Scalloptimizer
Team 20, hgZoom

Executive Summary

Scalloptimizer is a sensor-integrated vertical net that is designed to help small-scale scallop farmers adapt to rising ocean temperature and acidification. Our business aims to reduce yield loss through real-time environmental optimization.

Background & Motivation

Japanese aquaculture is facing an emerging crisis. Despite growing demand for scallops worldwide, supply is becoming increasingly unstable as global warming and shifting ocean conditions disrupt marine ecosystems, leading to prices increasing by 30-50% (1). In regions of Japan, where most scallop farmers operate on a small scale, mortality rates have reached as high as 90% due to rising ocean temperatures (2). Considering that the average harvest is about 10 million scallops, and the price per scallop is ¥100, the simple net loss would be a staggering 1 billion yen. To survive, the scallops must be placed in deeper, hence cooler, waters. However, these areas accumulate CO_2 and lower pH, hindering shell formation. As a result, scallop farmers in Japan now face a critical dilemma (3). Should they risk their scallops to higher temperatures or lower pH levels? Our product is designed to eliminate the tradeoff and encourage the growth of scallops.

Business Description

Scalloptimizer replaces traditional culture ropes with sensor-controlled, adjustable vertical nets that maximize scallop growth. Temperature and oxygen levels are constantly monitored and analyzed by AI, moving scallops to optimal depths with temperatures below 15°C, while maintaining sufficient exposure to their primary nutrition, surface plankton. To tackle the acidity in deeper waters, the system integrates red algae to absorb CO_2 and stabilize pH, and optical fibres at the core to provide light to fuel photosynthesis. This product allows scallops to grow at their optimal temperature and acidity with sufficient oxygen, drastically increasing and stabilizing production in weather-affected underwater farming. Moreover, the product is composed of biodegradable fibres, ensuring sustainability while retaining durability. The project combines established technologies like sensor-AI control, optical fibres, and seaweed capture nets in an innovative and logical manner; thus, remains realistic to execute in real life.

Market Strategy

Our primary target consists of individual scallop farmers in Hokkaido, who have experienced a recent decrease in yield. We will start with a few farmers by directly getting in contact, and then from there, we plan to partner with the Japan Fisheries Cooperative and the Fisheries Agency to gain government grants and subsidies. These farmers will continue to use our product for our competitive advantages: the drastic increase in production, cost-effectiveness, and biodegradable structure. Unlike pre-existing solutions, Scalloptimizer detects and solves the issue simultaneously while requiring minimal manual labor and behavioral change from its users, making implementation feasible.

Financial Plan

We are expecting about 100 units of our products to be sold to a few groups of scallop farmers, with each group buying 5~10 units each. Therefore, with a steady growth, we project to break even in the 4th year, with a starting profit of 21 million yen. As for the producers, a full implementation of Scalloptimzer would yield a 6 million yen profit, just in the first year, significantly more than previous years.

Conclusion

Our product supports a more economically sustainable industry that is not entirely dependent on large-scale production, allowing small-scale farmers to remain viable without relocation to new areas or resorting to wasteful measures. Moreover, it increases the proportion of scallops that survive to become consumable products, enabling farmers to achieve higher usable yields even with the same or lower overall production.

Citations

(1) https://asia.nikkei.com/business/fisheries/japanese-scallops-whet-world-s-appetite-amid-china-s-ban
(2) https://www.asahi.com/articles/ASTDR357NTDRUBNB00RM.html
(3) https://opus.lib.uts.edu.au/bitstream/10453/173695/3/Global%20Change%20Biology%20-%202023%20-%20Scanes%20-%20Warming%20and%20hypoxia%20threaten%20a%20valuable%20scallop%20fishery%20A%20warning%20for%20commercial.pdf

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