



جامعة السلطان قابوس
Sultan Qaboos University

College of Economics and Political Science

Business Communication Department

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A Proposal to Produce Biodegradable Food Containers to Replace Plastic Products

Team Members:

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Memo

Date: 12/12/2025

To: Dr Adil Al Busaidi

From: Al Kawthar Al Riyami, Hadeel Al Rashdi, Sujood Al Abri, Al Yaqeen Al Balushi,
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Subject: A proposal to produce biodegradable food containers to replace plastic products

Purpose

This proposal aims to obtain permission to implement Polyhydroxyalkanoates (PHA) as a sustainable and environmentally safe material replacement for traditional plastic, in Oman. This material will contribute to reducing ecological pollution by providing a fully biodegradable, reliable, safe and sustainable option for producing and packaging products.

Summary

The problem that the team will attempt to solve is the increase in plastic usage, specifically single-use plastic. While it is very difficult to convince consumers to completely stop using plastic due to its harm to the environment, a more viable alternative is single use biodegradable plastic. This proposal states that the production of biodegradable food containers with PHA in Oman is a practical way to reduce environmental obstacles resulting from plastic waste. The proposed project will be in line with Oman's environmental plans and Vision 2040 to offer a suitable alternative for the food sector with no loss of functionality. Based on market analysis, consultations with suppliers, and financial assessments, the report will prove the technical and financial viability of the venture and hence stands out as one promising step in reducing plastic pollution in Oman. The team consists of diverse talents, from technical research skills to detailed design abilities. This diversity will ensure that the personnel have all the essential strengths to produce an accurate product with little to no flaws.

Introduction

Using plastic for packaging and single-use products has been a central component of manufacturing due to its cost-effectiveness, durability and availability. However, its environmental impact has been growing to be more significant every year because plastic is non-biodegradable, and even if it does eventually decompose, it takes plastic up to 500 years or even more to do so. Furthermore, all methods that attempt to reuse plastic or manage its waste result in the release of toxic metals, acid gases, and other toxic substances into the air, water, and soil, some of which are considered the most toxic substances on Earth (Center for International Environmental Law, 2022).

The opportunity was found after looking into Oman's initiatives to reduce the impact of plastic on the environment. Waste management efforts were enhanced through phased implementation of a plastic bag ban and increase in the national recycling rate to over 40%, up from 34% the previous year (Mohammad, 2025). This, along with other initiatives like encouraging the use of electric vehicles, shows that Oman is moving towards a green economy. The idea proposed will be encouraged and supported due to its alignment with the nation's goals.

The current environmental pollution situation caused by plastics has increased the demand for the production of bioplastics to increase in the next few years (Vicente et al., 2023). On the other hand, it is very difficult in many industries to give up plastic, especially single-use plastics, since they are useful when it comes to reducing cross contamination. It is also worth mentioning that the current production of bioplastics represents only 1% of the total production of plastics, so there is a lot of room for expanding in the market, as well as the potential of having a first-mover

advantage. Therefore, rather than eliminating single-use products altogether, a more viable solution lies in replacing traditional plastics with environmentally friendly and biodegradable materials.

This proposal aims to obtain approval to explore Polyhydroxyalkanoates (PHA) as a viable alternative for synthetic plastic. PHA is polymeric compounds synthesized by various bacteria, acting as carbon energy reserves (Chouhan & Tiwari, 2025). The proposal scope will specifically cover single-use plastics in the food industry, like cups and lids, cutlery, and takeaway containers for cafes and restaurants. Hence, products will be sold commercially (B2B) rather than directly sold to consumers.

The proposal will include diverse sources of information. Firstly, technical and financial information will be provided by the supplier, Danimer Scientific. Interviews will be conducted with cafe owners to confirm that there is demand for biodegradable plastic alternatives, discuss preferences, and discuss price tolerance. Lastly, findings will be backed by scientific literature reviews that go over the characteristics of PHA, biodegradation behaviour, performance comparisons, and other metrics that determine feasibility.

Keywords: Polyhydroxyalkanoate (PHA), bioplastics, synthetic plastics.

Proposed Program

The following scheme will be carried out to produce biodegradable food containers locally:

Task 1) Conduct a Comprehensive Literature Review

The team will conduct secondary research on technologies and trends about biodegradable packaging. It will focus on Danimer Scientific's specialty: polyhydroxyalkanoates (PHA) and polycaprolactone (PCL).

This review will rely on reputable news articles, industry reports, Danimer Scientific's technical documentation, and academic journals such as the Journal of Water Process Engineering (Tao Q, et al., 2024). This review will help identify current market gaps in Oman's food packaging sector and validate the justification for integrating biodegradable solutions.

Task 2) Preliminary Consultation with Danimer Scientific

The research team will contact Danimer Scientific's Business Development and Regional Sales Managers. They are responsible for supporting new manufacturing partnerships and possess information regarding minimum order quantities (MOQs), pricing estimates, process requirements for molding/production and the required certifications (e.g. FDA). Acquiring these details will set out the disparities between Danimer's materials and local manufacturing capabilities. It will also help in estimating the cost structure for producing biodegradable containers in Oman.

Task 3) Market Assessment of Food-Container Use in Oman

This step aims to understand local demand on a primary level. Investigations will take place in different forms:

- Short interviews with managers of restaurants, cafes, grocery stores and packaging firms (refer to Appendix 1).

- Site visits to packaging distributors in Muscat.
- Observations of plastic usage patterns in retail environments.

Results from this research will narrow down the target audience. It will show which sectors are more interested, the potential volume of demand and other technical requirements of the product.

Task 4) Financial and Economic Feasibility Study

The team will prepare a detailed financial model. It will include the startup cost estimates (machinery, labor, material imports etc.) as well as an analysis of the unit production cost based on Danimer being the main supplier. The model will also include a break-even analysis, pricing strategy options, projected revenue, and an assessment of how much waste can be reduced to support Oman Vision 2040 sustainability goals. This step will help determine the financial and social feasibility of this project.

Task 5) Develop the Proposed Manufacturing Model

Using the data collected, the team will develop a clear operational plan. This will include identifying the equipment needed (thermoforming machines, quality testing tools, etc.), as well as outlining the full production workflow, from handling the raw materials to delivering the final product to consumers. The plan will also define key elements like workforce requirements and expected production output to ensure the operation runs smoothly and efficiently.

To achieve the goal of launching a commercial biodegradable container line in Oman, partnerships with restaurants, cafes, and retail stores will be secured during this stage.

Task 6) Compose the Final Report

All data, findings, and analyses from the previous steps will be assembled into a complete final proposal. It is a tool that will guide investors into understanding this new venture. It will include: market findings, financial analysis, supplier information, proposed partnerships, and recommendations for moving forward. In addition, a manufacturing model will be proposed. This step highlights how the proposal is a measure in achieving Oman's sustainability objectives, and an important step in replacing plastic products nationally.

Task Schedule

The following table lists the tasks along with the time required to complete each task:

Activity	Start Date	Finish Date
Task 1	01-January-2026	15-February-2026
Task 2	15-January-2026	1-February-2026
Task 3	1-February-2026	1-March-2026
Task 4	20-February-2026	15-March-2026
Task 5	1-March-2026	1-April-2026
Task 6	20-March-2026	5-April-2026

Budget

Direct Cost Item	Description	Estimated Cost (OMR)
Raw Material Samples	Initial PHA material samples for testing and evaluation	180
Supplier Consultation	Technical and commercial consultations with Danimer Scientific	120
Market Research	Interviews and site visits to restaurants, cafes, and distributors	90
Transportation & Logistics	Travel within Oman for meetings, field visits, and coordination	70
Financial Feasibility Analysis	Cash flow forecasting, pricing strategies, and break-even evaluation	110
Manufacturing Model Development	Choosing which process, equipment, and workflow design will be needed	130
Total Direct Cost		700

Indirect Cost Item	Description	Estimated Cost
Documentation	Preparation of reports, presentations, and printing	60
Administrative Overhead	Internet access, communication tools, and access to academic journals	40
Contingency	Unforeseen minor operational expenses	20
Total Indirect Cost		120

Category	Cost
Total Direct Costs	700
Total Indirect Costs	120
Total Estimated Budget	820 OMR

Qualifications

Our five-person team's combined expertise, abilities, and teamwork experience make us completely qualified to carry out the PHA sustainability project:

1. Al Kawthar Al Riyami - Research and Data Analyst

Al Kawthar's strengths lie in research and critical evaluation. This will help give the team an understanding of what PHA is, its properties, and its methods of production, along with other technical aspects of the research. This is a very critical part of the proposal as collecting correct and accurate information ensures less errors and more efficiency, which reduces costs and increases profits.

2. Hadeel Al Rashdi - Finance and Budget Allocation

Hadeel is responsible for managing finances, forecasting costs and setting budgets for each task. She has taken the courses Fundamentals of Corporate Finance and Cost Accounting, which have helped build a solid knowledge base in analysing financial requirements and setting realistic goals. Moreover, her internship with Mwasalat where she applied theoretical concepts will ensure that the financial risks are identified, and it will help the team make more informed decisions.

3. Sujood Al Abri - Project Planner/Coordinator

Sujood has excellent skills in the area of organisation, planning schedules and coordinating project teams. Sujood is responsible for identifying assigned personnel, managing project timelines, and ensuring that all project phases are completed in a timely and efficient manner.

4. Al Yaqeen Al Baloushi - Communication Expert

Al Yaqeen has a strong ability to communicate, both written and verbal. She develops professional reports, assists in developing proposal documents, and presents concise messages about the proposed product to many different audiences.

5. Hawra Al Ajmi - Creativity and Problem-Solving Specialist

Hawra brings forward creative thought processes and the ability to solve challenges. She will help develop advanced applications for the new innovative product, deal with development challenges, and provide practical solutions for making sure that this idea succeeds in Oman.

References

Center for International Environmental Law. (2022). *The Toxic Impacts of Plastic Across its Lifecycle*. Center for International Environmental Law.

<https://www.ciel.org/the-toxic-impacts-of-plastic-across-its-lifecycle/>

Chouhan, A., & Tiwari, A. (2025). Production of polyhydroxyalkanoate (PHA) biopolymer from crop residue using bacteria as an alternative to plastics: a review. *RSC Advances*, 15(15), 11845–11862. <https://doi.org/10.1039/d4ra08505a>

Mohammad. (2025, January 9). Environment Authority of Oman marks major milestones in 2024. Zawya. Retrieved from

<https://www.zawya.com/en/economy/gcc/environment-authority-of-oman-marks-major-milestones-in-2024-ifhptd8c>

Tao, Q., Huang, H., Yang, M., Zou, Y., Harder, M. K., Yan, Q., Liang, B., Ioanna Ntaikou, Antonopoulou, G., Gerasimos Lyberatos, & Zhang, Y. (2024). Comparison of batch, fed-batch and continuous operation modes for scalable polyhydroxyalkanoate (PHA) production and carbon sequestration from phenol. *Journal of Water Process Engineering*, 60, 105147–105147. <https://doi.org/10.1016/j.jwpe.2024.105147>

Vicente, D., Proença, D. N., & Morais, P. V. (2023). The Role of Bacterial Polyhydroalkanoate (PHA) in a Sustainable Future: A Review on the Biological Diversity. *International Journal of Environmental Research and Public Health*, 20(4), 2959. <https://doi.org/10.3390/ijerph20042959>

Appendices

Appendix 1: Interview Questions for Cafe Owners

Existing packaging

1. What type of single-use packaging do you currently use?
2. How many units do you consume on average every month?
3. What challenges have you faced with your current packaging methods?
4. Are you satisfied with your current supplier? why/why not?

New packaging

5. How important is sustainability for your business?
6. Have your customers suggested converting to sustainable packaging?
7. Do you think converting to sustainable packaging will help increase loyalty/improve brand image?
8. Are you willing to try PHA-based products that exceed or are of the same quality as synthetic plastic?

Price sensitivity

9. How much more are you willing to pay for sustainable packaging?
10. Are there any barriers that could prevent you from converting to sustainable packaging?