying Scent in the Marketplace and Aroma Marketing
 - Historical Background of Aroma Marketing
 - Scent in Marketing
 - Definition of Aroma Marketing
- 2.6 Olfactory Brand and Product Marketing. Olfactory Environment Marketing
 - Practical Examples in Product and Service Segment

2.1 How Smell Works 1-1

- humans have 5 millions olfactory cells;
- olfaction is especially important for food selection too. Much of what we call “*taste*” or “*flavour*” is really the odour of the food;
- research has shown that our body odour, produced by the genes which make up our immune system, can help us subconsciously choose our partners (Havlicek and Roberts, 2009);
- generally show this tendency more strongly than men do (Herz and Inzlicht, 2002);
- although the receptors sensitive to a particular chemical are scattered haphazardly in the nose, their axons find their way to the same target cells in the olfactory bulb, in a way that chemicals of similar smell excite neighbouring areas, and chemicals of different smell excite more separated areas (Uchida et al., 2000);
- the olfactory bulb sends axons to the olfactory area of the cerebral cortex. A complex substance, such as a food, activates a scattered population of cells (Lin et al., 2006; Rennaker et al., 2007);
- the human nose can distinguish over 10,000 different odours, being the most sensitive of the senses; besides, it has a tremendous evocative power of memories and experiences over the years (Lindström, 2010);
- Nef (1998) wrote that the olfactory receptors are vulnerable to damage because they are exposed to the air. Unlike receptors for vision and hearing, which remain the same for a lifetime, an olfactory receptor has an average survival time of just over a month.

2.1 How Smell Works 1-2

- each olfactory neuron axon contains copies of its olfactory receptor protein, which uses like an identification card to find its correct partner (Barnea et al., 2004; Strotmann and Levai et al., 2004);
- if the entire olfactory surface is damaged at once, for instance, by a blast of toxic fumes, so that the system has to replace all the receptors at the same time, many of them fail to make the correct connections, and olfactory experience does not fully recover (Iwema et al., 2004);
- odours are initially registered by receptor cells in the nasal cavity. These send electrical impulses along dedicated pathways to the olfactory bulb. The olfactory bulb is part of the brain's limbic system, the seat of emotions, desires, and instincts, which is why smells can trigger strong emotional reactions;
- once processed by the olfactory bulb, data is transmitted via three olfactory pathways to higher centres in the brain that process it in different ways, this process is called „*orthonasal*“smelling, in which smell data travels along pathways directly from the nose;
- in retro-nasal smelling, odours also have a flavour component that enters the olfactory pathways *via* the mouth (Carter et al., 2014A) specific smell will activate a specific pattern or array across the receptors, so that each smell has its own signature;
- when the receptors forming a specific pattern are activated, this signature is sent to the brain for processing (Carter et al., 2014);
- using both nostrils to sample a smell, the human brain uses both sets of data to accurately pinpoint the location of the source of the odour.

2.1 How Smell Works 1-3

- “blind” smell refers to the ability of the brain to detect a smell without being consciously aware of it, which has been demonstrated in experiments using fMRI (functional magnetic resonance imaging) scans showing how olfactory areas are activated without the participant’s knowledge (Carter et al., 2014);
- this study pointed out that 85 % of smell affected customer’s opinion about the goods, thanks to that the willingness to buy fragrance rose by 14.8 %, amount of time spent in the shop rose also 15 %, and the general interest and willingness to communicate odour rose 19 % (Neumann, 2011);
- there are many studies that use neuroimaging and biometric techniques in an attempt to demonstrate the impact of odours on brain activity (Lorig, 2000; Pinto et al., 2014), which analysed the reactions of people after their exposure to certain fragrances using EEG (electroencephalography) signal, because this’s electrophysiological monitoring method to record electrical activity of the brain, as well as exploring the impact of scents on emotions in terms of mood and physiology (Warrenburg, 2005);
- Neuro Focus Advisory Board member, Gerald Zaltman, noted that, *“Olfactory cues are hardwired into the brain’s limbic system, the seat of emotion, and stimulate vivid recollections”*;
- Zaltman speculates that scents of that type could be helpful when introducing a new product. Now with EEG testing, researchers can help determining which smell work best in which environment (Pradeep, 2010);
- pleasant and unpleasant odours provoke different autonomic reactions: skin conductance (SC), heart rate (HR), and startle reflex and are affected by odour pleasantness (Bensafi et al. 2002).

2.2 Smell Perception and its Impact on Consumer' Emotions 1-1

- while 60 % of human brain is devoted to sight, a scant 1 % is devoted to smell (Pradeep, 2010);
- olfaction, the sense of smell, is the response to chemicals that contact the membranes inside the nose (Kalat, 2014);
- on average, women detect odours more readily than men, and the brain responses to odours are stronger in women, those differences occur at all ages and in all cultures that have been tested so far (Doty and Applebaum et al., 1985; Yousem et al., 1999);
- in addition, if people repeatedly attend to some faint odour, young adult women gradually become more and more sensitive to it, until they can detect it in concentrations one ten thousandth of what they could at the start (Dalton, Doolittle and Breslin, 2002); however, men, girls before puberty, and women after menopause do not show that effect, so it apparently depends on female hormones (Kalat, 2014);
- olfactory receptors located high up in the nasal cavity send electrical impulses to the olfactory bulb, in the limbic area of the brain, for processing;
- table 1 shows examples of the worst smells in the world. The distinctive smell of the durian fruit is perceived by some as revolting but others find it extremely tempting (Carter et al., 2014).

2.2 Smell Perception and its Impact on Consumer' Emotions 1-2

Table 1 The Six Worst Smells in the World

Smell	Description
Decaying flesh	Repulsive to most people; may evoke thoughts of death
Skunk odour	Horrible to most, but a few people find it “interesting”
Vomit	Often associated with illness, which may heighten disgust
Feces or urine	Caused by gas released as bacteria break down food residue
Decaying food	Triggers an adaptive response to food that could cause illness
Isonitriles	Chemicals in nonlethal weapons described as world’s worst smell

Source: own table, data retrieved from Carter et al. (2014).

2.3 The Secret to Scent Memories 1-1

- people perceive the world around with the five senses and smell is just one them, but an important one because the average person can normally distinguish about 10,000 smells;
- on average, each person breathes 20,000 times a day and with each breath comes a chance to pitch a product because the sense of smell cannot be turned off;
- this type of memory is called the “*proustian memory effect*”, which is named after Marcel Proust (Sikela, 2014);
- the special memory system for senses, for thinks that man remembers, is called “episodic memory”;
- people have many other memory systems: procedural, semantic, short-term, and long-term, but, episodic memory is the function that may best be described as a mental time machine that stores memories about what, where, and when;
- while humans generate the most lasting visual or audio memories between the ages of 15 and 30, the more powerful smell memories are a pony ride straight back to childhood, studies have consistently found that human’ peak smelling ability ranges from 5 to 10 years old (Pradeep, 2010);
- the neurons responsible for smell are the olfactory cells, which line in the olfactory epithelium in the rear of the nasal air passages (Figure 1);
- like metabotropic neurotransmitter receptors, each of these proteins traverses the cell membrane seven times and responds to a chemical outside the cell by triggering changes in a G-protein inside the cell. The G-protein, then, provokes chemical activities that lead to an action potential (Zhang and Firestein, 2002).

2.3 The Secret to Scent Memories 1-2

- humans have only three kinds of cones and five kinds of taste receptors, so researchers were surprised to find so many kinds of olfactory receptors;
- the response of one receptor might mean a fatty acid with a straight chain of three to five carbon atoms, the response of another might mean either a fatty acid or an aldehyde with a straight chain of five to seven carbon atoms (Araneda, Kini and Firestein, 2000; Imamura et al., 1992).

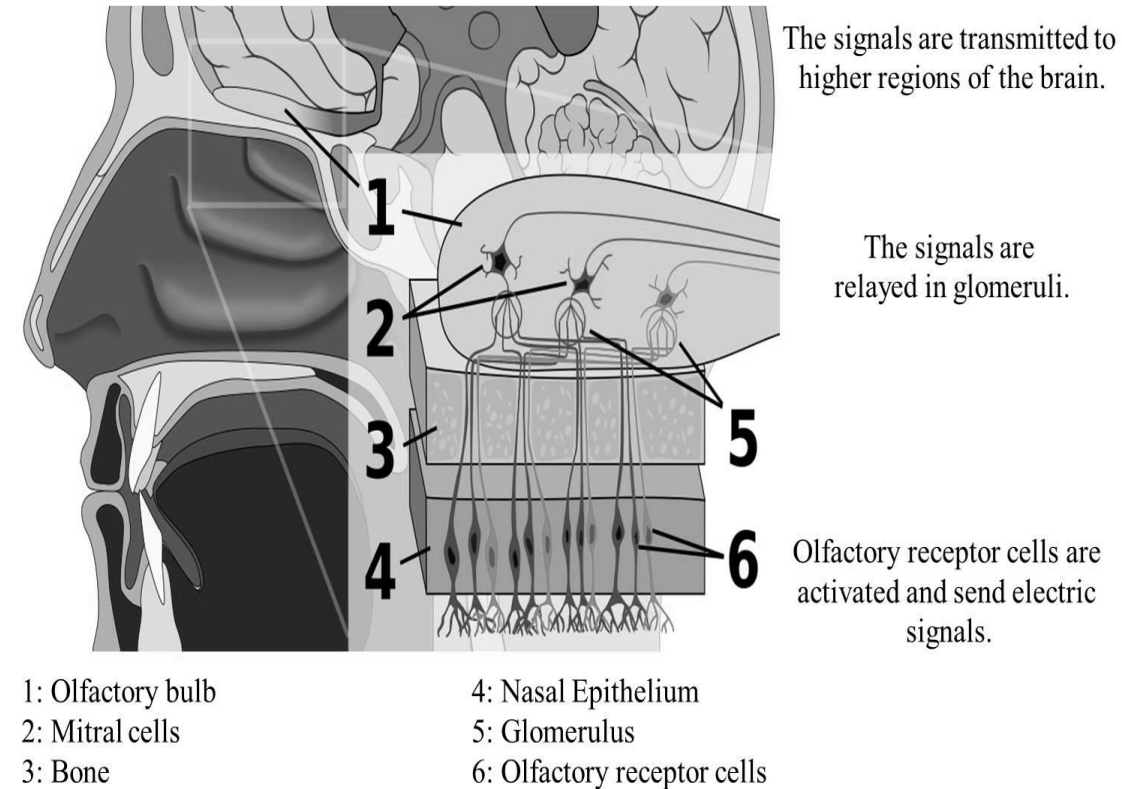


Figure 1 Olfactory Receptors

Source: own processing, image is retrieved from <http://www.scienceinschool.org/it/content/dal-metonale-al-pollo-fritto>.

2.3 The Secret to Scent Memories 1-3

- the scent and memory do not have to be related to be effective (Figure 2); in this case, the brut smell had nothing to do with molecular biology;
- people will remember more about a product, even its ad copy, if it is scented. If a product is unexpectedly scented and competitive products are not, people will remember not just the scent but their opinion about the aroma of product (Dooley, 2012);
- comparisons of the structures of smell molecules within each category have shown some similarities (Figure 2), for example, minty smelling compounds often share a similar molecular structure;
- octane, a linear hydrocarbon, smells like oranges, while octanoic acid, a saturated fatty acid, which differs from octane by only one oxygen atom, smells like sweat;
- re-experiencing any of the sight, smell, or sound inputs may trigger a memory of the event, but smell seems most strongly associated with memory;
- this experimental fact may be because olfactory regions are linked to all emotional areas in the limbic system, research shows that a memory of a visual image is likely to fade within days, but the memory of a smell may persist for up to a year or even decades (Carter et al., 2014);
- it can be stated that except mood, emotional states were also affected by odours. In this way, a study carried out at the Rockefeller University (reference needed) showed that in the short term we remember just 1 % of what we touch, 2 % of what we hear, 5 % of what we see, 15 % of what we taste, and 35 % of what we smell.

2.3 The Secret to Scent Memories 1-4

SMELL AND MEMORY

The olfactory bulb is in the limbic system, close to the amygdala (associated with emotion) and the hippocampus (associated with memory). When you first encounter a smell, it becomes linked to the emotions you associate with the events of that time. Encountering the smell again may trigger this link, evoking the memory and associated emotion.

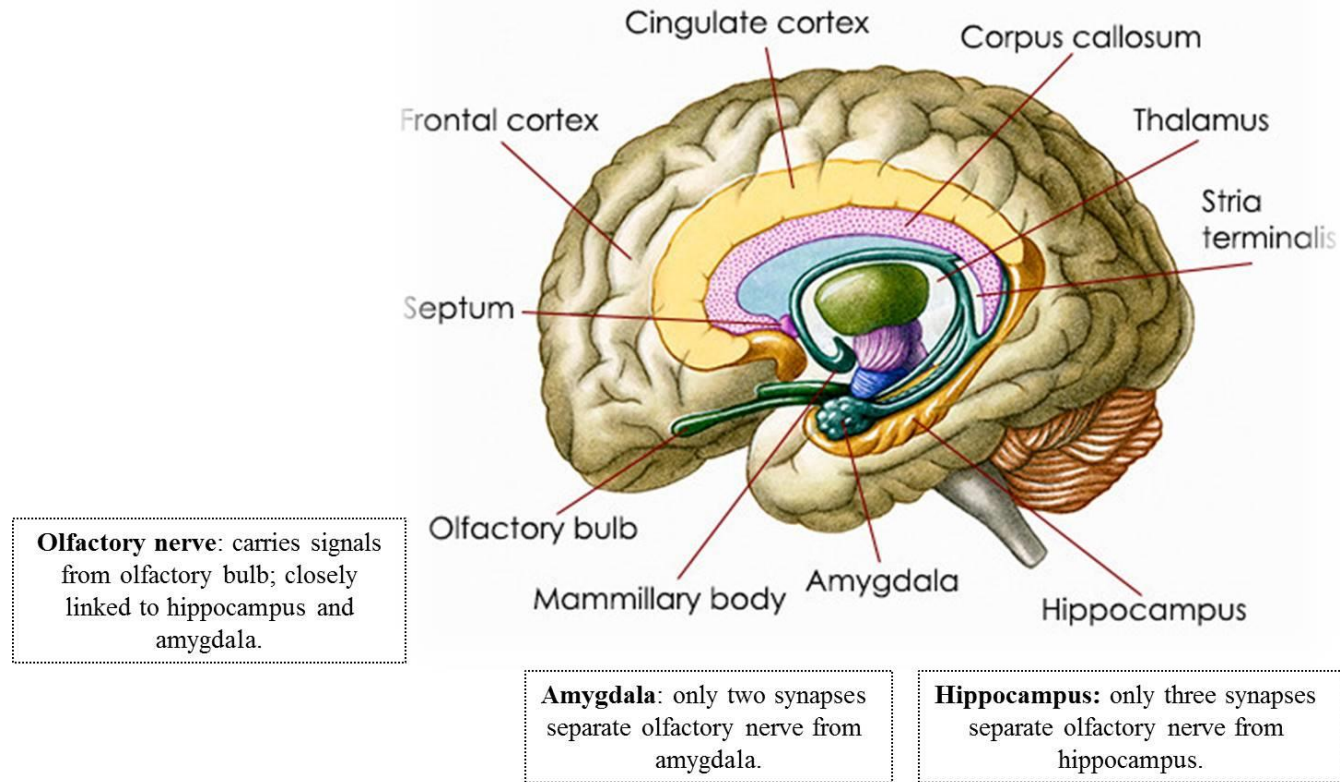


Figure 2 Smell and Memory

Source: own scheme, image is retrieved from <http://www.buzzle.com/articles/amygdala-function.html>.

2.4 Odours and Air quality 1-1

- people spend more than 80 % of their time inside of buildings; therefore, according to the publication of *Indoor Air Quality Research* it is important to consider all aspects of the internal environment affecting the overall well-being, health and performance of the users in spaces (e.g. offices, production halls, shopping centres etc.) (WHO, 2006);
- the space in buildings is made up of various environments' components including inside air controlling, humidity and atmospheric conditions (Földváry and Petra, 2014), the internal or enclosures environment' components can be divided into (Kapalo, 2009):
 - *physical* (heat, humidity, light, sound, electric fields, static electricity, aero ions),
 - *chemicals* (toxicants, aerosols, odorous substances),
 - *biological* (microorganisms, bacteria's, biological allergens (pollen, fur), and
 - *psychic* (type of work, its method of organization).
- in the case of physical factors, their limited values as well as the process of measurement are described by national or international standards (Molina et al., 1989);
- quality assessment of the internal environment must, therefore, cover not only the lighting, vibration, thermal comfort, as well as indoor air quality too, which is affected by many factors, and determining the concentration of various pollutants, ventilation rates, spatial distribution, chemical reactions of pollutants and air as a medium of communication used (TZB portal, 2011).

2.4 Odours and Air quality 1-2

- providing an acceptable indoor air quality is associated with the analysis of the chemical composition of indoor air and solids, it provides sufficient fresh air, reduce the concentration of pollutants to a level which does not adversely affect health and well-being of users under their limited values, and minimum of odour substances in indoor environment is ensured;
- excessive ventilation causes energy loss and, conversely, lack of ventilation in unsatisfactory quality of indoor air. In this regard, a balance with adjustable regulation of the level and method of ventilated area using, heat and moisture conditions and the rate of occurrence of pollutants in the environment should be ensured (Šenitková et al., 1999; Vilčeková, 2009).
- the main indicators of internal environment' evaluation in selected systems of environmental assessments of buildings is shown in Table 2;
- the requirements for internal air quality are controlled by *American Standard ASHRAE 62* (Ventilation for acceptable indoor air quality) in USA and in some others countries (ANSI/ASHREA, 2001), while in many European countries, as well as in some others, it is regulated by European norm *prEN 13779* (CEN, prEn13779, 1999);
- these two documents are not the same and have some differences. American norm lays down the minimum value 8 litres *per second per person* for required amount of fresh air in the spaces on base of internal maximum concentration CO₂ 700 ppm (mg/L).

2.4 Odours and Air quality 1-3

Table 2 Indicators of Building's Internal Environment Evaluation

System	Area of Evaluation	Indicators of Evaluation
CASBEE (Japan)	Internal environment	Noise and acoustics, heat comfort, brightness and lighting, air quality
BREEAM (UK)	Health and relax	Internal and external questions influencing health and relax (lighting, air quality, dangerous materials, radon, internal noise, system of heat water)
SBTool (28 world countries)	Quality of internal environment	Quality of internal air, ventilation, air temperature and relatively humidity, daily light and lighting, noise and acoustics, electromagnetic pollution
LEED (USA)	Quality of internal environment	Quality of internal environment, pollution control from smoking, monitoring of CO ₂ , increasing of ventilation, managerial plans IAQ, low emitting materials, control of harmful substances 'sources and chemicals, thermal comfort
Green Globes (Canada)	Internal environment	Effectiveness of ventilation system, control of sources or internal pollution, proposal of lighting and integration of illuminating system, thermal and acoustics comfort
HK-Beam (Hong Kong)	Quality of internal environment	Thermal comfort, ventilation, quality of internal air, natural lighting, artificial lighting, noise and vibration
NABERS (Australia)	Interior	The nature of the weapons site, equipment and service, percentage of job positions in far of 5 metres from the windows, percentage of workers able to control, lighting of work place

Source: own table, data retrieved from Vilčková (2009).

2.4 Odours and Air quality 1-4

- the European Standard defines three levels of performance: IDA1, IDA2, IDA3 based on a concentration CO₂ in 800, 1000, and 1500 ppm;
- it is likely that the strictest European requirement IDA1 is more moderate than the one requested by ASHRAE. In the spaces where smoking is forbidden, prEN 13779 allows the ventilation with a speed of 4 litres *per second per person* for a degree IDA3; it is a half air speed exchange as in case of ASHRAE. There is also a local Israeli regulation, which is at the phase of preparation; its goal is to suggest the compromises between both previous documents (Javorček and Sternová, 2016);
- The essential requirements from the perspective of internal climate on that (what is pleasant), are provided by European standards:
 - EN 15251 Indoor environmental input parameters for design and assessment of energy performance of buildings-addressing indoor air quality, thermal environment, lighting and acoustics;
 - Directive 2010/31/EU of the European parliament and of the council of 19 May 2010 on the energy performance of buildings;
 - ISO EN 7730 Moderate Thermal Environments;
 - CR 1752 Ventilation for Buildings - Design Criteria for The Indoor Environment;
 - EN 13779 Ventilation for non-residential buildings - Performance requirements for ventilation and room-conditioning systems;
 - EN ISO 7726 Ergonomics of the thermal environment - Instruments for measuring physical quantities; and,
 - EN 12599 Ventilation for buildings - Test procedures and measurement methods to hand over air conditioning and ventilation systems.

2.4 Odours and Air quality 1-5

- standards and guidelines for estimating the required minimum ventilation rates are currently available and are far from complete. In this context, users mainly have two requirements:
 - health risk of inhaled air should be negligible, and
 - air should be felt fresh and pleasant;
- according to the American society of engineers for heating, cooling, and air treatment (ASHRAE), the acceptable air quality can be defined as *“an air in which there are no known pollution in harmful concentrations determined by the competent authorities, with which the majority (80 % or more) people exposed do not reflect dissatisfaction”* (ANSI/ ASHREA, 2001);
- people produce carbon dioxide (CO₂) in proportion to the level of their metabolism (Seppänen et al., 1999);
- at low concentrations, the inner CO₂ is not harmful and, then, people do not feel it, CO₂ has been successfully used as indicator of pollution produced by humans for over a century (Hurtíková and Petráš, 2014);
- the main indicators from the perspective of air quality are (Šabíková, 2002):
 - high, low or unstable temperature;
 - concentration of CO₂ in an air;
 - intensity of relative humidity;
 - air velocity, and
 - presence of smoking, odours, dust, dirt, and mildew too.

2.4 Odours and Air quality 1-6

- in terms of comfort, there are many residents which include the link between carbon dioxide and indoor air quality (Földváry and Petra, 2014);
- if in a limited space, there is a high concentration of CO₂, it emerges a dissatisfaction and sleepy feeling, what ultimately discourage people from a long-term stay in this area;
- the fresh air contains about 400 mg/L of CO₂, and in a classic room, the concentration of CO₂ can be doubled in just 1 h;
- this applies when 1 person stays at a rest; if in a room there are more people, who moreover do some physical activity (e.g. shopping, moving), it is necessary to maintain the air quality by replacing the volume of air in the room several times per hour (Table 3);
- an equally important factor of quality indoor air is its temperature, on contrary he/she may be demotivated because of too warm environment, which in combination with high concentrations of CO₂ represents a worst case scenario for a given place, because the indoor environment in any building is a result of the interaction between the site, climate, building system, construction techniques, contaminant sources and building occupants (Berčík and Paluchová et al., 2016);
- table 3 shows that optimum climatic conditions in different areas are different according to the performance of individual activities;

2.4 Odours and Air quality 1-7

- the temperature in grocery stores is ranging from 19 to 24 °C, while it is finding of a compromise between the implementation of activities, pleasant environment in terms of consumer perceptions, as well as to all conditions of storage for display in various departments;
- retails must use climatic units to achieve the required level of temperature and CO₂ concentration in the individual food department. In the foreground is another important factor, relative humidity;
- the air in the stores must not be too dry, but, on the other hand, not too moist, the optimal level is between 30 - 70 % saturation of the air with water vapour (Berčík, 2015).

Table 3 The Classes of Activities

Class	Total Energy Output		Examples of Activities
	q_m [W/ m ²]	q_m [met]	
0	≤ 65	≤ 1.12	Peaceful lying, relaxed lying (rest, watching TV)
1a	66 - 80	1.13 – 1.38	Seating activity with minimum of moving activity (administration, students in a rooms, control activity), seating activity connected with light manual hand/ shoulder-work (PC job, laboratory work, selecting of mini products)
1b	81 - 105	1.39 - 1.81	Seating activity with manual hand/shoulder/feet-work (outlet control, driving a car), standing activity something connected with slow walking with light obstacles moving or with overcoming of resistance (cooking, machine treatment and assembly of small parts, piece work of mechanics, service staff, shopping)
1c	106 - 130	1.82 – 2.23	seating activity with regular using of both hands/ shoulders/ feet's (work in food sector and in kitchens, machine treatment and assembly of hard parts, driving a truck, tractors), standing activity with permanent using of both hands/ shoulders/ feet's in moving of more than 10 kilos of materials (shop assistants by a big frequency of customers, painting, welding, managing of drilling-machine, of lathe and moving of light trolleys), slow walking on a flat

Source: own table, data retrieved from Vilčková (2009).

2.4 Odours and Air quality 1-8

Table 4 Examples of Optimal and Acceptable Conditions of Heat-Humidity Micro Clime for Warm Period in a Year

Work Class	Operative Temperature [C]		Acceptable Speed of Air Ventilation v_a [m/ s]	Acceptable Relative Air Humidity [%]
	Optimal	Acceptable		
0	25 - 28	20 - 29	≤ 0.2	30 - 70
1a	23 - 27	20 - 28	≤ 0.25	
1b	22 - 25	19 - 27	≤ 0.3	
1c	20 - 24	17 - 26	≤ 0.3	

Source: own table, data retrieved from Vilčeková (2009).

- According to Berčík, Paluchová, Vietoris, Horská (2016), in addition to ensuring the optimal air quality, it is necessary to pay attention in eliminating unwanted odours, a typical example can be departments of animal feed with a specific odour in food stores;
- the sense of space aromatization for the purpose of stimulating (positive emotions, higher labour productivity, reducing nervousness etc.) acquires the desired effect and force only when it reached a certain standard of indoor air quality (normal air temperature, humidity, neutralization of undesirable odours and breathable air).

2.5 Deploying Scent in the Marketplace and Aroma Marketing 1-1

Historical Background of Aroma Marketing

- already in Egypt more than 5,000 years ago, they used the power of using flavourings to mask the smell of burning blood of their victims;
- in Rome, in turn, they involved animals, such as doves, which spread fragrances into the rooms at various social events. But smell, as such, was also used on two-floor trains during the war time, to inject courage to the fighters;
- Greeks used ceramic vases for storing scented essences to be used in massaging their legendary athletes. In China, traders came to the smarter way to sell their silk and used different essential oils to attract customers, in a very clever way;
- one of the first studies drawing attention to the significance of scent within the marketing industry occurred in 1932, during this study, women were exposed to a number of nylon stockings; each pair had a faint narcissus, fruit, sachet, or natural scent (somewhat unpleasant) (Fitzgerald and Swati, 2008; Clark, 2009);
- later, in the 1969, links between scent and both sales and consumers' perceptions of product quality were again evaluated and identified, in this study, Cox (1969) reported, nylon stockings with an orange odour sold better than unscented stockings.

2.5 Deploying Scent in the Marketplace and Aroma Marketing 1-2

Historical Background of Aroma Marketing

- in the 1970's, fragrances also began to gain recognition as a tool for retailers, during this time, the study of aromatherapy also became more widely accepted. Indeed, aromatherapy, enhancing the smells of indoor environments by introducing specific aromas, first became fashionable in the late 70's (Schifferstein and Block, 2002);
- in this situation, research was conducted analysing the influence of scent on consumers purchase intent, in turn, *"Scratch and Sniff Stickers"* represented one of the next milestones for scent in the marketing industry, in the 1980's in North America (Smellstickers.com, 2008);
- in the 1970's marketers began to find that smell could be used in brand promotion, they were also able to adjust the scent of their products to make them more palatable for the consumer;
- olfactory Marketing started back in the 1980's when British supermarkets discovered that if they had a bakery in a supermarket, the smell of fresh baking bread helped them sell not just more bread, but more other products from supermarket portfolio, what is also influenced by placing of bakery department in a store (Hanlon, 2005);
- in 1982, further recognition of the significance of scent in the marketing industry occurred, when the *Olfactory Research Fund* coined the term "aromachology", of note for marketing, this area of expertise is concerned only with the temporary effects of fragrances on human behaviour, feelings, of well-being, moods, and emotions (Olfactory Research Fund, 2008; Clark, 2009).

2.5 Deploying Scent in the Marketplace and Aroma Marketing 1-3

Introducing to Aroma Marketing

Scent in Marketing

- the shops which apply scents, give their customers the feeling that they spend less time viewing goods, and testing them (Levy et al., 2012; Bradford and Desrochers, 2009);
- fragrance has become an important factor for the trader, which can slow the flow of customers in the store (Sikela, 2014);
- Fiore et al. (2000) wrote that scent had an effect on affective state that partly mediated the effect on attitudes towards products and approach behaviours, the aroma could be used in marketing in many parts, such as marketer scent, product scent, ambient scent (see Figure 3);
- research has shown that suitable application of aromas contribute to the following facts:
 - customers better and deeper evaluate a store,
 - customers better perceive a value of offered products and services, and
 - customers have a subconscious tendency to return to the place, where the flavouring was applied (Scentair, 2015).

2.5 Deploying Scent in the Marketplace and Aroma Marketing 1-4

Introducing to Aroma Marketing

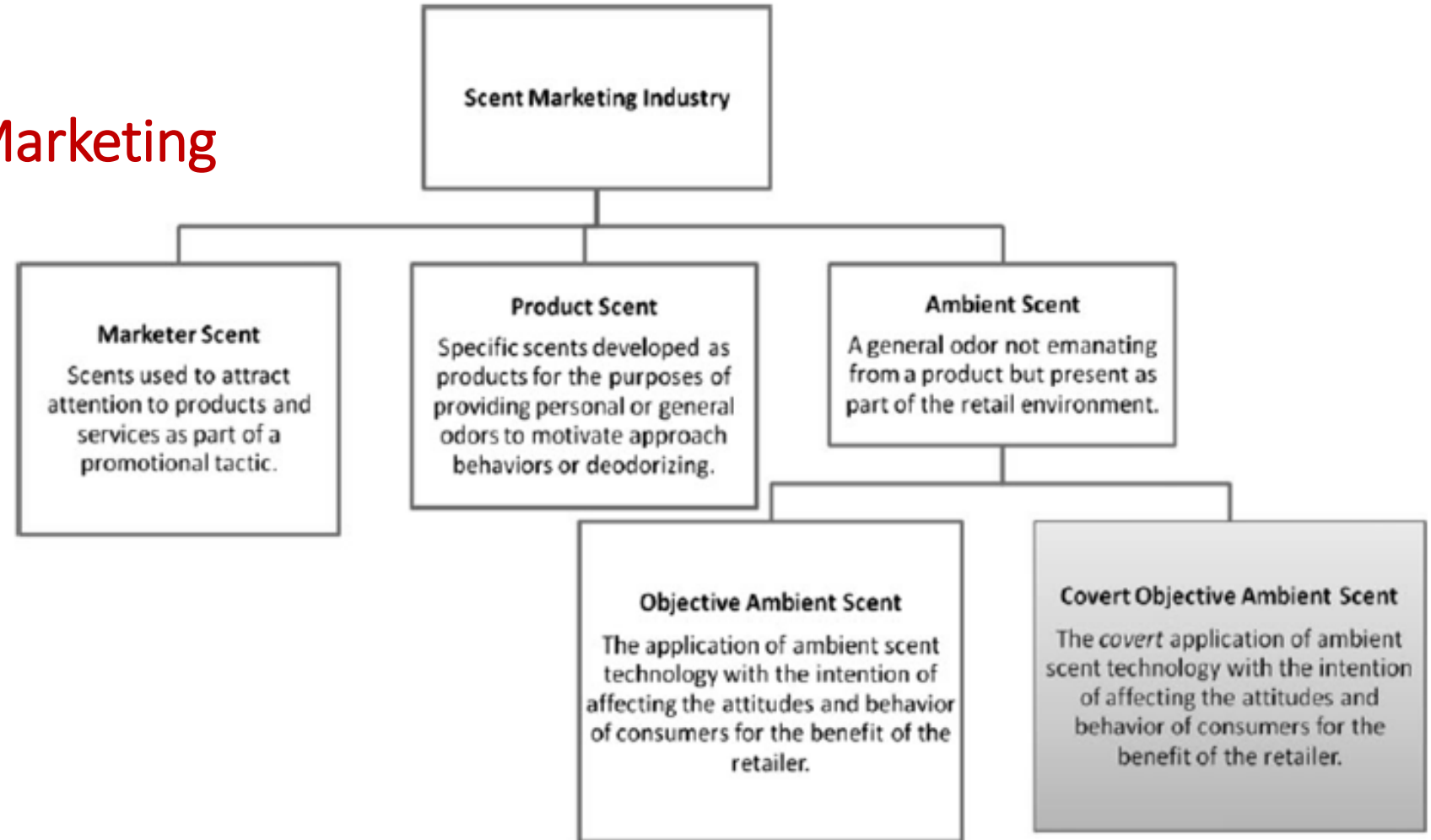


Figure 3 The Use of Scents to Influence Consumers

Source: Bradford and Desrochers (2009).

2.5 Deploying Scent in the Marketplace and Aroma Marketing 1-5

Introducing to Aroma Marketing

- it is assumed that a scent is a sensory experience of smell perceived by a human being (Tarczydło, 2014);
- scents are unique, just like fingerprints. For thousands of years, humans have used the power of scents for different purposes: a) protection, b) camouflage, c) beauty, and d) distinguishment (Emsenhuber, 2009; Vietoris, 2008);
- figure 4 shows three types of odours: a) head, b) heart and c) basic (Štetka, 2012; Saidl, 2012), head notes are generally smaller, lighter molecules which dazzle and invigorate;
- molecules of heart notes tend to be larger and smoother and can take anywhere from five minutes to an hour to develop;
- they can include different ingredients including flowers, spices, woods, resins and grasses, base notes have the largest, heaviest molecules;
- smell is linked to pleasure and well-being, emotion, and memory, therefore, it can influence customers' emotional state and mood to make the customers more susceptible to impact customer behaviour (Lindström, 2010).

2.5 Deploying Scent in the Marketplace and Aroma Marketing 1-6

Introducing to Aroma Marketing

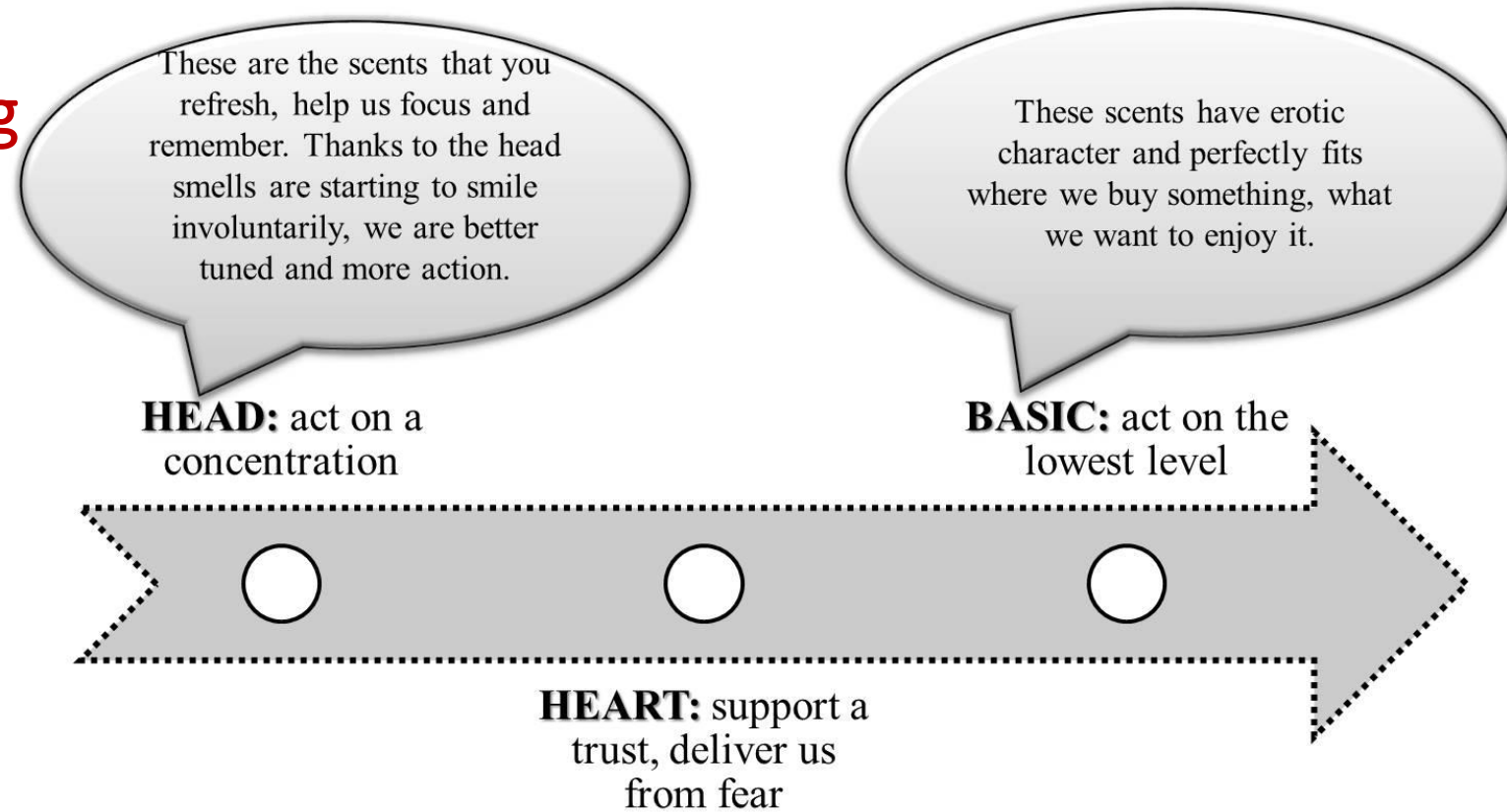


Figure 4 Types of Scents

Source: own processing, based on Štetka (2012); Saidl (2012).

2.5 Deploying Scent in the Marketplace and Aroma Marketing 1-7

Introducing to Aroma Marketing

- diffusing the right aroma can reinforce brand identity, create the perfect ambiance for clients, employees and guests, and differentiate our own business from competitors (Herz, 2009)
- the aroma use is a part of a recent recognition that branding needs to work through the emotions (with scent marketing itself, marketed through the promise that smell works directly on the limbic system), but also forms part of a longer term emphasis on the active shaping of retail atmospherics, wrote Anderson (2014);
- scent is used to create a pleasant ambient, create a signature for a brand, or convey a specific scent naturally associated with a product; in this way, scent can increase vividness of a stimulus through concreteness (Kardes et al., 2014);
- The benefits of using scents in marketing are, among others:
 - *scents can help boost sales*: it can trigger instant emotional reactions from customers and scent marketing can, thus, be very effective in boosting sales;
 - *scents make customers linger*: the subjects were more likely to look around and browse through products in the rooms that were scented, and reported more positive opinions and a tendency to wait longer in lines in the fake store than its unscented counterpart;
 - *scents help create brand image*: they are helpful in making people remember you, or to create associations in their minds; this is why it can be useful in creating an all rounded brand image; and,
 - *scents create a perception of quality*: customers tend to perceive a scented product or space as being of better quality and will be willing to pay more when shopping in a scented store (Cartwright, 2014).

2.5 Deploying Scent in the Marketplace and Aroma Marketing 1-8

Definition of Aroma Marketing

- aroma, scent or olfactory marketing is more than just diffusing a pleasant fragrance in a space. It is the art of taking a company's brand identity, marketing messages, target audience and creating a scent that amplifies these values;
- Baron (1997) concluded that much higher levels of positive affect were reported when participants were exposed to pleasant ambient scent and a positive state (happiness) can be created by means of odours (de Groot et al., 2015);
- the expression “scent marketing” has been used to describe using scent to set a mood, promote products or position a brand and, thus, scents marketing can be defined as the strategic use of scent and olfactory experience in relation to commercial products (Vlahos, 2007; Anderson, 2014);
- aroma marketing as one of modern form of marketing increases the store image and brings to customers the new shopping experience (Sikela, 2014). Scent marketing has got two ways:
 - *ambient scenting*, fill spaces in certain types of scents, such as the smell of coffee, and
 - *scent branding*, creating a specific scent identifying mark (Scentmarketing, 2016);
- Müller, Alt and Michelis (2011) differentiated between three forms of scent marketing, depending on how scents were used: (i) the marketer scent, (ii) the product scent, and (iii) the ambient scent.

2.5 Deploying Scent in the Marketplace and Aroma Marketing 1-9

Definition of Aroma Marketing

- the *Scent Marketing Institute* estimates that number of odour will reach more than 500 million by 2016-2017;
- professional aroma spaces (scent marketing) have a positive effect in all psychographic directions and are suitable for long-term increase in turnover (Stöhra, 1998);
- aroma marketing is a series of incidents in which it is possible, with an impact of scents, to stimulate customers to buy goods and services and workers to be more active;
- advertising agencies attribute to odour much more than just release a pleasant fragrance; in fact, it is a tool with a wide range of use (can stimulate, revitalize, create a feeling of relaxation, balance, peace, awakens memories, inspiration, feelings);
- fragrances are used with the specific aim, to increase the profits and sales (Pajonk and Plevová, 2015);
- scent marketing uses different diffusers or aroma techniques, while fragrances are adapted to profile of target consumer group (Jurášková et al., 2012);
- the importance of aroma marketing relies on several factors: a) the application of good air quality, it can consciously help to change or improve current mood, not only customers but also employees, b) scent marketing has a positive impact on customers, it makes them to become more generous, c) its placing allows to achieve increased sales and d) products and services are offered in a particularly favourable way.

2.5 Deploying Scent in the Marketplace and Aroma Marketing 1-10

Definition of Aroma Marketing

- Kardes, Cronley and Cline (2014) reported that scent marketing is a special branch of sensory marketing that studies and uses the enormous potential of perfume as a means of communication, emotion and memory;
- Holliman (2011) describes aroma marketing as „*marketing without dollars*“;
- ambient scent is popularly believed to have the potential to create positive mood states, which will, then, translate into more favourable store and product evaluations and eventually into higher sales revenues (Krishna, 2010), it becomes „*permanent memory*“ (Levy et al., 2012);
- according to Pabian (2011), aroma marketing signifies:
 - exerting influence on the customer behaviour in the place of sales by using individually selected compositions of aromas;
 - the art of using scents in the marketing campaign and accessing the customer's emotions;
 - a significant element supporting modern marketing strategies and a part of the marketing mix;
 - an exceptionally effective business tool; and,
 - a powerful weapon in the fight for a customer, as one cannot resist the magic of scents, may close eyes and block the ears but we cannot stop breathing.

2.5 Deploying Scent in the Marketplace and Aroma Marketing 1-11

Definition of Aroma Marketing

- Kimmel (2012) gave some advices when using aroma marketing:
 - test aromas on “real” customers and get feedback before making final decision;
 - do not overwhelm customers with a particular fragrance;
 - make brand scent as specific and original as possible; so there is a unique association with company brand;
 - scent marketing works best with just a single aroma, so avoid complicated fragrances;
 - think about the fact that what others smells might be nearby;
 - brand fragrances can work best when there is already a particular association with a product and a particular smell in people’s minds; and,
- Scent marketing has different uses for different business, and so can be effectively divided into four distinct types (Cartwright, 2014):
 - *the aroma billboard smell*, which makes the boldest scent statement; the customers are consciously aware of it, and the smell is part of the customer experience and is what consciously attracts attention;
 - *a thematic smell complements* the décor or purpose of the place, such as vanilla or lavender smells at a beauty spa or a resort;
 - *ambient smells* are more subtle and create an atmosphere, used to cover unpleasant odours or to fill a void;
 - *a signature smell* is exclusive to a big brand name and is used to create a brand image; customers associate this smell with their favourite brand and what it represents.

2.6 Olfactory Brand and Product Marketing.

Olfactory Environment Marketing 1-1

- olfactory product marketing is a bit more straightforward but is still important. In that same environment, though, there may be many other aroma marketing techniques in use, either intentionally or not (Dooley, 2012);
- aromatising and neutralising scents is performed not only to refresh the air but also to create a proper background for presentation of the company offer, to improve its perception, or to create a unique brand image;
- in fact, a brand specific odour is likely to evoke connections to the brand and strengthen the brand identity (Schmitt and Simonson, 1997; Prarthana, 2014);
- Spangenberg et al. (2006) found that shoppers spent more money in a clothing store, when the scent that was emitted in a particular department was congruent with the type of clothing being sold (i.e., a feminine/masculine scent emitted into the women's/men's department);
- Morrin (2010) found that emitting a pleasant scent into shopping mall increased expenditures, but only among more contemplative shoppers or those who did not make unplanned purchase, the main target of scent marketing is the creation of a pleasant atmosphere for clients (Tarczydło, 2014; Kardes et al., 2014);
- Dave Van Epps, president of ScentAir (2015), a producer of aroma-marketing systems, told scent marketing, whether for condos or cars, is part of a broader movement known as "full sensory branding" *"The key principle is that to be successful in an advertisement crammed world, companies must reach consumers not only through the overtaxed avenues of sight and sound but also through touch, taste and smell"* (Vlahos, 2007).

2.6 Olfactory Brand and Product Marketing.

Olfactory Environment Marketing 1-2

- brand image is: (i) a set of opinions, judgements, and images held by stakeholders; (ii) something like a symbolic brand superstructure; (iii) tangible convictions allowing for enhancement of an individual's self-image; or finally (iv) intangible factors/images significantly impacting the human behaviour in the market (Tarczydło, 2014);
- companies seek in these cases the association of a specific odour with brands; it is a so-called “*signature fragrance*” (Hultén et al., 2009; Košťál, 2006; Jitpleecheep, 2011; Douce et al., 2013);
- neuromarketing research has begun to focus on these sensory aspects (aroma, lighting, sounds, interior, and others visual elements) of shopping, neuromarketing firms have arisen, and are specialised in testing sensory effects and advising retailers on sensory best practices;
- smell is increasingly exploited by retailers using piped-in fragrances to trigger associations and activate goals related to a purchase (Genco, Pohlmann and Steidl, 2013);
- scent marketing relies on the neuropsychological processing of olfactory stimuli in the human brain, the area of research which analyses neuropsychological effects of advertising and commercial activities on the consumer is called “*neuroeconomics*” (Berčík, Paluchová and Horská, 2016);
- the term “*scent marketing*” defines a subarea of the neuroeconomic research and describes the usage of scents for marketing purpose (Dooley, 2012; Carter et al., 2014; Gulas and Bloch, 1995; Solomon, 2010).

2.6 Olfactory Brand and Product Marketing.

Olfactory Environment Marketing 1-3

Practical Examples in Product and Service Segment

- Alankin (2016) published that the aroma marketing services may include:
 - creation of a scent logo/corporate aroma;
 - distributing bioactive fragrance compositions indoors (the method of scent space), considering the given industry specificity, and consequently special composition for: art galleries, travel agencies, fitness clubs, medical and dental practices, etc.;
 - influencing the customer behaviour in the point of sale (scent post), reaching out to the customer's consciousness and sub-consciousness, creating emotions;
 - atomising fragrance compositions related to the brand of the product during events, promotional activities, fairs (scent event), influencing the customer's sense of wellbeing, creating atmosphere and therefore facilitating friendly communication which is of vital importance in business relations; and,
 - using scent in an advertising campaign (scent advertisement), e.g. in the form of products made by applying the scent print technology;
- sensory branding stimulates a consumer's relationship with a brand and cultivates an emotional connection by incorporating scent from a design perspective; this can empower an environment, and optimize brand loyalty;
- in Table 5, a summary of brands or companies, which apply aroma marketing in the practice is illustrated.

2.6 Olfactory Brand and Product Marketing.

Olfactory Environment Marketing 1-4

Practical Examples in Product and Service Segment

Table 5 Practical Examples of Aroma Marketing

Product examples	
Citroën C4 Perfume diffuser programme	<ul style="list-style-type: none">• Citroen C4, offering as standard a scent-diffuser in the ventilation system and a range of nine different scents; customers may choose vanilla, lavender or citrus odour.• A feature of the C4 is based on the fact that smells can have a significant effect on mood and sense of well-being, very pleasant environment for users of the C4; the perfumes also have ability to inspire an environment that is favourable to safe driving,• Citroen test marketed the idea of perfume diffuser kit with a special edition Citroen C3 in 2003; the C3 Buddha Bar, which offered five difference fragrances based on the theme of Feng Shui (Hanlon, 2005; Hultén et al., 2009).
Nike shoes	<ul style="list-style-type: none">• An experiment conducted, two identical pairs of Nike running shoes were placed in two separate, but identical, rooms; one room was infused with a mixed floral scent and the other was not. Ttest subjects inspected the shoes in each room and, then, answered a questionnaire.• 85 % customer's preferred the shoes displayed in the room with the fragrance and also estimated the value of the scented shoes on average to be \$10.33 (9.48 €) higher than the pair of shoes in the unscented room (Prarthana, 2014; Aromaone, 2016).
Digital Flex Media leader in CD and DVD	<ul style="list-style-type: none">• Announced the launch of a line of Rub'n Smell discs. These discs help businesses, marketers and advertisers to cost-effectively connect and influence their target markets with scent marketing. The scent was incorporated into the ink and varnish was used to coat the company's disks.• Scents such as fresh fruit, flowers, coffee, pizza, chocolate and custom scents and fragrances supplied by clients were used on the disks. The scent was activated when rubbed and lasted for a few seconds each time.• These disks could retain their scent for years and the intensity of the smell could be controlled by scenting a larger or smaller area (Prarthana, 2014).

2.6 Olfactory Brand and Product Marketing.

Olfactory Environment Marketing 1-5

Practical Examples in Product and Service Segment

Bloom grocery stores: “Smell of grilling steak”	<ul style="list-style-type: none">• Designed by ScentAir Ltd. in Mooresville, NC.• Billboard displays impaled piece of beef; inside this billboard a fan was installed that scatters to the surroundings the smell of black pepper and charcoal, which customers use when cooking the beef (Frucci, 2010).
McCain Corp.: “Baked potato-scented frozen aisles”	<ul style="list-style-type: none">• Up to 500 Tesco and Asda stores are set to install scented displays that waft the aroma of jacket potatoes through the frozen aisles when a customer presses the front of the unit. It has created “3-D baked potatoes” that fill bus shelters across the U.K. with the smell of the baking potato,• When people press a button on a poster, a hidden heating element warms the fiberglass 3-D potato and releases the aroma of oven-baked jacket potato throughout the bus shelter (Magda, 2013; Advertising Age, 2012).
New Balance shoe store	<ul style="list-style-type: none">• In Beijing, a consulting firm introduced Chinese shoppers to the U.S. brand through a sensory store experience. A nostalgic wood and leather scent was used to convey the heritage and craftsmanship of the brand.• Shoppers spent twice as much money as compared to similarly sized stores elsewhere; the atmosphere induced them to linger longer (Equal Strategy consulting firm, 2016).
California Milk Processor: “Got Milk? Campaign”	<ul style="list-style-type: none">• In a campaign intended to boost US sales of milk, the California board set up a device that emitted the fragrance of fresh-baked chocolate chip cookies from advertisements posted in San Francisco bus shelters.• Thus bus users complained that the scent was inappropriate and city officials ordered the ads to be removed (Kimmel, 2012).
LG Chocolate phone	<ul style="list-style-type: none">• The campaign used chocolate-scented point-of-purchase store displays, accomplished by embedding plastic, scent-infused strips into the displays and by adding a scented varnish into the information posters.• Bowls of Hershey Kisses chocolates also were placed on the counter, next to the phone displays, although the chocolate scent was inconsistent with the mobile phone product category.• It effectively associated aroma to its chocolate brand identity, and likely contributed to the successful launch of the product. The scent provided a strong link to the brand name, which accounted for much of the campaign’s success (Kimmel, 2012).

2.6 Olfactory Brand and Product Marketing.

Olfactory Environment Marketing 1-6

Practical Examples in Product and Service Segment

Kraft Foods	<ul style="list-style-type: none"> It sponsored a special holiday issue of People magazine. Five of its ads in the issue allowed readers to rub a spot to experience the smell of a product being advertised, such as Chips Ahoy and Philadelphia Cream Cheese (Solomon, 2010).
Coty: off-screen activity	<ul style="list-style-type: none"> The international campaign of a cosmetics group “Coty” was done in a popular chain of cinemas in the Czech Republic, Slovakia, and Hungary. Spots were projected on movie screens and were supported by non-standard off-screen activities relying on techniques aroma marketing. COTY spots were placed on 316 movie screen in 22 cities in three European countries. The campaign was aimed at promoting parfumes in foyer cinemas. This was parallel added by ads of Calvin Klein, Chloé, Davidoff, Guess, David Beckham and Katy Perry parfums. The results of this promotion are not published by Coty. (Marketingové noviny, 2014).
Nivea: a) "Nivea- smell of summer." and b) “Buy one get one free”	<ul style="list-style-type: none"> Aromatization in the commercial was first used by NIVEA in Germany; before a film in a cinema, during the commercials depicting the seashore and resting people, the aroma of the sunscreen was sprayed around the hall, and the advertisement was completed with the inscription: “Nivea- smell of summer”. Recall of the ad increased by 515 % over viewers who had seen the ad without the scent. Another scent practice was also conducted as the branded scent bags for NIVEA were available in almost 1.000 drug stores (Digital marketing glossary, 2015; Smartnose, 2016; Strategistmedia, 2015).
Sony: “To smell what the actor smells at that point in the movie.”	<ul style="list-style-type: none"> The company Sony joined the fragrance battle with using a scent combining an admixture of mandarin and vanilla. This flavour was chosen not by chance, but because the company is interested in attracting the female audience. This invention will allow olfactory content to be overlaid onto the content of video games (Powell, 2014; Strategistmedia, 2015).
Samsung	<ul style="list-style-type: none"> It was conducting a test of its new signature fragrance in its Samsung experience concept store. German inventors have already patented a mobile phone with a smell chip which allows sending and receiving smell messages. People were staying in the scented room for about 11 minutes longer than usual (Strategistmedia, 2015).

2.6 Olfactory Brand and Product Marketing.

Olfactory Environment Marketing 1-7

Practical Examples in Product and Service Segment

Apple computers	<ul style="list-style-type: none">• Buyers of Apple computers, iPhones and other products, know them too well, even the smell of a new device.• This very specific smell is rumoured to come from inside the devices, but some have suggested that the packaging is responsible for it. However, the plastic iPhone has the same smell as the aluminium MacBook, so the scent is probably not added to the plastic.,• Apple has never owned up to these tactics, but an Apple Mac scent has been produced by the Air Aroma company, combining the smells of cardboard, ink and other ingredients (Bever, 2013).
Lipton tea brand	<ul style="list-style-type: none">• In the Czech Republic the Lipton company launched an “aroma ad”. They installed 3D pyramids from fruits, which look like bags of Lipton on the bus stations in Anděl and Florenc (Prague).• There, an intensive tea fragrance was sprayed at 5 minutes intervals (Media Guru, 2012).
Nature et Découvertes	<ul style="list-style-type: none">• The store atmosphere plays a prominent role; most consumers are stimulated by smell,• Before consumers enter the store, a cedar smell is distributed. Consumers are first attracted by this scent, and then by the product range.• Cedar scent was chosen because the smell of wood is closely connected with nature and represents a brand identity (Krofiánová, 2008).
Rolls-Royce	<ul style="list-style-type: none">• In England, buyers began complaining in the mid-1990 that the new models just did not live up to their earlier models. The company went to work to track down the problem.• Rolls Royce reproduced the scent of his big seller, the 1965 Silver Cloud, and sprays it under the seats to recreate the scent of this classic “Roller.”.Rolls Royce has been known to use scent in their showrooms, alongside their beautiful cars.• They reconstructed the classic scent, and now spray it under the seats of new vehicles (Brumfield, 2008).
Cadillac	<ul style="list-style-type: none">• In USA the new-car smell, the real scent of factory freshness, is no longer just a project. General Motors recently revealed that its Cadillac division had engineered a scent for its vehicles and has been adding it into the leather seats.• The scent was created in a laboratory, was picked by focus groups, and is now the aroma of every new Cadillac put on the road (Hakim, 2003).

2.6 Olfactory Brand and Product Marketing.

Olfactory Environment Marketing 1-8

Practical Examples in Product and Service Segment

Service examples	
Dunkin' Donuts: "Scent of Coffee on Seoul Buses"	<ul style="list-style-type: none">• The company Dunkin' Donuts launched a campaign in South Korea, known as Flavour Radio. Air fresheners were installed on commuter buses in Seoul to lure in customers to their stores.• These machines would release the aroma of Dunkin' Donuts coffee into the air as the sound of the company's advertisement was simultaneously played on the buses speakers. When the radio advertisement ended, the bus conveniently stopped close to a Dunkin' Donuts store.• Coffee shops in Seoul increased by 16 % their sales and especially the sales of Dunkin Donuts by the bus stops in Seoul increased by 29 % (Tam, 2012; Aromaone, 2016; Pastier, 2012).
Omni hotels: "Scratch-and-sniff tags"	<ul style="list-style-type: none">• In 2006, the company Omni was pioneer in offering sensory branding as part of their public space amenities with the use of a green tea and lemongrass-infused scent in their lobbies and cappuccino-and mochaccino infused scenting in their coffees.• The guests at Omni hotels received the papers with the patches smelling of blueberry muffins to encourage muffin purchases at the Starbucks located in the hotel lobbies (Krishna, 2010; Ambius, 2016).
Disney Corporation "Smellitzer"	<ul style="list-style-type: none">• "Smellitzer" is a device that shoots out carefully engineered scents the way a howitzer sprays bullets, a method for sequentially directing at least two different scents from a gaseous scent-emitting system, according to a U.S. patent issued in 1986.• Haunted Mansion is suitably dank and musty, and that the Pirates of the Caribbean ride evokes the smell of the sea (Keenan, 2014).
British Airways: "Making Flying Special."	<ul style="list-style-type: none">• In fact, since 1999, British Airways has been scenting its business class lounge at Heathrow Airport with the smell of freshly cut grass and the ocean.• BA was also a sponsor of the Fragrance Foundation's 2011 Jasmine Awards. It was only natural for them to take the leap into in cabin scent marketing (O'Keefe, 2013).

2.6 Olfactory Brand and Product Marketing.

Olfactory Environment Marketing 1-9

Practical Examples in Product and Service Segment

Singapore Airlines	<ul style="list-style-type: none">• This company uses a scent called Stefan Floridian Waters to perfume the cabins of its airplanes.• SA towels and lounges are perfumed with the scent of flowers (Klara, 2012; Bevers, 2013; Gains, 2013).
Orange Slovakia	<ul style="list-style-type: none">• In 2012 in the shopping mall Aupark used specific aroma to increase shopping experience and connect brand with odour (Strategie, 2012).
KFC	<ul style="list-style-type: none">• Research was done on the influence of aroma on guests. KFC got a good kick out of a spike in sales after they've invaded people's homes with the irresistible scent of their unique, one-of-a-kind spices and lulled them into their restaurants to pay them money for the real thing.• 46,3 % felt exciting, 31,3 % were happy, 12,7 % felt nothing, 9 % were relaxed,• KFC is piloting an "scent-focused" campaign that delivered food filled mail to corporate mail rooms at the lunch time mail drop. The mail was contain chicken, a side item, and a biscuit aimed to release the aroma of fried chicken throughout the office and trigger the cravings of busy cubicle dwellers. (Latasha et al., 2016).

- Berčík and Paluchová et al. (2016), conducted research on how aroma compounds influenced the profit of a chosen pub-restaurant Sportpub Brezno and how influenced the sales of Panini's (baked banquettes) on base of implementation of aroma equipment (Aroma Dispenser);
- in the primary research, the researchers monitored daily sale (amount) of baked baguettes without using of aroma stimulus and, then, two kinds of fragrances were placed inside the pub restaurant;
- both aroma fillings are mostly made from natural ingredients and they are produced under strictly view of IFRA (International Fragrance Association, www.ifraorg.org).

2.6 Olfactory Brand and Product Marketing.

Olfactory Environment Marketing 1-10

Practical Examples in Product and Service Segment

- an aroma of “*Crunchy bread*” was used in first two weeks, and after this, the last two weeks, a fragrance of “*Chicken soup*” was tested. The aroma compounds were placed in the middle of the pub restaurant Sportpub Brezno;
- after a total comparison of studied period (first month without aromatization and second month with aromatization) it was possible to state, that during the period in which aroma compounds were used the sales increased a 2.6 % (on April, 2016);
- a possible explanation for the positive but minimal effects was that only one diffuser (aromatic compound designed for space with an area of 30 m²) was used in a pub restaurant of 120 m²;
- there are more modern spraying methods based on the principle of nebulization (aroma particles 1000 times smaller in comparison to conventional aerosol freshener);
- besides, during the research time at the Sportpub Brezno, the quality of the air (e.g. the amount of CO₂ particles, temperature, and humidity) was not constant.

Conclusion

- while TV, radio, the internet and print media appeal to consumer's senses of sight and sound, the sense of smell offers unique challenges to companies trying to attract an attention;
- an era where the actual customer experience of being in a hotel, restaurant or retail store is becoming more and more important, then aroma marketing's research could be focused on placing the right fragrances on the right places;
- more modern stores are designed to maximise the impact of scent and create a multisensory experience;
- many businesses are simply using „real smells“ to their advantage (except them, which are located in the big shopping malls, because they can't change the central air conditions of mall) versus places, where the owners can and would like to influence our smell sense. In the following of this research, it could be realized in real and as well as in laboratory conditions;
- one of the most important survey 'goals of scent marketing for future are the odour' impact on business profit, time spending by shopping, association between brands and gender, age etc.;
- smell is one of most powerful senses whose background in the industry taught customers the value of aroma. We also undoubtedly see an application of this topic in the connection with consumer neuroscience (especially EEG, fMRI, FaceReader equipments);
- this may detailed described, how can aroma influence consumer decision in various business segments (for example: health service, production, administration, business, financial institutions, personal transportation, etc.).

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