ALLERGEN WARNINGS IN MENU DESIGN

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ALLERGEN WARNINGS IN MENU DESIGN

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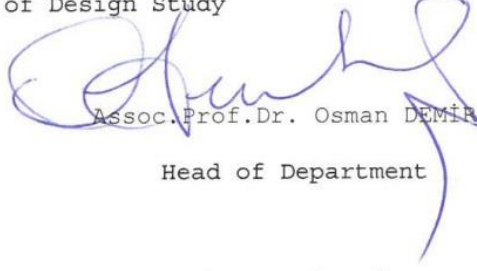
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BY

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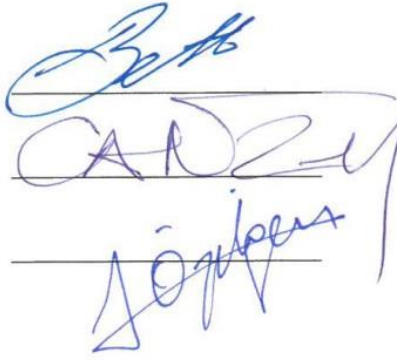
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ABSTRACT

ALLERGEN WARNINGS IN MENU DESIGN
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DESIGN STUDY
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MAY 2019

This thesis analyzes the allergen warnings. The food and beverage industry has a significant impact on the environment and society. The food and beverage industry is intertwined with the design and health sector. The most important problem in the food and beverage sector is health-related adverse effects. Allergens are one of the most important health problems. People suffer from many negatives due to allergens. There are lots of reasons for health effects. The wrong choices of restaurants by consumers is the main effects. Also, there are serious problems in the design of allergens noticeable. These problems can only be solved by design. A more efficient design is required to make food choices more reliable. Allergen warnings should be redesigned so that customers can make their choices more reliable.

In this study, the menu design for the allergies was studied. A questionnaire was performed to the customers to determine the color, typography. As a result of the online survey, it has been found that colored allergen symbols have a positive effect on consumer selection. It has been determined that people find this use more descriptive and understandable.

Keywords: allergen warnings, menu design

ÖZET

MENÜ TASARIMINDA ALERJEN UYARILARI
KARA, BUSE NUR
TASARIM ÇALIŞMALARI
Tez Yoneticisi: Asst.Prof.Dr. Betül ÖZTÜRK

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Bu calisma, alerjen uyarılarını analiz ediyor. Yiyecek ve içecek sektörü çevre ve toplum üzerinde önemli bir etkiye sahiptir. Bu sektor, tasarım ve sağlık sektörü ile iç içedir. Yiyecek ve içecek sektörü için en önemli sorunlardan biri insan sağlığı ile ilgili olumsuz etkilerdir. Alerjenler en önemli sağlık sorunlarından biridir. İnsanlar alerjenler nedeniyle birçok olumsuzluk yaşamaktadır. Bu olumsuzlukların birçok nedeni vardır. Tüketicilerin yanlış tercihleri ana etkenlerden biridir. Ayrıca, alerjen uyarılarının yanlış beyanı, eksik bilgisi veya fark edilmemesi nedeniyle ciddi problemler ortaya çıkabilir. Bu problemler ancak tasarımla çözülebilir. Yiyecek seçimlerini daha güvenilir hale getirmek için daha verimli bir tasarım gerekir. Alerjenler, müşterilerin seçimlerini daha güvenilir hale getirebilecek şekilde yeniden tasarlanmalıdır.

Bu çalışmada yeni alerjen uyarılarına yönelik menü tasarımı incelenmiştir. Renk tipografisini belirlemek için anket uygulanmıştır. Online anket sonucunda, renkli alerjen sembollerinin tüketici seçiminde olumlu bir etkiye sahip olduğu tespit edilmiştir. İnsanlar için bu kullanımın, daha açıklayıcı ve anlaşılır olduğu belirlenmiştir.

Anahtar Kelimeler: alerjen uyarıları, menü tasarımı

To My Parents

ACKNOWLEDGMENTS

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Buse Nur Kara received her graduated in 2016 Izmir Economy University,
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CHAPTER 1

1. Introduction

Globally, food service delivery is growing (British Hospitality Association, 2015). The menu is a key communication tool in food service delivery. It is important to take full advantage of the potential it offers to influence the choice of consumers in the right direction (Kang et al., 2015; Wansink and Love, 2014). In the research, it was found that the menu design had a great effect on food selection (Özdemir and Caliskan, 2014). The menu is a list of prices and data about food and beverages sold in a restaurant. It represents the focus of the components of the food service systems. The menu determines what the customer needs based on the customer portfolio. The basic gain of a well-planned menu is to meet consumer demands and to win consumer satisfaction. The menu helps guests what to order (Altınel, 2011; Bulduk, 2013; Yılmaz, 2006). Menu design is a very important factor for a restaurant. The menu is one of the main norms for the restaurant. The correct menu design is a preview of the restaurant. The customer portfolio can be expanded with the right menu design. Careful attention should be paid to menu descriptions, layouts, and colors. Effective menu design is more than words, symbols and price lists (Jones and Mifli 2001). An effective restaurant menu combines a well-planned layout, well-written descriptions, and accurate pricing for food costs. Good menus avoid overly described descriptions and unnecessary graphics from crowded layouts (McAdams, 2003). Menu items should reflect the theme of the restaurant. A restaurant menu design is a reflection of a restaurant's concept and target audience. Good menu is a good communication tool. In this way, it helps marketing and controls the cost. Emphasizes customer requests. It also highlights the best products in the restaurant. Good menu design will help managers achieve their goals.

The menu design can be better understood by adopting design thinking models (Hasso-Plattner, 2009). Design thinking models are the methodology of methodological, methodical and organizational technical procedures that provide real information about the subject of research (Hasso-Plattner, 2009). There are several methods used for this. Firstly, the target is set. Expectations and possible results are analyzed. This is called the linear design cycle. Then decisions are made and evaluations are made.

Everything will be implemented if appropriate (Asimow, 1962). In this process, the purpose, problems, and tasks are determined and many alternatives are determined for the solution (Conklin, 2006). Another method is called the dynamic process (Compton and Barrett, 2015). M. Compton and S. Barrett (2015) indicated that "the design process is often linear and not complicated, involves the simultaneous evaluation of multiple information". At this stage, qualitative research, observations, surveys, and data analysis are performed to determine the needs. The results of these studies provide useful data for existing services and new services. Another method is a systematic process that starts with the determined goals and various results (Compton and Barrett, 2015). At this stage, it is equally important to understand the problem. The name of this system is 'Double Diamond' (Design Council, 2008) (Figure 1.1).
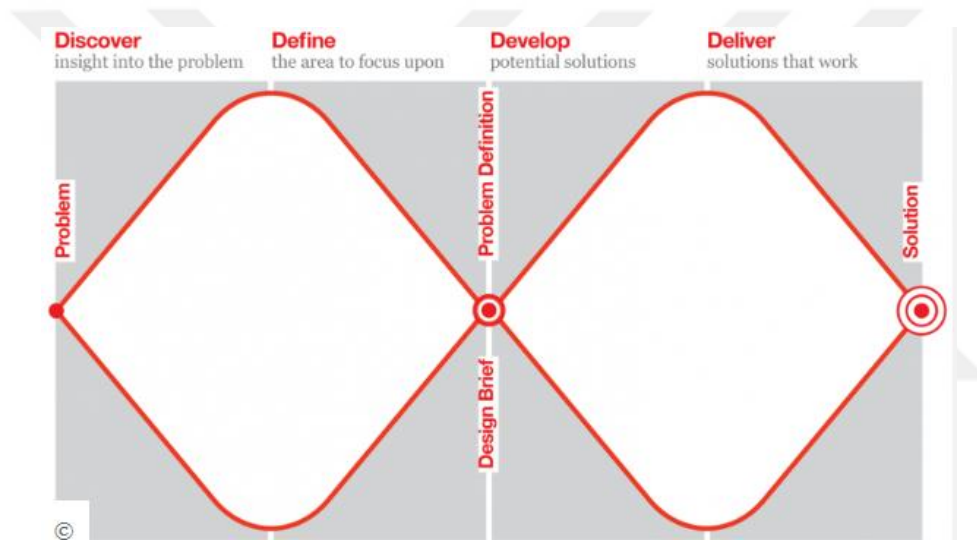
Figure1.1 Design Thinking 'Double Diamond' Process Model

Source: www.designcouncil.org.uk

It is divided into four stages - Discover, Define, Enhance and Deliver - Double Diamond is the map of the design process (Design Council, 2005). The problem should be identified and the result should be reached. This should be repeated repeatedly. Weak ideas are eliminated. In this way, it is understood which idea is the best. This cycle is an important part of good design.

The fourth method is a design process that starts without assumptions about possible results (Mattesich, 1982). This model is required when the basic problem is defined and only changes are necessary. This approach is concerned with the development of

medium and large-scale strategic, economic, political, environmental and social projects. It is used to achieve systematic thinking, knowledge, and truth (Mattesich, 1982). While analyzing the design thinking models and the essence of a problem to be solved, there is the possibility of finding new solutions if the 1st and 2nd ways are used. The Double Diamond design process can be used in more complex situations (Design Council, 2005). The fourth case can be used when the basic problem is defined and only changes are necessary. These approaches and methodologies are used according to the possibilities and needs. The most important thing at this stage is to comprehend the relationship between problem, content, and methodology. The appropriate method should be used in different situations.

By nature of design, it aims to improve an existing design. At this point, the solutions to the problems are facilitated by using interdisciplinary cooperation. By utilizing design thinking modeling at this stage, the allergen problem can be more effectively adapted to the menu design. In the menu, the use of correctly designed allergen stimuli is the right way to protect people. While food allergy can cause various symptoms, reactions can be serious and fatal (What You Need to Know about Food Allergies, 2018). People with food allergies may face difficulties in dealing with allergens while eating (What You Need to Know about Food Allergies, 2018). They may be accidentally exposed to food allergens. While designing the menu, there may not be enough explanations for them or the warnings may be insufficient. The fact that food allergens are not clearly stated in the menu is the main cause of food allergy reactions (What You Need to Know about Food Allergies, 2018). Therefore, the design of allergens in the menu is important in preventing these risks. While serving customers with food allergies, restaurants should prepare menu designs very carefully.

The main purpose of this research was to make allergen warnings more understandable by using a new method. The main focal point of this research was to design a menu with new allergen warnings. In this design, the effects of the elements of the menu design (colors, visuals, symbols, letters, images) on human psychology will be taken into consideration. The concept of design thinking has been chosen to develop theoretical concepts by observing practical applications and making comparisons and researches. Besides, the results of this research will be a utility for Turkey. Because

allergen warnings began to be used in Turkey. Allergen substance stimulation is obligatory in the establishments that sell bulk meals as of 2019 in our country. It has been included in the Budget Presentation Booklet of the Ministry of Agriculture and Forestry in 2019 (TRT, 2019). With a properly designed menu, the allergen problem can be prevented. For this reason, the results obtained will be useful in increasing usage and spreading the correct usage. For the survey study to be carried out, the 'testing' stage of the design thinking method was used. A menu design will be created with the information obtained as a result of the researches. Also, two menu designs will be created based on the methods used today. Totally three different menu designs will be shared with the participants. The main purpose; to understand the effect of the difference on the people compared to the menu samples prepared by the previously used methods. Impacts on participants are observed. Using the described research questions, the answers are analyzed.

CHAPTER 2

2.1 Design

Design is the development of a plan or process to achieve or create something. Designs include objects, events, and many other elements of daily life anything that is created by humankind (Press, 2017). It is one of the first known actions of human intelligence. Design is the norm we use at every stage of our lives. The cup we use, the couch we use, the car we use, the mold we use when making cakes, the menu design example that we order food in the restaurant. Definitions for design and design can be increased. However, to intelligible the design, it is significant to compare the design actions and activities in different fields and to understand how the different disciplines perceive the design. The design is a production-oriented activity, but that there are significant differences in the final product presented by designers in different fields (Lawson, 2006). To intelligible the design, it is important to intelligible design thinking first. Examining the connection between design thinking and menu design is very important for the allergen problem.

2.2 Design Thinking

Design thinking focuses on reaching the product, the benefit, the design, and continues the process of this approach until it receives the best answer (Erbeldinger and Ramge, 2015). Design thinking is a person-oriented and realistic thinking system. It is based on interdisciplinary principles. It is based on the principle of transparency. It is focused on the result (Erbeldinger and Ramge, 2015). Intuitively, extensive questions were subdivided into sub-questions without grounded theories (Plattner et al., 2009). At first, different options should be investigated and alternative strategies should be searched. Based on this, all possible assumptions are evaluated. With this thinking system, it can be used in all areas. Tim Brown (2012), one of the founders of the world-renowned design company international design and consulting firm (IDEO), is the person who brings out the most advanced concept of design thinking. Tim Brown said; "design thinking is a problem-solving methodology that includes all innovation activities, and focuses on people."

The idea of design helps to establish a link between the problem and the solution. The Design Thinking approach is a systematic, user-oriented approach to solving real-life problems. Instead of focusing on how the problem can be technically solved, the main focus is addressing the user's needs and requirements (Plattner et al., 2009). The design-oriented mentality can ignore problems. But design thinking is focused on solution and action. After the problem is analyzed, it can be solved by combining it with imagination. Everything can be improved by design thinking. In this case, everything depends on the designer. Everything depends on the creator's creativity, leadership, and innovation.

Although there are different approaches to the design thinking method, the Hasso-Plattner Design Institute of Stanford University's presents a 5 stage design thinking model (Hasso-Plattner, 2009). Plattner, Meinel and Weinberg's approach represents a reflection of their experience with design thinking (Hasso-Plattner, 2009). This approach is used at the Hasso-PlattnerInstitute in Potsdam and at Stanford University in Palo Alto (2009). This stands out as the most well-known design-oriented thinking model. The principles of design thinking progress step by step to solve a problem and consider all necessary factors. This process continues until the best solution is reached.

The first stage is empathy. Empathy is established with users. This step involves understanding and analyzing the customer's problems (Hasso-Plattner, 2009).

The second stage is define. All information is recovered and the synthesis process begins. The point to be considered in this process is who the user is, their features and needs (Hasso-Plattner, 2009).

The third stage is ideate. A design idea should bring as many ideas as possible. Brainstorming is done for ideas; The only purpose is to produce many ideas (Hasso-Plattner, 2009).

The fourth stage is prototyping. This section is about reaching the final solution and controlling the possibilities. Experiences are generated and feedback is obtained (Hasso-Plattner, 2009). All feedback is received from the customer. According to these results is generated better results.

The fifth stage is test. This is the stage in which the exact solution is fully tested. The best solution obtained in the previous step is applied (Hasso-Plattner, 2009). The test will help you understand what works and what doesn't work. After testing, the entire design thinking process may need to be repeated. If the customer approves the solution, the design thinking process ends here. As a result of these stages, it is possible to create a good design.

2.3 Menu Design

Effective menu design is more than words, symbols and price lists. Jones and Mifli (2001) state that the menu has two different meanings. Firstly, the price list of food and beverages. Secondly, the restaurant offers a choice of food and beverage options. Also, menu; is a list of food and beverages served in a business, whose names, prices, descriptions are written in a certain order, with or without images, to help the customer decide (Altınel, 2011; Bulduk, 2013; Yilmaz, 2006). Well-designed menu; makes pricing, descriptions and planning right. The good menu avoids redundancies. Everything should be indigenous and adequate. The menu is the restaurant's vision. It should reflect the restaurant's customer portfolio.

'Aesthetics' comes from the Greek word aesthetics, referring to abstract meanings. In the eighteenth century, the philosopher Baumgarten stated that the word aesthetics reflected emotions (Goldman, 2001). Aesthetic perception is parallel to design. A product should satisfy emotions, as aesthetically. This is only possible with good design. The basic purpose of good design is unity. Also called harmony and integrity. The basic principles of design should be used at this stage. The design principle offers suggestions for solving a design problem (Nowack 1997). In the design phase, non-written principles are adopted. The principles that are written are always applied during production and use. The main element that makes a difference between designs is the details (McAdams, 2003). As the details increase, the designs differ. As a design principle, the balance is defined in a defined and aesthetic way. In other words, the items used in the menu should be balanced and adequately used in the menu design. Another principle is the visual hierarchy, the perception that the human eye sees. This model is formed by visual contrast between the forms in the field of perception (The Principles of Design and Their Importance, 2018). At this point, the visuals used and

the descriptions of these images should create visual contrast. The balance between visuality and perception must be established (The Principles of Design and Their Importance, 2018). Rhythm must occur. The visual movements of the colors, shapes, forms, gaps, and textures used should be a rhythm when repeating (The Principles of Design and Their Importance, 2018). The materials used in the design of the menu should be proportionate to each other and between parts according to their size and scale (The Principles of Design and Their Importance, 2018). These materials should be highlighted correctly in the menu. This creates a focal point and should serve the right purpose. They should draw attention to the most important part of the design. Finally, the most important issue is compatibility. It means the harmony of the entire menu design. All visuals, prints, shapes, images, descriptions, and colors used in menu design should work as a holistic visual theme (The Principles of Design and Their Importance, 2018). In addition to these, menu engineering should be used when making a good design. In this way, the menu can be made more robust by supporting the correct methods.

2.4 Menu Engineering

There are some important norms when designing the menu. The menu design should reflect the restaurant. The menu design should be in line with the general activities of the restaurant. A good menu should increase the restaurant's profits. Most importantly, a good menu design should be permanent in the customer's mind. To survive among the restaurants, restaurateurs have to show each customer the "value for money" restaurant and differentiate themselves from the rivalry (Yim et al., 2014). This pricing is achieved through the adoption of various revenue and quality management methods, including quality assurance and marketing techniques (Raab et al., 2009). To achieve these goals, menu engineering should be used. Kasavana and Smith (1990) are those who develop menu engineering, analyze the profitability and popularity of food and beverages that make up menu items. LeBruto, Ashley, and Quain (1995, 1997) expanding the analysis, the menu engineering approach has further improved. The design of an effective menu should not be with random estimation and control. Most importantly, to analyze customer psychology and costs well. Profitability can be analyzed in detail. This analysis is called menu engineering. Menu engineering uses

real business data. Menu analysis can also be used with them. Menu analysis is one of the most basic tools used in the menu evaluation process. With this analysis, it is possible to plan menus well, develop an effective pricing and cost control system, carry out in-service training, identify the targeted customer group and implement successful strategies for them. Atkinson and Jones (1994) describe the menu analysis as a mathematical technique that distinguishes between low and high-performance menu items by evaluating the performance of each menu item and revealing performance differences. In addition to menu engineering, it is necessary to analyze the menu elements (color, text, font style, nutrition information with symbols, images..) well. In this way, a stronger menu can be created.

2.5 Menu Design Elements

The menu is a guide that clearly explains what to sell, equipment, material list and qualifications of employees. The menu is a sales tool that links with the customer (Kincaid and Corsun, 2003). More specifically, it is not just a price list of food and drinks. It also represents the image of the firm. A good menu markets food and drinks that restaurant managers want to bring to the fore. Because the menu is the portfolio where customers choose food (Antun and Gustafson, 2005). The menu is very important for customer experiences. The menu has material and spiritual meanings. Financially, the menu indicates the prices of food and beverages served by a restaurant. The menu guides customer ideas. It affects customers' thoughts about the restaurant (Wansink et al., 2005). It also includes financial issues (Jones and Mifli, 2001). Menu engineering is used to determine material issues. Spiritually, the factors that make up the menu design are accepted. The menu design captures the attention of menu researchers. Attempting to position menu items correctly on the menu (Bowen and Morris, 1995; Kincaid and Corsun, 2003; Reynolds et al., 2005). Menu design has a great impact on human psychology. In other words, the factors that make up the menu design directly affect people's psychological perceptions. Colors, writing points, shapes, symbols, images, descriptions, the shape and design of the menu are very effective in people's perceptions. With these factors, signals are sent that can affect the perceptions of the customers. In this way, customers are directly affected by what they want to order or sell. In order to influence customer choices, it is necessary to plan

menu items correctly. Images, graphics, descriptions, prices and food names should be placed at the right points. Also, a correctly designed menu helps people in their choices. Some factors affect human psychology when designing the menu. These factors; font style, colors, text, and nutrition information with symbols (allergen symbols).

2.5.1 Color

One of the most effective ways to use psychology in menu design is the colors. Color transmits symbolic and relational messages. It helps to add meaning to the crop and trademark (Schmitt and Pan, 1994; Garber et al. 2000). Color perception plays an important role in people's emotions and behaviors. The use of color in packaging, labeling, and logos helps shape the perception of crop and trademark (Grossman and Wisenblit, 1999; Aslam, 2006). The color of a product can be a powerful sign for both price and grade (Kerfoot et al., 2003). 'Colors can be psychologically associated with some meanings' (Barsalou, 2008). The labeling system where colors are used is the traffic light routing scheme created by the British Food Standards Agency (Di Falco et al., 2010). Traffic Light labels have been found to help differentiate between healthy and unhealthy foods (Borgmeier and Westenhoefer 2009; Vasiljevic, Pechey and Marteau, 2015). They found that the use of Traffic Light labels reduced red-label consumption (Archer et al., 2011). The use of colors in nutrition labels can be an important part of making healthy food selection more effective. People are not aware of this interaction. This happens in the subconscious of people. The red color is known to have an appetizing effect. It is a remarkable color. When red color is used, the attention of the people is directly focused. It also indicates the color danger of our red. In other words, the red color will be remarkable. The red color has both positive (eg romance and passion) and predominantly negative relationships (Elliot, Maier, Binser et al., 2009). The blue color is not an appetizing color. The blue color can be used to represent low-calorie foods. It can also be used in a fish restaurant because the blue represents freshness and lightness. The blue color psychologically evokes fish and seafood. When people see the green color, nature comes to their minds. It is a very strong and universal color. Because of the universal nature of the green, when people see the green color, they think psychologically that of nature. It has positive relations

especially about green color, organic food, health and nature (Schuldt 2013). Yellow makes people happy and can be used to attract the reader's attention. Psychologically, it turns yellow appetite. Also, one of the strongest colors is yellow. When people see the orange color, their appetites are stimulated. Orange is a stunning color. The orange color reminds people of delicious food. People psychologically relate orange to healthy food. Purple color creates a sensation of sensitivity in humans. When people see a purple color, they are psychologically focused more and more on the area. Besides, the world-famous chocolate company Milka uses purple cows in its advertisements. Over the years, purple and milk are associated with each other. This is codified in people's minds.

2.5.2 Font Style

Another way to use psychology in menu design is font style. The correct font allows the menu to serve strategic purposes. The font is an important element that completes the menu and determines the overall dining experience of each customer and the first impression of the restaurant. Using complex and very small writing types is inconvenient. More understandable and readable font types should be preferred. Fonts (eg underlined, bold, italic) have a special meaning for the reader (Childers and Jass, 2002). If the font association is used correctly for the menu, it can have a positive effect and if the font is not appropriate, it can have a negative effect (Doyle and Bottomley, 2004). Outside to the food industry, research has been done on several font styles. For example, Diemand-Yauman et al (2011) found that the italic font used in learning materials provides better memory performance. Using this research, we conclude that a menu with italics is better understood by the customer. Italic font is more understandable and striking than simpler font styles. The idea that the font may affect service perceptions is supported (Berry, 2000). Hensdill (1998) states that a menu with a different color image is more understandable and interesting than a normal presentation. A similar effect for the menu can be performed using an italic, bold, or different font (Kotschevar, 1987).

2.5.3 Text

Text information provides information about food and drinks in the menu. This information may be related to the nutrient properties of the product such as calorie, fat, allergen warnings, amount of sugar, and may be directed to the cooking or service form or the materials inside the product. It has become one of the issues that businesses pay attention to. Today's conscious consumer is waiting to receive informative, satisfying information about the food he eats, and the explanations that allow him to consume the food easily. For packaged foods, product information such as nutritional information, halal label, allergen substance warning is mandatory. However, there is no necessity except for writing allergen substances for restaurant menus. Information on energy and nutrients related to the products in the menu is mostly based on volunteering. Nutrition information is mandatory in restaurants in places such as schools, care centers in America. Not mandatory in Canada. In countries such as Mexico, South Korea, and Taiwan, there are legal requirements. It is seen that these explanations were made more voluntarily in Europe (Gümüş, 2014). Mills and Thomas (2008) want to examine the expectations of restaurant customers from restaurant menus have done work. As a result of the research, it is determined that customers want information about nutrition, products and foods. Vanderlee and Hammond (2014) investigated whether food descriptions in the menu affect eating habits. As a result of their studies, they found that energy, oil, and sodium consumption were significantly reduced thanks to the labels, thus affecting the food preferences. Shoemaker, Dawson, and Johnson (2005) investigated the effect of detailed menu explanations on the selection of food. They concluded that detailed menu explanations had a positive effect on selection. McCall and Lynn (2008) in their work found that the detailed explanations in the menu items increase the probability of selection, quality perception, and price expectation. Hwang and Lorenzon (2008) concluded in their research that consumers want to be informed about calorie, nutrient content and amount of fat, but that too much information can be ineffective by confusing. They showed that sufficient nutritional information allowed for healthy choices rather than unhealthy choices.

The literature review on the subject provides sufficient evidence that product descriptions significantly affect the customer's choice of food.

2.5.4 Nutrition Information with Symbols

The menu should reflect the restaurant's vision, provide financial benefits and ensure that the restaurant remains in the client's mind. Proper use of symbols is very important when designing the menu. Because, when used correctly, it serves the right purpose. When people see nutritional information with symbols, they are expected to feel psychologically good. This means they know that they can make the right choice. This allows people to feel psychologically good. The information in Wansink et al. (2001) and Lockyer (2006) is evidence that the symbols used in the menu significantly influence the choice and perception of customers. More specifically, Wansink et al. (2005), symbols can be used to draw attention to certain elements. This is especially for allergen warnings. This use positively affects the perceptions of the customers. Alternatively, Hwangand Lorenzon (2008) found that symbols used for nutritional information on the menu could increase the positive attitudes of customers. Because information about the options in the menu will increase. Choi et al. (2010), the menu also used graphics and symbols can be used to attract attention to certain products. The symbols used in the menu are used not only to provide information but also to create an attractive menu. Based on this information, we can assume that the use of symbols is an accurate method for allergens. But for the right use, first, it is important to recognize and analyze allergens.

2.6 Allergens

In today's world, the progression of allergic reactions and the prevention of these reactions are very important. Food allergy is significant because of the frequency of these reactions and in humans. Therefore, it has been a subject to focus on. The term allergy was first used in 1906 by the Austrian pediatrist 'Clemens von Pirquet'. Allergy term; hypersensitivity has been defined as an exaggerated or unexpected immune response of the body against allergens or antigens (Neyzi and Bundak, 2002). The onset of symptoms of allergies in the body takes place by respiration, digestion or injection, or by direct contact with mucosal surfaces (Kırsaçlıoğlu and Özden, 2007).

These effects are classified as toxic and non-toxic reactions. As the substance causing toxic reactions can be seen in everyone when consumed too much, the amount is important. In non-toxic reactions, there is personal sensitivity. Allergic reactions can be seen in the contact points of food such as lips or tongue as well as in the whole body. Some of these are in food intolerance (eg lactose intolerance), disease (eg celiac disease) or food poisoning classes (Köksel et al, 2011). 20% of adolescents and one-third of school children are allergy patients. Familial inheritance (genetic trend) and the factors affecting the allergy risk of various environmental factors (Kinaciyan, 2013).

People are faced with thousands of different foods during their life after birth. Although every person can react allergic to any nutrients, the foods that cause allergies in humans are often; milk, eggs, fish, shellfish, tree nuts, wheat, peanuts, soybeans. These foods have been identified as the main nutrient allergen for food and other food groups. These foods or foods constitute 90 percent of food allergies (ASCIA). Some of these foods are known to cause more allergic reactions. For example, peanuts cause allergic reactions more often than fruits. Some foods cause allergic reactions, especially in early childhood (12-24 months of cow's milk allergy), while others continue for life (such as peanut allergy) (U.S. Department of health and human services 2007). In addition to causing allergic reactions, these foods cross-react with similar types of nutrients. For example, someone allergic to wood nuts (almonds, walnuts, etc.) can also react to all other tree nuts. Table2.1 is a diagram in which allergens that cause food allergy are examined. In this table, the names, symptoms, nutrients of the allergens, the nutrients they are at risk of transmission, the risk levels and the diseases they cause are investigated.

Table 2.1 Food Allergens Table

Source: Öztürk and Besler, 2008; Özçeker and Tamay, 2015; Yang, Mejia and Lee, 2011; ASCIA 2017

	Symptom	Cross-Sensitivity Situations	Allergic Food	The danger level for people	Diseases
Milk	Diarrhea, vomiting, blood in the stool, restlessness and crying due to pain in the child	Other Animal Milk	Products containing milk product	Reduction in sensitivity of intestines as a result of decreased sensitivity	Lactose intolerance
Eggs	The frequency of eczema and itching, skin and eye lesions, eczema especially in infants.	Eggs of other birds	Eggs (all kinds of animal eggs), Albumin and Globulin ingredients, mayonnaise, pasta.	Egg allergy is dangerous in infancy and early childhood.	Since measles and mumps vaccines are prepared from chicken embryos, caution should be exercised in vaccination with mumps and mumps in children with egg allergy.
Nuts	It causes itching in or around the throat. May cause skin diseases. Diarrhea, stomach cramps, nausea or vomiting can occur digestive problems. Chest tightness. Shortness of breath or wheezing.	Various other tree peanuts, rarely other legumes	Products containing nuts product	Peanut allergy is especially dangerous for children. May cause minor irritations or fatal reactions.	
Soybean	Soy, throat, and swelling in the mouth, itching; gastrointestinal reactions (nausea, cramps, diarrhea), respiratory diseases (spring fever, asthma), skin disorders (known as urticaria or hives), shortness of breath, drop in blood pressure may cause.	Rarely other legumes	Soybean oil is used in the form of flour or concentrate. Bread, pastry, and cookies are usually added as flour. Soy is also consumed in milk, beverage, and porridge. Bean curd or clot forms the basis of fermented soy products such as miso, okara, soy sauce, or meat.	It is not fatal but affects the quality of life.	Although there is no food allergy, exposure to soybean dust or flour can cause respiratory diseases such as the runny nose, asthma, and asthma.

Table 2.1 Food Allergens

Source: Öztürk and Besler, 2008; Özçeker and Tamay, 2015; Yang, Mejia and Lee, 2011; ASCIA 2017

	Symptom	Cross-Sensitivity Situations	Allergic Food	The danger level for people	Diseases
Shellfish and Fish	Allergy-causing fish and seafood after the skin blushing, itching eye and skin lesions, digestive system; abdominal pain, vomiting, nausea, diarrhea, and abdominal cramps, respiratory system; asthma and allergic rhinitis, and anaphylaxis	Other shellfish and fish	Shark, stingrays, codfish, sardines, mackerel, tuna, lobster, crayfish, oyster, shrimp, crab, snails, clams, mussels, clams, squid, and octopus.	They are very strong allergens and cause severe and sudden reactions.	
Wheat	Abdominal pain, swelling, and intermittent diarrhea	Wheat products (but often barley, not rye, corn, oats and rice)	Products containing wheat and corn product	If it is not diagnosed in early childhood, in adulthood causes anemia and bone resorption. They cause infertility in men.	Celiac disease, gluten allergy, gluten intolerance
Tree Nuts	May cause skin reactions. It may cause itching in or around the throat. May cause digestive problems. May cause problems with breathing.	Almonds, Brazil nuts, cashews, chestnuts, filberts/hazelnuts, macadamia nuts, pecans, pistachios, pine nuts, shea nuts, and walnuts	Tree nuts; Almonds, Brazil nuts, cashews, chestnuts, filberts/hazelnuts, macadamia nuts, pecans, pistachios, pine nuts, shea nuts, and walnuts.	Life-threatening and sometimes fatal reactions	

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In the above table, eight main allergens were examined. In this table; symptoms, disease, food, danger, and cross-contamination were given. In general, allergic reactions may be pharmacological, enzymatic or toxic. Food allergy, which can be defined by the immune system of any food as being accidentally identified as foreign, creating a reaction and the emergence of clinical symptoms, is very important.

2.6.1 The Importance of Allergens in The World

Allergens affect many people around the world. Therefore, countries are implementing a variety of procedures. These procedures for protecting and raising the living standards of their citizens are quite comprehensive. These procedures apply from the smallest enterprises to the largest enterprises.

One of the countries with the most stringent rules for allergens in the United States. The US has an organization called the Food and Drug Administration for food and beverage control(FDA). The FDA, established to assist Americans, applies the 2004 Food Allergy Labeling and Consumer Protection Act (What You Need to Know about Food Allergies, 2018). The law requires the food labels to identify the food source of any component that is one of the main food allergens or which contains any protein derived from the main food allergen (What You Need to Know about Food Allergies, 2018). The Food Allergy Labeling and Consumer Protection Act (FALCPA) sets out the laws that relate to allergens (FALCPA, 2018). It refers to the labeling of foods containing certain food allergens. Full implementation of these laws by all enterprises is mandatory (Allergen labeling for food manufacturers, 2017)

On the other hand, the European Commission (EU) is a large enterprise in Europe for food and beverage. The purpose of the institution; to explain to consumers, businesses and authorities what should be done about the substances that cause allergies (New EU law on food information to consumers, 2016). The labeling directive and its subsequent amendments are part of EU legislation (Official Journal of the European Union, 2010), particularly in allergic appetite. The Labeling Directive requires producers to declare all content in packaged foods sold in the EU with very few exceptions (New EU law on food information to consumers, 2016). Also, the European Food Safety Authority (EFSA, 2002) provides information on food allergy labeling in Europe. The scientific

panel responsible for food allergies has, for example, provided a set of scientific grounds for labeling legislation and its exceptions. 'To provide consumers with better information on food labeling and to protect the health of people with food allergies, it requires the mandatory labeling of foodstuffs, including all known allergens' (EFSA, 2002).

In Turkey, the laws regarding food allergens and food are determined by the Ministry of Agriculture and Forestry. The Food and Control General Directorate (1924), established by the Ministry of Food, Agriculture, and Forestry, provides food inspection. The purpose of this institution is; to provide reliable food and feed supply, to create and supervise policies for this purpose (Policy et al., 2018). To determine the principles regarding the traceability of materials and materials in contact with food, food additives, and food in every stage of production and to control the production, processing and marketing processes (Policy et al., 2018). The information that food enterprises need to provide to their customers is controlled by this institution. On 13 December 2014, the EU Regulation on Food Information for Consumers (EU FIC) entered into force (New EU law on food information to consumers, 2016).

Information Regulations 2014 (FIR) in the UK. With this law, allergic ingredients will be listed in the content list of pre-packaged foods (Allergen labeling for food manufacturers, 2017). Besides, allergen substance stimulation is obligatory in the establishments that sell bulk meals as of 2019 in our country. It has been included in the Budget Presentation Booklet of the Ministry of Agriculture and Forestry in 2019 (TRT, 2019).

The laws that countries use are intended to protect the consumer. Through these laws, all businesses related to food have to be careful about allergens. These laws can prevent all negative effects caused by allergens.

2.6.2 Allergen Warnings in Menu Design

Food allergens have an important place in daily life. Warnings and symbols are used for food allergens. This warning is of great importance to people. This information should be given clearly in restaurant menus.
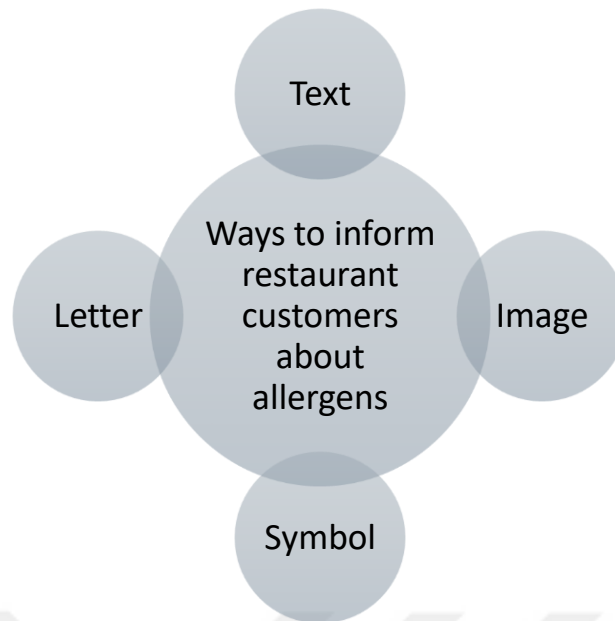
Figure2.1 Ways to inform restaurant customers about allergen with allergen warning.

As stated in the figure2.1 above, these warnings can be expressed by text, image, symbol, and letter. To understand the second part in which the articles will be examined, the first part will be examined using visuals.

It has been found that if a particular font is used appropriately for a product, it may have a positive effect. It has been found that the font may have a negative effect if it is not appropriate to transmit the intended image (Doyle and Bottomley, 2004). This is directly related to letter coding of allergen alerts. The correct font and correct coding make it clear to the customer. Bill's Restaurant uses a different allergen warning system using letters. As shown in the table below, there are letters under each dish. These letters are like a dictionary of their own and represent each allergen. Milk, nuts, sesame, eggs, crustaceans, softball players, fish, garlic, mustard, wheat gluten, celery, soybean, soybean, sulfur dioxide, and vegan foods are used for different encodings. To make them more understandable, a mini dictionary with explanations of abbreviations is added.

GRILL

english lamb rump, brushed with garlic and rosemary with roasted new potatoes, green bean and rocket salad · 15.50

(d) (gc)

marinated chicken skewers · 9.95
served on a cous cous salad with tomato, mint, parsley and lemon with tzatziki and wholemeal pitta bread

(d) (w) (g) (so) (c) (sd) (gc)

chipotle, coriander and lemon marinated chicken · 11.95
delicate mix of hot/sweet paprika, chipotle, coriander and lemon, served with chilli buttered corn and sweet potato fries

(d) (w) (g) (e) (c) (sd) (gc)

STEAKS
aged for a minimum of 28 days. our english beef is chargrilled, served with a portobello mushroom, tomato skewer, chimichurri sauce and fries

(d) (w) (g) (e) (sd) (gc)

10oz sirloin	18.50
10oz ribeye	16.95
8oz rump	14.50
choose a sauce to accompany;	all £1

béarnaise (d) (e) (sd)

peppercorn (d) (w) (g) (c) (sd)

garlic butter (d) (gc)

Figure 2.2 Bill's Restaurant Menu Allergen Warnings

Source: https://bills-website.co.uk/

It is desired to see visual images while grasping oral information such as meal names, meal contents (Wyer et al., 2010). Written explanations have different tangible values. Therefore, written explanations can encourage imagination to some extent (Lutz and Lutz, 1977). Edell and Spanish (1983) have shown that providing images related to oral knowledge can be a better understandable way than verbal knowledge. As suggested by Wyer et al. (2010), The use of symbols creates a positive effect on the understanding of oral knowledge. However, if the oral information and the symbol do not match, it will mislead the customers. Consumers code their food information with visual symbols and make them more understandable in their minds. When food descriptions and visual symbols are combined in a single mode, positive attitudes towards products have been identified (For example; Hecklerand Childers, 1992). For example, for those with allergies, this menu is used in the Grand Rapids restaurant and symbols are used. These symbols represent allergens. Figure2.3 is an example of this menu.

Figure2.3 Grand Rapids Restaurant Menu Allergen Warnings

Source: https://glutenfreepsd.wordpress.com

Visualization is very common in marketing strategies. Visually expressed products are more understandable to the consumer. Brands that use painting become more permanent than people's minds. In this way, their rememberability increases (Kisielius and Sternthal, 1984; Starch, 1966; Shepard, 1967). Current research shows that images can improve consumer attitudes. Pennings et al. (2013) found that adding images on food package could were more remarkable. Because, when people are focused on images, they also read their nutrition labels. This increases the possibility of choosing healthy foods. For example, Mc Donalds, one of the largest fast food brands in the world, gave information about allergens. Mc Donalds has published a pamphlet that the foods they sell may contain peanuts or other allergens. This pictorial brochure indicates the possibility of cross-contact between allergens and food. Figure2.4 shows this warning.

Figure2.4 Mcdonalds Allergen Warnings

Source: https://www.allergicliving.com

Lastly, Maggiano's Little Italy Restaurant has written a stimulating text instead of using allergen alerts. The Maggiano menu has a "Chef Requests" section. This section contains warnings about food allergies. In the menu description, people with allergies are required to state this when ordering. Before ordering, it is requested to order by asking if there are allergens.

Figure2.5 Maggiano's Little Italy Restaurant Allergen Warnings

Source: https://www.maggianos.com

In the above section, text, images, symbols, and letter expressions are examined with examples of allergen warnings.

2.7 Literature Review Nutrients and Allergens

In this part of the study, literature and food-related allergens were analyzed. In the first part, allergen warnings were examined visually. In this section, the researches for the

food and beverage sector (nutrients, allergens) were examined. The general purpose of the research is to examine the existing problems and seek solutions.

In a study, the effect of menu design on the customer was investigated. In the study, a survey was conducted to customers who were eating at the Waroeng Mas Kemal Restaurant for two months. The questionnaire includes questions about demographic questions and menu design. The collected data were then analyzed using multiple regression techniques. In conclusıon, customers are most influenced by food information, symbols, and font style (Fikri and Ramadhan,2011).

According to the research conducted at the university campus restaurant, customer satisfaction increases when nutrition information is available in the menu (Cranage et al., 2004). Wansink et al. 2001 found that food labels increased sales by 27%. Furthermore, it is determined that customers continue to come to the restaurant (Wansink et al., 2001). Special nutrition information in the restaurant menus supports the expectations of the consumers. The amount of food and content information provided to customers is directly related to reliability. The most effective menu design was found to be the menus with nutritional content information. The amount of food and content information provided to customers is directly related to reliability. In this way, it was determined that the reliability of the restaurant increased in the eyes of the consumer (Hwang and Lorenzen, 2008).

In research, 196 participants have tested the relationship between green and red color with healthy and unhealthy foods. As a result of the research, it was seen that the green food labeled package was matched with healthy foods. Red food labeled package was matched with unhealthy foods. It has been found that the use of colored food labels can improve the correct interpretation of nutritional information and promote healthy food choices (Tan et al., 2016).

Another study measures how customer food choices affect environmental and health factors (Bejjani et al., 2017). The study aims to test the effect of environmental factors on food selection; It has adopted the approach of 'intervention' or 'field trial' (Harrison and List, 2004). Real experiments are important. Because, in the real world environment, ideas and hypotheses should be tested with researches. Thus, a more

practical and realistic perspective occurs (Harrison and List, 2004). For this, a restaurant was chosen. The whole menu was changed to make a real experiment. The following keywords have been added to the menu; 1) item price; 2) list of ingredients; 3) the provenance of ingredients; 4) allergens; 5) calorific; 6) nutritional, and 7) carbon footprint values. Using the traffic light food labeling system, nutritional information is provided in the menu (Campbell, 2013). This system uses three colors. These; green, yellow and red. Green represents a safe, yellow middle safe and red warning meaning. As a result of the research, it was seen that the consumers were generally favorable. Nutritional value, nutritional and calorific values are important. It has been determined that the nutritional properties must become menu items.

In another research, the effect of the font on the menu was investigated. When the menu font is italicized, it shows that potential customers perceive the best service. So, the expected quality of service increases (Magninia and Kim, 2015). It has been found that the use of correct fonts draws the attention of the customer to the right place.

Due to the importance of consumer health, nutritious foodstuffs have become increasingly important. Nutritional information is one of the most important tools that try to reveal healthy nutrition models (Grunert and Wills, 2007; Kim and Almanza, 2001). For example; for a person with a gluten allergy, the product with allergen stimuli is preferred. Because, for people with different eating habits, this is the reason for preferring. The main factor that influences purchasing decisions for people with important nutritional and health issues is the nutritional information of the foods they consume (Acharya et al., 2006). For a person with allergen sensitivity, the main factor to pay attention to when eating is allergen warnings. If a menu does not have allergen alerts it does not prefer to eat in a restaurant. In some of the researches, customers were observed while exchanging food. It was determined that people with food allergies trust and buy products containing allergen symbols (Chow et al., 2011). Similarly, it was observed that parents purchased foods with both allergen symbols and text allergen information (Vermaat et al., 2008). Similar to food labeling, it is preferred in allergen stimuli because the use of symbols is more understandable.

In summary, the allergen and nutritional information offered to humans are very important. People with allergen related problems want to learn about allergens when

ordering or shopping at the restaurant. This information needs to be presented to people in the most understandable way. In the first part, the use of allergen warnings in restaurant menus was examined. Four different methods are used to indicate allergen stimuli. This; description with lettering, letters, symbols, and illustrations. In the second part, researches about food and allergens were investigated.

CHAPTER 3

3.1 Hypothesis

This study aims to examine the menu design that provides more reliable information about food allergens for consumers. In the food and beverage sector, it is desired to identify the deficiencies related to allergen warnings. It is aimed to solve the problems identified by design. For this purpose, three different expressions were proposed as hypotheses:

H1. If the nutritional information is presented on the menu, the confidence of consumer increases. Also, the consumer can make the right choice with the information provided.

H2. People who adopt either a healthy lifestyle or having allergic problems generally prefer the restaurant that includes the ingredient information or related labels.

H3. Consumer prefers colored symbols labeling for the food allergens instead of food information description or letter coding system.

3.2 Research Design and Strategy

Menu design does not only provide the list of the choices in the restaurant but also allows organizing budget of the restaurant. In recent years, the awareness of consumers towards healthy lifestyle causes changes in restaurant management. The desire to know detailed information about foods affect the design of the menu. Healthy information can take place with a properly designed menu. Because the right menu design is the best way to make good choices. Customers want to see an understandable menu design when choosing food. This is especially important for customers who have adopted a healthy lifestyle. Specifically, the correct warning method for allergens should be used. Existing methods should be developed. Allergen warnings should provide detailed information that customers want. When using these warnings, they must be understandable and correctly expressed. The purpose of this study is to adapt allergen warnings correctly to the menu design.

In this project, a survey analysis was performed with menu design thinking modeling. The procedures used to reach the answers of the questions used in the research and the

methods used before obtaining the data are explained. The general methodology and the link behind the use are associated.

3.2.1 Menu Design Thinking: A Branch of Design Thinking Specific to Menu Design with Allergens

To fully understand the method of design thinking is important for the right menu design. To make an accurate design, you need to analyze well. All steps of the design thinking method should be used at this stage. Allergen warnings are adapted to the design of the menu by design method.

Design Thinking is a method. This method can be used by designers for different purposes. When designers determine the suitability of the topic, it provides a better understanding of the design. Develops products for needs.

In this study, an application will be made in the field of menu design using the design thinking method. It is aimed to use a new concept with facts and possibilities. The menu design prepared with design thinking methods will be designed for people to make the right choices. It is aimed to create a menu design system in which the allergens are much better indicated and symbols and colors are directly related to human psychology. Name of the method to be used in this study Design Allergen Themes on Menu (DATM). DATM and design thinking were used together and the methodology of this study was determined.

3.2.2 Methodology

Components of the DATM Method

The DATM method can be applied to almost any menu design. As a starting point, it will be used to apply allergen warnings to the menu design. It can be used in different concept menus by removing the subject of allergen. The figure3.1 below illustrates the DATM method adaptation of the stages used when designing using design thinking.
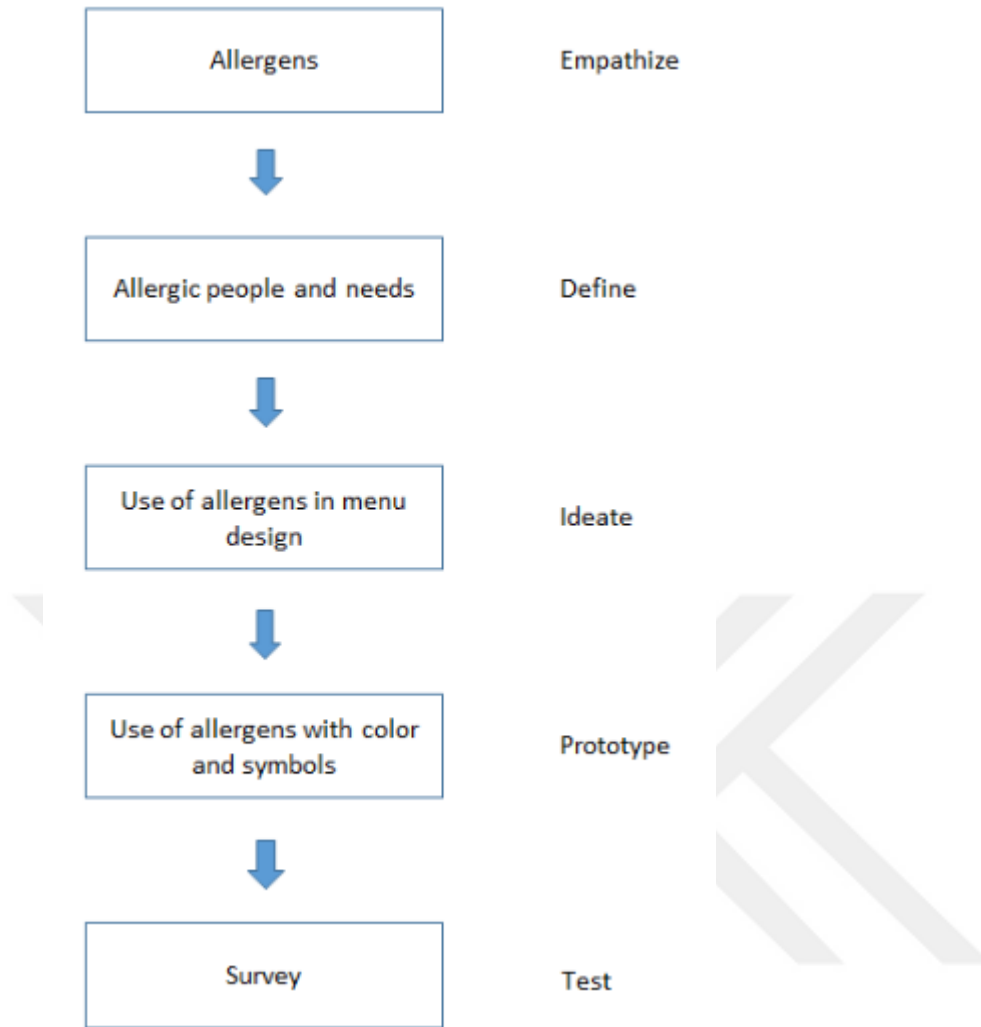
Figure3.1 Design Thinking Steps for Allergen Warnings

Eight of the most dangerous allergens present (milk, soybean, lactose, wood nuts, nuts, fish, eggs, shellfish) should be analyzed in all aspects. In the study, necessary research has been done about allergens. The effects of these allergens, their causes, contents, usage areas, consumption amounts, losses and their use in restaurants were investigated. All the research has been done about their needs and allergic people. Collecting this data is a method for preparing the design process. In the information collected, the design problem is deducted and the material is gathered to produce ideas. This is considered the second step defined.

The other one is the ideate. Ideata; In this section, a design idea should bring as many ideas as possible. Brainstorming is done for ideas; The only goal is to produce many

ideas. The literature review on this subject has been done throughout the research. While designing the menu, which elements should be considered. Research has been carried out on how to make a better design by using many different methods.

The other step is Prototype. This stage is about reaching the final solution and controlling the possibilities. Experiences are generated and feedback is received. Various literature studies have been conducted on the use of allergen warnings on the menu. The use of allergen warnings in the design of the menu has been studied in the research. There are different types of menu design that includes the allergen warning by using symbols, letter coding system, image (Bill's restaurant, Mc Donalds). Also, the effects of colors on human psychology are also examined. Research has been carried out about how colors give messages according to the sensation they leave on people and their usage areas. Using this data, a new idea for allergen warnings has been identified. The difference between all the methods studied is colors.

Table3.1 Combination of colors and symbols

Source: Binser et al., 2009; Schuldt JP 2013; Temple, Johnson and Archer, 2011; Barsalou, 2008; Kerfoot et al., 2003

Color	Allergen	Reason
Red Light Red	Nut TreeNut	Red and the light red color represents peanut and tree nut allergies. Peanut and tree nut allergy is the most dangerous and deadly. The reason for this use is that the red color is associated with the hazard and warning. The red color and the peanut symbol combine to form a more remarkable combination.
Blue Light Blue	Fish Shellfish	Blue and light blue represent fish and shellfish allergies. Blue color for fish and seafood is the best choice. Blue color represents the sea and freshness. Therefore, a blue colored allergen symbol is the best combination.
Yellow	Egg	Yellow color represents egg allergy. Red is the most remarkable color after color. Egg allergy is a very important allergy. Because egg allergy is seen in infancy and childhood. The effect of this allergy decreases as age progresses. Yellow is a stunning color. The combination of yellow and egg symbol is a remarkable warning for families with children.
Orange	Gluten	Orange represents gluten allergy. Gluten allergy is an important disorder. It causes celiac disease. It is a disease that lasts for life and has serious consequences. Therefore, powerful color orange and gluten are a good combination. Also, the orange color is that The main ingredient of gluten represents wheat.

Table3.1 Combination of colors and symbols

Source: Binser et al., 2009; Schuldt JP 2013; Temple, Johnson and Archer, 2011; Barsalou, 2008; Kerfoot et al., 2003

Color	Allergen	Reason
Green	Soy	Green represents soy allergy. It is a very strong and universal color. The green color evokes nature in man. The use of soybean is quite common. It is used in many fields such as additives, food, cosmetic materials. The widespread use of soy with the perception of universality of green is in harmony. Also, because the soybean plant is a green color, its use is remarkable and very suitable.
Purple	Milk	Purple represents milk allergy. Purple color creates a sensation of sensitivity in humans. Besides, the world-famous brand Milka uses purple color for cows. Purple cow used in advertisements makes milk connotation. Milk allergy is given as lactose intolerance. This allergy can be seen in infancy, childhood, and adulthood. But it is very important for infancy, which is the most sensitive period. The combination of purple color and milk symbol is very remarkable.

As a result of research, colors have different effects on humans. Using these effects, it is possible that allergen warnings become more noticeable. Colors and symbols will be used together in this new design. In this way, a visually stronger and remarkable result is intended. The combination of colors and symbols, which are specifically identified for this research, are given in Table 3.1 above.

Also, Figure3.2, colors are sorted by their hazard levels. First, colors representing deadly allergies were placed. Then the allergen colors seen in childhood are listed. The final colors are those with a low-risk level.
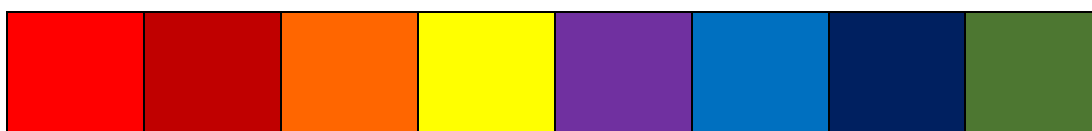

Figure3.2 Ordering of colors by hazard perceptions for allergens

To obtain the final result, combinations of color and allergen warnings have been created. The use of these colors has a psychological impact on people. In this way, the allergen warning has become more prominent and understandable.

The final step is testing. Test; this is the stage in which the exact solution is fully tested. The best solution obtained in the previous step is applied. The test will help you understand what works and what doesn't work. Data collection methods and analysis procedures will be described

3.3 Data Collection Methods and Analysis Procedures

A questionnaire with 25 questions prepared to investigate the correct use of allergen warnings. The questionnaire is mainly divided into two parts: demographic questions (age, educational status, place of residence, income, marital status, children) and prototype questions (allergens, allergen warnings, fonts, food information, frequency of eating out, colors, symbols). To collect data, the survey was published online. Everyone's participation was free for the survey. At the end of the survey, data were collected from a total of 300 participants. All participants were given an online link via e-mails online for the survey and the purpose of the research, and the participants' answers were kept confidential. The participants were informed that the results of the survey would be used only for scientific purposes. Data were collected in March and April 2019. The descriptive statistics of the participants are given in Table3.3. The participants were from Izmir (70,7%) and the other city's (29,3%). Participants'were aged (40,3%) 18-24 years, (30,3%) 25-29 years, (16,3%) 30-39 years, (10%) 40-49 years and (3,1%) + 50 years. The income of participants were (27,2%) 2021-3999, (27,2%) 4000-5999, (18,8%) 6000-7999, (15,8%) 8000 and above, (11,1%) 2020 and below. Participants were bachelor's degree (48,7%), high school degree (36,6%) and graduate degree (8,3%). Of the participants, 220 (73,3%) were married and 80 (26,7%) were single. Participants had 231(77%) children and hadn't 69(23%) children.

Table3.2 Demographic profile of participants

Variable	Number (person)	Percentage	Variable	Number (person)	Percentage
City			**Graduated**		
Izmir	212	%70,7	Under graduate	146	%48,7
Other	88	%29,3	High school	102	%34
Age			Primary school	25	%8,3
18-24	120	%40,3	Other school	27	%9
25-29	91	%30,3	**Marital status**		
30-39	49	%16,3	Married	220	%73,3
40-49	30	%10	Single	80	%26,7
+50	10	%3,1			

Table3.2 Demographic profile of participants

Variable	Number (person)	Percentage	Variable	Number (person)	Percentage
Monthly income (TL)			**Have children**		
2021-3999	81	%27,2	Yes	69	%23
4000-5999	81	%27,2	No	231	%77
6000-7999	57	%18,8			
+8000	48	%15,8			
-2020	33	%11,1			

Prototype questions were prepared to measure the effect of the combination of colors and symbols on humans. Also, the realism of the hypotheses was measured with the questions and answers. Thus, the interaction between the colors, symbols and other allergen warning was measured.

Table3.3 Frequency distribution of statements related to allergies and eating out

Variable	Number (person)	Percentage
What is the frequency of you or your family eating out?		
2-3 Times a week	99	%33
Seldom	86	%28,7
3-4 times a week	77	%25,7
Once a week	38	%12
Do you or any of your family have food allergies		
No	196	%65,3
Yes	104	%34,7
Which nutrients if you have a food allergy?		
Gluten	84	%28,4
milk	41	%13,7
Egg	35	%11,8
Nut	35	%11,8
Tree nut	26	%8,8
other	79	%25,5

Table3.3 Frequency distribution of statements related to allergies and eating out

Variable	Number (person)	Percentage
Bad experience at the a restaurant because of allergies		
No	224	%74,6
Yes	76	%25,4
If you have a bad experience, which is the reason		
Other reasons	126	%41,9
No warning	66	%21,9
Not obvious	54	%18,1
Not interesting	54	%18,1

Participants were found to eat out 99 participants 2-3 times a week, 85participants seldom, 77 participants 3-4 times a week and 36participants once a week. An average of 100 people or one of their families had a food allergy. An average of 60 people was experienced a bad experience in the restaurant due to food allergy. The reason for this is mostly since the allergen warnings are not understandable, absence or not noticeable. An sad event similar to this has also recently taken place in Spain. The customer who dines at the Michelin-starred RiFF Restaurant in Valencia, Spain, died from food poisoning. In addition, some of the customers in the restaurant have been poisoned. According to the statement, a substance used caused allergy (Valencia, 28 feb 2019) .

126 participants stated that they read food information texts. As a result of the analysis of the information collected until this stage, H1 and H2 were supported. H1. If the nutritional information is presented on the menu, the confidence of consumer increases. Besides, the consumer can make the right choice with the information provided. According to the participants, food information texts were found to be useful. Some of the participants with allergies experienced a bad experience in the restaurant. The reason for this is the lack of allergen warnings or not to be used correctly. This problem can be prevented by proper nutritional information. Problems with allergy warnings can be avoided. In this respect, allergen warning system is more advantageous both for the enterprise and for the customer. Because the customer who

sees food information in the menu will feel safer. As a result of the data, it was determined that H2 was also supported. H2. People who adopt either a healthy lifestyle or having allergic problems generally prefer the restaurant that includes the ingredient information or related labels. Because the participants have problems with allergen warnings on restaurant menu. Because the restaurant that uses food labels, the problems of people will be eliminated. And because they will feel safer, their preferences will be in this direction.

Based on the data collected in Table3.4, it was determined that the participants found the bold typeface more understandable, but the letter coding system was not understood. In other words, it is seen that bold letters are more striking than other fonts. The italic font was chosen as the second alternative. However, when the food information text and the letter coding system were compared, it was determined that the food information text was more comprehensible. Also, it had been determined that the use of symbols (%69,3) among the letter coding system (%2) and food information text (%28,7) were more understandable. That is, the allergen warnings prepared with the symbols are more understandable than other options. In addition, it was determined that the use of colored symbols (%91) was more remarkable than the use of normal symbols (%9).

Table3.4 Frequency distribution of menu design elements (typography, encoding, etc.)

Variable	Number (person)	Percentage
Do you read information texts about food? (text, letter coding or symbols)		
Yes	260	%86,7
No	40	%13,3
Which is more noticeable?		
Italic	61	%19,3
Normal	217	%73,3
Thick	22	%7,3

Table3.4 Frequency distribution of menu design elements (typography, encoding, etc.)

Variable	Number (person)	Percentage
Is the encoding method understood?		
Yes	81	%27
No	219	%73
Is food information descriptive?		
Yes	205	%68,3
No	95	%31,7
Which of the allergen stimuli is clearer?		
Letter encoding	6	%2
Symbol	208	%69,3
Food information text	86	%28,7
Are allergen symbols understandable?		
Yes	264	%88
No	36	%12
Which are more understandable?		
Symbols with color	273	%91
Symbols	27	%9

Table3.5 Frequency distribution for color-danger coupling

Color Questions	Red	Orange	Yellow	Green	Purple	Blue
Danger / warning (Nut)	**%86**	%0,3	%1,3	%1	%5	%6,3
Naturalness (Soy)	%0,7	%4	%10	**%80,6**	%4	%0,7
Grain products	%0,3	**%59,2**	%35,5	%3	%1	%1
Egg products	%0,7	%33,4	**%61,2**	%1,3	%2	%1,3
Fish products	%3,4	%3,4	%12,6	%8,5	%19,8	**%52,2**
Milk products	%1	%3,4	%2,3	%4,4	**%74,2**	%14,8

In table 3.5, questions about the colors were analyzed. Based on the data collected in table, participants chosed red color for peanut allergy (red color to be dangerous). Participants chosed green color for soy allergy (evokes nature). Participants chosed

orange color for cereal products. Participants chosed yellow color for egg products. Participants chosed blue color for fish products. Participants chosed purple for milk products. So allergen warnings and colors combination are verified by participants.

In Table3.5, questions about the colors were analyzed. Based on the data collected in table 5.6, ıt was found that 86% of the participants considered the red color to be dangerous and had chosen for peanut allergy. It was seen that 80,6% of the participants had the green color evokes nature and selected for soy allergy. It was seen that 59,2% of the participants chose an orange color for cereal products. It was seen that 61,2% of the participants chose a yellow color for egg products. It was seen that 52,2% of the participants chose a blue color for fish products. It was seen that 74,2% of the participants chose a purple color for milk products.

Based on the questions asked up to this stage, three menus were prepared according.

Figure3.3 Menu design types according to survey questions

In the first menu the food information text is given. In the second menu, the use of allergen with colored symbols is given. Because, as illustrated in Table 3.5, colored symbols for participants are more understandable. The analysis of the colors and symbols used is table 3.6. In the third menu, allergen warnings are given by letter coding system. In this letter encoding system, italic and bold letters are used. Participants were asked to choose which of these menus was clearer and clearer. Inresponse to this question, the second menu was selected as analyzed in figure 3.4.
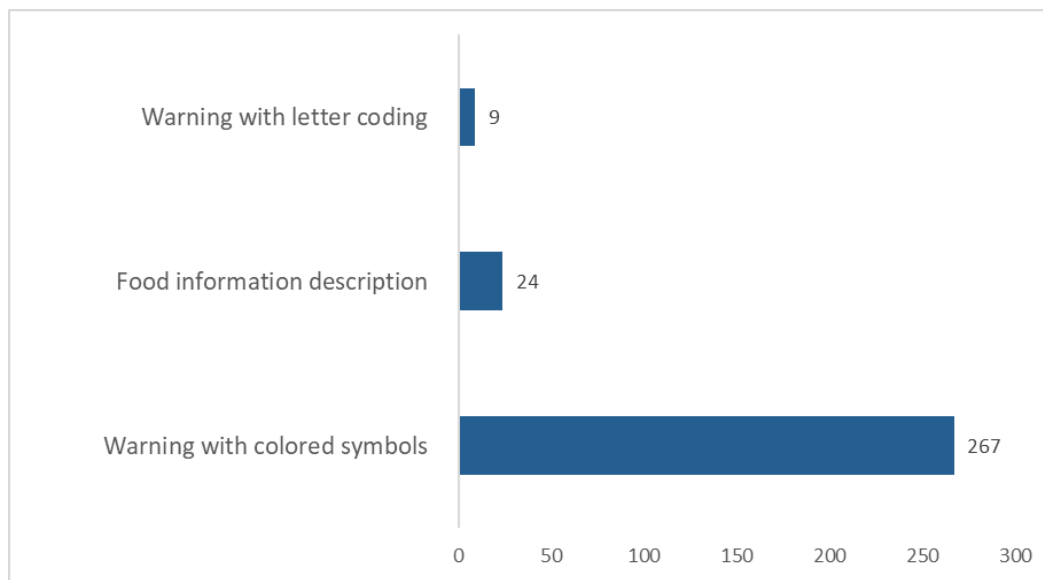
Figure3.4 According to the survey questions menu selection analysis

As a result of the participants' preferences, the menu with the colored symbols was selected. In this respect, it was determined that H3 was supported. The menu prepared with colorful symbols was found more understandable by the participants than the other options.

H3. Consumer prefers colored symbols labeling for the food allergens instead of food information description or letter coding system. As mentioned in H3, the combination of colors and symbols creates a more comprehensible perception on people. A visually used allergen warning system makes customers feel more secure. Visually prepared allergen warnings system becomes more active when supported by colors. In this respect, the colored allergen warning system is more advantageous both for the enterprise and for the customer.

For allergen warnings, the correct use of menu design is very important. Allergen warnings should be best expressed. For the correct allergen warning system can be accessed through a menu based on the basic principles of design. The main problem is that allergen impulses are not used correctly or allergen warnings are insufficient. Research on this topic and menu examples were examined. Allergen warnings are used in three different ways; symbols, food information text, and letters encoding system. At this stage, the elements of the menu design are examined. These are font style, colors, text, images, and symbols. Also, while examining menu design elements, the effects of colors on human psychology are examined. It has been seen that colors can direct people's attention and perception correctly. In parallel with this attitude analysis, regression analysis was performed with dependent hypotheses. As a result of these analyzes, it was seen that the use of allergen-colored symbols would have definite benefits. Figüre3.5 example was prepared by benefiting from the results of the survey.
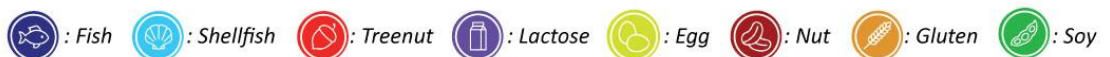
Figure3.5 Allergen warnings in menu design

This menu will be a new breath for restaurant menus. In the menu prepared as a result of the data obtained, colored symbols are used. In this way, a new menu is designed to make safer choices for customers. The use of this menu will also be an advantage for restaurant managers. Because, it will be an important factor for people who adopt healthy lifestyle.

4. Conclusion

Design is always a period of restructuring. The most effective approach for solving, creating and questioning problems is design. By using the design process, existing problems can be solved and development can be achieved. Everything we encounter in our daily lives is either a design or part of the design process. Before buying a product, its packaging is examined. Packaging design is one of the most important parts of the product. When looking at the magazine, the magazine cover design draws attention. One of the most important features of a company is its logo. The company logo is recognized as long as it remains in mind. Logo for internet sites is very important. Because, when people see that logo, the only thing that comes to their mind is that website. With this perspective, the importance of menu design is better understood. Restaurants are mainly evaluated with menus. The menu design is both the logo, the vision, and the mission of the restaurant. The menu design gives tips on the restaurant's potential. With the right menu design, potential problems can be overcome. A properly designed menu helps you to manage the restaurant quite. The aim of this study is to solve the allergen problem with the correct design.

The main purpose of the allergen warning is to facilitate consumer preferences. Allergen warnings make it easy for those with food allergies to participate in daily living activities. Because restaurants provide more than just food: they are used for social and commercial activities, facilitating travel and influencing cultural activities. The use of allergen warnings by the restaurants can reduce the risks for allergic people. This may help those with food allergies to live a more active life.

Allergen warnings are a starting point for requirements. Allergen warnings can be used to more safely eat food. People will use their restaurant preferences in this direction

because they feel safe. This system is an advantageous application for restaurant managers. In addition to allergen warnings, allergen cross-contact should be avoided. Because, many issues need to be taken into consideration for the solution of the allergen problem. Everyone and people in the food and beverage industry should be trained on this issue. In addition, measures related to this issue should be increased. For the allergen warning system, a federal regulatory system may be required. Food policies should be prepared to reshape the structure of the food services industry and to meet changes in consumer demand and to improve preparations for future challenges. As a result, a safer environment for public health can be provided. Design is the most effective method for this.

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APPENDIX 1

SURVEY

1)The city which you are living

   a) Izmir
   b) Other

2)Age

   a) 18-24
   b) 25-29
   c) 30-39
   d) 40-49
   e) 50+

3)Household income per month(Tl/Month)

   a) 2020-
   b) 2021-3999
   c) 4000-5999
   d) 6000-7999
   e) 8000+

4)Graduated

   a) Primary school
   b) Middle School
   c) High school
   d) Associate Degree
   e) License
   f) Master

5)Your marital status

   a) Married
   b) Single

6)Do you have children?

   a) Yes

   b) No

7)What is the frequency of you or your family eating out?

   a) 3-4 times a week

   b) 2-3 times a week

   c) 1 time per week

   d) Once in a while

   e) No

8)Do you or any of your family have food allergies?

   a) Yes

   b) No

9)What food if you have food allergies?

   a) Milk

   b) Egg

   c) Gluten

   d) Soy

   e) The fish

   f) Shellfish

   g) Peanut

   h) Tree Nuts

   i) Other

10Have you had a bad experience at the restaurant because of allergies?

   a) Yes

   b) No

11) If you have a bad experience, which is the reason?

   a) There was no warning for allergens.

   b) There were warnings for allergens; it was not understandable.

   c) There were warnings for allergens; I could not see because it was not remarkable.

   d) Other

12) Do you read information texts about food?

   a) Yes

   b) No

13) Which of the following fonts is remarkable?

   a) *Allergy* (italic)

   b) **Allergy** (thick)

   c) Allergy (normal)

14) The following is an example of coding for allergen stimulation by letter. What they represent in parentheses is written. Do you think the coding method is understood?

G (Gluten Allergy) F (Fish allergy) SF (Allergy to shellfish) E (Egg allergy) L (Lactose allergy) P (Peanut allergy) T (TreeNut) S (Soy allergy)

   a) Yes

   b) No

15) Is the given food information text descriptive?

If you or any of our guests are allergic, please inform the waiter. Our chefs will be happy to meet your needs.

   a) Yes

   b) No

Answer the following questions according to the colors specified

1	2	3	4	5	6
■	■	■	■	■	■

16) Which of the colors creates the highest danger / warning?

17) Which of the colors creates a perception of naturalness?

18) Which of the colors do you call grain products?

19) Which of the colors does the egg refer to?
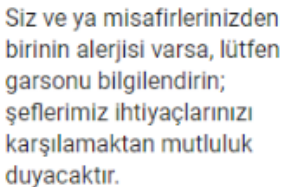
20) Which of the colors does the milk refer to?

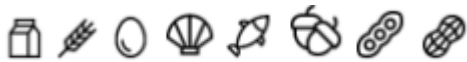21) Which of the colors does the fish refer to?

22) Which of the following allergen warnings is more understandable? (This question is based on milk allergy.)

a) **S**

b)

c) Siz ve ya misafirlerinizden birinin alerjisi varsa, lütfen garsonu bilgilendirin; şeflerimiz ihtiyaçlarınızı karşılamaktan mutluluk duyacaktır.

23) Are the given allergen symbols understandable?

a) Yes

b) No

24)Which of the allergen impulses given is more noticeable?

a)

b)

25)Below are three menus. Each of these menus has different allergen symbols. Which of these menus is more revealing, understandable and remarkable?

a)

SPECIAL MENU

Pumpkin Soup with Cream
Pumpkin, Cream.

Broccoli Soup
Broccoli, Milk, Nut

Mozzarella Gratin
Mozzarella, Soy Sauce and Vegetable

Penne with Seefood
Penne, Shellfish and Cream

Beef with Hollandaise Sauce
Beef, Hollandaise Sauce, Walnut

Perch Fillets with Sauce
Perch, Cream Sauce and vegetables

DESSERTS INCLUDED!

Tiramisu
Cream and Savoyer

Cherry Cheesecake
Cream and Biscotti

b)

SPECIAL MENU

Pumpkin Soup with Cream
Pumpkin, Cream.
G - L - E

Broccoli Soup
Broccoli, Milk, Nut
G - N - L

Mozzarella Gratin
Mozzarella, Soy Sauce and Vegetable
L - S - T - E - G

Penne with Seefood
Penne, Shellfish and Cream
L - G - SH

Beef with Hollandaise Sauce
Beef, Hollandaise Sauce, Walnut
E - L - T

Perch Fillets with Sauce
Perch, Cream Sauce and vegetables
L - F

DESSERTS INCLUDED!

Tiramisu
Cream and Savoyer
L - G - E

Cherry Cheesecake
Cream and Biscotti
T - G - L - E

F: Fish - SH: Shellfish - T: Treenut - L: Lactose - E: Egg - N: Nut - G: Gluten - S: Soy

c)