

## Sector Not Named in The Packaging: Packaging Protection Products

Ambalajda Adı Konmamış Sektör: Ambalaj Koruma Ürünleri

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### Abstract



Although it is known exactly what it is and where it is used, there is no overarching name for the industry that produces packaging protection products. Although the market area of packaging protection products is growing daily, it is a sector that has not yet been named. Users of the product, including industry employees, do not know what industry they are in. On the other hand, industry producers have started finding a proper name for themselves. In this sense, severe name inflation has occurred. Although the technologies are different, it is essential for the independent growth of the sector that the products produced for the same purpose have a known name. In this article, this industry, which produces packaging protection and support products, is researched and introduced. This article proposes a name for this huge industry that has yet to be named. It was thought that the proposed name should be inclusive, descriptive, easy to pronounce, effective, wise, and a source of pride for its employees.

Protective packaging is designed and manufactured to protect the product from atmospheric, magnetic, electrostatic, vibration, or shock damage. It is not possible to find all these protective components in a single package, and it is not possible to mention all these risks in a single package. Packaging is the precautions and methods taken to promote, ship, and protect the product from the producer to the consumer. In the packaging sector, which requires separate expertise, while the physical presence of the package, such as its size, weight, and form, is at the forefront, most of the time, it does not matter what the product inside the package is. The safety of the packaging means the safety of the product. Therefore, the packaging is designed and implemented independently of the packaging. In this sense, packaging protective systems and products are produced under many names. Each method is produced and applied for the safety of the packaging. For this reason, it was thought that the name "Packaging" would be appropriate for this process, with the idea that it would be inclusive and that the name "Packaging Sector" would be appropriate for the sector. Although this term, which is always used by all sector users, academics, and employees, has caused disappointment for most readers, it should be realized that this sector has an inclusive feature. Rather than expecting a new term, using an existing one can also meet expectations. At least, it is enough to bring the name gap of this sector to the forefront.

**Keywords:** Packing, packaging, packaging protection, sector, product.

### Extended Turkish Abstract

Ambalajın ortaya çıkışı, insanlığın özellikle yiyeceklerini taşıma ve koruma ihtiyacıyla başlamıştır. Arkeolojik bulgular, M.Ö. 8000 yıllarında, ağaç kabuğu, yapraklar, deniz kabukları, kil çömlek gibi doğal malzemelerin ürünleri saklamak için kullanıldığını göstermektedir (Esmer, Başak, 2021, s.123). Ancak ambalajlamanın insanlıktan çok öncelere dayandığı tahmin edilebilir. Ambalaj, içindeki ürünü hijyenik bir şekilde muhafaza ederek, içeriği hakkında bilgilerin bulunduğu prospektüsü ile tüketicileri

bilgilendiren ve dikkatini çekerek albenisini olumlu yönde etkileyen malzemedir (Madan, İpek, 2024, s.23). Ambalajlama ise, bu malzemelerin ürünü sarması ve koruması şeklidir. Ögleki bu eylemi çevremizdeki hayvanların da uyguladığını gözlemleyebiliriz. Bu makale ile iki önemli soruna dikkat çekilmiştir. Sorunlardan biri ambalaj sektöründe sık kullanılan iki farklı terimin aynı anlama geliyor gibi kullanılmasıdır. Diğeri ise makaleye konu olan kavramlardan birinin oluşturduğu sektörün henüz bir adının olmayışıdır. Ne olduğu ve nerede kullanıldığı tam olarak biliniyor olmasına karşın, ambalaj koruma ürünleri üreten bu sektör için kapsayıcı bir isim yoktur. Ambalaj koruma ürünleri pazarı, her geçen gün büyüyor olmasına karşın kapsayıcı bir adı bulunmamaktadır. Sektör çalışanları dahi, hangi sektörde olduklarını bilmemektedir. Sektör üreticileri ise kendilerince uygun bir isim bulma yoluna gitmiştir. Bu anlamda ciddi bir isim enflasyonu oluşmuştur. Ambalaj koruma ürünleri sektörü için sektör üreticisinin ön gördüğü, dahili ambalaj malzemeleri, ambalaj koruma ürünleri, ambalaj yastıklama ürünleri, ambalaj tamponlama ürünleri, yenilenebilir ambalaj taşıma sistemleri gibi birçok isim bulunmaktadır. Oysaki teknolojileri farklı olsa da aynı amaçlı üretilen ürünlerin genel bir adının olması, sektörün bağımsız büyümesi adına önemlidir. Bu makalede, ambalaj koruma ve destekleme ürünleri üreten bu sektör araştırılmış ve tanıtılmıştır. Yukarıda ön görülmüş her bir isim için ayrı inceleme yapılmış ve örneklendirilmiştir. Bu makale ile isim enflasyonu yaşayan ve henüz isim konmamış olan bu devasa sektör için bir isim önerilmiştir. Önerilen ismin, yapılan araştırma doğrultusunda kapsayıcı, tanımlayıcı, telaffuzu kolay, duyuşsal, algısı yüksek ve çalışanlarına çok da yabancı olmaması gerektiği düşünülmüştür. Bu nedenle önerilen isim, sektör çalışanları ve sektör kullanıcılarının kendilerini tanımlarken sıkça kullandıkları, farkında olmadan da olsa ortak noktada buluştukları kavramlardan hareketle oluşturulmuştur. Sektöre önerilen isim, aslında sektörün kendini tarif ederken kullandığı, ama farkında olmadığı kavramlardan seçilmiştir. Bu makale önerilen kavramın, sektörü tarif etmekten daha çok tanımlandığını ve dünya genelinde kullanılması hedeflenmiştir. Önerilen bu isim, sektörde kabul görmese dahi en azından sektörün isminin olmadığı farkındalığını yaratmasını sağlamalıdır. Sektörün isim eksikliğinin giderilmesine öncülük etmesi yine bu makalenin önemini ve aynı zamanda da başarısını ortaya koymuş olacaktır.

Makalenin ikinci önemi ise, anlamları aynıymış gibi kullanılan iki farklı kavramı tartışmaya açmak olacaktır. Bu iki önemli kavramın biri ambalaj, diğeri ise ambalajlamadır. Ne yazık ki bu iki farklı kavram, sektör çalışanlardan, akademisyenlere kadar hemen herkes tarafından aynı anlamdaymış gibi kullanılmaktadır. Ambalaj koruma ürünleri sektörünü isimlendirmek, ancak bu sektörü tanımlamak mümkün olabilir. Ne ürettiği ne işe yaradığı ve ambalaja ne kattığı bilinmelidir. Aksi duruma verilen isim ya bölgesel veya kapsayıcılıktan uzak olur. Nitekim mevcut isimlerin temel sorunun bu olduğu görülebilir. Ambalajlama sistemleri üreticilerinin ortak amacı, ambalajı korumaktır. En naif şekliyle ambalaj ürünü, ambalajlama ise ambalajı korur. Bu basit yaklaşımla dahi, iki farklı kavramdan bahsedildiği hemen fark edilebilir. Ancak ambalajı korumak, takviye önlemlere bağlıdır. Takviye önlemler ambalajın hem iç güvenliğini hem de dış güvenliğini sağlar. Sevkiyat esnasında ambalajın ve dolayısıyla ürünün zarar görmesini engeller. Tüketicinin güvenliğini sağlar, marka bilincini artırır. Öyle görülüyor ki bu iki kavramın tanımları doğru yapılırsa, sektörün isim sorunu da kendiliğinden çözülmüş olacaktır. Makalenin tartışma bölümünde, ambalajlama kavramına geniş yer verilmiş olması da bu nedenledir. Ambalajlama kavramının ambalajı koruma ürünleri üreten sektör olduğu anlatılmıştır. Koruyucu ambalajlar, ürünü atmosferik, manyetik, elektrostatik, titreşim veya şok hasarından korumak için tasarlanmış ve üretilmiştir. Tüm bu koruma bileşenlerinin tek bir ambalajda bulunması mümkün olmadığı gibi tek bir ambalaj için bu risklerin tamamından söz etmek de mümkün değildir. Ayrı bir uzmanlığın gerektirdiği ambalajlama sektöründe, ambalajın büyüklüğü, ağırlığı, formu gibi fiziksel varlığı ön plandayken, çoğu zaman ambalaj içindeki ürünün ne olduğunun önemi kalmaz. Ancak tamamen ürün odaklı ambalajlama da yapılmaktadır. Ambalajın güvende olması, ürünün güvende olması anlamına gelir.

Bu makale ile ambalajlama sektörünün sadece tanımı yapılmamış ona hak ettiği saygınlık verilmek istenmiştir. Türkiye ambalaj sektörünün 2024 yılı ilk altı ayının 3 milyar 322 milyon dolar (ASD, 2024) ciro yaptığı, Smithers'in bir araştırmasına göre ise 2018-2028 yılları arasında küresel ambalaj pazarının yılda yaklaşık %3 büyüyerek 1,2 trilyon doların üzerine çıkması bekleniyor (Marinova, 2022, s. 3). Katma değerinin bilindiği ve vergisini ödediği bu devasa sektörün, ambalaj sektörünün gölgesinde kalması kabul edilebilir bir durum olmamalıdır. Bu araştırma, sektörün görünürlüğünü artırmaya yönelik bir katkı sunmayı amaçlamaktadır. Neredeyse görülmez olmuş bir sektörü göstermeyi amaçlamış bu makale, nitel araştırma yönteminin belge analizi ile elde edilmiş yığın bilgilerin yorumlanmasıyla oluşturulmuştur. Nitel araştırma, insana özgü bireysel özelliklerin farklı ve derin doğasına odaklanır. Bu çalışmada genellemelerden ziyade bilginin derinliği ve özgünlüğünün önemli üzerinde durulmuştur. Araştırmanın belge toplama sürecinde, daha önceden yazılmış ilgili makale, kitap ve tezlerden elde edilmiş bilgilerin yanında sektör temsilcilerinin tanımlarından da yararlanılmıştır. Bu araştırma, büyük örneklem yerine daha küçük çalışma gruplarından elde edilen derin ve özellikli verilere odaklanmıştır. Ambalajlama kavramını ve önemini anlatarak, sektörel büyüklüğünü ortaya koymuştur. Ambalaj ve ambalajlamanın kavram farklılıkları ile ambalajlama sektörünün isimsiz kalmasının nedenlerinin tespiti yapılmıştır. Hatta bu makale ile bu sektöre kapsayıcı bir isim önerilmiştir. Ancak önerilen bu isim yeni bir terim beklentilerinden ziyade, var olanı göstererek, yerinde ve doğru kullanılması bilincini karşılayabilir.

**Anahtar Sözcükler:** Ambalaj, ambalajlama, ambalaj koruma, sektör, ürün.

## Introduction



The emergence of packaging began with humanity's need to carry and protect its food, in particular. Archaeological findings show that natural materials such as tree bark, leaves, seashells, and clay pots were used to store products in 8000 BC (Esmer & Başak, 2021, p.123). However, it can be estimated that packing dates back much earlier than humanity. Packaging is a material that preserves

the product hygienically, informs consumers with its leaflet containing information about its content, and positively affects its appeal by attracting attention (Madan & İpek, 2024, p.23). Packing is the way these materials wrap and protect the product. Now, we can observe that animals around us also perform this action. Two concepts that are often confused are packaging and packing up. Packaging is “an important component of the system that ensures the safe protection, transportation and delivery of the product from the point of manufacture to the end user” (Linus Opara & Mditshwa, 2013, p.2621). It includes every aspect of the preparation of products for shipping and marketing, distribution, storage, and display of the product (Oduncu, 2020, p.508). Technological developments in this system can offer new prospects for reducing losses, maintaining quality, adding value, prolonging product life and securing this system. The packing up is the preparation of the product or good for proper storage and transportation. This preparation “requires additional operations such as cushioning, buffering, marking, sealing, strapping, wrapping” (Singh, 2020, p.39). “Seeing of the packing up as an integral and complementary part of marketing” by (Esmer, Başak, 2021, p.124) shows that packing up systems are as important as the packaging itself. The packing up has to secure the product during transportation, reduce external influences, and provide a link between product content safety and the consumer. For this reason, the protection feature of the packaging should start with the packing up systems. In other words, packaging protects the product, and the packing up protects the packaging. The packing up is made sure that the product is protected within the packaging indirectly. Research show that “the number of defective packaging exceeds 5% of the total production” (Fidianti and Susanto, 2018, p.3). Although packaging may seem like an additional expense to the manufacturer, the deformation of the packaging may create surprises such as leakage, smelling bad, spillage or breakage of the product, resulting in a defective product, which may initiate a legal process. Frequent occurrence of such bad results can have much more serious consequences for the manufacturer brand. For this reason, the packing up systems in the sectoral sense have great importance and value in the packaging industry. In these days when the world population is increasing by 144000 (Hardenburg, Nd, p.102) daily, the task of producing, processing, storing, marketing and continuous protection of adequate food will become more and more important. This is a serious issue that concerns not only the packaging industry but also the packing up industry.

### Aim

Naming the packaging protection products industry can only be possible by recognizing this industry. It should be known what it produces, what benefit it provides and what it adds to the packaging. Otherwise, the given name will be either regional or far from inclusive. As a matter of fact, this is the main problem with the existing names. The common goal of the packing up systems manufacturers is to protect the packaging. When the packaging is protected, the product is systematically protected. Moreover, the measures to protect the product are taken by the packaging manufacturers. It is declared as “safety is the features expected to be present in the packaging” (Demirbilek & Sensor, 2003, p.2). But protecting the packaging is dependent on reinforcing measures. Reinforcement measures ensure both internal and external safety of the package. It prevents the packaging and thus the product from being damaged during shipment. In this way, the trust of the consumer can be ensured, and the brand value can be increased.

In the packaging protection products sector, names such as inner packaging materials, packaging protection products, packaging cushioning products, packaging buffering products, and renewable packaging carrying systems are used. This is such a large sector that the Turkish packaging sector's turnover in the first six months of 2024 is expected to be 3 billion 322 million dollars (ASD, 2024). According to a study by Smithers, the global packaging market is expected to grow by approximately 3% annually between 2018 and 2028, exceeding 1.2 trillion dollars (Marinova, 2022, p. 3). Naturally, it can be considered normal for many names in a huge sector.



## Buffering

One way manufacturers can increase efficiency and stability in the packing up system is to use buffer systems effectively. Buffer systems stabilize production output and increase efficiency by securing transport time. For this reason, buffering is a common filling process in transport packing up and frequently used in secondary packaging. Buffering processes often involve gaps between the transport packing up and the primary packaging. However, it can be seen that it is also used for the space between the primary packaging and the product. The buffering process can be done by filling the gap, or the same process can be applied by wrapping the product in layers. Materials such as paper, newspaper, bubble wrap, air bags, towels are generally used for this work. Special machines can be used to shape crumpled materials such as paper or newspaper into the desired shape (Figure 2/a).

Various types of buffer systems and materials may be needed, each with different geometries, needs, capabilities, advantages, or disadvantages, considering product size, shape, weight, orientation, and reason for use. Observation and research are needed to determine whether a buffer system can provide the solution needed or if there is a more serious design or equipment defect causing handling problems. It is necessary to know the following variations in order to match the product with a sufficiently flexible, robust, moisture-absorbing, shock-absorbing bumper model that most specifically meets individual requirements and is applied or protected to new products.

- a) **Paper:** The most frequently used material in packaging and the packing up systems is undoubtedly paper. Although it does not have much protective feature in the buffering area, its easy shaping, stylish appearance and creating a sense of hygiene increase the usage area. The paper and newspaper in the buffering process are generally used for the filling space and compaction processes. The size and shape of the product determines the amount of paper pad to be used. A paper buffer can be used in many different ways. Buffering can be done such as compressing and fixing the product, both cushioning and supporting the product, top and bottom capping in the form of sandwich, wrapping the product or package. The purpose of the paper bumper is not to give a stylish look. For this reason, only its functionality is utilized by using it for fast and industrial product shipment. For this purpose, special papers such as graphite, sulfite, parchment can be used, as well as newspapers and waste wraps.



**Figure 2.** Buffering operations: a). Forming machine used to increase the flexibility of the material such as paper newspaper to be used in the buffering process. b) Filling the space in the primary packaging in the transport package to prevent external impact and possible vibration. c) The buffering process by filling the packaging space in the primary packaging to protect the product directly



- b) Bubble Wrap:** Bubble wrap, an important material in the buffering function, is an air-injected small bubble-coated plastic wrap material that can be in different colors. Bubbles are often used in fragile goods because of their high ability to prevent damage from collisions, falls and vibrations. However, in addition to more durable industrial products, it is also an indispensable buffering material for sensitive electronic devices. Bubble wrap can be made of small or big bubbles. It can be seen that coarse-grained bubble wraps are used for shipments of industrial, cleaning or chemical products. Although it cannot be said that such a distinction is made according to the type of product, it is clear that the preference is in this direction.



**Figure 3.** Big-bubbles bubble wrap material



**Figure 4.** Air bubble wrap was first developed by the USA-based "Airproduct". The current bubble cloth is generally composed of two parts of PE plastic. Its specification is injection air into the cylindrical center that comes out after plastic molding on one side, and then seal it with another part, so that it can achieve the purpose of preventing pressure" (<https://www.xiang.hao.com.tw>, Retrieved : 12.01.2021).

- c) Air Bags:** Air bag protection wraps, which have many differences, are in the form of filling, bubble or column bags and are a wide-based packaging application with definitions such as air cushion, bag inner cushion, gas column. Air bags not only adjust to product size, they also have excellent shock absorbing and cushioning properties. For this reason, it is preferred "especially in the food and beverage sectors" (Özerden, 2017, p. 30). Its wide-based usage opportunity also provides the advantage of use in the furniture and home transportation sector. Its stylish appearance, external force absorption quality, light weight and small footprint are the reasons for preference among packaging interior protection systems. In addition to these, air bags provide both labor and transportation advantages. Air bags, which are frequently used in the transportation sector, are called "inflatable bags" because they can be produced in rolls and inflated with a mini compressor at the place of use (Özerden Product Catalogue, 2017).



**Figure 5.** Air bags, which are environmentally friendly with their recyclable feature, allow shipment with zero damage, which can be shaped according to the size of the product. It has many options as a usage area. It does not take up space in the packaging, does not make weight and is cost effective.

## Protection

In-pack protection materials are widely used in transport and storage packaging to “provide support for the product and minimize damage from impacts” (Ma., Lu., Chen, 2020, p.3). Today, the rise of globalized marketing and online commerce has made protective packaging an important part of sales. Packaging protection products protect the transported product throughout the entire distribution cycle, ensuring integrity. It can almost completely envelop the product. With this advantage, it can protect the product not only against impact, but also from moisture. It prevents “mechanical injuries due to static pressure, shocks, vibration and collision” (Zhou et al., 2021, p.2). However, protection materials are a good inner packaging system with their “low air permeability, absorbing water but not easily desorbing” structure (Chen et al., 2019, p.7). This system is an economical and sustainable, environmentally friendly solution.



**Figure 6.** In-pack protection products are the systems used in the primary packaging that surround or fix the product. This type of system not only protects the product, it can create admirable confidence in the consumer. By ensuring the ownership of the brand, it can have a competitive advantage as the first choice and recommended.

## Internal Packaging Systems



**Figure 7.** Blisters can be used as independent packaging, as well as as an in-pack protection product, especially in the pharmaceutical industry.

Internal packaging systems are mandatory supporting materials that come into direct contact with the product, compact with the product and continue to exist until the end of the product. These materials are generally produced from lacquered cardboard, aluminum wrap, PET, PS and PVC plastic. It is used to keep the product in the desired form or to prevent product-packaging contamination. However, it is seen that it is also used to create a perception of prestige or hygiene.

Internal packaging products, although not a direct part of the packaging, can become an integral part of the product. Internal systems, which have protective and supporting functions, especially in food products, are generally in a structure suitable for the form of the product. In a way, they are designed and produced specifically for the product. The biggest feature of internal packaging systems is that their existence is proportional to the existence of the product. It is identical with the product, and it can carry, protect, and store functions even without the product packaging, and can also create a perception of hygiene. Internal packaging products that are not intended for decoration can create a serious sense of appeal in the consumer. With their general

structure, they are used as base, tray, separator or blister in cake, chocolate, syrup desserts, medicine and cosmetics industry. However, it can also be seen that blister are used alone as primary packaging.



**Figure 8.** Transport packaging wrapped with shrink film



**Figure 9.** Angle gussets, an important production in packaging products, guarantee the safe shipment of transport packaging.



**Figure 10.** Tapes are an important product for packaging. It keeps the transport packaging together.

### Packing up Industry

The packing up industry technically produces protective packaging products. “Protective packaging is often used as the main component of a product packaging or as a secondary form of packaging supply dependent on the product it contains.” (Dube, 2020, p.2). “Packing up Industry” does not produce packaging. They are different from the packaging industry by producing supplementary products that protect the packaging. However, the packaging is responsible for protecting the product rather than itself. When packaging is designed, its durability for shipment is not in the first place. In order for the product to be transported, different reinforcement measures must be taken. It may require a new understanding, a new material, a new design and new applications. In other words, a new packing up obligation arises. This obligation means the design and manufacture of protective packaging products. There is a huge industry in this area. Within the "Packing up Industry", the classification of packaging protective products has constituted new expertise areas. For example, in the packaging industry, there are manufacturers that specialize in these areas by producing only wooden or plastic pallets, or producing only packaging tapes, stretch film, shrink film or only gusset, inner foam, underlayment, etc. This gigantic industry can make standard production as well as packaging or manufacturer-specific production. In this sense, it can be said that the name "Packing up Industry", which has a wide range of production, is inclusive and accurately describes the work done. With this proposed name, it is thought that the sector can design and produce packaging-independent products as well as being a protector, supporter, holder, carrier, storage or stacker for the packaging. The target of the packing up industry is the packaging itself. The packing up industry does not pack the product on its own but can pack the product in its package. Thus, an external measure is taken for the safety of the product. The packing up industry can technically use any material and produce protective and supporting external products. The sensitivity of the product can be decisive in the material selection. The packing up products offers packaging-independent but packaging-specific technical systems.

### Result

In packing up processes, it can be supported by fixing from the outer edges and corners in proportion to the size and weight of the package. In this case, it can be seen that the sector needs a



broader scope than definitions just for packaging such as "cushioning", "internal", "buffering" or "renewable".

Protective packaging is designed and manufactured to protect the product from atmospheric, magnetic, electrostatic, vibration and shock damage (www.globalspec-com, A.D. 22.09.2022). It is not possible to have all these protection components in a single package, and it is not possible to talk about all of these risks for a single package. Packaging is “measures and methods taken for the promotion, shipment and protection of the product on the way from the producer to the consumer” (Erdal, 2022, p. 12). In the packing up sector, which requires a separate expertise, the physical presence of the package, such as size, weight and form, is at the forefront, but most of the time, it does not matter what the product in the package is. Safe packaging means the product is safe. Therefore, the packing up is designed and applied independently of the packaging. In this sense, packaging protective systems and products are produced under many names. Each method produced and applied is done for the safety of the packaging. For this reason, it was thought that the name "Packing up" would be appropriate for this process, and the name "Packing up Sector" would be appropriate for the sector.

### References

- Ambalaj, T. (2020). Taç Ambalaj Ürün Kataloğu. *Koruyucu Ürünler*. Taç Ambalaj.
- Anonim. (2020). *What is the buffer packaging material?* Shockindicator Enterprise Co.: <https://www-xiang-hao-com-tw.translate.goog/en/what-is-the-buffer-packaging-material>. E.T. 09.20.2020.
- ASD (2024). Ambalaj Sektöründen 2024 ilk 6 Ayda 1,1 Milyar Dolarlık Dış Ticaret Fazlası. E.T. 05.06.2025).
- Chen, Y. Z. (2019). Effect of softening treatments on the properties of high- density cylindrical luffa as potential mattress cushioning material. *Spinger*, (26), 9831–9852 <https://doi.org/10.1007/s10570-019-02766-6>
- Csavajda, P. B. (2021). Effect of Temperature Changes on the Vibration Transmissibility of XPE and PE Packaging Cushioning Material. *Applied Sciences*, 11(2), 482. <https://doi.org/10.3390/app11020482>
- Demirbilek, O. S. (2003). Product design, semantics and emotional response. *Article in Ergonomics*, 46, (13/14), 1346-1360.
- Dube, N. (2020). Koruyucu Ambalaj Nedir? Tanım, Türler ve Kullanımlar. Webster, MA, Amerika Birleşik Devletleri.
- Erdal, G. (2022). *Etkili Ambalaj Tasarımı 2. Basım*. Bursa: Ekin Yayınevi.
- Esmer, Z. B. (2021). Re-design of The Ayrar Package For Children. *Gazi Üniversitesi Fen Bilimleri Dergisi, GU J Sci, Part C*, 9(1), 122-133.
- Fidiyanti, F. A. (2018). SHS Web of Conferences 49. *Analysis of the cause of the defect packaging of capsule products using six sigma: A case study (PT SM)*, (?), 1-8.
- Gıdagündemi. (2007, 07 13). *Ambalajlamada Kullanılan Yastıklama Malzemeleri*. Gıda Gündemi: <https://forum.gidagundemi.com> adresinden alındı
- Hardenbürg, R. E. (ND). <https://naldc.nal.usda.gov> adresinden alındı
- Larton. (2020). Larton Ambalaj Ürün Kataloğu. *Ambalaj Koruyucu Ürünleri*. İstanbul: larton.comn.tr.
- Linus Opara, U. M. (2013). A review on the role of packaging in securing food system: Adding value to food products and reducing losses and waste. *African Journal of Agricultural Research*, 2621-2630.
- Ma, Q. L. (2020). Could aerogels from lignin-containing forest materials be used for cushioning in packaging systems? *bioresources.com*, (15), 1.

- Madan, S. N., İpek, A. R. (2024). *Minimalizm'in Ambalaj Tasarımlarında Grafik Tasarım Yönünden Ögesel İncelenmesi*. Eurasian Journal of Social and Economic Research (EJSER). 11 (2), 22-45.
- Marinova, V. (2022). *Trends in Packaging Sector*. Izvestia Journal Of The Union Of Scientists, 10 (1), 1-13.
- Oduncu, S. (2020). Kitap Kapağı Tasarımlarında Renk Kullanımının Cinsiyet Odağında Değerlendirilmesi. *ulakbilge*, (48), 28. doi: 10.7816/ulakbilge-08-48-02, 507–519.
- Özerden Ürün Kataloğu. (2017). *Airbad*. İstanbul: Özerden Plastik Sayısı.
- 360, E. (2022). *Protective Packaging Information*. Globalspec: <https://www-globalspec-com> adresinden alındı
- Pulliam, E. (2018). *Cushioning Systems In Packaging- What's The Point?* Packagingschool-com.: <https://packagingschool-com.translate.goog/blog/2018/12/04/2018-12-4-cushioning-systems-in-packaging-whats-the-point/> adresinden alındı
- Singh, J. S. (2020). *Prioritization of Failure Modes in Manufacturing Processes: A Fuzzy Logic based Approach*. Bingley, UK: Emerald Group Publishing.
- Wang, J., Khan, Y., Yang, Rui-Hua., Lu, Li-Xin., Wang, Zhi-Wei.(2013). Dynamical Behaviors of a Coupled Cushioning Packaging Model with Linear and Nonlinear Stiffness. *Arab J Sci Eng*, 1625–1629 .
- Zhou, W., Fang, J., Tang, S., Wu, Z., Wang, X. (2021). 3D-Printed Nanocellulose-Based Cushioning–Antibacterial Dual-Function Food Packaging Aerogel. *Molecules*, 26 (12), 3543. <https://doi.org/10.3390/molecules26123543>

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