

Review article

SMART CITIES, GREEN DIETS: HOW THE LUCY VEG APP SUPPORTS VALENCIA'S VEGAN COMMUNITY AND CONTRIBUTES TO SDGS

Regina Veckalne, Martins Kapustins, and Tatjana Tambovceva

Abstract. In the context of growing environmental concerns and the need to promote sustainable living, this study explores the potential of the Lucy Veg App, a digital solution under development, in contributing to the achievement of the Sustainable Development Goals (SDGs) in Valencia. The app is designed to empower the local vegan community by providing resources such as plant-based recipes, eco-friendly product recommendations, and a platform for connecting like-minded individuals. This research utilizes a review of relevant literature and examines the theoretical implications of the app on the achievement of SDGs in Valencia. Methodologically, this study draws on existing research related to digital technologies, sustainable living, and SDGs, focusing on the potential of the Lucy Veg App to promote plant-based diets and sustainable lifestyles. By analyzing the app's features and exploring its potential contributions to multiple SDGs, the research studies the app's alignment with various sustainability dimensions. The findings suggest that the Lucy Veg App has the potential to contribute to several SDGs by fostering community engagement, driving positive behavior change, and addressing key sustainability challenges related to food production, consumption, and their associated environmental and health impacts. The study also identifies promising avenues for future research and practical implementation of the app, including evaluating its effectiveness, expanding its features, analyzing user data, and assessing its broader contribution to SDGs in Valencia. In conclusion, the Lucy Veg App presents a promising opportunity to support Valencia's efforts to achieve the SDGs by promoting plant-based diets, sustainable lifestyles, and leveraging digital technologies. Further research and ongoing evaluation of the app's impact on users' behavior and the achievement of SDGs are necessary to maximize its potential in fostering a more sustainable future.

Keywords: digital technology; food sustainability; sustainable development goals; smart cities; veganism.

Authors:**Regina Veckalne**

Riga Technical University, Kipsalas iela 6a, Riga, LV-1048, Latvia

E-mail: regina.veckalne@rtu.lv

<https://orcid.org/0000-0003-2517-1749>

Martins Kapustins

LucyVeg, Valencia, Spain

E-mail: martins.kapustins@gmail.com

<https://orcid.org/0009-0008-4612-9906>

Tatjana Tambovceva

Riga Technical University, Kipsalas iela 6a, Riga, LV-1048, Latvia

E-mail: tatjana.tambovceva@rtu.lv

<https://orcid.org/0000-0002-9516-1530>

Corresponding author: Regina Veckalne, regina.veckalne@rtu.lv

Citation: Veckalne, R., Kapustins, M., & Tambovceva, T. (2023). Smart Cities, Green Diets: How the Lucy Veg App Supports Valencia's Vegan Community and Contributes to SDGs. *Virtual Economics*, 6(2), 7-22. [https://doi.org/10.34021/ve.2023.06.02\(1\)](https://doi.org/10.34021/ve.2023.06.02(1))

Received: December 18, 2022. Revised: April 25, 2023. Accepted: June 10, 2023.

© Author(s) 2023. Licensed under the [Creative Commons License - Attribution 4.0 International \(CC BY 4.0\)](https://creativecommons.org/licenses/by/4.0/)

1. Introduction

Sustainable development, as defined by the United Nations, refers to development that meets the needs of the present without compromising the ability of future generations to meet their own needs [1]. In recent years, there has been a growing awareness of the role that individual dietary choices play in achieving the Sustainable Development Goals (SDGs). Research has indicated that the adoption of plant-based diets can substantially reduce environmental impacts and promote public health [2–4].

Valencia, like many other cities in the Mediterranean region, has a rich culinary heritage rooted in the Mediterranean diet. This diet is praised for its health benefits and lower environmental impact compared to other dietary patterns [5]. However, contemporary dietary trends in Spain have drifted from the traditional Mediterranean diet towards more resource-intensive and less healthy alternatives [6]. This dietary shift poses challenges to both human health and the environment, and is particularly concerning in the context of climate change and its impacts on agricultural systems [7].

The Lucy Veg App is an innovative digital tool currently under development, designed to facilitate the transition to a more sustainable, plant-based diet for the citizens of Valencia. The app incorporates cutting-edge technologies to provide information on vegan, organic, and gluten-free ingredients, as well as geolocation services to guide users to nearby establishments offering desired items. By offering plant-based recipes, eco-friendly product suggestions, and fostering connections among like-minded individuals, the app aims to empower the local vegan community and contribute to the achievement of SDGs in Valencia.

This article examines the potential of the Lucy Veg App to promote sustainable development in Valencia through the adoption of plant-based diets. The authors draw upon recent literature to explore the environmental and health impacts of dietary choices, with a specific focus on Valencia. The article will also discuss the role of digital technologies in promoting sustainable diets, and how the Lucy Veg App can contribute to this effort. Ultimately, this research aims to shed light on the potential of innovative digital solutions in achieving sustainable development goals.

2. Literature Review

2.1. Environmental and Health Impacts of Dietary Choices

Dietary choices play a significant role in determining the environmental impacts of food systems, with the production, distribution, and consumption of food being major contributors to greenhouse gas emissions (GHG), land use change, and other environmental challenges [2,8,9]. Research has shown that shifting to more plant-based diets can lead to significant reductions in these environmental impacts [3,10].

The environmental benefits of plant-based diets can be attributed to the lower resource intensity of plant-based food production as compared to animal-based food production [11]. Animal agriculture, particularly ruminant livestock, contributes to substantial GHG emissions due to enteric fermentation, manure management, and land-use change associated with feed production [12,13]. Plant-based diets, on the other hand, generally have lower GHG emissions,

as they require fewer resources such as land, water, and energy, and result in reduced deforestation and habitat destruction [14,15].

In the Mediterranean region, traditional dietary patterns based on fruits, vegetables, legumes, nuts, whole grains, and olive oil are known for their lower environmental footprint when compared to more resource-intensive Western diets, which are high in animal products and processed foods [16]. However, in recent years, dietary patterns in Spain and other Mediterranean countries have been shifting towards more animal-based and processed food consumption, leading to increased environmental pressures and adverse health outcomes. As a result, there is a growing need to promote sustainable diets that are not only healthy but also environmentally sound. In addition to the environmental implications of dietary choices, there is a growing body of evidence demonstrating the health benefits associated with plant-based diets [17,18]. These benefits include reduced risk of chronic diseases such as cardiovascular disease, type 2 diabetes, certain types of cancer, and obesity, as well as overall improvements in life expectancy and quality of life [3,19].

When developing a social-change application companies, including LucyVeg are interested in making green changes and building their sustainable brands in order to stand out in the market and appeal to customers' interests. The research of web searches conducted using the Google Trends tool (Fig.1) revealed a rise in the popularity of veganism among internet users. It is seen that since 2004 the interest in veganism increased by 5 times.

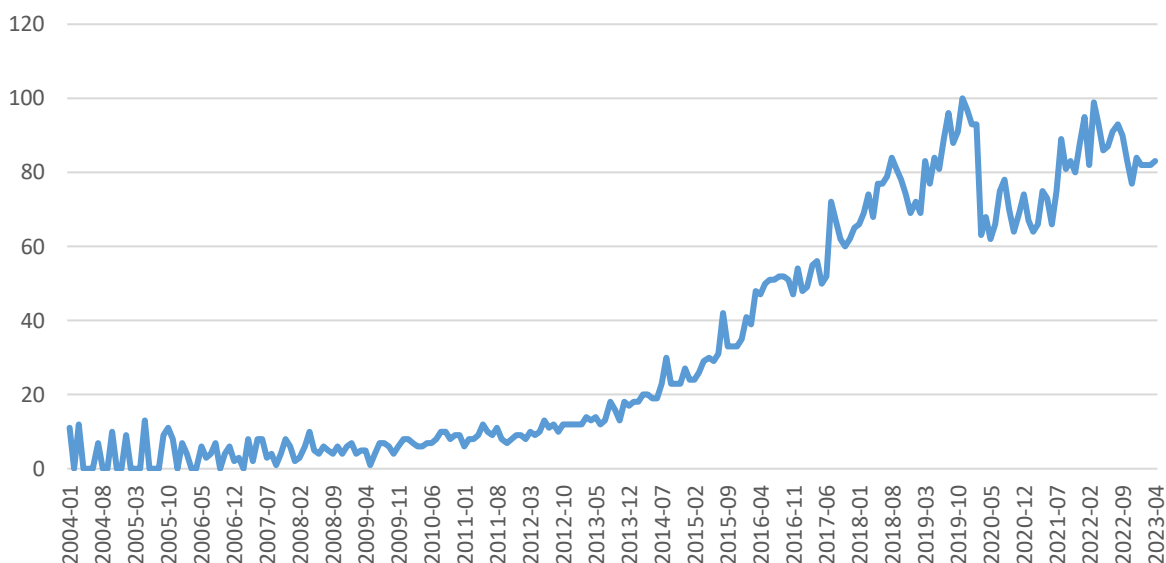


Figure 1. Web search dynamics on Google, 2004-2023

Source: developed by the authors.

Additionally, sentiment examination has been conducted to analyze netizens' emotions towards plant-based lifestyle. The majority of plant-based-related tweets, according to the tweet text analysis, fall within the right-bottom quadrant, meaning that the term "plant-based" evokes calm serene and pleasant emotions (Fig. 2).

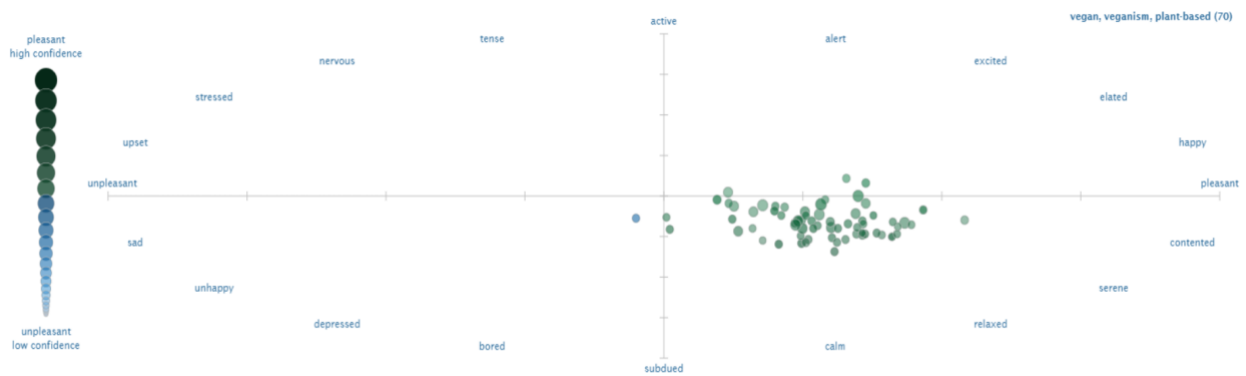


Figure 2. Sentiment analysis on tweets

Source: developed by the authors.

570 documents appear when searching for “vegan diet” and “plant-based diet” in Scopus. As shown in figure 3, the first mentions of these diets appeared 25 years ago, however it was not until 2013 when this topic garnered significant scholarly attention. Since then, the number of topics related to veganism and plant-based diet increased continuously.

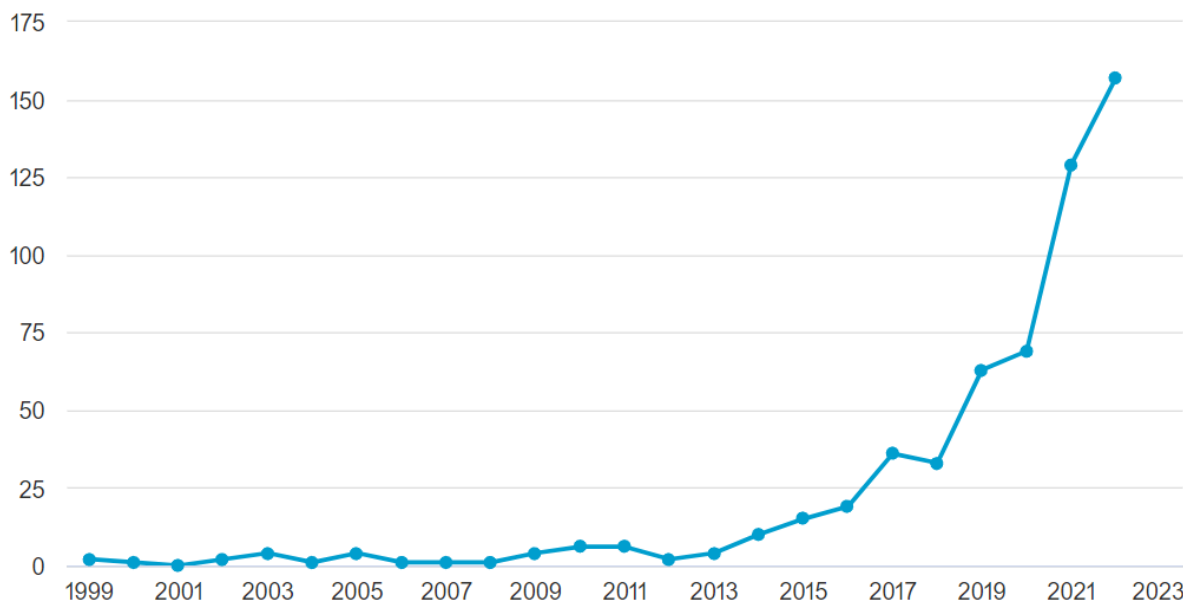


Figure 3. The number of documents on “vegan diet” and “plant-based diet” published in Scopus between 1999-2022.

Source: developed by the authors.

When it comes to research in the field of vegan and plant-based diets, Spain is among top 5 contributors (Table 1). Although its contribution is almost 5 times smaller compared to the USA (195) documents, Spain still makes it to the 4th place with 41 publications. Germany and the United Kingdom are ahead of Spain with 72 and 52 published articles respectively.

The Mediterranean diet, traditionally consumed in Spain and other Mediterranean countries, is widely recognized for its health-promoting properties, largely due to its emphasis on plant-based foods, healthy fats, and moderate consumption of fish and poultry [16]. Numerous studies have shown that adhering to a Mediterranean-style diet can help prevent and manage chronic diseases, as well as improve overall health outcomes [20,21]. However, since recent trends indicate that dietary patterns in Spain and other Mediterranean countries are shifting towards more Westernized diets that are higher in animal products, processed foods, and unhealthy fats [16] not only does it have negative implications for the environment but also poses significant risks to public health.

By promoting plant-based diets and eco-friendly products, the Lucy Veg App aims to support individuals in Valencia in making healthier dietary choices that align with the principles of the plant-based diet while reducing their environmental impact. The app's features, such as plant-based recipes and product recommendations, are designed to facilitate the adoption of healthier and more sustainable eating patterns, which can contribute to improved public health outcomes and reduced pressure on healthcare systems [22,23].

Furthermore, the Lucy Veg App's platform for connecting like-minded individuals can foster a supportive community that encourages healthy and sustainable lifestyle choices, which is a key factor in promoting a long-term behavior change [24,25]. By leveraging digital technologies to empower users in making informed dietary decisions, the app can play a critical role in promoting public health and achieving the Sustainable Development Goals in Valencia.

2.1. The Role of Digital Technologies Promoting Sustainable Diets

The rapid advancement of digital technologies has created unprecedented opportunities to support individuals in adopting more sustainable and healthy dietary choices. Digital tools, such as mobile applications, websites, and online platforms, have the potential to provide users with access to a wealth of information, resources, and social support networks that can facilitate a positive behavior change [24,25].

Digital technologies can enhance the accessibility and effectiveness of interventions aimed at promoting sustainable diets in several ways. First, they can deliver tailored information and feedback to users, enabling them to make informed decisions about their food consumption patterns and preferences [26]. Second, digital tools can help users track their dietary habits, set goals, and monitor their progress over time, which can be instrumental in fostering motivation and commitment to behavior change [24,27]. Finally, digital platforms can facilitate social support and interaction among users by connecting like-minded individuals who share similar values, interests, and lifestyle goals, thereby reinforcing a sense of community and collective action towards sustainable development [24].



Figure 5. LucyVeg product-scan mockup

Source: developed by the authors.

The Lucy Veg App is an example of an innovative digital solution designed to empower the local vegan community in Valencia and promote the adoption of plant-based diets, which are aligned with the principles of sustainable development. By providing users with information on vegan, organic, and gluten-free ingredients, as well as geolocation services to locate nearby establishments offering these items, the app aims at making sustainable and healthy dietary choices more accessible and convenient for users [23].

Furthermore, the app's features, such as plant-based recipes and eco-friendly product recommendations, can help users navigate the complexities of adopting a more sustainable lifestyle, while its platform for connecting like-minded individuals can foster a supportive community that encourages collective action towards sustainable development [24,28]. By leveraging the power of digital technologies, the Lucy Veg App can play a vital role in promoting sustainable diets and contributing to the achievement of the Sustainable Development Goals in Valencia.

3. Veganism Potential Contribution to SDGs

Veganism, as a lifestyle choice that abstains from the consumption of animal-derived products, has the potential to contribute significantly to the achievement of the Sustainable Development Goals. By embracing plant-based diets, individuals can promote environmental sustainability, public health, and social equity, thereby supporting progress towards several SDGs [2,4].

SDG 2: Zero Hunger

By adopting plant-based diets, resources such as land, water, and energy can be used more efficiently, allowing for increased food production and greater food security [11,15]. Livestock production requires large amounts of feed, much of which is derived from edible crops that could otherwise be used to feed humans directly [29]. By shifting towards plant-based diets, the global availability of food calories could increase, contributing to the eradication of hunger and malnutrition [9].

SDG 3: Good Health and Well-being

As previously discussed, plant-based diets are associated with numerous health benefits, including reduced risks of chronic diseases, such as cardiovascular disease, type 2 diabetes, and certain types of cancer [3,18,19]. By embracing veganism, individuals can promote their own health and well-being, thereby contributing to the achievement of SDG 3 and reducing pressure on healthcare systems [4].

SDG 6: Clean Water and Sanitation

Animal agriculture is a significant contributor to water pollution due to the excessive use of fertilizers, pesticides, and other agrochemicals, as well as the release of nutrients, pathogens, and pharmaceuticals from livestock waste [31,32]. Additionally, livestock production requires substantial amounts of water, primarily for feed production and animal husbandry practices [33]. By adopting plant-based diets, individuals can help reduce water pollution and conserve water resources, thus contributing to SDG 6.

SDG 8: Decent Work and Economic Growth

The shift towards plant-based diets has the potential to create new economic opportunities within the agri-food sector, as the demand for plant-based alternatives to animal-derived products continues to grow [33,34]. This transition can lead to job creation and economic growth in industries related to the production, distribution, and marketing of plant-based products, thus supporting SDG 8.

Veganism inherently supports responsible consumption and production by promoting the consumption of plant-based foods, which have lower environmental footprints compared to animal-derived products [3,14]. The adoption of vegan diets can lead to reduced greenhouse gas emissions, land use, and other environmental impacts associated with food production, thereby supporting more sustainable production practices and responsible consumption patterns [2,8].

SDG 13: Climate Action

The adoption of plant-based diets can contribute significantly to climate change mitigation, as animal agriculture is a major contributor to greenhouse gas emissions [12,13]. By reducing demand for animal products, veganism can help reduce the emissions associated with livestock production, thereby contributing to global efforts to combat climate change [3,9].

SDG 14: Life Below Water

By reducing the demand for animal-derived products, particularly fish and other seafood, veganism can help alleviate pressure on marine ecosystems and promote the sustainable management of fisheries [35,36]. Overfishing, bycatch, and other unsustainable fishing

practices contribute to the decline of marine biodiversity and the degradation of marine habitats [37]. Adopting plant-based diets can help conserve marine resources and support the achievement of SDG 14.

SDG 15: Life on Land

By supporting the adoption of plant-based diets, veganism can contribute to the protection and restoration of terrestrial ecosystems [2,8]. Animal agriculture is a significant driver of deforestation, habitat destruction, and biodiversity loss, as vast areas of land are required for livestock grazing and feed production [29,30]. By reducing demand for animal products, veganism can help alleviate these pressures on land and promote the conservation of terrestrial ecosystems.

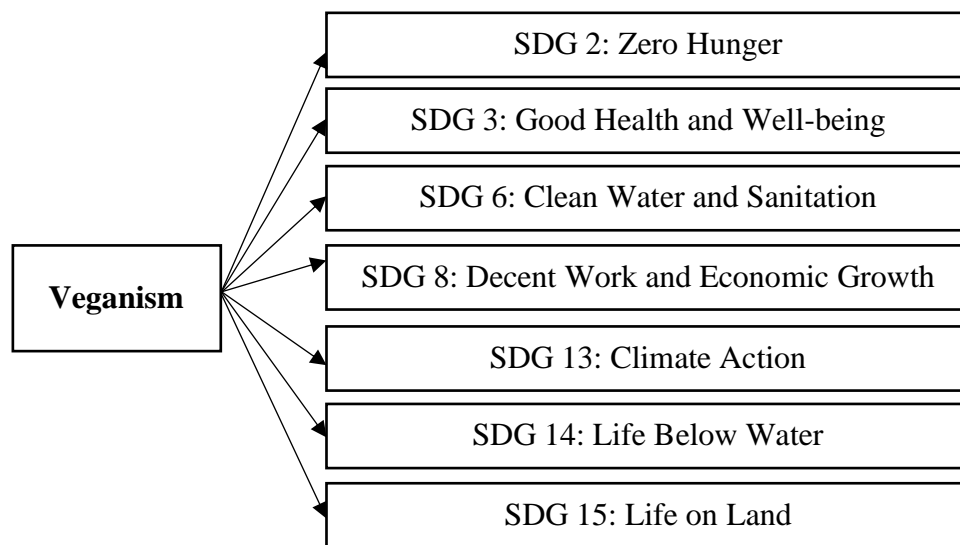


Figure 6. Veganism influence on SGDs

Source: developed by the authors.

In summary, veganism offers a wide range of potential contributions to the SDGs by addressing key sustainability challenges related to food production, consumption, and their associated environmental and health impacts. The Lucy Veg App, through its promotion of plant-based diets and eco-friendly products, can serve as a catalyst for individuals to embrace more sustainable and healthy lifestyles, thereby supporting the achievement of the Sustainable Development Goals in Valencia and beyond.

4. Digital Nudges and Behavioral Change

Digital nudges are interventions that leverage technology to subtly influence people's behavior and decision-making processes, often by providing personalized information, feedback, and prompts [38,39]. These nudges have been shown to be effective in promoting healthier and more sustainable behaviors, as they capitalize on cognitive biases and heuristics to facilitate a behavior change without restricting individuals' freedom of choice [39,40].

Digital nudges have the potential to support the adoption of plant-based diets and sustainable lifestyles by providing users with tailored information and feedback, helping them set and monitor personal goals, and fostering motivation and commitment to change [25,41]. For example, digital nudges can remind users of the environmental and health benefits of consuming plant-based meals, suggest healthy and sustainable meal options, or provide social comparison feedback to reinforce positive behaviors [42,43].

The Lucy Veg App can incorporate digital nudges to encourage users to make more sustainable and healthy dietary choices, by providing them with relevant and timely information, personalized recommendations, and interactive features that promote engagement and self-reflection [24,25]. For instance, the app could display visual representations of the environmental impact of users' food choices, offer recipe suggestions based on users' dietary preferences and nutritional needs, or facilitate goal-setting and progress tracking for individual sustainability targets.

Furthermore, the Lucy Veg App can leverage social influence and peer support to reinforce behavior change, by providing users with a platform for connecting with like-minded individuals and sharing their experiences, tips, and achievements related to veganism and sustainable living. By integrating digital nudges and social support features, the app can foster a sense of community and collective action towards the achievement of the Sustainable Development Goals in Valencia.

In summary, digital nudges have the potential to be a powerful tool for promoting the adoption of plant-based diets and sustainable lifestyles. By incorporating these nudges into the Lucy Veg App, developers can harness the power of technology to support users in making more informed, healthy, and environmentally friendly dietary choices, thereby contributing to the achievement of the Sustainable Development Goals in Valencia and beyond.

5. Lucy Veg App for Valencia's Sustainability

The Lucy Veg App is a revolutionary digital tool designed to cater to the needs of the vegan, vegetarian, and flexitarian community in Valencia. The app is equipped with advanced features and services that help users identify vegan-friendly products, explore new vegan products, and find vegan-friendly businesses in the city. The Lucy Veg App is a user-friendly mobile application that allows users to scan product barcodes and receive real-time information on whether the product is vegan-friendly or not. In case the product is not yet in the database, users can upload the product by taking a photo of it, including the ingredients, typing in the brand name, and selecting the shop where it was bought. The app also provides information on product certificates, such as vegan and eco certification.

Additionally, Lucy Veg App offers an explore section, which allows users to discover new vegan products from smaller local brands. This feature helps support local vegan businesses and promotes sustainable consumption habits. Thus, it is a comprehensive digital tool that provides a range of features and services designed to help users make informed decisions about the products they purchase and the businesses they support.

Moreover, the app is about to introduce a new feature that provides information on food allergies, helping users make safer and healthier choices when selecting products. Additionally, the app's search feature allows users to find product alternatives, making it easier to find vegan-friendly substitutes for products they may have previously enjoyed. In future versions of the app, there are also plans to expand the product and shop list to include cosmetic products, as well as provide a map of Valencia highlighting vegan-friendly businesses such as shops, cafes, restaurants, hairdressers, gyms, and more. By partnering with other vegan-friendly businesses, the Lucy Veg App aims at creating a supportive network that makes it easier for people to transition to a vegan lifestyle.

6. Theoretical Implications of the Lucy Veg App on SDGs in Valencia

The Lucy Veg App has several theoretical implications for the achievement of Sustainable Development Goals in Valencia. By promoting plant-based diets and sustainable lifestyles through digital means, the app has the potential to contribute to multiple SDGs, foster community engagement, and drive a positive behavior change. The Lucy Veg App aligns with various SDGs by addressing key sustainability challenges related to food production, consumption, and their associated environmental and health impacts. As discussed in section 3, the app can contribute to the achievement of SDGs, such as SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-being), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), SDG 15 (Life on Land), SDG 6 (Clean Water and Sanitation), SDG 8 (Decent Work and Economic Growth), and SDG 14 (Life Below Water). By encouraging plant-based diets, the app can help reduce greenhouse gas emissions, land and water use, and promote more sustainable resource management.

The Lucy Veg App can foster community engagement by providing a platform for like-minded individuals to connect, share knowledge, and support each other in adopting plant-based diets and sustainable lifestyles. This sense of community can facilitate collective action towards the achievement of the Sustainable Development Goals in Valencia. Moreover, the data generated by the app can provide valuable insights into local dietary trends and preferences, informing urban planning and policy-making processes related to food systems, public health, and environmental management. The app has the potential to drive a positive behavior change by incorporating digital nudges and personalized feedback, helping users make more informed, healthy, and environmentally friendly dietary choices. The Lucy Veg App can encourage users to make more sustainable choices by displaying visual representations of the environmental impact of their food choices, offering recipe suggestions based on users' dietary preferences and nutritional needs, or facilitating goal-setting and progress tracking for individual sustainability targets.

In conclusion, the Lucy Veg App has various theoretical implications for the achievement of the Sustainable Development Goals in Valencia. By leveraging digital technologies, the app can promote plant-based diets and sustainable lifestyles, contribute to multiple SDGs, foster community engagement, and drive positive behavior change. Although the app is still in the development stage, its potential to support the city of Valencia in achieving SDGs presents promising opportunities for future research and practical applications.

7. Conclusions

It is important to consider the practical implications of the Lucy Veg App in furthering the achievement of the Sustainable Development Goals (SDGs) in Valencia. The app can play a significant role in raising awareness about the environmental and health benefits of plant-based diets, encouraging individuals to adopt more sustainable food consumption patterns.

One practical implementation strategy for the app could involve collaboration with local restaurants, grocery stores, and food delivery services to promote plant-based options and provide incentives for users to choose sustainable food alternatives. By partnering with these establishments, the app can help expand the availability and accessibility of plant-based food choices, making it easier for individuals to make sustainable dietary decisions.

Furthermore, the app can leverage digital technologies such as gamification and social networking features to foster community engagement and create a sense of shared purpose among its users. Through challenges, rewards, and interactive features, the app can encourage users to actively participate in sustainable practices, share their experiences, and inspire others to follow suit. This sense of community and collective action can contribute to the achievement of SDG 17, which emphasizes the importance of partnerships and collaboration for sustainable development.

To maximize the impact of the Lucy Veg App, ongoing evaluation and improvement are crucial. Continuous user feedback and data analysis can help identify areas for enhancement and tailor the app's features to better meet users' needs and preferences. By incorporating machine learning algorithms and personalized recommendations, the app can provide users with tailored suggestions, recipes, and resources based on their individual preferences and goals. This personalized approach can facilitate behavior change and increase users' motivation to adopt sustainable dietary habits.

Additionally, the app can serve as a platform for educational content, providing information on the environmental, health, and ethical aspects of plant-based diets. By disseminating evidence-based knowledge, the app can help dispel misconceptions and provide individuals with the information needed to make informed choices. This educational component aligns with SDG 4, which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

In conclusion, the Lucy Veg App represents a promising digital solution for promoting plant-based diets and sustainable lifestyles in Valencia. By leveraging digital technologies, fostering community engagement, and incorporating ongoing evaluation and improvement, the app has the potential to contribute significantly to the achievement of the SDGs. With collaboration, strategic partnerships, and a focus on user-centered design, the app can become a valuable tool in creating a more sustainable future, not only in Valencia but also in other regions striving for sustainable development.

Author Contributions: Conceptualization, R.V. and M.K.; methodology, R.V.; software, M.K.; validation, T.T.; formal analysis, R.V.; investigation, M.K.; resources, T.T.; data curation, T.T.; writing-original draft preparation, R.V. and M.K.; writing-review and editing, T.T.; supervision, T.T.; project administration, M.K.; funding acquisition, T.T. All authors have read and agreed to the published version of the manuscript.”

Funding: not applicable.

Data Availability Statement: not applicable.

Acknowledgements: not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Brundtland Commission. (1987). Report of the World Commission on Environment and Development: Our Common Future. United Nations. <http://www.un-documents.net/our-common-future.pdf>
2. Clark, M., & Tilman, D. (2017). Comparative analysis of environmental impacts of agricultural production systems, agricultural input efficiency, and food choice. *Environmental Research Letters*, 12(6), 064016. <https://doi.org/10.1088/1748-9326/aa6cd5>
3. Springmann, M., Godfray, H. C. J., Rayner, M., & Scarborough, P. (2016). Analysis and valuation of the health and climate change co-benefits of dietary change. *Proceedings of the National Academy of Sciences*, 113(15), 4146-4151. <https://doi.org/10.1073/pnas.1523119113>
4. Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., Garnett, T., Tilman, D., DeClerck, F., Wood, A., Jonell, M., Clark, M., Gordon, L. J., Fanzo, J., Hawkes, C., Zurayk, R., Rivera, J. A., De Vries, W., Sibanda, L. M., Afshin, A., ... Murray, C. J. L. (2019). Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. *The Lancet*, 393(10170), 447–492. [https://doi.org/10.1016/S0140-6736\(18\)31788-4](https://doi.org/10.1016/S0140-6736(18)31788-4)
5. Acevedo Cantero, P., Ortega Santos, C. P., & López-Ejeda, N. (2022). Vegetarian diets in Spain: Temporal evolution through national health surveys and their association with healthy lifestyles. *Endocrinología, Diabetes Y Nutrición*, 70(2), 1–8. <https://doi.org/10.1016/j.endinu.2022.02.005>
6. Cambeses-Franco, C., Feijoo, G., Moreira, M. T., & González-García, S. (2022). Co-benefits of the EAT–Lancet diet for environmental protection in the framework of the Spanish dietary pattern. *Science of the Total Environment*, 836, 155683. <https://doi.org/10.1016/j.scitotenv.2022.155683>
7. Meybeck, A., & Gitz, V. (2017). Sustainable diets within sustainable food systems. *Proceedings of the Nutrition Society*, 76(1), 1–11. <https://doi.org/10.1017/S0029665116000653>
8. Lynch, H., Johnston, C., & Wharton, C. (2018). Plant-Based Diets: Considerations for Environmental Impact, Protein Quality, and Exercise Performance. *Nutrients*, 10(12), 1841. <https://doi.org/10.3390/nu10121841>
9. Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science*, 360(6392), 987–992. <https://doi.org/10.1126/science.aag0216>
10. Scarborough, P., Appleby, P. N., Mizdrak, A., Briggs, A. D. M., Travis, R. C., Bradbury, K. E., & Key, T. J. (2014). Dietary greenhouse gas emissions of meat-eaters, fish-eaters, vegetarians and vegans in the UK. *Climatic Change*, 125(2), 179–192. <https://doi.org/10.1007/s10584-014-1169-1>
11. Smetana, S., Mathys, A., Knoch, A. et al. Meat alternatives: life cycle assessment of most known meat substitutes. *International Journal of Life Cycle Assessment*, 20, 1254–1267 (2015). <https://doi.org/10.1007/s11367-015-0931-6>
12. González-García, S., Esteve-Llorens, X., Moreira, M. T., & Feijoo, G. (2018). Carbon footprint and nutritional quality of different human dietary choices. *Science of the Total Environment*, 644, 77–94. <https://doi.org/10.1016/j.scitotenv.2018.06.339>

13. Parker, R. W., Blanchard, J. L., Gardner, C., Green, B. S., Hartmann, K., Tyedmers, P. H., & Watson, R. A. (2018). Fuel use and greenhouse gas emissions of world fisheries. *Nature Climate Change*, 8(4), 333–337. <https://doi.org/10.1038/s41558-018-0117-x>
14. Clune, S., Crossin, E., & Verghese, K. (2017). Systematic review of greenhouse gas emissions for different fresh food categories. *Journal of Cleaner Production*, 140, 766–783. <https://doi.org/10.1016/j.jclepro.2016.04.082>
15. Gibbs J, Cappuccio FP. Plant-Based Dietary Patterns for Human and Planetary Health. *Nutrients*. 2022 Apr 13;14(8):1614. doi: 10.3390/nu14081614. PMID: 35458176; PMCID: PMC9024616. Berry, E. M. (2019). Sustainable Food Systems and the Mediterranean Diet. *Nutrients*, 11(9), 2229. <https://doi.org/10.3390/nu11092229>
16. Pais, D. F., Marques, A. C., & Fuinhas, J. A. (2022). The cost of healthier and more sustainable food choices: Do plant-based consumers spend more on food? *Agricultural and Food Economics*, 10(1), 18. <https://doi.org/10.1186/s40100-022-00224-9>
17. Dinu, M., Abbate, R., Gensini, G. F., Casini, A., & Sofi, F. (2017). Vegetarian, vegan diets and multiple health outcomes: A systematic review with meta-analysis of observational studies. *Critical Reviews in Food Science and Nutrition*, 57(17), 3640–3649. <https://doi.org/10.1080/10408398.2016.1138447>
18. Orlich, M. J., Singh, P. N., Sabaté, J., Jaceldo-Siegl, K., Fan, J., Knutsen, S., Beeson, W. L., & Fraser, G. E. (2013). Vegetarian dietary patterns and mortality in Adventist Health Study 2. *JAMA Internal Medicine*, 173(13), 1230–1238. <https://doi.org/10.1001/jamainternmed.2013.6473>
19. Estruch, R., Ros, E., Salas-Salvadó, J., Covas, M. I., Corella, D., Arós, F., Gómez-Gracia, E., Ruiz-Gutiérrez, V., Fiol, M., Lapetra, J., Lamuela-Raventós, R. M., Serra-Majem, L., Pintó, X., Basora, J., Muñoz, M. A., Sorlí, J. V., Martínez, J. A., & Martínez-González, M. A. (2018). Primary Prevention of Cardiovascular Disease with a Mediterranean Diet Supplemented with Extra-Virgin Olive Oil or Nuts. *The New England Journal of Medicine*, 378(25), e34. <https://doi.org/10.1056/NEJMoa1800389>
20. Martínez-González, M. Á., Salas-Salvadó, J., Estruch, R., Corella, D., Fitó, M., & Ros, E. (2014). Benefits of the Mediterranean Diet: Insights from the PREDIMED Study. *Progress in Cardiovascular Diseases*, 58(1), 50–60. <https://doi.org/10.1016/j.pcad.2015.04.003>
21. Heller, M. C., & Keoleian, G. A. (2015). Greenhouse gas emission estimates of U.S. dietary choices and food loss. *Journal of Industrial Ecology*, 19(3), 391–401. <https://doi.org/10.1111/jiec.12174>
22. Stehfest, E., Bouwman, L., van Vuuren, D. P., den Elzen, M. G. J., Eickhout, B., & Kabat, P. (2009). Climate benefits of changing diet. *Climatic Change*, 95(1-2), 83–102. <https://doi.org/10.1007/s10584-008-9534-6>
23. Macassa G. Can sustainable health behaviour contribute to ensure healthy lives and wellbeing for all at all ages (SDG 3)? A viewpoint. *Journal of Public Health Research*, 10(3), 2051. <https://doi.org/10.4081/jphr.2021.2051>
24. Garnett, T., Mathewson, S., Angelides, P., & Borthwick, F. (2015). Policies and actions to shift eating patterns: What works? Food Climate Research Network. https://tabledebates.org/sites/default/files/2020-10/ferc_n_chatham_house_0.pdf
25. Webb, J., Williams, A. G., Hope, E., Evans, D., & Moorhouse, E. (2013). Do foods imported into the UK have a greater environmental impact than the same foods produced within the UK? *The International Journal of Life Cycle Assessment*, 18(7), 1325–1343. <https://doi.org/10.1007/s11367-013-0576-2>
26. Hartmann, P., Apaolaza, V., D'Souza, C., Barrutia, J. M., & Echebarria, C. (2014). Environmental threat appeals in green advertising. *International Journal of Advertising*, 33(4), 741–765. <https://doi.org/10.2501/ija-33-4-741-765>
27. Foley, J. A., Ramankutty, N., Brauman, K. A., Cassidy, E. S., Gerber, J. S., Johnston, M., Mueller, N. D., O'Connell, C., Ray, D. K., West, P. C., Balzer, C., Bennett, E. M., Carpenter, S. R., Hill, J., Monfreda, C., Polasky, S., Rockström, J., Sheehan, J., Siebert, S., ... Zaks, D. P. M. (2011). *Solutions for a cultivated planet*. *Nature*, 478(7369), 337–342. <https://doi.org/10.1038/nature10452>
28. Machovina, B., Feeley, K. J., & Ripple, W. J. (2015). Biodiversity conservation: The key is reducing meat consumption. *Science of the Total Environment*, 536, 419–431. <https://doi.org/10.1016/j.scitotenv.2015.07.022>
29. Rosi, A., Mena, P., Pellegrini, N., Turrone, S., Neviani, E., Ferrocino, I., Di Cagno, R., Ruini, L., Ciati, R., Angelino, D., Maddock, J., Gobetti, M., Brighenti, F., & Del Rio, D. (2017). Environmental impact of omnivorous, ovo-lacto-vegetarian, and vegan diet. *Scientific Reports*, 7(1), 6105. <https://doi.org/10.1038/s41598-017-06466-8>

30. Vanham, D., Bouraoui, F., Leip, A., Grizzetti, B., & Bidoglio, G. (2015). Lost water and nitrogen resources due to EU consumer food waste. *Environmental Research Letters*, 10(8), 084008. <https://doi.org/10.1088/1748-9326/10/8/084008>
31. Mekonnen, M. M., & Hoekstra, A. Y. (2012). A global assessment of the water footprint of farm animal products. *Ecosystems*, 15(3), 401–415. <https://doi.org/10.1007/s10021-011-9517-8>
32. Sanchez-Sabate, R., & Sabaté, J. (2019). Consumer Attitudes Towards Environmental Concerns of Meat Consumption: A Systematic Review. *International journal of environmental research and public health*, 16(7), 1220. <https://doi.org/10.3390/ijerph16071220>
33. Gephart, J. A., Troell, M., Henriksson, P. J. G., Beveridge, M. C. M., Verdegem, M., Metian, M., Mateos, L. D., & Deutsch, L. (2016). The 'seafood gap' in the food-water nexus literature—issues surrounding freshwater use in seafood production chains. *Advances in Water Resources*, 110, 505–514. <https://doi.org/10.1016/j.advwatres.2017.03.025>
34. Hilborn, R., Banobi, J., Hall, S. J., Pucylowski, T., & Walsworth, T. E. (2018). The environmental cost of animal source foods. *Frontiers in Ecology and the Environment*, 16(6), 329–335. <https://doi.org/10.1002/fee.1822>
35. Pauly, D., Christensen, V., Guénette, S., Pitcher, T. J., Sumaila, U. R., Walters, C. J., Watson, R., & Zeller, D. (2002). Towards sustainability in world fisheries. *Nature*, 418(6898), 689–695. <https://doi.org/10.1038/nature01017>
36. Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Yale University Press.
37. Hummel, D., & Maedche, A. (2019). How effective is nudging? A quantitative review on the effect sizes and limits of empirical nudging studies. *Journal of Behavioral and Experimental Economics*, 80, 47–58. <https://doi.org/10.1016/j.socec.2019.03.005>
38. Costa, A. I., Dekker, M., & Jongen, W. M. (2000). Quality function deployment in the food industry: a review. *Trends in Food Science & Technology*, 11(9-10), 306–314. [https://doi.org/10.1016/s0924-2244\(01\)00002-4](https://doi.org/10.1016/s0924-2244(01)00002-4)
39. Niederle, P., & Schubert, M. N. (2020). HOW does veganism contribute to shape sustainable food systems? Practices, meanings and identities of vegan restaurants in Porto Alegre, Brazil. *Journal of Rural Studies*, 78, 304–313. <https://doi.org/10.1016/j.jrurstud.2020.06.02>
40. Jesse, M., & Jannach, D. (2021). Digital nudging with recommender systems: Survey and future directions. *Computers in Human Behavior Reports*, 3, 100052. <https://doi.org/10.1016/j.chbr.2020.100052>
41. Lepenies, R., & Małecka, M. (2019). The ethics of behavioural public policy. In *The Routledge Handbook of Ethics and Public Policy* (pp. 513–525). Routledge.