



The Role of Innovation and Technology Transfer in Enhancing the Efficiency and Environmental Performance of Seafood Production Systems

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Outline

- 01 Driving Efficiency Gains
- 02 Enhancing Environmental Performance
- 03 Technology Transfer Mechanisms
- 04 Key Benefits
- 05 Challenges & Solutions

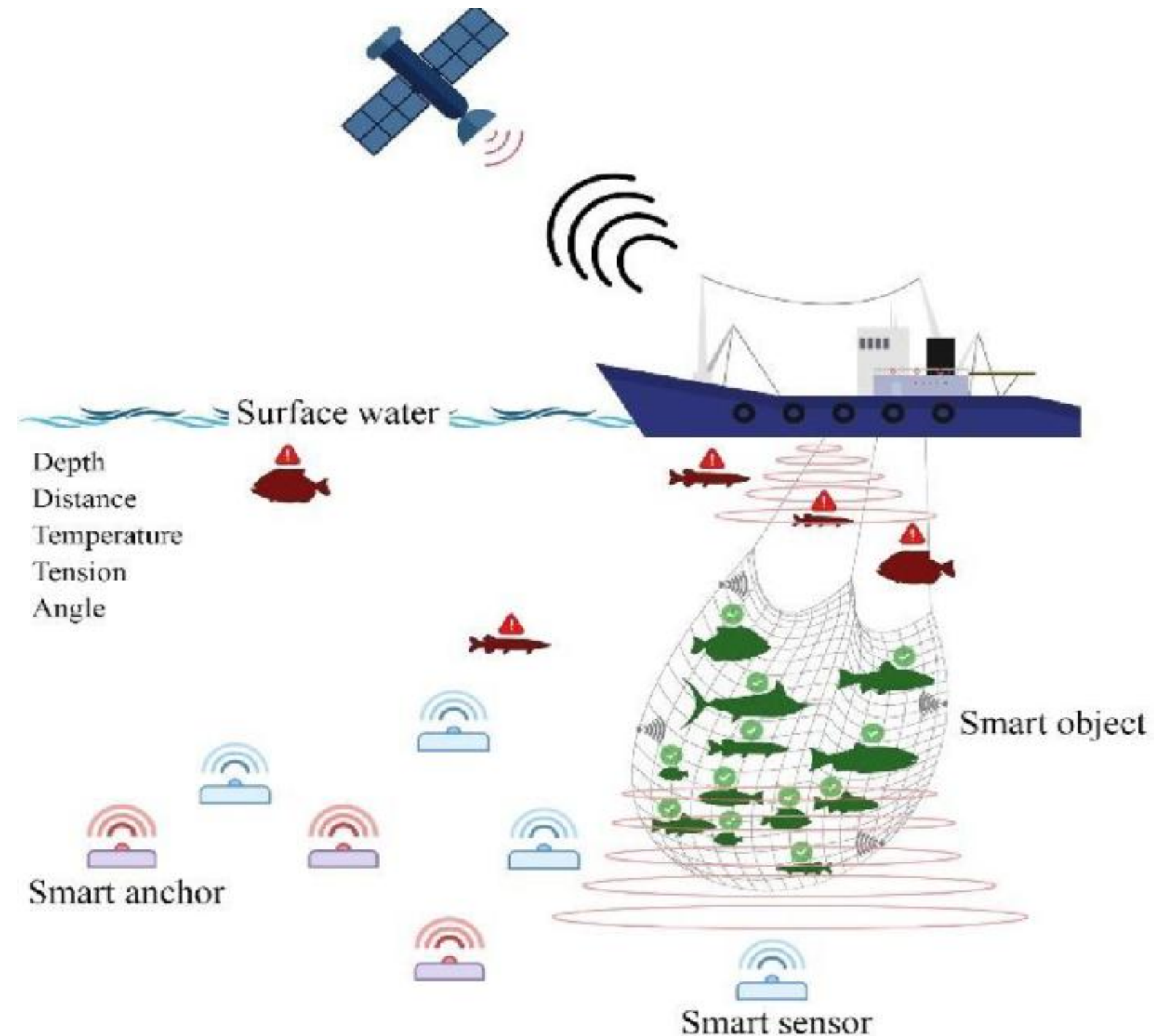


Technology Transfer



1. Driving Efficiency Gains

- **Precision Aquaculture:** Sensors, AI, and IoT monitor water quality, feeding, and fish health in real-time, reducing waste and improving growth rates (e.g., automated feeders cut feed costs by 20–30%) [1].
- **Smart Fisheries:** Satellite data, drones, and acoustic tech help locate fish stocks accurately, minimizing fuel use and bycatch (e.g., "precision fishing" reduces fuel consumption by up to 15%) [2].
- **Automated Processing:** Robotics and AI streamline sorting, gutting, and packaging, boosting throughput while reducing labor and waste.



2. Enhancing Environmental Performance

- **Closed-Containment Systems:** Recirculating Aquaculture Systems (RAS) recycle >95% of water, prevent habitat damage, and curb disease spread [3].
- **Alternative Feeds:** Innovations like algal oil, insect meal, and single-cell proteins replace fishmeal/oil, easing pressure on wild forage fish (e.g., 30–50% substitution in salmon diets) [4].
- **Ecosystem Monitoring:** DNA barcoding and eDNA tools track biodiversity impacts, enabling adaptive management of wild fisheries and farms [5].
- **Waste Valorization:** Tech converts fish waste into biogas, fertilizers, or chitin (from shells), supporting circular economies [6].



Cycle of Ecosystem Monitoring and Management

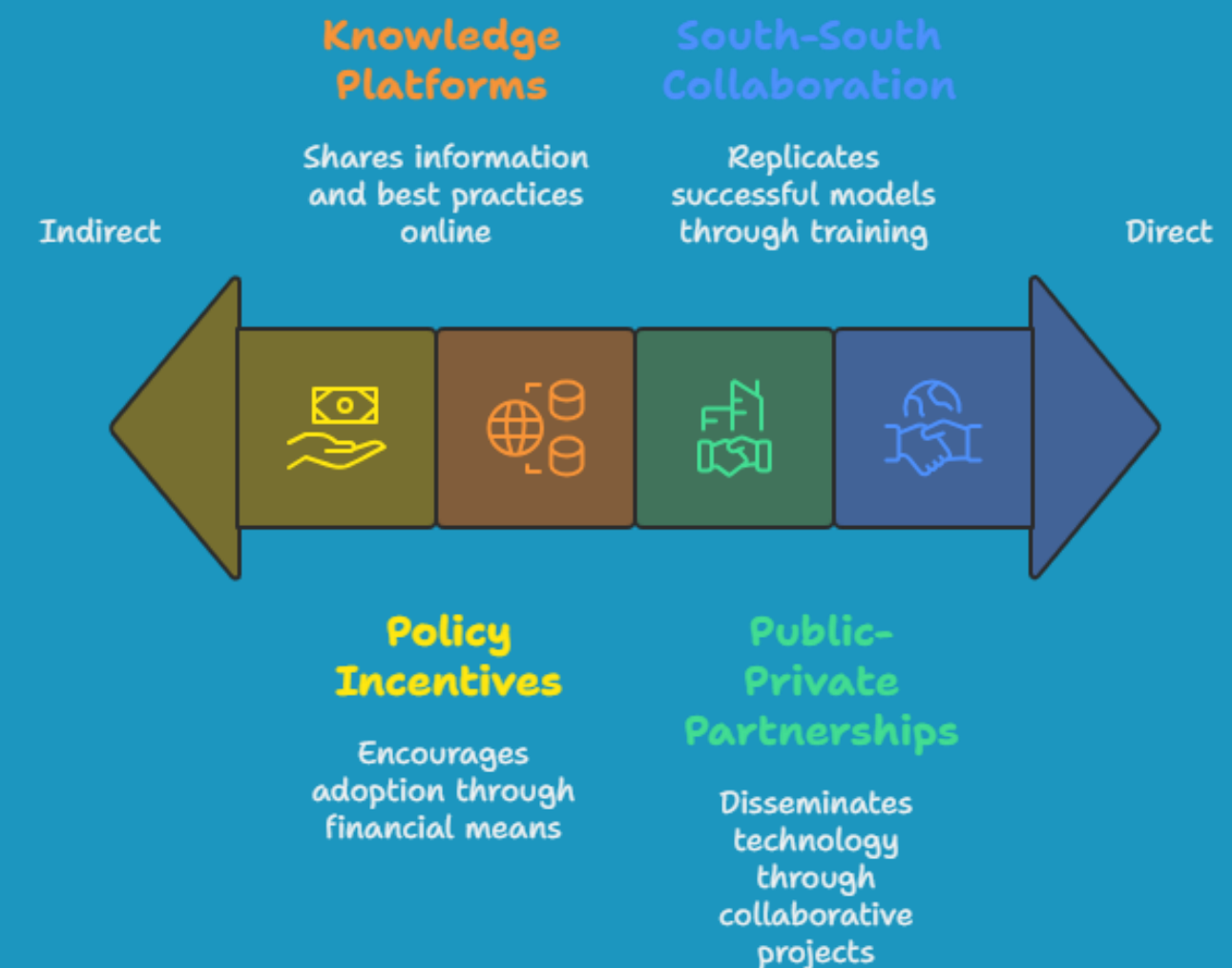


3. Technology Transfer Mechanisms

- **Public-Private Partnerships:** Initiatives like WorldFish's "FISH CRP" disseminate tech (e.g., disease-resistant tilapia strains) to smallholders in Asia/Africa.
- **Knowledge Platforms:** FAO's digital hubs share best practices for sustainable aquaculture and low-impact fishing gear.
- **Policy Incentives:** Subsidies for RAS adoption or bycatch-reduction gear (e.g., LED lights in nets cut turtle bycatch by 70%).
- **South-South Collaboration:** Vietnam's rice-shrimp farming model replicated in Bangladesh via training programs.



Technology transfer mechanisms ranked by directness of implementation

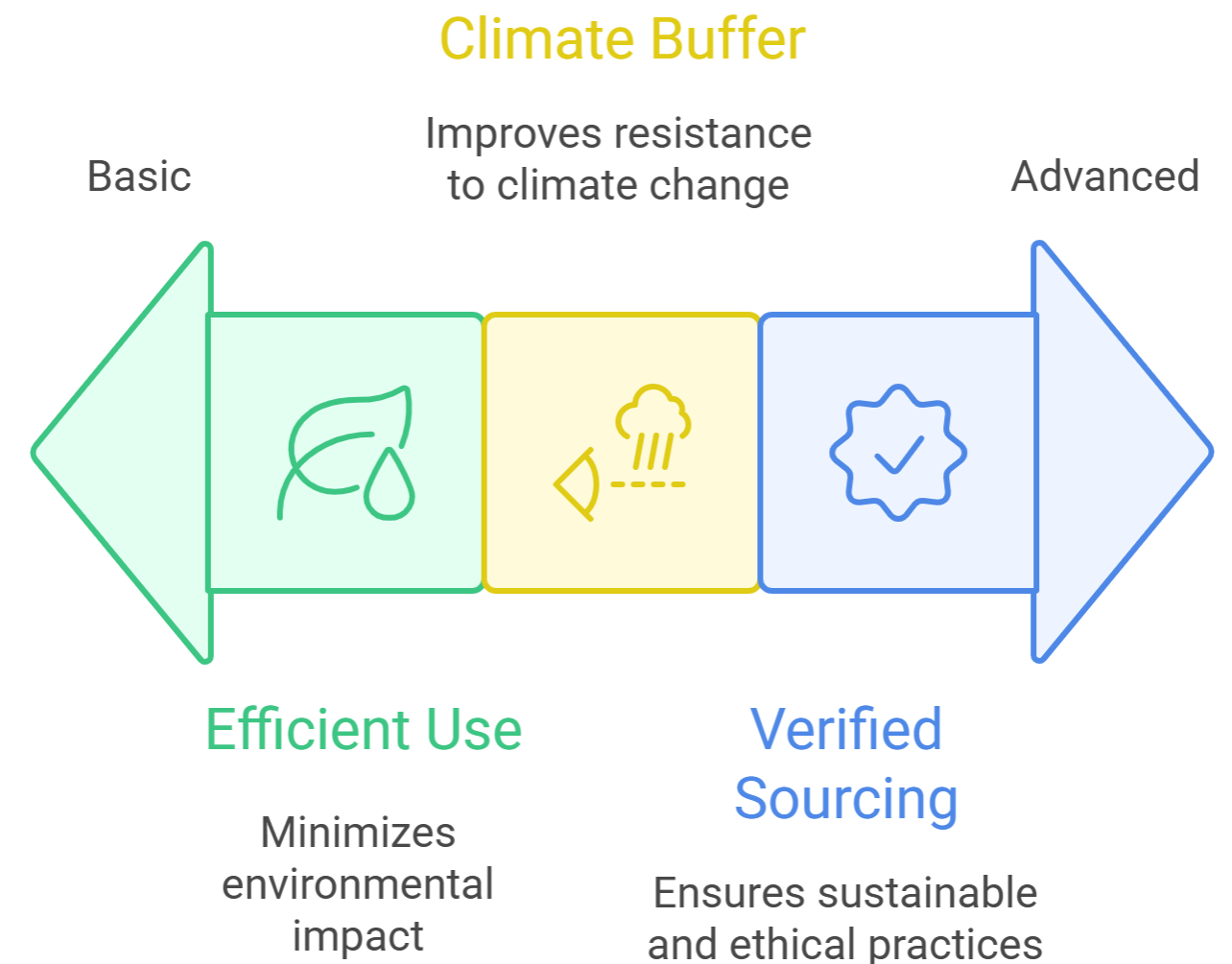


4. Key Benefits

- **Resource Conservation:** Efficient feed/water use and reduced emissions (e.g., offshore wind-powered aquaculture cuts carbon footprints).
- **Resilience:** Disease diagnostics and genetic improvements buffer against climate shocks.
- **Traceability:** Blockchain and QR codes verify sustainable sourcing, meeting consumer demands (e.g., WWF's blockchain tuna project in Fiji) [7].



Sustainable aquaculture practices range from basic to advanced.

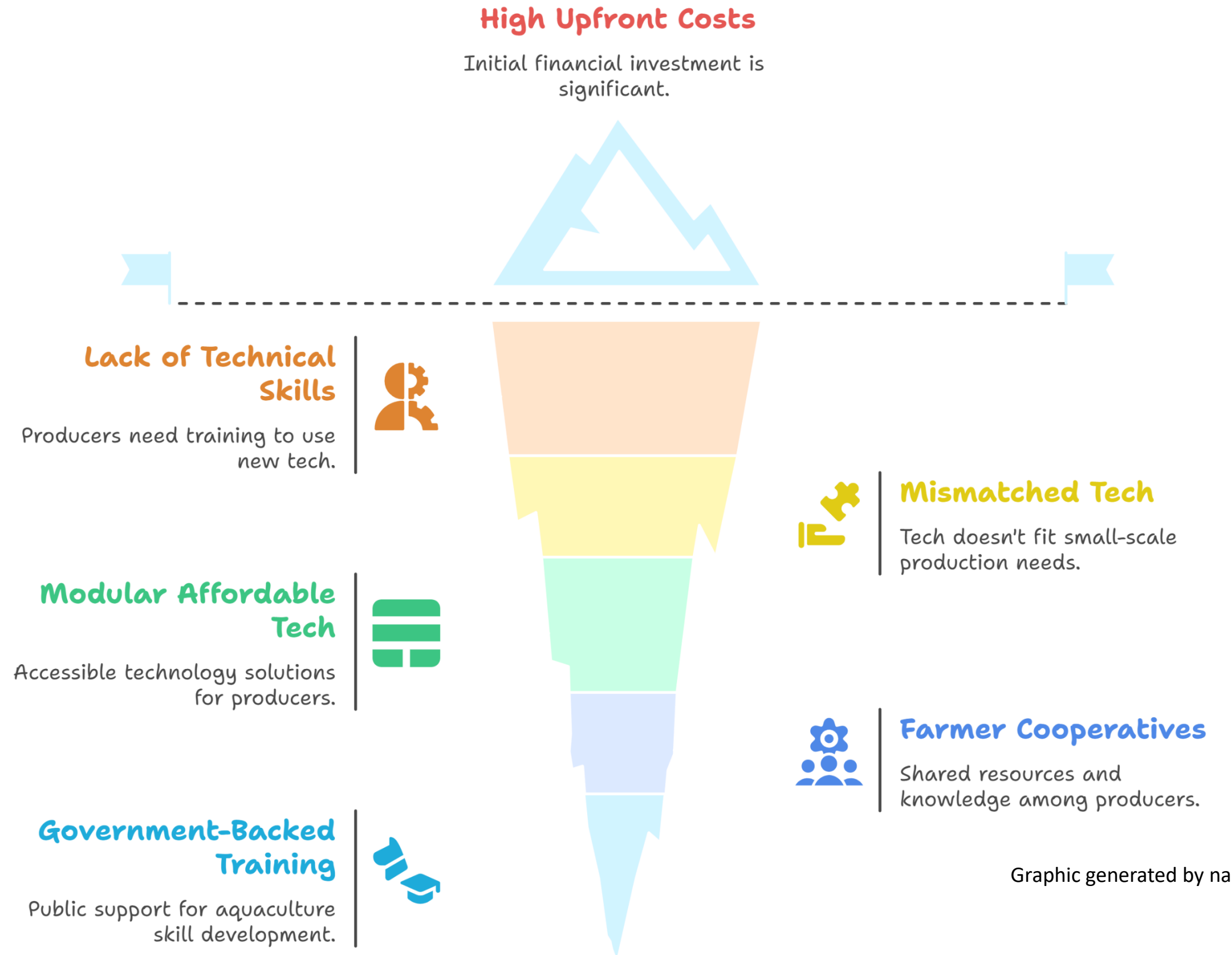


5. Barriers & Challenges

- **Barriers:** High upfront costs, lack of technical skills, and mismatched tech for small-scale producers.
- **Overcoming Gaps:**
 - Modular, affordable tech (e.g., solar-powered aeration for ponds).
 - Farmer cooperatives for shared tech access.
 - Government-backed training (e.g., Norway's aquaculture innovation clusters).



Overcoming Barriers to Tech Adoption in Aquaculture.



Innovation generates solutions, but effective technology transfer ensures they reach all stakeholders—especially small producers in developing regions. Together, they enable seafood systems to meet rising global demand (projected +15% by 2030) while reducing ecological footprints. Success hinges on inclusive policies, cross-sector collaboration, and adaptive tech design.

Technology Transfer



CONCLUSION



Further Reading

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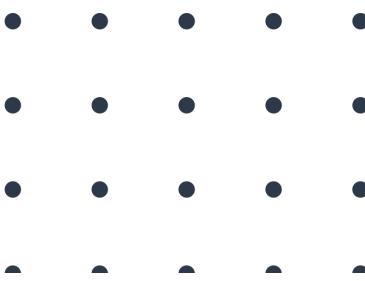
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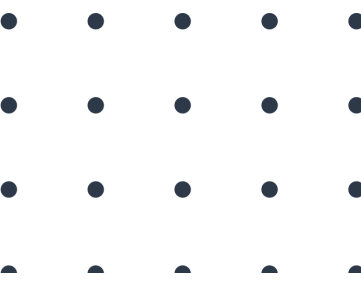
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THANK YOU

Farid K Muzaki / ITS

 +6281217762277

 faridmuzaki@gmail.com
rm_faridkm@bio.its.ac.id



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