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The adaptation of the triple bottom line model to the pet industry: A holistic approach to sustainability

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Abstract

The pet industry has undergone a significant transformation, evolving into a more sustainable landscape. This reflects a collective commitment to environmental protection and the health and well-being of pets. The research presents a comprehensive analysis of the theoretical foundations of the Triple Bottom Line (TBL) model, with the objective of gaining insights into its framework and structure. The objective was to develop a version of the model that would enable comparison of the sustainability performance of different companies within the pet industry, based on the key features that are common to all pet food manufacturers. The findings of the in-depth interviews conducted for this study indicate that companies with a focus on sustainable business practices place significant emphasis on ensuring compliance with specific safety regulations for the benefit of pet health. The ratio of revenue from eco-friendly products demonstrates a markedly disparate trend among the manufacturers under analysis.

Keywords: Eco-friendly products, Pet industry, Sustainability, Sustainable business practices, Triple bottom line (TBL).

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1. Introduction

The Triple Bottom Line (TBL) model represents a sustainability framework that evaluates a company's performance based on three dimensions: economic, social, and environmental factors. The objective of this model is to achieve a balance between these three aspects in order to facilitate sustainable development [1]. This framework was developed in response to the need to evaluate organizational performance beyond traditional economic metrics [2]. This comprehensive approach encourages businesses to consider their impact on society and the environment, thereby facilitating the development of a more sustainable operational paradigm. As organizations increasingly recognize the crucial importance of sustainability in

relation to their overarching strategic objectives and long-term goals [3]. This transition not only enhances the reputation of the corporation in question but also drives innovation and resilience in an ever-evolving market landscape.

In recent years, there has been a notable shift within the pet industry towards greater sustainability, driven by an increasing awareness among consumers about environmental issues and the impact of their purchasing decisions [4]. As pet owners become more environmentally conscious, there is a growing demand for products and practices that align with their values. This has resulted in the emergence of several sustainability trends within the sector, including the development of biodegradable or recycled bags used for packaging and the adoption of sustainable manufacturing processes. Companies are now placing a greater emphasis on transparency, ethical sourcing, and innovative packaging solutions, with the aim of reducing their carbon footprint and promoting responsible pet ownership [5]. As these trends continue to gain momentum, the pet industry is evolving into a more sustainable landscape, reflecting a collective commitment to protecting the planet while ensuring the health and well-being of beloved pets.

The research presents a comprehensive analysis of the theoretical foundations of the Triple Bottom Line (TBL) model, with the objective of gaining insights into its framework and structure. To facilitate the successful adaptation of the TBL framework to the pet industry, an overview of the pet market has been conducted. In the second part of the research, the other implications of the TBL model have been analyzed and subsequently adapted to the pet industry.

2. Theoretical Background

The Triple Bottom Line (TBL) framework emerged during the latter part of the 1990s, with significant attribution to the groundbreaking contributions of Sherman [6]. He put forth this innovative paradigm as a means of redefining and evaluating corporate achievement, moving beyond the conventional emphasis on financial metrics. The TBL model proposes that organizations should evaluate their impact across three essential dimensions: social, environmental, and economic [7]. The Triple Bottom Line (TBL) framework has emerged as a foundational concept in promoting sustainability within business and economic contexts by underscoring the integration of economic, environmental, and social dimensions. In the context of sustainable business models (SBMs), this approach facilitates the alignment of core business strategies with long-term societal and environmental objectives, thereby enabling innovation and competitive advantage [8]. These models are designed to address a broader range of stakeholder interests, moving beyond profit to incorporate ethical and ecological considerations into decision-making.

This holistic methodology encourages businesses to adopt a more expansive view of accountability, compelling them to consider their obligations not only to shareholders but also to a diverse range of stakeholders [9]. Such stakeholders include employees, customers, suppliers, and the broader community, all of whom are affected by corporate actions and decisions. The TBL framework is predicated on the integration of three fundamental tenets, frequently designated as people, planet, and profit [10]. This amalgamation fosters a more sustainable and ethically sound approach to business practices. It requires that organizations consider the impact of their operations on societal welfare, environmental stewardship, and economic sustainability. In this way, the TBL paradigm not only advances a more responsible corporate ethos but also equips businesses to prosper in an increasingly discerning marketplace where both consumers and investors prioritize sustainability and social responsibility. This shift in focus encourages innovation and collaboration, prompting companies to seek out new solutions that align with these values while enhancing their competitive edge. As a result, organizations are increasingly adopting practices such as circular economy models, sustainable sourcing, and community engagement initiatives that not only reduce their ecological footprint but also foster stronger relationships with stakeholders. These initiatives contribute to a healthier planet and also create new opportunities for growth and resilience. TBL is also closely associated with Corporate Social Responsibility (CSR), serving as a theoretical underpinning for businesses aiming to build stakeholder trust and sustain their social license to operate [11]. Within the context of CSR, the emphasis is placed on recognizing and managing the broader implications of corporate activities on society and the environment, thereby underscoring the interdependence of corporate conduct and public legitimacy.

2.1. Social Outcomes

In this specific context, there is a notable emphasis on the critical importance of fostering social equity, actively engaging with the community, and prioritizing the overall well-being of the various stakeholders involved. A substantial body of research, including studies by Magdalena, et al. [12] and Porter and Kramer [13], indicates that organizations that adopt and integrate Triple Bottom Line (TBL) principles tend to garner a more favorable reputation in the marketplace and cultivate greater customer loyalty. Furthermore, these practices not only contribute to a more sustainable business model but also encourage innovation and adaptability in an ever-evolving economic landscape. In light of these insights, organizations are increasingly recognizing the necessity to integrate social and environmental considerations into their core strategies, thereby aligning their objectives with the broader goals of society. This alignment not only fosters a positive brand image but also attracts a workforce that is increasingly motivated by purpose-driven initiatives, ultimately leading to improved employee engagement and retention [14].

2.2. Environmental Outcomes

The environmental component of the Triple Bottom Line (TBL), which is often abbreviated, places significant emphasis on the ecological footprint that various organizations leave behind as they operate. Concurrently, it advocates for the importance of sustainable management of resources and strives towards a marked reduction in the degradation of our precious environment [15]. A substantial body of evidence from numerous studies demonstrates [16-19] that environmentally responsible practices contribute to the well-being of the planet and can also result in significant cost savings and increased

operational efficiencies for businesses. Moreover, companies that prioritize sustainability often enhance their brand reputation, attracting a growing segment of consumers who are environmentally conscious and willing to support businesses that align with their values. This shift in consumer behavior highlights the necessity for organizations to integrate sustainability into their core strategies, thereby fostering innovation and resilience in an ever-evolving market landscape [20].

2.3. Economic Outcomes

While conventional measures of success frequently prioritize financial performance as the primary indicator of achievement, the Triple Bottom Line (TBL) model advocates a more comprehensive and nuanced understanding of economic value. This encompasses not only immediate financial gains but also the critical aspects of long-term sustainability and the implementation of ethical business practices that resonate with broader societal values [21]. This specific aspect of the TBL framework has been directly correlated with a notable increase in both innovation and competitive advantage within the marketplace, as evidenced by Elkington [22] in his influential work published in 2004. Furthermore, companies that adopt this holistic approach often find themselves better equipped to navigate the complexities of modern consumer expectations, fostering deeper connections with their stakeholders and enhancing brand loyalty in an increasingly conscientious market [23]. Consequently, organizations are increasingly prioritizing transparency and accountability, recognizing that these elements not only bolster their reputation but also drive sustainable growth and resilience in the face of evolving challenges [24].

Although the TBL model has been evaluated in a number of contexts, including supply chain resilience, corporate responsibility, and sustainable financial instruments, it is still confronted with challenges related to measurement and application. In order for it to be fully effective, these issues must be addressed [25]. In the domain of economic development, TBL enables a more comprehensive evaluation of progress by integrating sustainability into national economic strategies. This multidimensional perspective challenges traditional growth models and encourages nations to incorporate environmental and social metrics into their development agendas [26].

2.4. General Applications of the TBL Model

The Triple Bottom Line (TBL) plays a pivotal role in shaping new business models aimed at sustainable operations management across various industries. The application of these principles has been observed in various sectors, including manufacturing, agriculture, and services [27]. Notwithstanding the acknowledged limitations and constraints, TBL continues to be recognized as a reliable and widely adopted concept within the field of sustainability [28].

TBL is also closely associated with Corporate Social Responsibility (CSR), in which it serves as a foundational framework for companies seeking to build stakeholder trust and maintain their social license to operate [11]. In the context of Corporate Social Responsibility (CSR), the model underscores the significance of overseeing the comprehensive social and environmental ramifications of corporate actions, accentuating the nexus between responsible conduct and organizational legitimacy.

A mounting body of research substantiates the efficacy of TBL across a range of industrial contexts. For instance, Purnama [29] concluded that incorporating TBL into marketing strategies increases emphasis on the environmental dimension, thereby enhancing the sustainability orientation of such initiatives. Liu, et al. [30] examined TBL's role in promoting more sustainable mineral extraction practices. However, they also noted potential trade-offs, such as increased unemployment. In the field of food industry research, Trojanowski [31] and Fauziyah [32] presented divergent assessments of the model's viability. However, both scholars concurred that when integrated with components of the marketing mix, TBL has the capacity to facilitate more sustainable manufacturing processes. The healthcare sector has also demonstrated encouraging results, as evidenced by Vergunst, et al. [33], who found that the implementation of the TBL model can lead to a reduction in CO_2 emissions and enhance the understanding of sustainability in healthcare services.

The TBL framework provides a robust structure for measuring and reporting business performance across economic, social, and environmental dimensions. This multidimensional approach enhances transparency and accountability. Nevertheless, substantial challenges persist, particularly in the quantification of social and environmental outcomes, which are inherently more complex and less standardized than financial metrics [34]. This imbalance frequently gives rise to the predominance of economic considerations, which may come to eclipse the other two pillars.

TBL's adaptability is evident in its sector-specific applications. In the field of agriculture, it has facilitated the development of sustainable supply chains and decision-support tools [35]. In the maritime industry, it has contributed to more integrated assessments of the sustainability of shipping operations.

Despite its extensive implementation, the TBL model has been subject to critique. A significant concern pertains to the challenges encountered by numerous organizations in seamlessly operationalizing these principles, frequently attributable to the dearth of coherent frameworks and indicators [11]. Moreover, certain scholars posit that TBL exhibits a paucity of conceptual distinctiveness, exhibiting substantial overlap with existing frameworks such as CSR, without concomitantly offering any discernible added value [34].

In conclusion, the TBL model has played a central role in guiding both businesses and policymakers toward more sustainable practices and long-term value creation. Nevertheless, challenges related to measurement, integration, and conceptual clarity must be addressed to achieve its full potential in promoting sustainable development.

As illustrated in Table 1, the Triple Bottom Line (TBL) framework has been employed in a variety of sectors, underscoring its adaptability and relevance in fostering sustainable practices. A multitude of studies from various industries, including marketing [29], minerals [30], food [31], agro-industry [32] and healthcare [33] have demonstrated the efficacy of TBL in adapting to diverse contexts. These studies employ a range of methodologies, encompassing qualitative reviews and

advanced econometric models. Notwithstanding the methodological disparities, the findings concur on the value of TBL in enhancing sustainability, operational performance, and long-term value creation. However, as demonstrated by Liu, et al. [30] certain studies also reveal trade-offs, such as the potential rise in unemployment from environmentally focused practices. This highlights the complexity of implementing TBL in practice. In summary, the table underscores the efficacy of TBL as a comprehensive framework for balancing economic, social, and environmental objectives across diverse industrial landscapes.

Table 1.
Most notable studies related to the analysis of TBL model.

Study reference	Aim of study	Method of analysis	Conclusion	Area
Purnama [29]	Observe the implementation of the Triple Bottom Line (TBL) concept to enhance sustainable marketing performance in businesses.	Qualitative research method Literature review approach	Integration of TBL into marketing strategies, foster long-term value and corporate sustainability.	Marketing
Liu, et al. [30]	Examine sustainable development in the extraction of critical minerals.	CS-ARDL (Common Structural Autoregressive Distributed Lag) Approach Comparative Analysis	Financial development and FDI lead to CO2 emissions increase. Unemployment rates linked to reduced emissions in critical minerals extraction.	Mineral industry
Trojanowski [31]	Determine the activities undertaken by food industry enterprises concerning the components of the marketing mix.	Theoretical and empirical (interview) research methods	TBL concept combined with sustainable marketing mix is effective	Food industry
Fauziyah [32]	Understand the level of awareness among agro-industry businesspeople and determine whether this understanding has a significant impact on business performance.	Quantitative study with questionnaire for data collection Descriptive analysis and PLS-SEM model analysis for data analysis	The triple bottom line concept is important for agro-industry businesses and significantly affects business performance.	Agro-Industry
Vergunst, et al. [33]	Assess the feasibility and usefulness of applying the Triple Bottom Line (TBL) framework to healthcare interventions	Secondary data analysis of a 12-month randomised controlled trial. Standardised costing and CO2e emissions figures obtained from publicly available data.	The Triple Bottom Line (TBL) assessment can be applied retrospectively to healthcare interventions, providing a more comprehensive evaluation of the true costs.	Healthcare

The Triple Bottom Line (TBL) model is confronted with numerous substantial challenges that impede its effective implementation and measurement across various industries. A significant challenge pertains to the absence of standardized frameworks for calculating and assessing the social and environmental dimensions of sustainability. This deficiency hinders the capacity to compare outcomes across projects or sectors [35, 36]. Specifically, the social dimension is underdeveloped in conceptual terms, resulting in inconsistencies in the identification and quantification of social impacts [37]. Moreover, the interdependencies between economic, environmental, and social dimensions are frequently intricate and not adequately captured by current methodologies, thereby impeding a holistic understanding of sustainability [38, 39]. Data-related challenges persist, especially in developing regions where the availability and quality of environmental and social data are limited. This often causes companies to prioritize economic metrics due to their clearer measurability [36]. Furthermore, the integration of TBL principles into business operations and global supply chains remains challenging, particularly due to the frequent underrepresentation of social considerations [35]. Despite methodological advances, such as life cycle analysis and new sustainability indices, there is still a pressing need for robust, comprehensive tools capable of encapsulating the full scope of TBL sustainability in practice [39].

2.5. Situation of the Pet Market

The European pet market is robust and growing, with revenue in the pet food sector reaching $42.82 billion in 2024 [40]. The market is expected to grow annually by 4.21%, indicating significant potential [40]. A survey conducted in 2023 by the

European Pet Food Industry revealed that approximately 91 million households in the European Union own at least one pet, indicating that nearly every second household in the region includes a pet. In 2023, the annual sales of premium pet food products reached €29.1 billion [41]. It is estimated that there are approximately 150 pet food companies in operation, collectively employing over one million workers directly or indirectly [40]. The market is diverse, encompassing pet food, accessories, and services. Pet food volume is projected to reach 15.38 billion kg by 2029, with an average per-person consumption of 17.2 kg in 2024 [40].

This is made possible by the fact that, in recent decades, the anthropomorphic perception of domestic animals has resulted in an increase in their incorporation into the family unit, thereby conferring upon them the status of family members [42]. A survey from 2023 indicated that the largest proportion of pet owners were millennials, and that this demographic exhibited the highest level of attachment to their pets, viewing them as children Statista [40]. Conway and Saker [42] demonstrated in their experiments that pet owners (of cats and dogs) are aware of the significance of environmental sustainability and identified several independent variables that influence the probability of dietary alteration. Moreover, a recent study indicates that pet owners are, in general, more inclined to engage in environmentally friendly practices. As Muñoz [43] notes, approximately one-quarter of consumers view the term "environmentally friendly" in the context of pet food as an influential claim.

Therefore, consumers evince a favorable disposition towards sustainability, anti-allergenicity, and intestinal health claims [44]. This fact draws the attention of marketing experts to the necessity of informing the public and communicating the fundamental benefits of innovative pet foods. Deng and Swanson [45] provided a comprehensive overview of the key challenges facing the pet food industry, including consumer expectations, the regulatory environment, and sustainability. In a life cycle analysis of the environmental impact of pet food production, Acuff MS, et al. [46], identified several key areas for improvement, including the sourcing of ingredients, particularly protein sources with high environmental footprints, energy-intensive manufacturing processes, and issues related to packaging waste. The findings revealed the environmental impact of pet food production and pet ownership, emphasizing the necessity for sustainability in this field.

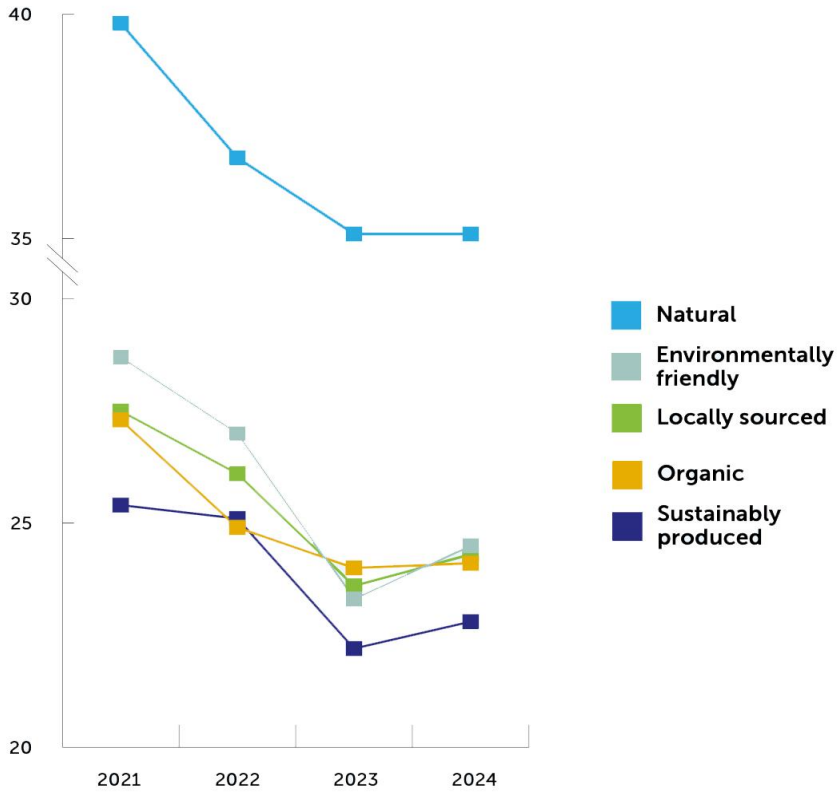

Figure 1.
Influential product features for pet owners (% of pet owners).
Source: Euromonitor International, January-February 2024 (n=39,235).

Furthermore, this research is supported by Ravikumar, et al. [47] Vice President of Investor Relations and Corporate Sustainability of Maxwell [48]. She asserts that the sustainability of pet food is predominantly driven by consumer demand. Consumers are increasingly concerned about sustainability, so 'pet players must ensure they meet the environmental, social, and governance commitments they make to their customers' [48]. It is also important to note that there is no straightforward correlation between sustainability and purchasing behavior.

Considering the latest research and findings, it seems plausible to suggest that the TBL Model could prove to be an effective means of enabling the pet industry to achieve greater levels of sustainability for animals and the planet, while simultaneously ensuring the profitability and longevity of businesses in the sector.

3. Methodology

Multiple case study design was used in order to successfully adapt the TBL model to the needs of the pet industry. The multiple case study design is a qualitative research methodology that provides an in-depth exploration of complex phenomena across various contexts. This approach is particularly useful in fields like education, management, and health professions, where understanding diverse perspectives is key to gaining comprehensive insights. A primary feature of this method is its ability to foster contextual understanding, allowing researchers to examine personal, social, and organizational factors that influence outcomes [49]. In health education, for example, multiple case studies enhance clinical learning by exposing students to different scenarios, boosting both engagement and practical knowledge application [50]. However, conducting multiple case studies requires methodological rigor, including the careful selection of cases and clear descriptions of research methods to ensure reliability and validity [51]. Despite their value, these studies can pose challenges, such as the potential for complexity in data analysis, making it crucial for researchers to strike a balance between depth and manageability.

The research is based on in-depth interviews with the advisory boards of three major pet food manufacturers, a review of publicly available sustainability reports supported by secondary data analysis. The adaptation was based on the original structure of the Triple Bottom Line Model and focused on three main aspects: Pets, Planet, and Profit. The objective was to develop a version of the model that would enable comparison of the sustainability performance of different companies within the industry, based on the key features that are common to all pet food manufacturers.

3.1. Background of the Analyzed Companies

Company A, the initial pet food manufacturer, is headquartered in France and has been engaged in the production of super-premium pet food since 1965. In 2023, the company generated an annual revenue of $9 billion and employed 7,500 individuals [52]. The pet food division of the company has received a €14 million investment with the objective of increasing its production capacity to 40,000 tons per year. Additionally, the company is placing a significant emphasis on sustainable manufacturing practices, utilizing over 90% of its raw materials sourced from France and avoiding the use of genetically modified organisms (GMOs). This is in alignment with the company's strategy to serve the French and European markets, which are experiencing moderate growth (3% to 4% annually). The company's fundamental objective has remained consistent since its inception: to generate sustainable value in the vegetable oils and proteins sector while producing superior-quality food and safeguarding the planet.

Company B is an Italian-based enterprise that was established a century ago. The product range is more diverse, comprising low-priced eco pet food and also super-premium, high-priced alternatives for cats and dogs. The company's annual revenue is €35.7 million, with 67 employees [52]. The company is 100% family-owned and manufactures exclusively at its own facilities. It is therefore committed to sustainable development and to business practices oriented towards an environmental culture, with the objective of having a minimal impact on the environment and on the use of natural resources. In order to measure and control its environmental protection, the company has developed a bespoke management system comprising targets and a structural checklist for energy saving, water consumption, and waste production.

Company C is headquartered in the Czech Republic and generates an annual revenue of €191.5 million [52]. It is a leading European producer of pet food, with a portfolio of market-leading brands. The company operates nine pet food factories across Europe, with an annual production capacity of approximately 220,000 tons. The company is acutely aware of the environmental impact of the pet food industry and is therefore committed to operating in a sustainable manner. The company's objective is to utilize 100% recycled materials for packaging by 2025, with 25% of electrical usage derived from renewable sources and 50% of raw materials sourced from ethical suppliers.

3.2. Adaptation of the TBL Model for the Pet Industry

The Pets aspect consists of three subpoints. The findings of the in-depth interviews conducted for this study indicate that companies with a focus on sustainability put significant emphasis on ensuring compliance with specific safety regulations for the benefit of pet health. Such standards may include meeting ISO standards in facilities. Another pivotal aspect of the Sustainability Framework is Nutrition, which assesses the nutritional balance and suitability of the products for specific needs. Moreover, companies are increasingly prioritizing the dissemination of information to customers regarding responsible pet ownership.

From a sustainability perspective, the most crucial element is the Planet aspect, which encompasses the ingredients section and the ratio of regionally sourced or imported materials. Furthermore, the type of packaging used for the products, in addition to the ratio of ingredients and waste, is important.

It is crucial to consider the profit-oriented nature of pet food manufacturers when adapting the TBL Model. This entails measuring the ratio of revenue generated from eco-friendly products, which provides insight into the potential benefits for the company of prioritizing this revenue stream. Additionally, it is essential to assess the proportion of research and development costs allocated to sustainability advancements and the loyalty level of customers based on the company's sustainability and ethical practices.

Table 2.
Triple bottom line (TBL) sustainability framework for the pet industry.

Pets		**Planet**		**Profit**	
Safety	Percentage of products that meet certified safety regulations for pet health.	Ingredients	Percentage of ingredients locally or regionally sourced materials.	Revenue	Percentage of revenue came from eco-friendly products
Nutrition	Percentage of products offering species-appropriate, nutritionally balanced diets.	Packaging	Percentage of products packaged in biodegradable, recyclable, or reusable materials.	R&D	Percentage of R&D costs of sustainable innovations
Education	Number of programs/resources provided to customers about pet care and responsible ownership.	Waste	Ratio of ingredients in and waste out	Loyalty	Increase in customer retention rates through brand loyalty programs focused on sustainability and ethical practices.

This novel adaptation of the TBL Model offers a comprehensive account of the sustainability practices of pet food manufacturers across a range of domains. The three principal categories and three subcategories facilitate comprehensive comparisons of the levels of different companies and identify areas that are either absent or inadequately addressed.

3.3. Adaptation of the TBL Model in Practice

In examining the Pets aspect, it becomes evident that all three of the analyzed companies prioritize the implementation of robust safety measures to guarantee that their products comply with all applicable safety regulations. All three companies comply with the UNI EN ISO 9001 and FSSC 22000 standards, which pertain to the formulation and production of dry food for dogs and cats. All of the companies produce super-premium food for pets, which provides highly palatable nutrition for any species of dog or cat. Nevertheless, only Company A has made an effort to educate its consumers about the benefits and sustainable approach it has taken in the production of pet food. It is evident that both Company B and Company C have considerable scope for improvement in this regard.

The French and Italian companies place an emphasis on the utilization of environmentally friendly raw materials. Company A sources 90% of its raw materials from inland suppliers, while Company B ensures that only non-GMO materials and materials sourced from EU-based suppliers are used. Company C has not provided precise details regarding the origin of its raw materials, which is understandable given the complexity of its operations, which encompass nine production facilities in the region. Conversely, Company C prioritizes the utilization of recycled materials for the packaging of its products. The company's current portfolio comprises 90% recycled packaging, with the objective of reaching 100% by the end of 2025. Company A currently offers one product line comprising five items, all of which are packaged in 100% recycled materials. In contrast, Company B does not currently offer any products in this packaging format. The issue of waste management is of significant concern to all of the companies.

The ratio of revenue from eco-friendly products demonstrates a markedly disparate trend between the manufacturers under analysis. The eco-friendly product line of Company A represents approximately 20% of the company's total revenue. Company B and Company C do not currently offer an eco-friendly product line. In contrast, Company A is investing significant resources in research and development to enhance the sustainability of its production, packaging, and brand new manufacturing plant, which incorporates the latest technological advancements. While Company B and Company C are content with their current sustainability levels, only Company A is measuring the customer retention of its eco-friendly product line.

4. Discussion

The adaptation of the Triple Bottom Line (TBL) model for the pet industry reveals both similarities and differences when compared with existing literature and applications across other sectors. These comparisons highlight the pioneering nature of this study while contextualizing it within the broader framework of sustainability practices. In alignment with prior research on the TBL framework [10, 33], the innovative adaptation for the pet industry reinforces the significance of integrating social, environmental, and economic dimensions into organizational practices. As observed in the healthcare industry [33], where sustainability measures have been shown to enhance service delivery and reduce CO2 emissions, the pet industry demonstrates comparable efforts, particularly in terms of the Planet dimension. For example, companies such as A and C are investing in recyclable and sustainable packaging, which reflects broader trends in environmentally conscious practices. The Pets aspect of the TBL adaptation is consistent with findings from other industries regarding stakeholder engagement. As evidenced by studies such as Pawar and Charak [14], addressing the needs of stakeholders—such as pet owners in this context—not only enhances brand loyalty but also aligns corporate goals with societal expectations. This is evident in Company A's focus on educating customers about sustainability in pet care, which has the dual benefit of improving customer retention and reputation. However, the empirical findings reveal certain distinctive challenges and practices in the pet industry that differentiate it from other sectors. A noteworthy discovery is the pronounced emphasis on pet health and safety

regulations as a pivotal element of the Pets dimension. In contrast to other industries, such as food or agriculture, where social outcomes often focus on equity and workforce well-being [31, 32], the pet industry places a premium on rigorous safety standards for pet health. These include compliance with ISO 9001 and FSSC 22000 certifications. This focus reflects the industry's specialized stakeholder base, comprising pets and their owners, and underscores the necessity of adapting the TBL framework to align with sector-specific priorities.

Furthermore, while sustainability practices in other industries frequently prioritize resource efficiency and environmental impact [20, 29], the pet industry presents distinctive challenges in the sourcing of materials and waste management. In addition, companies such as A and B place an emphasis on the utilization of raw materials and ingredients that are sourced from the region in question, as well as those that are not genetically modified. This is in alignment with the findings that have been identified in the context of agro-industrial contexts [32]. However, the complexity of Company C's multi-facility operations demonstrates the difficulties in achieving transparency and uniformity in sourcing, a challenge that is less frequently addressed in sectors such as healthcare or marketing.

A further noteworthy divergence is evident in the profit dimension, particularly in the ratio of revenue generated from eco-friendly products. In contrast to industries where eco-friendly products frequently represent a central element of marketing strategies [29], the pet industry demonstrates notable discrepancies among manufacturers. Company A's eco-friendly product line generates 20% of its revenue, which serves to illustrate a proactive investment in sustainable innovation and customer loyalty. In contrast, Companies B and C do not have dedicated eco-friendly product lines, indicating a slower adoption of sustainability-focused revenue streams. This disparity underscores a critical area for growth and adaptation within the pet industry and highlights the potential of the TBL model to drive innovation and competitive advantage [53].

The novel framework developed in this study, Pets, Planet, Profit, introduces a sector-specific adaptation that bridges gaps identified in previous research, in addition to the comparability that is missing from other implementations of the model [54]. By quantifying dimensions such as safety compliance, nutritional suitability, and eco-friendly revenue ratios, this study enables more precise comparisons of sustainability performance across companies. Unlike the general frameworks applied in other industries [28], this tailored model addresses the unique characteristics and priorities of the pet industry.

5. Conclusion

The pet market is a rapidly expanding sector of the global economy, and as a result, it is important to monitor and develop sustainability actions within this industry. Research indicates that pet owners are increasingly aware of the importance of sustainability, and this awareness is influencing their purchasing decisions, including those related to pet food. The adaptation of the Triple Bottom Line Model provides a suitable basis for measuring the level of sustainability in different pet food manufacturing companies, thus assisting customers in making more informed decisions by introducing tailored metrics under the categories of Pets, Planet and Profit. It highlights the industry’s growing focus on sustainability, driven by consumer demand and environmental challenges.

Although the novel findings align with prior research in advocating for a holistic approach to sustainability, they also underscore the necessity for industry-specific adaptations to guarantee relevance and efficacy. The pet industry's distinctive stakeholder requirements, difficulties in material sourcing, and disparate levels of eco-friendly product adoption underscore the importance of a bespoke TBL framework in facilitating meaningful advancement. This study not only broadens the scope of applicability of the TBL model but also provides actionable insights for companies seeking to enhance their sustainability practices and align themselves with the evolving expectations of environmentally and socially conscious consumers.

The findings illustrate variability in sustainability practices across analyzed companies, with notable gaps in consumer education and eco-product availability. Company A demonstrated leadership in sustainability innovation, while Companies B and C showcased opportunities for further alignment with TBL principles. This sector-specific adaptation of TBL offers a comprehensive framework for assessing sustainability performance and encouraging industry-wide improvements.

It should be noted that the present study is limited by the fact that only three companies were included in the analysis in order to adapt the Sustainability Framework. Future research should focus on standardizing metrics and addressing the practical challenges of implementing and measuring TBL outcomes in the pet food industry. This would enhance the model’s utility in guiding sustainable practices and fostering accountability among stakeholders. Consequently, future research could also encompass the testing of this approach in the human food industry.

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