

Trend Environmental Implications in Pet Food Industry: Focusing on Sustainability Issues

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In recent years, many of the 150 pet food companies currently producing pet food in Europe have started to focus on the ethical and local sourcing of raw materials, but there is still a lack of optimisation of the production processes and sustainable sourcing of raw materials. The aim of this research is to describe the steps already taken by pet food manufacturers towards sustainability and to analyse future plans and objectives of the industry in relation to food overproduction and unnecessary waste. The Delphi method was used with a team of experts from two major international European pet food companies to gain insights to identify current aspects and also where we can see room for development. The research shows that there is a huge potential in recycled human food waste used as pet food raw material, while there are currently efforts on packaging and more effective energy consumption. Moving to insect-based pet food could be an even better approach to increase the level of sustainability. The pet food market is becoming increasingly important as a result of economic development and modern social standards, and it is particularly important to pay attention to these aspects related to the production of pet food even more.

1. Introduction

Sustainability has emerged as a critical concern for resource-intensive goods and services, particularly in the context of natural resource depletion and climate change. The sustainability of the pet market is under-researched, with previous studies focusing primarily on the environmental impact of pet ownership, sustainable packaging, and consumer behaviour. While there is insight into pet food production and trends such as insect-based pet food (Acuff et al., 2021), there is a gap in the sustainability initiatives of pet food manufacturers. While previous researchers have provided insights into pet food production (Csiba and Gyoker, 2020), insect-based pet food (Baral et al., 2021), and the stability of the pet market during pandemics (Hoffman et al., 2021), there is a gap in research on the pet market and its sustainability. According to a 2020 survey by the European Pet Food Industry, approximately 88 million households in the European Union own at least one pet. The pet industry and pet food manufacturers are responding to this cultural shift with fad diets that have questionable links to animal health, nutritional biochemistry, and physiology. Annual sales of premium pet food products are estimated to reach €21.8 billion in 2020 (FEDIAF, 2023). In Hungary, retail sales are expected to increase by 10 % in 2021 compared to 2020, amounting to HUF 82.7 billion (Euromonitor, 2022).

This research aims to identify and describe the sustainability initiatives of pet food manufacturers in Hungary, focusing on their current practices and future plans regarding food overproduction and waste reduction. While previous studies have examined the environmental impact of pet ownership and consumer behaviour toward sustainable products, this study specifically analyses the sustainability efforts of Hungarian pet food companies in response to increasing consumer demand. It also examines the relationship between these initiatives and competitive advantage in the pet food sector. By filling gaps in the literature, this study provides valuable insights for academics and industry stakeholders to inform policies and practices that promote sustainable consumption and production in the pet food market.

The theoretical background is followed by the research questions and methodology. Finally, the results are presented, and the study concludes by highlighting the theoretical and practical contribution of this study.

2. Theoretical background

Global pet ownership, particularly of cats and dogs, is on the rise alongside rising incomes, and so is the environmental impact associated with feeding them (Alexander et al., 2020). In recent decades, the anthropomorphism of domestic animals has led to an increase in their inclusion in family units, making them considered family members (Conway and Saker, 2018). In their experiments, pet owners of cats and dogs demonstrated an awareness of the importance of environmental sustainability and identified several independent factors that influenced the likelihood of a change in diet. The authors concluded that public education about pet food choices and their environmental implications was required. Siddiqui and his co-authors (2023) found that the market for insect-based pet food is growing rapidly in Europe. The emergence of insect-based pet food products is being driven by health and sustainability claims, and consumers have a positive relationship with sustainability, anti-allergenicity, and intestinal health claims (Siddiqui et al., 2023). A current study of Fantech et al. (2024) analysed the willingness of 400 Italian dog and/or cat caregivers to pay for pet foods containing insect proteins, as measured by the Multiple Price List methodology. The study concluded that insect-based pet foods were attractive only when consumers were well informed about the product's attributes in terms of sustainability and healthiness for their pets. This fact raises the attention of marketing experts who want to inform people and communicate the basic benefits of novel pet foods. Den and Swanson (2015) summarised the major challenges facing the pet food industry related to consumer expectations, the regulatory environment, and sustainability. Acuff et al. (2021) conducted a life cycle analysis of the environmental impact of pet food production. Their findings revealed the environmental impact of pet food production and pet ownership, emphasising the necessity for sustainability in this area.

Consumer behaviour has a considerable impact on sustainability in the pet market (Swanson et al., 2013). Some influencing factors include price sensitivity (Liu, 2023), convenience, and sustainability reporting (Corley, 2013). Businesses and consumers can play an important role in promoting sustainability through informed choices and responsible pet ownership. Sustainability reporting has a significant and positive impact on consumer behaviour, making it an effective method of cause-related marketing to engage consumers (Corley, 2013). According to Ye et al. (2022), one innovative solution for reducing food waste is upcycling, which takes food that would otherwise be destined for the bottom of the hierarchy – compost or landfill – and turns it into value-added products. Researchers conducted an analysis of the acceptability of upcycled pet food. The results showed that pet owners viewed upcycled pet food as higher quality, more sustainable, and cheaper than conventional options. Overall, the studies highlighted the complex interplay between pet ownership, consumer behaviour, and sustainability concerns in the pet food industry (Table 1).

Table 1: Some notable studies related to sustainability and pet food industry

Authors	Field of study	Scientific problem	Findings
Den and Swanson (2015)	Business, Sustainability	Key challenges facing the pet food industry	The pet food industry is challenged to meet consumer expectations while ensuring sustainability and regulatory compliance.
Acuff et al. (2021)	Environmental Science, Life Cycle Analysis	Analysing the environmental impact of pet food production	Pet food production has significant environmental impacts, emphasising the need for sustainability measures in the industry.
Ye et al. (2022)	Food Science, Sustainability	Analysing the acceptability of upcycled pet food to reduce food waste.	Pet owners perceive upcycled pet food as superior in quality and sustainability compared to conventional pet food at lower price points
Siddiqui et al. (2023)	Food science	The emergence of insect-based pet food products and their market growth in Europe.	Consumers are attracted to insect-based pet foods due to health and sustainability claims, indicating a shift in preferences toward environmentally friendly options.
Fantech et al. (2024)	Consumer Behavior, Marketing	Analysis of consumer willingness to pay for insect-based pet foods.	Consumers are more inclined to choose insect-based pet foods when well-informed about their sustainability and health benefits

Based on the literature review, the authors defined the following research questions:

RQ1: What is the trend in sustainability among European pet food manufacturers?

RQ2: What can be a competitive advantage for producers in the pet industry?

3. Method

The research involved an examination of secondary data on the sustainability of the pet food industry. By employing the Delphi technique, the study was able to gain greater insight into the specific priorities of manufacturers. The authors have collected secondary data on the European pet food industry and its impact on the food supply chain from a sustainability perspective. The research is based on the most recent European case studies on the food industry, such as those conducted by the Food and Agriculture Organization (FAO), and sustainability-focused scientific journals, such as the International Journal of Social Ecology and Sustainable Development (IJSESD). The dataset was supplemented with studies on animal food processing by the authors Rowlands (2019) and San Martin et al. (2016). In addition, the studies included in the analysis must have been conducted no more than 10 y ago and focus on the European region to provide a relevant comparison to the Delphi technique. As outlined by Schultz et al. (2003), the Delphi method is a group facilitation technique that aims to achieve consensus by gathering expert opinions on a given topic through a series of anonymous, structured questionnaires. In each iteration, participants indicate their level of agreement with proposals using a 1-5 Likert scale and propose new suggestions for subsequent rounds. Ideas supported by at least three participants are selected for further consideration. After each round, the responses are averaged in order to ascertain the degree of overall consensus. This process is then repeated iteratively until a stable agreement or consensus is reached (Figure 1).

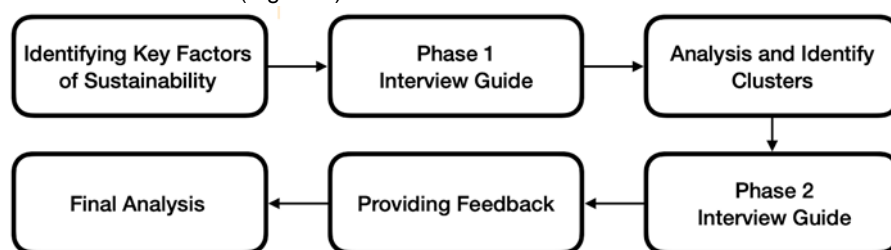


Figure 1: Interview guide applied in the Delphi method. Source: Own compilation based on Schultz et al. (2003)

The fundamental tenets of the Delphi technique are structured communication, iterative rounds of data collection, anonymity, feedback, consensus building, and its application in diverse fields (Chalmers and Armour, 2019). However, the technique is not without challenges, including the subjective interpretation of qualitative results, inconsistent standards for interpreting findings, and the time required for implementation. It is of the utmost importance to ensure the reliability and validity of the Delphi method by exercising meticulous care in the design of the study, including the composition of the panel, the use of Likert scales, and the determination of the appropriate number of rounds (Shelton and Creghan, 2015). The participants were selected from two medium-sized manufacturers based in France (Company A) and Italy (Company B). In Phase 1, participants were requested to evaluate the importance of the key factors within their specific field of work and to identify five actions that they or the company had taken in relation to those factors (Table 2).

Table 2: Participants of the Delphi method

Position	Company	Time spent in the company
Manufacturing Manager	Company A	6 y
Export Business Developer	Company A	3 y
R&D Director	Company A	6 y
International Pet Business Manager	Company B	7 y
R&D Manager	Company B	13 y
Production Manager	Company B	1 y

Following the initial analysis of the responses to the questionnaire, the authors were able to identify distinct clusters of actions in relation to the field of work and the level of involvement. In Phase 2, the authors provided a list of fields and correlated actions with the key factors. The participants were then asked to provide their opinions on these factors based on their professional knowledge and experience.

The following key factors were identified: (1) Source of raw materials; (2) Level of manufacturing technology; (3) Waste Management; (4) Corporate Social Responsibility (CSR).

4. Results

The authors have found that many factors are correlated between the secondary analysis and qualitative data collected (data included source of raw material, level of manufacturing technology, waste management, CSR) from the experts of the two companies on the most important factors of sustainability and future plans towards to reduce their environmental impact.

4.1 Current situation of sustainability among pet food manufacturers

In 2022, the European Union generated approximately 58.4 Mt of food waste, with households (54 %) accounting for the majority, followed by food processing (21 %), restaurants (9 %), and retail (7 %) (European Commission, 2022). Fortunately, over the past few decades, a significant number of pet food manufacturers have recognised this and have initiated collaborative efforts with human food chains. For example, Royal Canin, arguably the most popular pet food brand in Europe, is owned by Mars Inc. Purina, another key participant of the pet market, is in the possession of Nestlé S.A. In many cases, food is wasted due to quality control issues or an unsuitable size or shape, and these are perfectly usable as an ingredient in non-human food (Castrica et al., 2018). The sourcing of raw materials from human-grade ingredients not only reduces the environmental impact of pet food manufacturers but also that of the entire human food chain. The cost of leftover or recycled raw materials is typically lower, which can result in reduced retail prices for dog and cat food.



Figure 2: The channel of raw materials using 3 levels of processing, ensuring minimal waste

Utilising residual food components in the manufacture of pet food has been shown to result in reduced environmental impact when compared to the conventional production process. This reduction is evident in terms of global warming potential (~56.40 %), water consumption (~22.62 %), land use (~87.50 %) and fossil resource scarcity (~21.78 %) (Mosna et al., 2021). To enhance the efficiency of the production process with regard to the utilisation of raw materials, a significant number of European pet food manufacturers differentiate their products according to the specific market segment in question. This approach ensures that the residual materials from a premium pet food can be repurposed as an inferior, yet still palatable, alternative.

As evidenced by the findings of researchers such as Kim and Kim (2010), the recycling of human food waste as animal feed represents a promising avenue for reducing the environmental impact. The proportion of traditional and reused ingredients in a recipe can be altered by manufacturers according to their own specifications and quality standards, with varying impacts on sustainability (San Martin et al., 2016).

As one of the participants in the Delphi technique from Company A observed: 'the source of raw materials is only one aspect of sustainability, technology can be far more important'. It has been demonstrated that the utilisation of a higher degree of automation during the production stages results in a markedly reduced generation of waste and by-products throughout the entire process (Rowlands, 2019). The deployment of the latest technological tools has the potential to reduce the electricity requirement of the manufacturing process. Additionally, the utilisation of recycled or alternative materials for packaging is recommended, such as silk-based fibres, which have a reduced environmental impact when compared to traditional recycled paper. (Squillante et al., 2024).

4.2 Local raw materials

Both groups that were facilitated using the Delphi group facilitation technique have indicated the importance of using local raw materials as much as possible. 'It reduces costs and environmental impact of transportation to factory.', 'Supporting local farmers has a positive impact on the local economy.' Additionally, participants have suggested that establishing a more intimate and dependable connection could diminish the probability of excess production in both scenarios. 'Using the same raw materials from the same local suppliers in the long term can ensure that the palatability and overall quality of the final product remains constant, which also lowers the amount of waste'. It is important to acknowledge that both manufacturing plants are primarily focused on high-quality pet food production. Consequently, limiting the amount of waste is more challenging than with lower-quality alternatives.

The sourcing of local ingredients has a positive impact on the perception of end customers. 'If a product is not only made in Italy but sourced from Italy has a marketing advantage and increases loyalty.' Another participant elucidated that the company ceased importing materials such as grain as a consequence of the intensification of the war in Ukraine. 'The war showed us the importance of using ingredients from as close as possible, no matter the price.'

Conversely, neither company is currently engaged in the production of insect-based pet food, as their market research indicates that this is a short-term trend. They anticipate that other features, such as grain-free, GMO-free and hypoallergenic pet food, will continue to have a more significant market share in the long term. A trial of insect-based pet food was conducted over an 18-month period, during which time there was a lack of significant demand from distributors. It is acknowledged that, from a sustainability perspective, insect-based food production is a more beneficial approach. However, the market must first adapt to these products. This study identifies several novel findings regarding sustainability initiatives among Hungarian pet food manufacturers. Notable initiatives include the use of local raw materials and sophisticated manufacturing technologies to reduce waste and minimise environmental impact. The findings indicate a notable shift towards repurposing human-grade food waste, which has the dual benefit of significantly reducing the carbon footprint associated with pet food production.

5. Conclusion

The investigation into the sustainability practices of pet food manufacturers reveals a multifaceted approach to reducing environmental impact and improving resource efficiency. The data gathered from secondary sources and expert insights from two major companies underscore the importance of utilising residual food components, which not only curtails waste in the human food chain but also lowers production costs and retail prices for pet food. The adoption of these practices significantly diminishes global warming potential, water consumption, land use, and fossil resource scarcity to achieve carbon neutrality by 2050.

Local sourcing of raw materials emerges as a key strategy, benefiting both the environment by reducing transportation emissions and the local economy through supporting regional agriculture. This approach also helps maintain consistent product quality and enhances brand loyalty among consumers.

Overall, the findings indicate that while significant strides have been made towards sustainability in pet food manufacturing, continuous improvement and adaptation to both technological advancements and market trends are essential for further progress. The findings indicate a robust correlation between sustainability practices and competitive advantage in the pet food industry, underscoring the necessity of addressing food overproduction and waste reduction while responding to consumer demand for sustainable products.

There is scope for further research into the potential of certain technological applications in manufacturing to enhance sustainability and quantitative research involving several companies from the sector. The adaptation of a sustainability model for the pet industry would be beneficial in facilitating a comparative analysis of multiple companies in terms of their sustainability performance.

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