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Views of Food Stakeholders on Packaging Factors

Aggeliki Konstantoglou[a], Naoum Tsolakis[a], Dimitris Folinas[b*], and Thomas Fotiadis[b]

[a] Department of Production Engineering and Management, Democritus University of Thrace, Greece
[b] Department of Supply Chain Management, International Hellenic University, Greece
[*]Corresponding author
folinasd@ihu.gr
Tel: +306938312524

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Abstract

Packaging has an enabling role in supply chains (SCs) as it facilitates a range of functions, specifically (i) marketing; (ii) logistics and SC management; (iii) food technology; and (iv) environmental protection. This study explores the appreciation towards certain food packaging factors and attributes by consumers and industrial experts for a range of food product types. Primary data was collected through a questionnaire in the Greek market and then analysed using a 1-way ANOVA and the Tukey test. The study findings reveal that food SC stakeholders mainly appreciate packaging attractiveness. Other attributes that promote environmental sustainability and facilitate logistics operations were of high importance as well.

Keywords: Food packaging factors; Food packaging attributes; Food supply chains; Food product types

1 Introduction

Packaging has an enabling role in supply chains (SCs) as it facilitates distribution and logistics operations from an end-to-end perspective whilst allowing the realisation of reverse product flows (Pålsson & Sandberg, 2020). Particularly for food SCs, packaging conditions and techniques are a key decision in planning operations to enable the hygienic and safe delivery of primarily perishable commodities (Tsolakis et al., 2014). Consumers greatly appreciate this latter function, especially in cases such as the coronavirus outbreak (Feber et al., 2020). Packaging selection has emerged as a critical parameter in the optimisation of perishable food production routing problems (i.e., joint optimisation of production, inventory, distribution, and routing operations) that propels economic and environmental benefits (Li et al., 2020). The business significance of food packaging is reflected upon the respective global market value of about US$305 billion (Statista, 2020), which accounts for about 65-70% of the total packaging sales (Brody, 2008).

In food SCs, packaging has a multi-functional role in terms of marketing, logistics and handling operations, mitigation of spoilage effects, and environmental protection (Konstantoglou et al., 2020a). In upstream SC operations, supplier selection for packaging materials is pivotal for ensuring low-cost sourcing (Kumar et al., 2011). Downstream the food SC, packaging acts as a communication medium of brand image and firms' social responsibility whilst having an influential role on consumers' choices (Marsh & Bugusu, 2007; Silayoi & Speece, 2007). To that end, several packaging attributes are utilised for com-

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munication purposes, such as colours, designs, shapes, symbols, and messages, to provide companies with a competitive advantage (Konstantoglou et al., 2020b). These attributes are further categorised into factors that influence the purchasing behaviour of the public (Konstantoglou et al., 2020b).
Notwithstanding the multi-disciplinarity of food packaging (Konstantoglou et al., 2020a), a number of research gaps are evident. First, extant studies tend to focus on certain food packaging function(s) and/or attribute(s), whilst considering either:

1. an overarching view of food as an end-product (Young et al., 2020);
2. specific food product categories such as dairy (Baruk & Iwanicka, 2016); or
3. a limited number of food types like indicative cornflakes and popcorn (Scarpi et al., 2019).

Second, to the best of our knowledge, no study considers the views of food SC consumers and industry executives for an extended range of packaging factors and attributes for a multitude of product types. Third, consumers' and managers' views about packaging functionalities and attributes for specific food types remain poorly understood (Konstantoglou et al., 2020b). Owing to the ongoing advancements in packaging technology and reconfigurations in the food SC landscape (Han et al., 2018; Tsolakis et al., 2014), food SC stakeholders' views over packaging need also to be continuously monitored to capture emerging market requirements and business opportunities.
This research aims to shed light on the contemporary perceptions of consumers and industrialists about the appreciated packaging factors and attributes for specific food product types, addressing the following research questions:

Research Question #1 What are the key packaging factors that are appreciated by consumers and industry executives concerning specific food product types?

Research Question #2 How do consumers and industry executives value the attributes of packaging for particular food product types?

It is critical to answer the above research questions since food packaging is a key operational echelon in food SCs (FoodDrink Europe, 2019), with implications for both processors and consumers. In order to address Research Question #1, a literature overview and bibliometric analysis were conducted to map the relevance of key terms in the packaging domain that are dominant in the respective functionalities. Thereafter, a specifically designed primary survey tool to gather primary data from consumers and managers to tackle Research Question #2. The primary data was analysed using 1-way ANOVA and the Tukey test. The synthesis of the literature output and the survey findings reveal future research pathways.
Our research contributes to the food SC management field by contemporality exploring the views of consumers and industry executives on particular packaging factors and attributes for a range of food product types. To the best of our knowledge, this is the first research to embrace these multi-faceted aspects with regard to food packaging within an SC context.
The remainder of this paper is structured as follows. Section 2 describes the materials and methods relevant to this research by initially defining the literature search and bibliometric analysis process. The survey design and methodology used to gather data and analyse SC stakeholders' views on packaging factors and attributes for particular food product types are described as well. Section 3 presents the literature background on food packaging functionalities, while Section 4 discusses the primary research findings. A discussion of the results is provided in Section 5, while conclusions, limitations, and recommendations for future research are discussed in the final Section 6.

2 Materials and Methods

This research is expected to contribute to the food SC management domain via exploring diverse stakeholders' views about the significance of packaging factors and attributes for specific products; therefore, the object of scrutiny has to

be an analysis of the relevant literature (Tranfield et al., 2003) along with a questionnaire-based survey (Gideon, 2012, p.91-93). The research perspective, the literature overview and the questionnaire-based survey method underpinning this study are detailed in the subsections that follow.

2.1 Research perspective

To investigate the views of food SC stakeholders on packaging factors and attributes for specific product types, it is important to identify the constructs. This research adopts the view of Konstantoglou et al. (2020a) about the contributing role of food packaging with regard to the functional areas of

1. marketing;
2. logistics and SC management;
3. food technology; and
4. environmental protection.

The latter functional areas support packaging multi-disciplinarity and multi-functionality and shall be considered in food manufacturing and retailing. This view is also in alignment with (Rundh, 2013, p.1548) who quotes that: "... new customer needs have led to a consideration of new requirements for the design of a package and a development process involving the logistic, commercial and environmental functions of packaging".
Based on these four functional roles, and in alignment to the findings of Konstantoglou et al. (2020b), this research recognizes seven packaging factors, including:

1. informational content;
2. content protection and recognition;
3. smart functioning;
4. geometry;
5. environmentally friendliness;
6. endurance; and
7. coloration.

The latter denote specific attributes that directly appeal to consumers and industry executives. Figure 1 depicts the hierarchical structure of the considered food packaging constructs in this research.

2.2 Literature overview and bibliometric analysis

Literature searches were performed to gather relevant articles and conduct bibliometric analyses per each of the four identified food packaging functions. The bibliometric analyses helped to develop a holistic understanding of food packaging and functionalities by charting the knowledge structure and evolution of the research field (Danvila-del-Valle et al., 2019).
Provided that this research investigates food packaging factors and attributes across the functions of marketing, logistics and SC management, food technology, and environmental protection, four different literature searches with corresponding keywords (Table A1 in Appendix I) were conducted. The literature search terms were derived from a preliminary analysis of the literature on food packaging (e.g., Büsser and Jungbluth (2009) and Molina-Besch and Pålsson (2020). The literature searches were performed only via using the Scopus database owing to its recognition by the academic community and the reliability of the included academic outlets (Caviggioli & Ughetto, 2019). Ultimately, by 2nd May 2021, the four individual searches led to the identification of a total of 1,579 articles written in English.
In addition, an exploration how 'packaging' relates to each of the topics of 'marketing', 'logistics and SC management', 'food technology', and 'environmental protection' was conducted. Using the literature search outputs (as outlined above), we extracted the unstructured part of the publications' metadata (article title, paper abstract) and created a topic model using the co-occurrence relationship of the words in the abstracts of the retrieved articles and the semantic distance between the most frequent terms (the stop-words were excluded from the analysis). Even if some words are rather generic such as group, participant, sample, etc. we kept them

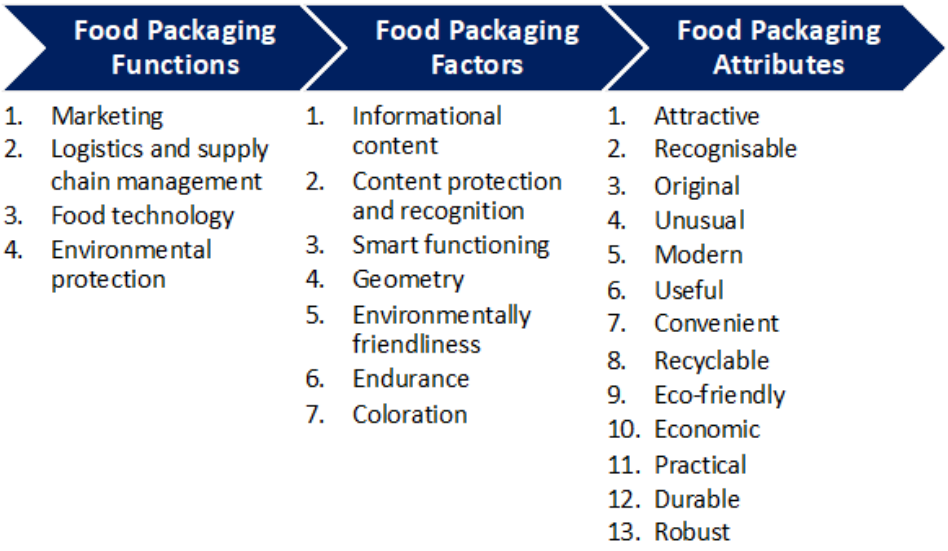

Figure 1: Food packaging functional roles, factors and attributes.

to capture the quantitative approaches of the research papers that are used in order to examine the relationships between the examined disciplines. The ratio of raw frequency counts over total counts was calculated to identify the underlining themes (i.e., clusters of terms) per every food packaging function.

2.3 Primary data collection

To evaluate the consumers' and industrial experts' views on food packaging, a survey to collect primary data was designed. The questionnaire was originally written in Greek and is inserted in Annex II (translated in English). The questionnaire is inserted in Appendix II. First, for consumers, the sampling locations were the stores of large retail chains in Northern Greece where the questionnaire was delivered face-to-face. To target managers in the food industry, an invitation was sent to the executive staff of 180 Greek companies that produce packaged food, asking them to complete the corresponding online questionnaire. These managers were in marketing/sales or logistics/supply chain departments, as well as, as food technologists or responsible for the environmental actions in their companies.

The survey involved 188 consumers and 123 industry executives who were asked to rate the significance of seven packaging factors and thirteen packaging attributes. Nineteen different food types were rated. The instructions given to consumers were to choose the products they usually purchase for themselves and/or their families. Industry experts were asked to rate products for which they had relevant knowledge; the informants were not employed in the manufacturing companies of the products for which characterization was provided.

3 Results and Discussion

Packaging supports multi-functional areas in food SCs (Hellström & Saghir, 2007), with Marsh and Bugusu (2007) denoting that "the goal of food packaging is to contain food in a cost-effective way that meets industry requirements and consumer desires, maintains food safety and minimizes environmental impact", thus highlighting the critical role of packaging in farm-to-fork operations. First, packaging helps promote food brands via displaying and communicating tangibly the brands its history/values (Ampuero

& Vila, 2006). A challenging fact is that packaging has to induce consumers to purchase particular products over alternative ones within a very limited amount of time (e.g., in the range of seconds). Second, Paine (1981) defines packaging as a system for preparing goods for their efficient transport, distribution, storage, and retail for the safe delivery of products to consumers at the lowest possible cost.
Third, food packaging is used to preserve and extend the shelf life of food products, e.g., in terms of nutritional value, appearance, and freshness, which is highly appreciated by consumers (Giusti et al., 2008). Fourth, the recognition of the growing impact of production and consumption on the environment has led to the development of certain packaging production methods that are environmentally friendly whilst informing consumers about packaging circularity via reusing and recycling (Yokokawa et al., 2021). The following subsections focus on the main considered functionalities of food packaging, namely:

1. marketing;
2. logistics and SC management;
3. food technology; and
4. environmental protection (Konstantoglou et al., 2020a).

3.1 Marketing

Packaging has multiple roles and affects almost all parts of a business (Denison & Cawthray, 1999). The role of packaging is not merely limited to protecting the enclosed products but has a function as a branding and advertising medium (Silayoi & Speece, 2004). Consumers are generally attracted by appealing packaging, which is in alignment with brand identity and consumers' personality (Underwood, 2003). In particular, packaging has a critical role in assisting corporations to effectively communicate a distinct food product proposition and attract the attention of consumers (Coles et al., 2003). Overall, food packaging is recognized to appeal to consumers' purchasing decisions (Koutsimanis et al., 2012), and relates to five major marketing implications, namely:

1. Increases product perception via motivating consumers' senses,
2. Attracts the attention of consumers,
3. Affects the purchasing behaviour of consumers,
4. Influences the decision to purchase certain products, and
5. Advertises and promotes the product.

The marketing functionality of packaging is appreciated due to the structure of the food retailing market that is characterised by the increased number of self-service stores, thus rendering packaging a significant medium to promote corporate image (Becker & Remington, 2011). The function of packaging in terms of marketing can be traced to the claim of Meyers and Gerstman (2004, p.40) who stated: "We select products by the perception of what we see and read on the package". To a greater extent, based on Muratoglu, Vice President of Marketing and Product Management at Tetra Pack Inc., "... packaging can serve as a point of differentiation and generate further value for consumers" (Furhman, 2011). Notably, Rundh (2013) recognised the marketing role of packaging as a more vital function to food protection.
Marker leaders have managed to create such recognizable packages, which are now an integral part of their corporate brand and communication strategy (Ares & Deliza, 2010). Owing to the influential role of packaging over children, research suggests that institutional directives shall focus on regulating child-appealing marketing of packaging to mitigate the risk of diet-related chronic diseases (Mulligan et al., 2020). Figure 2 illustrates the bibliometric map to understand the relevance of the terms 'packaging' and 'marketing' to other concepts in the literature. Findings confirm that Health and nutrition are two interrelated concepts that receive constant attention from the consumers, and the quality of a food product is inextricably linked to the quality of its packaging.

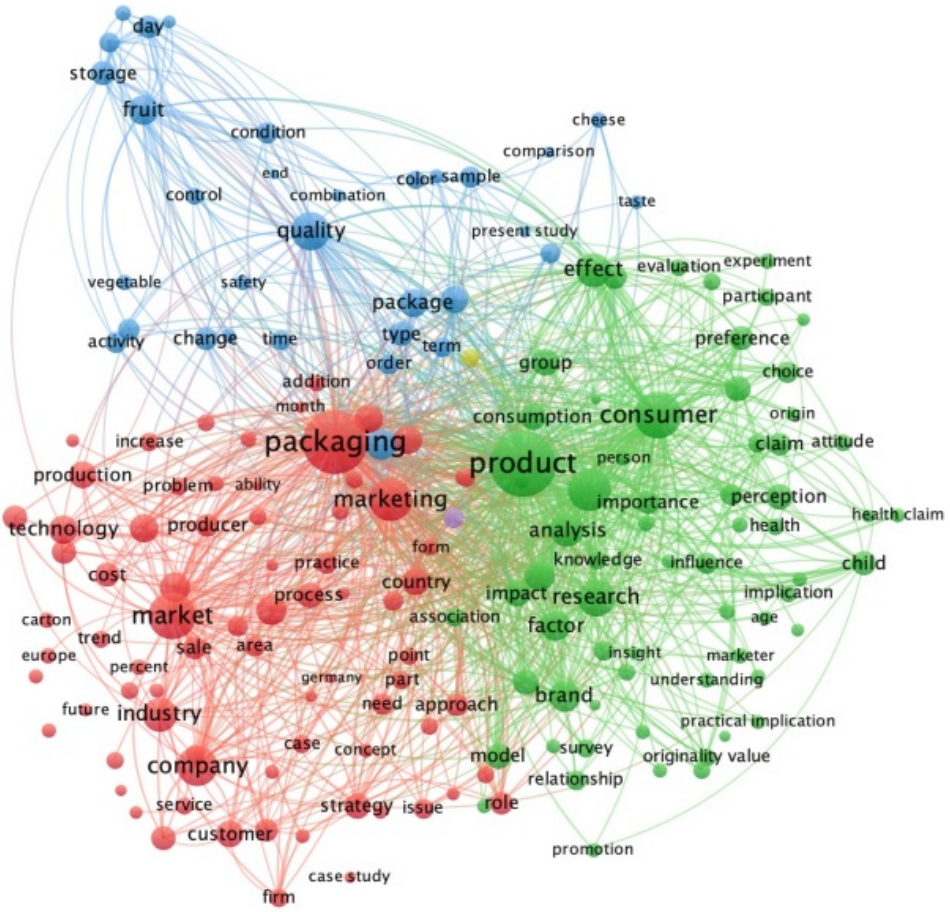

Figure 2: Network map illustrating the relations between the terms 'packaging' and 'marketing' in food supply chains.

3.2 Logistics and Supply Chain Management

Packaging is considered to be one of the most important means for material storage and management (Lambert et al., 1998). According to Sara (1990), the packaging is another subsystem of a company's logistics, while it should be considered as a medium that facilitates customer service and is closely linked to a product per se. The efficiency of product flows across a supply chain depends, among others, on packaging (Hellström & Saghir, 2007). Many studies in the literature examine how packaging supports logistics processes and food traceability in the food SC (Ahmed et al., 2005; Rundh, 2009).

In terms of food SCs, packaging must be properly designed to protect the enclosed goods during logistics operations (e.g., transportation, warehousing) whilst preserving the intrinsic food quality attributes (Lemaire & Limbourg, 2019). Packaging also affects the cost of logistics. Indicatively, Bowersox and Closs (1996) and Mohite and Chandel (2020) identified the business areas where packaging positively affects costs, including

1. inventory management (control) – the accuracy of the inventory process is positively affected by the proper selection and use of

packaging;

2. speed, accuracy and efficiency – three operational constituents that affect product identification the ease of handling;
3. cost management – facilitating handling operations while at the same time the operations are accelerated;
4. transport and storage costs –packaging must meet the different transport and storage needs in order to reduce costs and facilitate the whole process; and
5. customer service – customer satisfaction depends on the packaging to achieve quality control during distribution, providing useful information on handling, storage, ingredients, etc. and compliance with regulations (such as environmental, food, etc.).

Figure 3 depicts the bibliometric map of the relevance of the terms 'packaging' and 'logistics' to other concepts in the pertinent literature. Once again, the findings support packaging in terms of the protection and safety of products.

3.3 Food Technology

During distribution, food quality may deteriorate across biological and chemical attributes; storage time and temperature are determinant factors of food quality (Labuza & Breene, 1989). Therefore, in addition to enabling efficient distribution, sales and consumption, packaging prevents the deterioration of food and beverages' quality that occurs due to environmental effects (Han, 2014). Furthermore, an important concept for food technology is the nutrition label as it enables communication between the food producer and consumers (van Kleef et al., 2008). In every packaged food product, the nutrition label must be indicated in order to provide the consumer with useful information about

1. nutritional information such as protein content, fat, calorific value, and other nutrients;
2. information required by law (e.g., ingredients, weight/volume, storage conditions, shelf life); and
3. information not required by law.

Labels can help promote options for a proper, healthy and balanced diet (Agarwal et al., 2008). The bibliometric map of the relevance of the terms 'packaging' and 'food technology' to other concepts in the relevant literature is demonstrated in Figure 4. The findings focused on the safety and quality of the products and the information provided by the packaging, and less so on the aesthetic elements. The findings of this study show the acquisition of the environmentally friendly awareness of consumers.

3.4 Environmental protection

According to the US Environmental Protection Agency (2020), packaging materials consist of circa 28% of all municipal solid waste. As food is the only product that is consumed frequently daily, good practices for the disposal and management of food packaging waste are needed (e.g., plastic and glass recycling, composting). The monitoring of the environmental footprint of food along with the design and development of environmentally friendly packaging and labellin are other important initiatives for stakeholders (Leire & Thidell, 2005; Teisl et al., 2002). For example, the use of recyclable plastic containers in food catering chains had been demonstrated through LCA analysis to lead to reduced environmental impact in terms of CO_2-eq emissions (Accorsi et al., 2014). Recently, the use of natural leaf-type packaging material for local food products has been demonstrated to ensure environmental and health advantages, compared to synthetic packaging material, with further socio-economic implications in developing countries (Ezeudu et al., 2021).
Environmental labelling, defined as a visual communication tool that indicates products, services, and companies that operate according to specific environmental standards and criteria (Follows & Jobber, 2000; Taufique et al., 2014), has a decisive influential role in purchasing and consumption patterns (Banyte et al., 2010). Therefore, environmental labelling (or eco-labelling) is a modern environmental policy tool that stresses the role of information on the impact to the environment of production, distribution, consump-

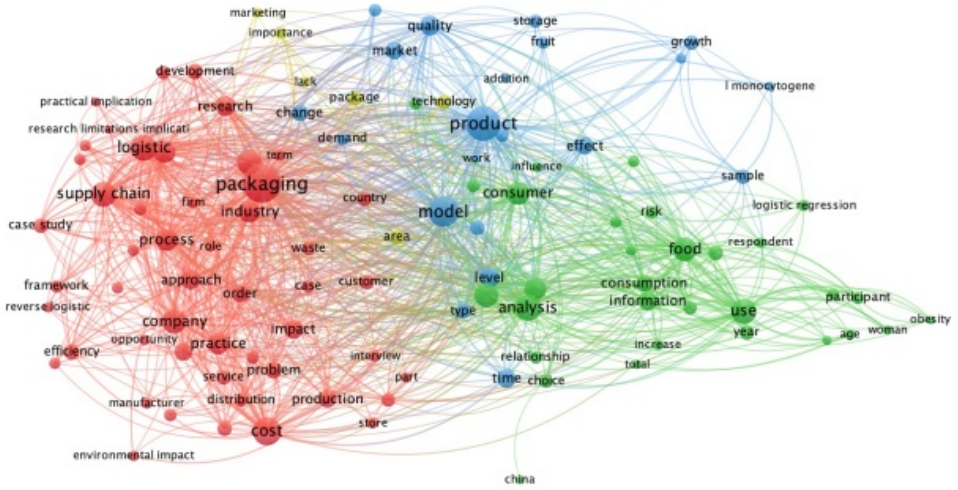

Figure 3: Network map illustrating the relations between the terms 'packaging' and 'logistics' in food supply chains.

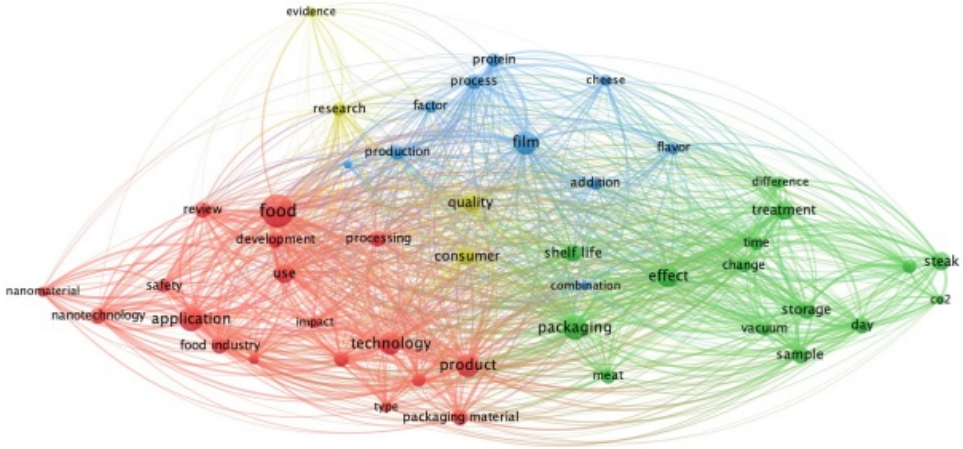

Figure 4: Network map illustrating the relations between the terms 'packaging' and 'food technology' in food supply chains.

tion and disposal of products (Jordan et al., 2003). At the consumer's end, environmental labels help distinguish "green" from conventional food products, thus influencing consumer behaviour in terms of preferences, purchase intention, willingness to pay, future redemption patterns and the word-of-mouth dissemination of relevant information (Brécard et al., 2009; Chen & Chang, 2012). Figure 5 shows the bibliometric map of the relevance of the terms 'packaging' and 'environmental protection' to other concepts in the literature.

4 Conclusions

The views of the informants with regard to packaging factors and packaging attributes, per the product type, are inserted in the sub-sections that follow.

4.1 Packaging Factors

In general, for all product types, consumers considered the factors of 'Environmental Friendliness' and 'Geometry' as important by assigning above-average values (Table 1). Notably, the gathered responses demonstrate the environmental sensitivity of consumers. On the opposite side, 'Smart Functioning' is regarded by consumers as the least significant packaging factor for all product types. Interestingly, cold cuts comprise a product type where the functions of 'Information Content', 'Content Protection & Recognition' and 'Endurance' are highly regarded by consumers, probably due to the elevated retail price and nutritional significance. Consumers also highly rated the packaging endurance of canned food and are interested in information and endurance of packaging for legumes and salad dressings.
Industry executives tend to appreciate packaging factors that enable logistics operations such as 'Endurance' and 'Geometry' (Table 2). The informative character of packaging is also appreciated. In alignment with consumers, industry executives regard 'Smart Functioning' as the packaging factor with the least significance for all product types. However, contrary to consumers, the environmental sustainability of packaging is of low concern for industrialists.

4.2 Packaging attributes

In terms of packaging attributes, consumers highly appreciate recyclability for all products studied, except for spices (Table 3). Following that, cost-effectiveness along with practicality and convenience are packaging attributes that consumers value. Interestingly, originality and robustness are the least appreciated attributes for all product types, except for spices.
The results highlight the diversity of consumers' views on packaging attributes and product types. Recyclability, economic, practicality, eco-friendliness, and convenience are attributes that are highly valued for fast-moving products such as dairy, salad-vegetables and nuts. Consumer concerns on premium and long shelf-life products, such as spices, are related to packaging characteristics associated with product safety and security, branding and uniqueness. The latter is demonstrated via the high appreciation of packaging solutions that are recognisable, durable, modern and attractive.
Industry executives do not seem to demonstrate any particular appreciation with regard to certain packaging attributes for product types (Table 4). Notable exceptions include chocolates, soft drinks and snacks, which are expected to have recognisable and attractive attributes to entice consumers' purchasing interest and increase sales. In addition, convenience and practicality are valued for cold cuts and legumes.

4.3 Comparative views

To identify any differences in the perceptions of consumers and industry executives with regard to the different factors of food packaging, a 1-way ANOVA at 99% confidence interval analysis was performed to compare the mean values for every food product type. In case that the differences in the means were considered, the data was analysed by the Tukey test ($p < 0.001$) to determine if the relationship between the data sets is statistically significant. The findings are summarised in Table 5.

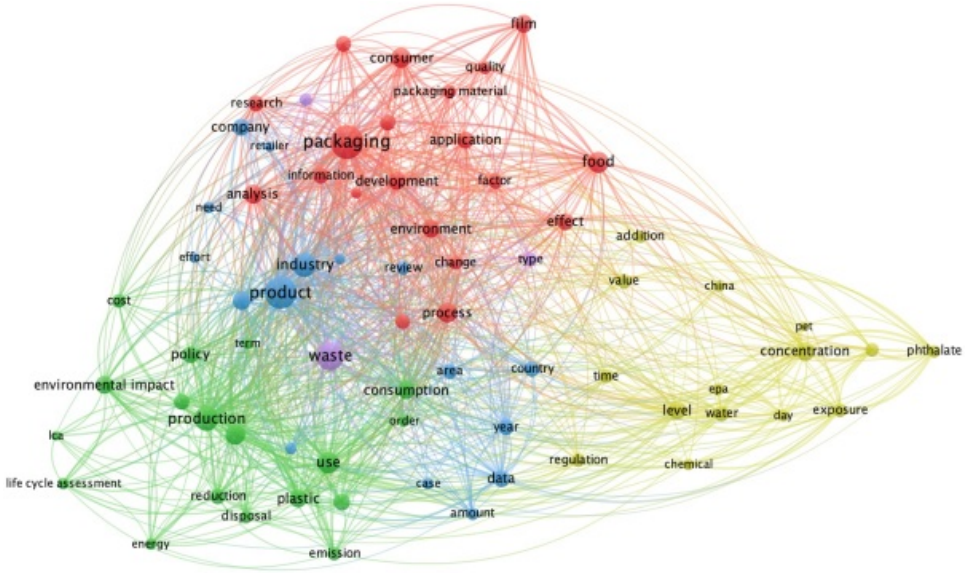

Figure 5: Network map illustrating the relations between the terms 'packaging' and 'environmental protection' in food supply chains.

Table 1: Consumers' appreciation over food packaging factors per product type.

Food Product Type (N)	Informational Content	Content Protection & Recognition	Smart Functioning	Geometry	Environmental Friendliness	Endurance	Coloration
• Alcoholic Beverages (10)	3.1 (0.4)	2.3 (0.3)	2.4 (0.4)	4.1 (0.9)	4.4 (0.3)	2.0 (0.6)	2.8 (0.5)
• Canned Food (10)	2.4 (0.6)	3.0 (0.6)	2.0 (0.7)	3.9 (1.0)	4.0 (0.6)	4.2 (0.7)	2.8 (0.5)
• Cereals (10)	1.5 (0.2)	1.5 (0.2)	2.2 (0.9)	5.0 (0.0)	3.6 (0.5)	2.9 (0.2)	3.1 (0.5)
• Cheese (10)	2.4 (0.5)	2.6 (0.7)	2.3 (0.9)	3.5 (0.9)	3.1 (1.0)	3.2 (0.6)	2.4 (0.4)
• Coffee (10)	3.2 (0.3)	3.2 (0.2)	1.6 (0.7)	4.6 (0.3)	3.8 (0.7)	2.4 (0.9)	2.6 (0.3)
• Cold Cuts (10)	4.1 (0.2)	3.7 (0.2)	2.4 (0.2)	5.0 (0.0)	3.3 (0.5)	4.3 (0.0)	1.7 (0.1)
• Dairy (10)	1.9 (0.4)	1.5 (0.1)	2.3 (0.4)	3.9 (0.4)	4.7 (0.0)	1.6 (0.3)	2.2 (0.2)
• Flour (10)	3.2 (0.2)	3.0 (0.2)	2.0 (0.5)	3.0 (0.0)	4.5 (0.2)	1.9 (0.8)	2.5 (0.4)
• Juices (10)	2.9 (1.1)	2.8 (0.8)	2.0 (1.0)	2.9 (1.1)	4.0 (1.1)	3.1 (1.3)	2.6 (0.7)
• Legumes (10)	3.4 (0.6)	3.7 (0.5)	2.9 (1.1)	3.5 (0.9)	3.7 (0.6)	3.4 (0.6)	3.2 (0.8)
• Meat (10)	2.5 (0.3)	3.3 (0.2)	1.6 (0.2)	3.3 (0.9)	2.5 (0.2)	3.4 (0.4)	2.5 (0.5)
• Nuts (10)	3.2 (0.0)	2.7 (0.0)	1.0 (0.0)	3.0 (0.0)	3.0 (0.0)	4.3 (0.0)	2.8 (0.2)
• Pasta (10)	3.0 (0.6)	2.3 (0.3)	1.0 (0.0)	3.8 (0.4)	1.2 (0.4)	2.9 (0.7)	2.1 (0.5)
• Salad Ointments (10)	3.6 (0.4)	3.2 (0.6)	2.0 (1.4)	3.6 (0.9)	3.4 (0.8)	3.3 (0.6)	2.7 (0.5)
• Salads – Vegetables (10)	2.3 (0.4)	2.5 (0.3)	1.0 (0.0)	2.5 (0.4)	5.0 (0.0)	2.0 (0.2)	2.4 (0.5)
• Snacks (8)	2.4 (0.4)	2.3 (0.3)	1.5 (0.6)	4.0 (1.3)	2.3 (0.9)	3.0 (1.0)	3.0 (0.7)
• Soft Drinks (10)	1.7 (0.4)	1.8 (0.5)	1.3 (0.4)	3.4 (0.7)	3.9 (0.6)	2.0 (0.8)	2.1 (0.4)
• Spices (10)	2.4 (0.3)	3.2 (0.2)	1.4 (0.2)	2.6 (0.4)	5.0 (0.0)	3.3 (0.2)	2.5 (0.3)
• Tea (10)	3.2 (0.4)	2.9 (0.4)	1.5 (0.2)	3.6 (0.4)	4.1 (0.6)	1.9 (0.5)	2.6 (0.4)

Table 2: Industry executives' appreciation over food packaging factors per product type.

Food Product Type (N)	Informational Content	Content Protection & Recognition	Smart Functioning	Geometry	Environmental Friendliness	Endurance	Coloration
• Bakery Products (3)	3.4 (0.3)	2.8 (0.1)	1.0 (0.0)	3.7 (1.2)	2.4 (0.5)	3.6 (0.5)	3.0 (0.4)
• Canned Food (10)	3.1 (0.5)	3.3 (0.4)	1.0 (0.0)	3.7 (0.0)	2.4 (0.1)	4.7 (0.4)	2.2 (0.4)
• Cereals (12)	3.0 (0.7)	2.5 (0.4)	1.0 (0.0)	3.2 (0.4)	3.1 (1.0)	3.0 (0.8)	2.5 (0.5)
• Cheese (1)	2.2 (0.0)	3.2 (0.0)	0.5 (0.0)	5.0 (0.0)	1.0 (0.0)	4.7 (0.0)	2.5 (0.0)
• Chocolatery (12)	3.2 (0.4)	3.1 (0.6)	1.0 (0.1)	4.2 (1.1)	3.1 (0.6)	3.6 (0.8)	2.9 (0.5)
• Coffee (14)	2.5 (0.7)	2.9 (0.5)	1.0 (0.0)	3.5 (0.9)	3.4 (1.1)	4.1 (0.6)	2.2 (0.5)
• Cold Cuts (2)	3.6 (0.3)	3.4 (0.1)	1.0 (0.0)	5.0 (0.0)	2.8 (0.7)	4.3 (0.5)	2.8 (0.4)
• Confectionery (3)	2.8 (0.8)	3.0 (0.2)	1.0 (0.0)	2.6 (1.0)	3.0 (0.7)	4.4 (0.5)	2.3 (0.8)
• Dairy (14)	3.3 (0.4)	2.7 (0.4)	1.0 (0.0)	2.9 (0.8)	2.9 (0.9)	3.9 (0.7)	2.7 (0.6)
• Jam – Honey (1)	2.3 (0.0)	3.2 (0.0)	1.0 (0.0)	4.3 (0.0)	3.3 (0.0)	4.3 (0.0)	3.0 (0.0)
• Legumes (3)	3.5 (0.4)	2.5 (0.3)	1.0 (0.0)	3.7 (1.2)	2.2 (0.2)	4.0 (0.6)	2.6 (0.6)
• Pasta (13)	3.7 (0.5)	3.1 (0.6)	1.0 (0.0)	4.4 (0.9)	2.8 (0.9)	3.3 (0.8)	2.6 (0.6)
• Salad Ointments (3)	3.0 (0.2)	3.1 (0.3)	1.0 (0.0)	3.0 (1.2)	2.4 (0.2)	4.4 (0.2)	3.3 (0.4)
• Salads – Vegetables (3)	2.3 (1.3)	2.5 (0.3)	1.0 (0.0)	2.8 (0.8)	1.8 (1.1)	2.0 (1.5)	2.1 (0.1)
• Snacks (12)	2.9 (0.4)	2.6 (0.4)	1.2 (0.6)	2.6 (0.7)	2.4 (0.9)	3.8 (0.8)	2.6 (0.5)
• Soft drinks (2)	2.5 (0.1)	2.8 (0.1)	1.0 (0.0)	2.0 (0.5)	2.0 (0.0)	4.5 (0.2)	2.8 (1.1)
• Spices (6)	3.0 (0.4)	2.8 (0.2)	1.0 (0.0)	2.4 (0.5)	2.7 (1.0)	4.4 (0.7)	2.5 (0.4)
• Tea (1)	3.9 (0.0)	3.0 (0.0)	1.0 (0.0)	3.7 (0.0)	4.0 (0.0)	4.7 (0.0)	2.8 (0.0)
• Wine (8)	2.7 (0.7)	2.8 (0.2)	1.0 (0.0)	2.8 (0.9)	3.4 (1.0)	4.3 (0.3)	2.8 (0.7)

Table 3: Consumers' views on packaging attributes per food product type.

Food Product Type	Attractive	Recognisable	Original	Unusual	Modern	Useful	Convenient	Recyclable	Eco-friendly	Economic	Practical	Durable	Robust
• Alcoholic Beverages	10%	10%	10%	0%	20%	60%	50%	70%	40%	30%	30%	20%	10%
• Canned Food	40%	0%	0%	10%	20%	60%	60%	50%	50%	50%	70%	50%	30%
• Cereals	40%	50%	0%	0%	0%	60%	30%	100%	100%	20%	60%	0%	0%
• Coffee	100%	20%	0%	60%	0%	100%	10%	0%	0%	10%	100%	10%	0%
• Cold Cuts	30%	80%	40%	30%	50%	40%	40%	60%	30%	30%	30%	10%	0%
• Dairy	0%	30%	40%	0%	0%	100%	100%	100%	100%	100%	100%	100%	0%
• Flour	0%	50%	40%	0%	40%	0%	0%	100%	100%	0%	0%	50%	0%
• Juices	20%	50%	0%	10%	0%	40%	60%	40%	40%	70%	60%	40%	20%
• Legumes	40%	20%	30%	60%	20%	40%	50%	40%	40%	10%	10%	20%	30%
• Meat	60%	60%	0%	0%	60%	10%	10%	80%	0%	70%	10%	10%	0%
• Nuts	0%	0%	0%	0%	0%	100%	100%	100%	100%	100%	100%	100%	0%
• Pasta	0%	80%	0%	0%	0%	0%	0%	100%	0%	0%	10%	0%	0%
• Salads Ointments	70%	60%	20%	20%	10%	70%	50%	80%	0%	50%	70%	10%	0%
• Salads – Vegetables	0%	0%	0%	0%	0%	0%	100%	100%	100%	100%	100%	0%	0%
• Snack	38%	25%	0%	0%	0%	50%	63%	75%	13%	75%	38%	13%	0%
• Soft Drinks	80%	70%	20%	0%	30%	20%	60%	40%	80%	90%	50%	40%	0%
• Spices	100%	100%	100%	100%	100%	0%	0%	0%	0%	100%	0%	100%	100%

Table 4: Industry experts' views on packaging attributes per food product type.

Food Product Type	Attractive	Recognisable	Original	Unusual	Modern	Useful	Convenient	Recyclable	Eco-friendly	Economic	Practical	Durable	Robust
• Canned Food	10%	10%	10%	10%	0%	60%	50%	0%	0%	50%	70%	90%	60%
• Cereals	75%	58%	0%	8%	42%	58%	8%	67%	17%	8%	33%	0%	0%
• Chocolatery	100%	100%	8%	8%	67%	33%	17%	33%	8%	0%	58%	8%	0%
• Coffee	86%	57%	7%	7%	64%	43%	14%	50%	0%	14%	7%	43%	7%
• Cold Cuts	0%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	100%	0%
• Dairy	71%	29%	0%	0%	21%	43%	29%	57%	0%	7%	7%	36%	21%
• Legumes	33%	0%	0%	0%	0%	67%	100%	0%	0%	0%	100%	67%	0%
• Pasta	69%	23%	38%	38%	46%	38%	23%	62%	31%	8%	8%	0%	0%
• Salad Ointments	33%	33%	0%	0%	0%	0%	67%	67%	0%	0%	0%	0%	0%
• Salads – Vegetables	33%	33%	0%	0%	0%	100%	0%	33%	0%	0%	0%	0%	0%
• Snack	92%	50%	25%	0%	50%	42%	42%	8%	0%	0%	17%	17%	0%
• Soft Drinks	50%	100%	0%	0%	0%	50%	0%	50%	0%	0%	50%	0%	0%
• Spices	67%	50%	0%	0%	0%	50%	17%	33%	17%	17%	17%	33%	17%
• Wine	50%	25%	38%	0%	50%	25%	0%	25%	25%	25%	25%	25%	13%

Table 5: Comparative views of food stakeholders on packaging factors.

Informational Content		
• Consumers	($p < 0.001$)	Cereals (1.5) < Salads – Vegetables (2.3) < Alcoholic Beverages (3.1) < Cold Cuts (4.1)
• Industry executives	($p < 0.001$)	Salads – Vegetables (2.3) < Pasta (3.7)
Content Protection & Recognition		
• Consumers	($p < 0.001$)	Dairy (1.5) && Cereals (1.5) < Alcoholic Beverages (2.3) < Tea (2.9) < Legumes (3.7) && Cold Cuts (3.7)
• Industry executives	($p = 0.001$)	No clustering is detected by the Tukey test
Smart Functioning		
• Consumers	($p < 0.001$)	Pasta (1.0) && Salads – Vegetables (1.0) && Nuts (1.0) < Legumes (2.9)
• Industry executives	($p = 0.856$)	No clustering is detected by the Tukey test
Geometry		
• Consumers	($p < 0.001$)	Salads – Vegetables (2.5) < Pasta (3.8) && Canned Food (3.9) && Dairy Products (3.9) && Snacks (4.0) < Cereals (5.0) && Cold Cuts (5.0)
• Industry executives	($p < 0.001$)	Soft Drinks (2.0) < Spices (2.4) < Cold Cuts (5.0)
Environmental Friendliness		
• Consumers	($p < 0.001$)	Pasta (1.2) < Snacks (2.3) < Cheese (3.1) < Juices (4.0) && Canned Food (4.0) && Tea (4.1) < Spices (5.0) && Salads – Vegetables (5.0)
• Industry executives	($p = 0.024$)	No clustering is detected by the Tukey test
Endurance		
• Consumers	($p < 0.001$)	Dairy (1.6) && Flour (1.9) && Tea (1.9) && Soft Drinks (2.0) && Alcoholic Beverages (2.0) && Salads – Vegetables (2.0) < Cereals (2.9) && Pasta (2.9) && Snacks (3.0) && Juices (3.1) && Spices (3.3) && Salad Ointments (3.3) && Meat (3.4) < Canned Food (4.2) && Cold Cuts (4.3) && Nuts (4.3)
• Industry executives	($p < 0.001$)	Salads – Vegetables (2.0) < Canned Food (4.7)
Coloration		
• Consumers	($p < 0.001$)	Cold Cuts (1.7) < Cheese (2.4) < Spices (2.5) && Flour (2.5) && Meat (2.5) < Juices (2.6) && Coffee (2.6) && Tea (2.6) < Salad Ointments (2.7) < Legumes (3.2)
• Industry executives	($p = 0.046$)	No clustering is detected by the Tukey test

5 Discussion

A discussion of the survey findings, related to food packaging attributes, and highlighting the stakeholders' views follows, to inform subsequent strategies.

5.1 Consumers

The packaging attributes that are highly appreciated by consumers are inserted in Table 6.
The consumers' survey results indicate that two food categories can be identified, regarding significant packaging attributes:

1. food product types where the packaging shall be 'Recognisable' and 'Attractive', and
2. food product types where the packaging has to be 'Eco-friendly'.

In the first food category, the food product types include cold cuts, spices, pasta, and coffee. This finding is in line with the research of Prieto-Castillo et al. (2015), who found that the most common cause of the consumers' agnosticism about food packaging is attributed to the lack of time availability. However, the attractiveness of packaging is determinant in stimulating the attention of these consumers. Furthermore, Kacen et al. (2012) identified that the buying process of grocery shoppers follows three stages in which, based on the theory of impulsive buying behaviour, the attraction of a stimulus leads to a desire that is ultimately manifested in a purchasing choice.
The two consumers' characteristics at the time of purchase are impulsiveness and the mental mood of the consumer. Throughout the process of food product purchase to disposal, consumers' interactions with packaging consist of the following steps: immediate understanding of the packaging and product use, opening (where and how), correct and accurate distribution, re-closure and ease of management (Fuente et al., 2015). In the latter study, the proposed conceptual model incorporates four usability constituents that include user, package, content, user's effort. Furthermore, perceptual, cognitive and kinaesthetic elements are identified as important for the design of the optimal packaging.

In the second food category, the following food product types can be classified: flour, soft drinks, dairy, cereals, meat, nuts, salad dressings, salads – vegetables, and snacks. The appearance of packaging (e.g., shapes, images, colours) attracts consumers' interest and affects their purchasing choices (Mohite et al., 2020). Other practical aspects such as the ability to re-use packaging, easiness in opening-closing the package, packaging quality and the capability to recycle can also incentivise consumers' buying preferences. Respondents consider highly packaging that indicated the incorporation of environmentally friendly practices and the manufacturing from eco-friendly materials. Notably, two out of three consumers appreciated highly recyclable packaging. This observation demonstrates consumers' ecological consciousness, and it could be used to inform corporate social responsibility agendas and direct research and investments towards eco-packaging.

5.2 Industry Executives

The packaging attributes that are highly appreciated by industry experts are inserted in Table 7.
Industry executives recognise that a food package shall be 'Attractive'; this is regarded as the most important attribute. Industrialists further apprehend the facilitating role of packaging in handling and logistics operations for the effective use of both storage and secondary packaging, whilst addressing problems with the freight weight (Stock & Lambert, 2001).

6 Conclusions

Packaging is related to all activities across an SC (Regattieri & Santarelli, 2013) as it determines the unit load by creating a "common business language" along with the supply network. Logistics operators of the products in circulation recognise and interpret in the same way specific elements (e.g., marking, quantities, and barcode).
Specifically, the food industry has made great progress in the packaging domain, with a range of smart innovations emerging during the last

Table 6: The attributes that consumers appreciate in packaging.

Food Product Type		**Packaging Attributes**												
		Attractive	**Recognisable**	**Original**	**Unusual**	**Modern**	**Useful**	**Convenient**	**Recyclable**	**Eco-friendly**	**Economic**	**Practical**	**Durable**	**Robust**
• Cereals	:								•	•				
• Coffee	:	•					•					•		
• Cold Cuts	:		•											
• Dairy	:						•	•	•	•	•	•	•	
• Flour	:								•	•				
• Meat	:								•					
• Nuts	:						•	•		•	•	•	•	
• Pasta	:		•						•					
• Salad Ointments	:								•					
• Salads – Vegetables	:							•	•	•	•	•		
• Snacks	:								•		•			
• Soft Drinks	:	•								•	•			
• Spices	:	•	•	•	•	•					•		•	•

Table 7: The attributes that consumers appreciate in packaging.

Food Product Type		**Packaging Attributes**												
		Attractive	**Recognisable**	**Original**	**Unusual**	**Modern**	**Useful**	**Convenient**	**Recyclable**	**Eco-friendly**	**Economic**	**Practical**	**Durable**	**Robust**
• Canned Food	:												•	
• Cereals	:	•												
• Chocolate	:	•	•											
• Coffee	:	•												
• Cold Cuts	:						•	•				•	•	
• Dairy	:	•												
• Legumes	:							•				•		
• Salads – Vegetables	:						•							
• Snacks	:	•												
• Soft Drinks	:		•											

decade, thus leading to improved food quality and safety. Notably, the majority of these innovations stem from the changing preferences of consumers (Kour et al., 2013) such as the adoption of western dietary norms across the globe along with elevated awareness about food quality and nutrients. Previous research has identified the multi-functional nature of packaging in the food industry. In addition, according to the extant research, food packaging in SCs can only be approached holistically, i.e., emphasising on its multi-disciplinary and multi-functional character (Konstantoglou et al., 2020a, 2020b).

The effect of packaging on SCs mainly relates to the provision of information, product standardisation and protection. Indicatively, Coles et al. (2003) emphasise that food packaging design shall consider factors such as promotion, safety, environmental impact, and waste management of material throughout the life cycle of food. Remarkably, the extant body of research reveals a divide between consumers' perceptions and industrial experts' focus on the functionality and attributes of packaging in the food sector (Zeng et al., 2021). To a greater extent, this research investigated consumers' and industrial experts' appreciation towards certain food packaging factors and attributes, for a range of food product types. A common attribute that is appreciated by these stakeholders refers to attractiveness. Other attributes that relate to environmental sustainability and facilitation of logistics operations are also esteemed. Notably, consumers value more packaging attributes compared to industrial executives, thus indicating the limited scope of organisations with regard to the market and business potential of packaging.

Considering the scope of this research, a few limitations can be identified. Firstly, a small number of consumers and industry experts were surveyed within Greece, thus the generalisability of the results is not obtainable. Secondly, possibly certain factors and attributes could have not to be included in this study.

Amidst the Internet of Things era, digital technologies have expanded the portfolio of packaging functionalities. Therefore, future research could focus on how novel smart packaging solutions can act as enablers of product traceability through near real-time data and information monitoring, thus leading to consumers' trust, improved scheduling of logistics operations, and reduced food losses and waste (Chen et al., 2020).

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