

A Study and Assessment of Selected Elements of the Visual Aspects of Collectible Chocolate Packaging with the Use of the Eye - Tracking Method

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Abstract

The visual aspect of packaging is a very important carrier of a specifically encoded market communication system. It is a certain form of a "language" that should lead to attracting the consumer's attention to a product, then decode the message, generate interest, trigger a purchase decision, and leave a long-lasting positive connotation. The aim of this study was to analyze the consumers' perception regarding the visual aspects of selected chocolate collectible wrappers with the use of the eye-tracking method. The subsidiary aim was to examine the reactions and acceptance of modern consumers to the visual aspects of the chocolate wrappers offered in the market in the 1970s and 1980s of the 20th century - a time when graphic designs were not directly connected with a product.

Keywords: packaging, visual aspect of packaging design, eye-tracking, consumer behavior, neuromarketing

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Due to the dynamic growth of pastry and confectionery goods and a wide range of products on offer, it is essential to diversify the goods' packaging in order to stand out on the shelf and attract customers. Creating a sense of uniqueness is particularly important, and thus, modern packaging has to serve as a marketing tool as well. Nowadays, it is unthinkable not to use packaging as a means of gaining a competitive edge (Ankiel-Homa, 2012).

The basic requirement in ensuring the effectiveness of packaging as a marketing tool is its aesthetical aspect (as well as technical, functional, ecological, and economic ones). Such an important role of packaging arises from the fact that most customers perceive a product via the packaging and the visual impressions it gives (Szczymszak & Ankiel-Homa, 2007). The visual aspect of packaging is a very important carrier of a specifically encoded market communication system. It is a certain form of "language" that should lead to attracting the consumer's attention to the product, then decode the message, generate interest, trigger a purchase decision, and leave a long-lasting positive connotation. The visual aspect of packaging is created by: type of packaging material, shape, color, graphic design, font size and shape, ergonomic solutions, and various safety & quality systems (Lisińska-Kuśnierz & Ucherek, 2006).

The visual aspect of a confectionery product packaging acts as a key factor in influencing consumers' purchase decision. According to a survey conducted by GFK Polonia, although only about 40% of the respondents openly admitted that a product's packaging played an important role in their purchase decision, they strongly identified a brand through the visual elements of packaging, and based on the obtained information, they formed a general opinion about a product. That is why the visual aspect of packaging design should influence consumers in such a

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Figure 1. A Series of Collectible Chocolate Packages “Hobby”



Image Source : Ł. Zuch

way so as to allow them to, either consciously or subconsciously, choose that particular product rather than a similar one offered by a competitor. Moreover, it should create an idea of the product's quality and, consequently, generate the consumer's need of purchasing the good (Ciechomski, 2008).

Research conducted by Hill (2010) showed that a packaged good has, on an average, 0.06 seconds to attract a consumer's attention and trigger a purchase decision. Therefore, the packaging has to have a strong impact upon the senses, particularly the sense of sight. As a result, research methods that focus on understanding and examining the perception of different elements of the visual aspect of packaging (including the neuromarketing methods) have been gaining momentum and have become incredibly important (Hill, 2010).

Problems relating to the analysis of individual elements of visual layer of selected groups of products in the market has been a subject of research for various researchers (Gębarowski, 2002 ; Gelici-Zeko, Lutters, Klooster, & Weijzen, 2012 ; Hill, 2010 ; Kauppinen-Räsänen, 2014 ; Świda & Kabaja, 2013). However, there is a lack of research on individual elements of the visual layer of neuromarketing. In the absence of scientific literature on the correlation of elements of visual layer of chocolates and the impact on consumers' perception, we conducted a research on the individual elements of visual layer, including chocolates, from the viewpoint of use in unusual packaging design projects (Cholewa-Wójcik & Świda, 2015). We carried out an analysis on collective packaging and showed differences in consumers' reception and reactions to specific graphic designs. For example : old models of vehicles.

The aim of this study is to analyze the consumers' perception of the visual aspects of selected chocolate collectible wrappers with the use of the eye-tracking method. The subsidiary aim was to examine the reactions and acceptance of modern consumers to the visual aspects of the chocolate wrappers sold in the market in the 1970s and the 1980s of the 20th century, a time when the graphic designs were not directly connected with the products.

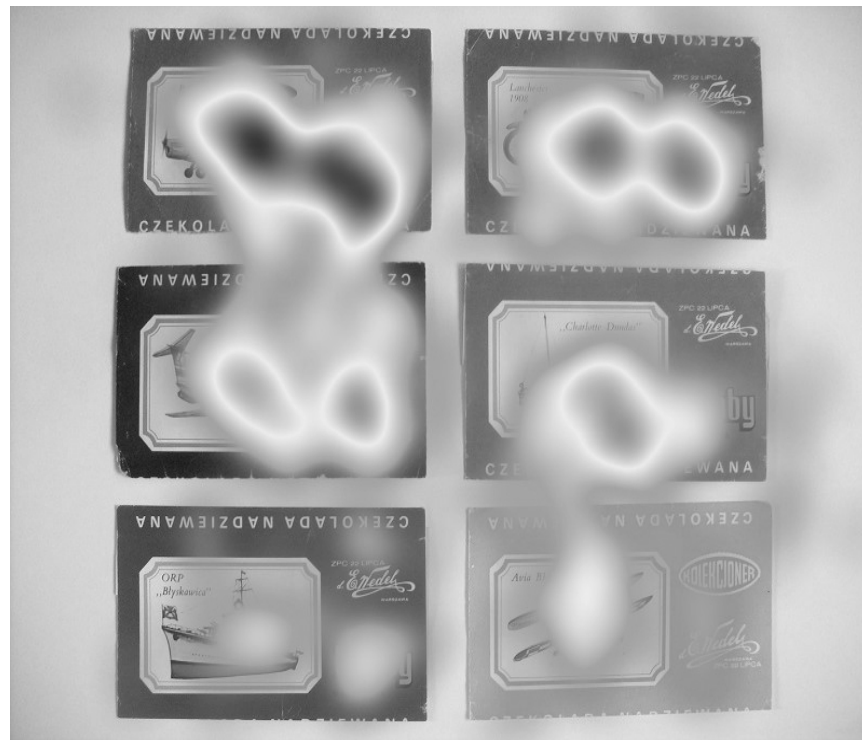
Research Materials and Methods

Research material consisted of a collection of chocolate wrappers kindly made available for the purpose of this study by its owner, Mrs. Łucja Zych. The collection boasts of over 1000 unique chocolate wrappers produced between 1970 and 2013. However, only those wrappers with uncommon design elements in their visual aspects were considered for the study. A special collectible series of filled chocolates produced by E. Wedel in the 1970s and the 1980s was eventually selected (Figure 1). The study was conducted by using the eye-tracking method, which involves tracking of participants' eye-ball movements, simultaneously recording saccades [1] and fixations [2]. This test allows researchers to determine how consumers perceive specific elements of the visual aspect of packaging and, thus, aids in understanding the visual perception of potential consumers. Thanks to this method, it is possible to determine which areas of the packaging the consumers focus their attention on, and which parts are completely ignored (Świda & Kabaja, 2013).

The research was conducted with the use of eyetracker Tobii X2-30 with Tobii Studio Version 3.2. software. The study was carried out in October 2013, and 50 young Polish consumers participated in the study (37 women and 13 men). The scope of the research was narrowed down to identify those areas of the visual aspect of the wrappers on which the consumers' eyesight was most focused and the study also aimed to determine the importance of these elements based on the scanning path, the number of fixations, and the total fixation time.

The results of the study have been presented in the form of heat maps, which present, in different colors, those areas of the packaging on which the participants focused their attention. The spots on which the participants' eyesight was mostly focused are in red (dark grey in images reproduced here), slightly less intensive attention was focused on the yellow spots (white outline in images reproduced here), and the least intensive - green (hazy light grey patches in images reproduced here). Different color shades in the figures show the total number and time of participants' fixations [3], or in other words, the spots on which their eyesight focused. Furthermore, the analysis was extended by vision path scanning, which pinpointed focus areas and the direct sequence of eye activity.

Figure 2. Heat map – Collectible Chocolate Packages by E. Wedel



Results and Discussion

The results of research performed by researchers (Fehrman & Fehrman, 2004 ; Ou, Luo, Woodcock, & Wright, 2004 ; Singh, 2006 ; Suero, Pardo, & Perez, 2010; Terwogt & Hoeksma, 1995) proved scientifically that among several elements of the visual aspect of packaging, the most important ones - in terms of marketing - are graphic design and color. While designing the visual aspect of packaging, both the graphics and color are chosen in such a way so as to ensure strong consumer connect with the product inside the packaging (Pradeep, 2010). Based on the above-mentioned research results and the assessment of the perception of the visual aspect of packaging, the following elements of the visual aspect were selected: graphic design (illustrations, logo), brand name, and color. All of these elements have been marked in the study as the area of interest (AOI) [4].

Due to the fact that strongly persuasive elements placed on the packaging (graphic elements, photographs, pictograms) can influence a potential consumer by creating a specific atmosphere and giving particularly positive impressions (such as of high quality, prestige, well-being, luxury), a perception analysis was performed after the participants were shown the collectible chocolate wrappers (Wright & Ward, 2008). In order to pinpoint the exact elements of the visual aspects of the chocolate wrappers that were particularly interesting for potential consumers, the obtained results of eye tracking have been presented in heat maps (Figure 2).

Further analysis of the obtained results reveals that in case of all chocolate wrappers considered for the study, the participants focused mostly on the graphic design. The analysis of the total intensity variation with the focus on color made it possible to determine the degree of consumers' attention on the analyzed elements (distribution from the highest to the lowest degree of attention), the highest being marked as red, average as yellow, and low as green (red : dark grey in images reproduced here ; yellow : white outline in images reproduced here ; green : hazy light grey patches in images reproduced here).

In order to determine the sequence of perception of different areas, that is, the eye scanning direction, the interpretation of the scan path has been added to the results presented in the Figure 2. Such an analysis with focus

Table 1. Number and Total Time of Fixations on Illustrations on the Packaging










Packaging type	Measure	Illustration		
		<i>n</i> min max	average min max	total min max
year:1976	Number of fixations	37	2,14	79
	Total time of fixations [s]	1	1	1
		1	5	5
		37	0,44	16,26
		1	0,08	0,08
	Total time of fixations [s]	1	1,14	1,14
		39	1,95	76
		1	1	1
		1	6	6
year: 1977	Number of fixations	39	1,95	76
	Total time of fixations [s]	39	0,47	18,35
		1	0,09	0,09
		1	2,09	2,09
		1	0,09	0,09
year:1977	Number of fixations	36	1,92	69
	Total time of fixations [s]	1	1	1
		1	4	4
		36	0,42	14,97
		1	0,08	0,08
	Total time of fixations [s]	1	0,95	0,95
		34	1,71	58
		1	1	1
		1	5	5
year: 1977	Number of fixations	34	1,71	58
	Total time of fixations [s]	34	0,37	12,53
		1	0,03	0,03
		1	1,17	1,17
		1	0,95	0,95
year: 1975	Number of fixations	24	1,25	30
	Total time of fixations [s]	1	1	1
		1	2	2
		24	0,32	7,58
		1	0,05	0,05
	Total time of fixations [s]	1	0,76	0,76
		30	1,70	51
		1	1	1
		1	3	3
year: 1981	Number of fixations	30	1,70	51
	Total time of fixations [s]	30	0,41	12,15
		1	0,06	0,06
		1	1,01	1,01
		1	0,06	0,06

Table 2. Number and Total Time of Fixations on the Written Information on the Packaging








Packaging type	Measure	Written information		
		n	min max	average min max
year:1976 	Number of fixations	12	1,50	18
		1	1	1
	Total time of fixations [s]	1	3	3
		12	0,31	3,66
		1	0,07	0,07
year: 1977 	Number of fixations	1	0,66	0,66
		11	1,18	13
	Total time of fixations [s]	1	1	1
		1	2	2
		11	0,24	2,66
year:1977 	Number of fixations	1	0,08	0,08
		1	0,45	0,45
	Total time of fixations [s]	12	1,00	12
		1	1	1
		1	1	1
year: 1977 	Number of fixations	12	0,15	1,82
		1	0,09	0,09
	Total time of fixations [s]	1	0,24	0,24
		14	1,43	20
		1	1	1
year: 1975 	Number of fixations	1	3	3
		14	0,28	3,88
	Total time of fixations [s]	1	0,02	0,02
		1	0,67	0,67
		3	2,00	6
year: 1981 	Number of fixations	1	2	2
		1	2	2
	Total time of fixations [s]	3	0,28	0,85
		1	0,19	0,19
		1	0,33	0,33
year: 1981 	Number of fixations	7	1,71	12
		1	1	1
	Total time of fixations [s]	1	3	3
		7	0,34	2,4
		1	0,05	0,05
		1	0,71	0,71

Table 3. Number and Total Time of Fixations on Brand Logo and Logotype on the Packaging







Packaging type	Measure	Logo		
		<i>n</i> min max	average min max	total min max
year:1976	Number of fixations	10	1,00	10
	Total time of fixations [s]	1	1	1
		1	1	1
		10	0,24	2,35
		1	0,13	0,13
		1	0,70	0,70
year: 1977	Number of fixations	2	1,00	2
	Total time of fixations [s]	1	1	1
		1	1	1
		2	0,12	0,23
		1	0,10	0,10
		1	0,13	0,13
year:1977	Number of fixations	15	1,27	19
	Total time of fixations [s]	1	1	1
		1	2	2
		15	0,25	3,8
		1	0,00	0,00
		1	0,97	0,97
year: 1977	Number of fixations	4	1,00	4
	Total time of fixations [s]	1	1	1
		1	1	1
		4	0,26	1,03
		1	0,09	0,09
		1	0,54	0,54
year: 1975	Number of fixations	3	1,00	3
	Total time of fixations [s]	1	1	1
		1	1	1
		3	0,21	0,64
		1	0,19	0,19
		1	0,25	0,25
year: 1981	Number of fixations	3	1,33	4
	Total time of fixations [s]	1	1	1
		1	2	2
		3	0,23	0,68
		1	0,09	0,09
		1	0,40	0,40

Figure 3(a). Perception Analysis Depending on the Participants' Gender : Men

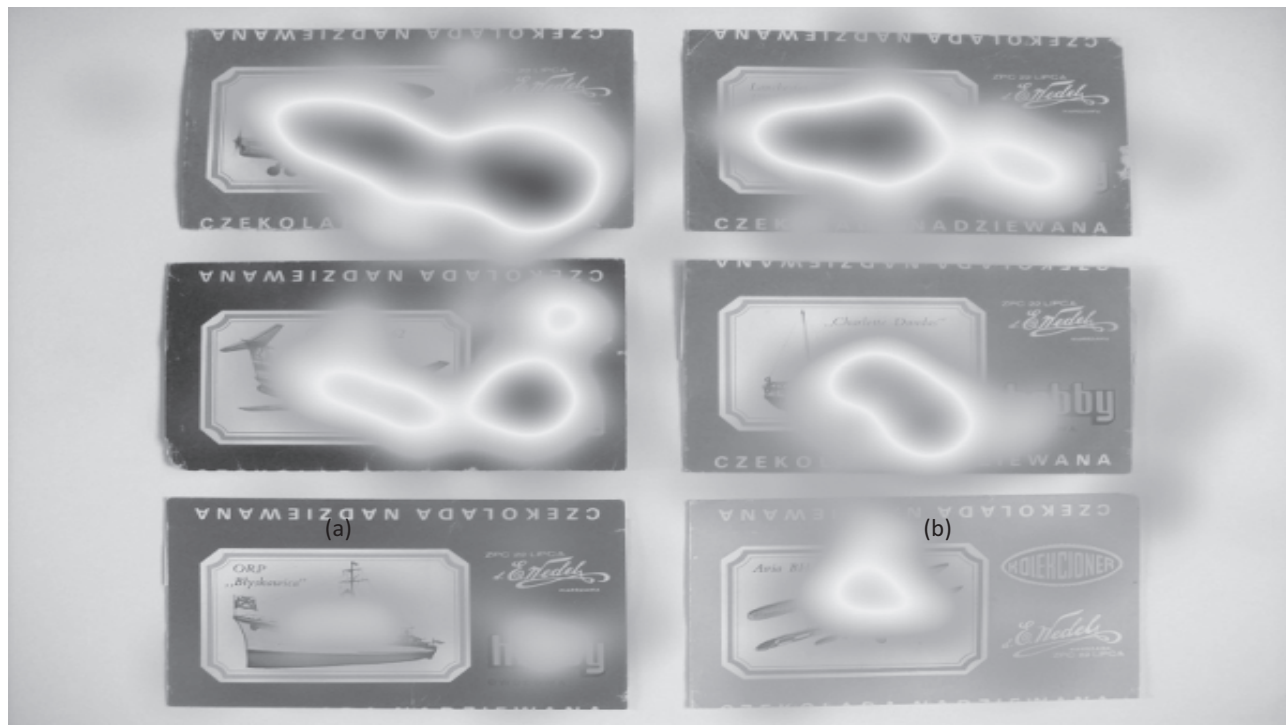
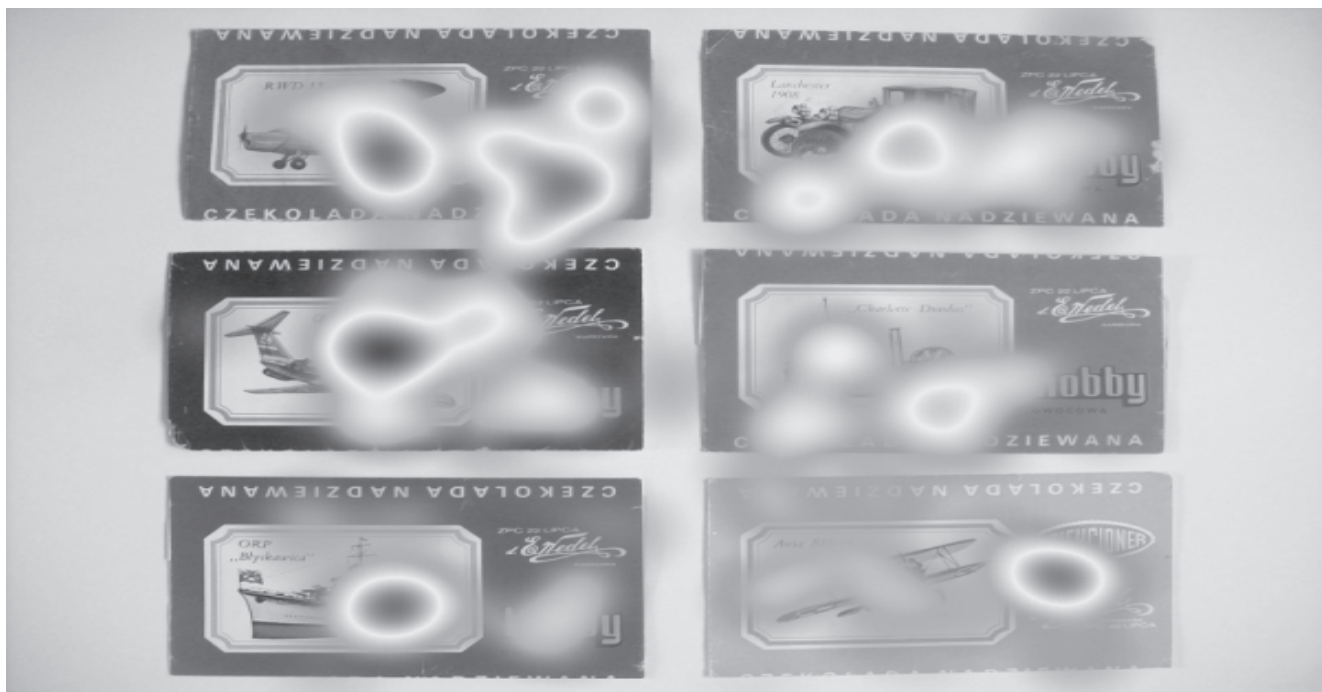


Figure 3(b). Perception Analysis Depending on the Participants' Gender : Women



on the so called gaze plots proves that in case of all chocolate wrappers considered for the study, the graphic design caused the pendulum effect, in other words, attracted the most attention. Based on the scan paths, it was observed that another important element attracting a lot of attention was the written information, such as brand name or chocolate type. The logo type was not as important in terms of attention focus. In order to prove that such hierarchy is valid, the number and time of fixations were counted to determine the significance of different elements of the visual aspect of the chocolate wrappers. The obtained eye-tracking results are depicted in the Table 1.

The analysis of the obtained eye-tracking results presented in the Table 1 reveals that in case of the examined chocolate wrappers, the total number of fixations was between 30 and 79. The greatest number of eye moves was directed towards the wrapper with RWD 13 plane illustration on it (79 fixations), then Lanchester car (76 fixations), and LOT IL-62 plane (69 fixations). The participants were slightly less interested in a steam boat Charlotte Dundas (58 fixations) and Avia BH-33 plane (51 fixations). The least attention was focused on ORP Błyskawica ship (30 fixations). In case of all examined wrappers, on which the illustrations presented different means of transport (planes, ships, and cars), the total time of fixations was between 8 and 19 seconds. Considering the total number of all fixations, the next element of the visual aspect analyzed in this study was written information (brand name, type of chocolate). The results are presented in the Table 2.

The analysis of the results presented in the Table 2 reveals that as compared to the illustrations, written information attracted much less attention. The fixation on this element was on the level of 6-20, with the total time of fixations being between 0.85 and 3.88 seconds. The last element analyzed in the study: brand logo and logotype revealed similar results (refer to Table 3). In case of logos on the examined wrappers, the total number of all fixations was between 2 and 19; whereas, the total time of fixations was on the level of 0.26-8.84 seconds.

A relatively wide attention span might be the result of the differences in graphic design of each and every wrapper, such as: size and shape of font, graphics and color, which is confirmed in other studies conducted by, among others, Gębarowski (2002) and Gelici-Zeko et al. (2012). Due to the fact that the graphic elements of all examined wrappers were placed in almost the same spot, it was observed that there might be a slight influence of the background color on the overall results. According to the research conducted by Ankiel-Homa (2012), the choice of packaging colors should embrace color interpretation depending upon such factors: consumer ethnicity, social circles, tradition, individual consumer characteristics, as well as deeply rooted stereotypes. That is why, an appropriate selection of colors and their combinations may create an impression strongly influencing the final purchase decision, which has been confirmed scientifically by Kauppinen-Räsänen (2014).







In order to determine the role of color in attracting the consumers' attention, a relationship between the first fixation and the color of the chocolate wrapper was examined. The results show that most of the individuals focused on a dark-blue wrapper first (19 people), then red (12); however, it did not translate into increased interest in these products. Changes in color perception depending upon gender were also observed. On analyzing the visualizations (Figure 3 (a) and Figure 3(b)) of eye moves and considering the time of fixations and the gender of the respondents, it was observed that women - more likely - focused on a purple wrapper; whereas, men were attracted to the brown wrapper.

The analysis based on the total results of fixation time in different areas of interest (AOI) of packaging, presented in the Table 4, proves that considering the color of the wrapper, most people focused mainly on the dark blue one (126 fixations and 26.95 seconds). The next most attractive wrapper (attention-wise) was the purple wrapper (115 fixations and 25.54 seconds). The least attractive (in this respect) seemed to be the brown wrapper (only 53 fixations were noted, and the total time of fixation was on the level of 12.17 seconds).

Discussion and Conclusion

An ever increasing competition between manufacturers to raise the market share influences the market and leads to a growing number of products offered to consumers. It is, of course, connected with the product positioning in the market, and the offers and company image are shaped in such a way so as to ensure a strong positive connotation and long-lasting impression. Currently, the positioning of time is becoming one of the key

Table 4. The Number and Total Time of Fixation in Different Areas of Interest (AOI) of Packaging

Packaging Type	Measure	Results
year:1976 	Number of fixations	144
	Total time of fixations [s]	32,05
year: 1977 	Number of fixations	115
	Total time of fixations [s]	25,54
year:1977 	Number of fixations	126
	Total time of fixations [s]	26,95
year: 1977 	Number of fixations	96
	Total time of fixations [s]	19,55
year: 1975 	Number of fixations	53
	Total time of fixations [s]	12,17
year: 1981 	Number of fixations	73
	Total time of fixations [s]	17,38

challenges that food manufacturers have to face.

In order to ensure good positioning in the market, manufacturers launch products with unordinary graphic designs on the packaging. Their main goal is to make a difference and use the marketing function of packaging to stand out and gain a competitive edge. A proper use of the elements of the visual aspect of packaging enables a manufacturer to build a product, brand, and company image, which is particularly important among food products, chocolates included.

The analysis of the obtained results proves the importance of the visual aspects of packaging and its influence on the consumers' purchase decisions. At the same time, the results have shown that uncommon elements of the visual aspects of chocolate wrappers are fully accepted by potential consumers and, in fact, they can be a crucial element influencing the purchase decision. Furthermore, a detailed analysis of the eye-tracking method and a thorough interpretation of the number and the total time of fixations led us to determine the areas of the highest interest and focus. From among all elements of the visual aspects of chocolate wrappers analyzed in this study, regardless of the product connotations, the element that attracted the most attention was illustration. Another important element was written information, and the third important element was the brand name. The logotype was relatively less important and could garner less interest.

Limitations of the Study and Scope for Further Research

It can, therefore, be concluded that despite the determined hierarchy of the elements of the visual aspect of examined wrappers in terms of their ability to attract consumers, it has to be understood that the perception of such elements is the result of many factors coming to play at the same time. The consumer's attention can be attracted by: the type of chocolate, the size and shape of the font used in the packaging, illustrations, colors and contrast. Completed research is a significant contribution towards the development of packaging and marketing theory. The research will allow for ordering a hierarchy of importance of individual elements of the visual aspects of collectible chocolate packaging. In addition, the study will determine the possibility of using neuromarketing research (eye-tracking method) for testing packaging and will allow marketers to go into the design assumptions. Hence, it is vital to continue research in this area and plan further studies with regard to the above-mentioned elements. Further research can be extended to the analysis of packaging in a holistic manner. This comprehensive

approach to chocolate packaging design creates an opportunity to provide potential consumers with both utilitarian, hedonistic, and semiotic benefits.

End Notes

[1] Saccades : Intensive eye-ball moves with quick changes in focal points.

[2] Fixations : A relatively stationary eye-ball position during which slight moves occur; it is believed that during the fixation phase, a cognitive process takes place, that is, the information is sent to the brain and processed there.

[3] Number of Fixations : Number of people looking (at least once) at a given area of the packaging.

Time of Fixations : The time during which a person focused on a given area of the packaging.

[4] Area of Interest (AOI) : Fragments of visual stimulus that are of interest to us; they allowed for the selection of the number of fixations among the ones directed towards a particular area of the packaging.

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