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Shrimp Aquaculture as Pakistan's Next Blue Economy Opportunity:

Lessons from Dhabeji Farm

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Executive Summary

Pakistan has vast coastal resources and areas of saline and brackish-water lands that are suitable for shrimp farming; however, shrimp farming is not well developed because of inadequate hatchery capacity, poor infrastructure, lack of research and extension services, and low compliance with international quality standards. The Dhabeji farm has demonstrated that saline land can be utilized for intensive shrimp farming with modern production technology and integrated value chain systems to generate employment and export income. This model could be scaled to make shrimp farming a true cornerstone of Pakistan's Blue Economy. However, to achieve this potential, some constraints need to be overcome, such as hatchery development, infrastructure, research and extension, international certification and compliance with sustainability requirements, including Turtle Excluder Device (TED) requirements. The study suggests the scientific identification of suitable sites for shrimp aquaculture using the GIS based mapping, the development of integrated aquaculture parks with shared infrastructure, expansion of SPF hatchery capacity, productive utilization of idle and underutilized ponds and improvement of processing, certification, and export infrastructure to boost Pakistan's competitiveness in shrimp export and contribute to the development of the Blue Economy.

1. Why Shrimp Aquaculture Matters for Pakistan

In this Knowledge Brief, the shrimp aquaculture export potential of Pakistan is explored using a case study of the Dhabeji shrimp farm in Sindh. The case study was conducted through structured interviews with the farm management and a review of production records for 2025.

As one of the fastest growing food production sectors in the world, aquaculture continues to play an increasing role in food security, employment, and seafood exports. FAO (2024) reports that in 2022, global aquaculture production totalled 130.9 million tonnes, an increase of 6.6 per cent from 2020. Shrimp is one of the most valuable aquaculture commodities in the world, with high export

value and relatively short production cycle, and is one of the most rapidly expanding sectors in aquaculture.

Pakistan is poised to secure a stake in this market. The country has favourable conditions for the commercial cultivation of shrimp with over 1,046 km of coastline along the Arabian Sea and huge coastal resources in Sindh and Balochistan. Shrimp farming would directly boost the Blue Economy in Pakistan by boosting seafood exports, providing jobs in coastal areas and utilizing saline and brackish water lands which are not suitable for traditional agriculture.

To tap this potential, the Government of Pakistan has framed the National Fisheries and Aquaculture Policy 2025-2035, which has shifted the emphasis from traditional fisheries management to modern and sustainable aquaculture development. This is a change from the National Policy and Strategy on Fisheries and Aquaculture Development in Pakistan (2007), which focused on fisheries governance and marine resource management, while the new policy focuses on aquaculture development, export competitiveness, and climate-resilient production systems.

Table 1. Key Priorities of the National Fisheries and Aquaculture Policy 2025–2035

Policy Priority	Objective
Aquaculture development	Promote sustainable fisheries and aquaculture development.
Export competitiveness	Improve seafood value addition and export performance.
Climate resilience	Support climate-resilient and environmentally sustainable production systems.
Modern technologies	Encourage adoption of modern technologies in fisheries and aquaculture.
Federal–provincial coordination	Strengthen coordination for policy implementation and governance.
Social inclusion	Promote gender inclusion, labour rights, entrepreneurship, and job creation.

Sources: Authors' compilation based on the Ministry of Maritime Affairs & FAO (2025)

Policy Implementation Considerations

The National Fisheries and Aquaculture Policy 2025–2035 is the first ever nationally adopted fisheries and aquaculture policy in Pakistan. A similar approach was developed in 2007, but it was not adopted due to political transition, while sectoral governance remained fragmented. (World Bank, 2018). Formal adoption is thus a worthwhile process in itself. The extent to which it will affect shrimp production will be determined by its delivery at the provincial level, where fisheries is constitutionally delegated, and by the effectiveness of the federal–provincial coordination that is also one of the policy's priorities (Table 1), as it applies to site-specific issues like land leasing, hatchery licensing, and export certification. The consistent delivery of these priorities, as demonstrated in the Dhabeji case study in Section 5, can help replicate similar farm-level outcomes in other areas.

2. Shrimp Aquaculture: Key Challenges

Although the shrimp aquaculture industry has a favourable natural resource base, structural constraints are present in the production, regulatory, research, and investment aspects of the industry in Pakistan:

- **Production and infrastructure:** Limited domestic hatchery capacity and reliance on imported broodstock, limited availability of good-quality feed locally, poor farm management practices, lack of processing and cold-chain facilities, and low number of internationally certified shrimp farms.

- **Regulatory and market access:** International requirements remain a key factor in access to premium markets like the United States and the European Union. Wild-caught shrimp is subject to the regulations of the US Endangered Species Act (ESA), which mandate that trawl nets be fitted with a grid that allows sea turtles to escape, while farmed shrimp like Dhabeji's is not subject to this specific requirement but must still comply with HACCP food-safety certification, traceability, and other import screening requirements common to all seafood entering these markets.

- **Research and extension:** Pakistan has no specific shrimp breeding or disease-surveillance program and the farms are vulnerable to outbreaks like white spot syndrome and early mortality syndrome. Extension services are provided to a few pilot farms.

- **Investment and financing:** The high initial investment required for pond construction, lining and aeration system makes shrimp farming unaffordable for smallholders, and expansion is largely dependent on private investment from groups like Al-Karam and Jaffer Brothers, where formal aquaculture financing is limited.

3. Current Status of Shrimp Aquaculture in Pakistan

Shrimp aquaculture is still in its early stages of commercialization in Pakistan despite the favourable environmental conditions for shrimp farming. The commercial production of shrimp is mainly concentrated in the coastal areas of Sindh, especially in the districts of Thatta, Sujawal, and Badin and on small scale in Balochistan and inland saline areas of Punjab. The sector is mainly composed of Pacific white shrimp (Litopenaeus vannamei), with some production of native shrimp species. The commercial shrimp farming area and production in Pakistan are still comparatively small.

Figure 1. Shrimp ponds

Figure 2. Shrimp ready for market

Pond infrastructure is also unevenly utilized among the provinces. The percentage of farmers owning ponds was significantly higher in Sindh (88 per cent) than in Punjab (39 per cent). In both provinces, 93% of owned or leased ponds were used for aquaculture (Khalid et al., 2024). Investment in hatcheries, feed production, and farm management, therefore, could increase commercial shrimp production significantly without the need to put idle land into production, but by increasing the productivity of existing ponds.

Pakistan's aquaculture sector currently contributes around 0.4 percent of GDP and produces an estimated US$650 million of fish annually, while considerable potential remains to expand production, strengthen value addition, and improve export competitiveness (Khalid et al., 2024). These figures indicate that, commercial shrimp aquaculture has the potential to make a significant contribution to the Blue Economy of Pakistan if the production constraints are overcome.

Currently, the shrimp farming in Pakistan is mainly traditional and semi-intensive, where relatively low stocking densities, natural feed resources, and simple pond management techniques are used. In contrast, modern intensive and super-intensive aquaculture systems demonstrate strong economic performance, although they also face significant environmental challenges related to water use, effluent management, and disease control. (Ho et al., 2025). The global shrimp aquaculture sector is led by Asian countries, with China, India, Viet Nam and Indonesia contributing the highest proportion of global shrimp production. (Jory, 2023). Investments in hatcheries, advanced feed technologies, intensive farming systems, and export-oriented value chains have contributed to improving the productivity and competitiveness of the shrimp aquaculture industry.

In 2025, the demand for shrimp was highly concentrated in China and the United States, which accounted for about 48 percent of the global shrimp import volume (FAO GLOBEFISH, 2026). Table 2 indicates that the majority of this growth has been in investment along the value chain, and not just at the farm level, with Ecuador, India, and Indonesia accounting for the bulk of the growth. The shrimp sector is not in the middle of this demand but on its periphery: Pakistan already has a number of buyers, but not as many as its competitors, and therefore has the opportunity to expand existing partnerships before entering new ones.

These practices are not yet widespread in Pakistan. But, the Dhabeji case study in Section 5 shows the what is possible when they are adopted.

Figure 3. Key technological differences between traditional and modern (super-intensive) shrimp production systems.

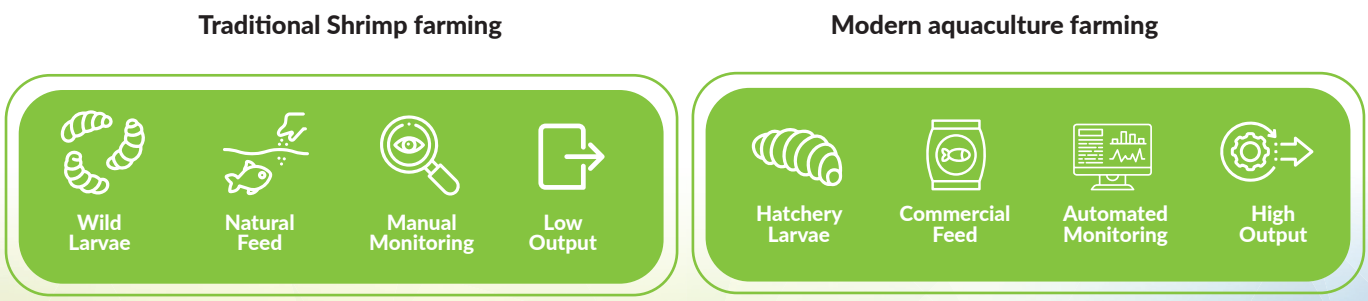


Table 2. Strategies Adopted by Leading Shrimp Exporters and Implications for Pakistan

Country	Shrimp exports (2025) (1000 tonnes)	Key Strategy Adopted	Implications for Pakistan
Ecuador	1405.84	Export-oriented farming, market diversification and investment in processing	Develop export-linked shrimp clusters connected to processors, cold chains and diversified export markets.
India	804.20	Large-scale vannamei farming and export diversification toward Asian and EU markets	Strengthen domestic vannamei farming capacity, quality control and market diversification
Viet Nam	335.28	Value-added processing and re-export model	Establish seafood processing zones to move beyond exporting raw frozen shrimp.
Indonesia	218.87	Smallholder modernization, traceability, climate-adaptive infrastructure and value-chain strengthening	Develop cluster-based shrimp farming supported by hatcheries, extension services, disease surveillance and shared infrastructure.

Source: Author's synthesis. Export figures from FAO GLOBEFISH (2026). Strategy content drawn from FAO GLOBEFISH (2026) for Ecuador, Viet Nam, and India's export diversification; Pakistan Business Council (2025) for India's vannamei farming strategy; and Asian Development Bank (2025) for Indonesia.

These comparator countries share Pakistan's developing-economy status, coastal resource base, and export orientation, but have converted those endowments into globally competitive shrimp industries through sustained investment across the value chain rather than at the farm level alone. The policy implications of these priorities are reflected in the recommendations presented at the end of this brief.

4. Pakistan Shrimp Export Performance and Potential Market Opportunity

The demand for shrimp in the world has been on the rise but Pakistan's shrimp exports are still low. According to UN Comtrade (2025), Pakistan exported frozen shrimp and prawns valued at USD 64.39 million in 2025. Meanwhile, the country has estimated shrimp export potential of about USD 6,538.38 million in selected international markets (Table 3), which means that there is significant potential to expand shrimp export volume by increasing production, improving the quality of shrimp, and market access. This estimate is based on existing trade flows and may be revised upwards as production and competitiveness increases.

Table 3. Pakistan's Shrimp Export Potential in Selected Markets

#	Country	Pakistan's Shrimp Exports (USD million)	Potential Market Size (USD million)
1	China	20.18	4,531.64
3	Japan	13.28	1,217.39
4	Malaysia	5.11	99.59
5	Saudi Arabia	1.95	16.07
6	Belgium	1.85	218.11
7	Netherlands	1.77	411.78
8	Thailand	4.21	43.80
	Total		6,538.38

Source: Authors' estimations.

It is seen from Table 3 that China is the biggest potential export market for Pakistan with an estimated untapped market opportunity of USD 4,531.64 million, followed by Japan (USD 1,217.39 million) and Malaysia (USD 99.59 million). There are also market opportunities in other countries such as Belgium, the Netherlands, Hong Kong, Saudi Arabia, and Thailand, which shows the huge geographical potential for the expansion of Pakistan's shrimp exports (UN Comtrade, 2024).

Even with these positive market prospects, Pakistan has not been able to tap into the potential of shrimp exports and still remains behind other regional countries like India, Viet Nam, and Bangladesh. This is attributed to the small-scale commercial production, low hatchery capacity, reliance on imported broodstock, low level of compliance with international quality and traceability standards, and weak cold-chain and processing facilities (Iqbal et al., 2024). Viet Nam is a good example of how that gap can be bridged: through intensive production systems, efficient supply chains and product diversification, both productivity and export value have increased. (Ho et al., 2025). The experience of India is similar: the competitiveness of shrimp exports has been achieved through market diversification, institutional reform, modernized production systems, and increased biosecurity efforts (Das et al., 2025)".

In this context, the Dhabeji Shrimp Farm is a local case study that needs careful examination as it represents a working example of an intensive aquaculture enterprise that has turned Pakistan's export capacities into reality.

5. Dhabeji Shrimp Farm: Evidence for Commercial Shrimp Aquaculture in Pakistan

5.1 Why Dhabeji?

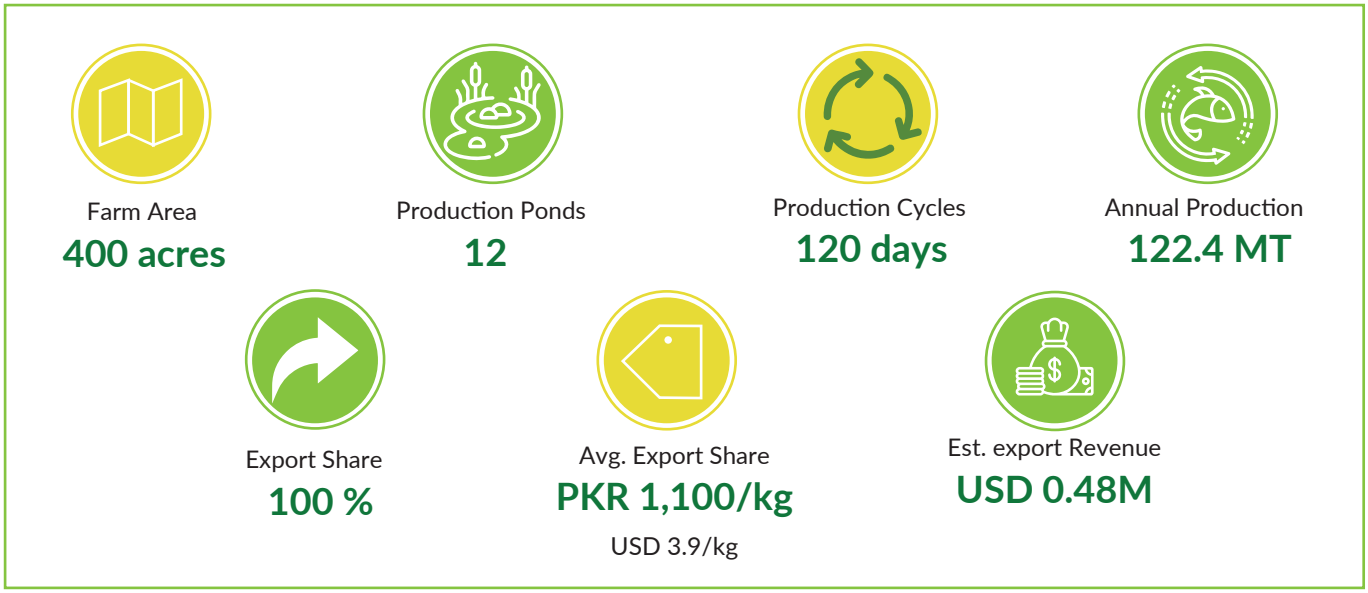
To assess whether commercial shrimp aquaculture can be successfully developed in Pakistan, this Knowledge Brief examines Dhabeji Aqua Foods, Sindh, one of the country's largest commercial shrimp farms. This case study draws on structured interviews with farm management, production records, and field observations conducted in 2025, covering production practices, costs, exports, profitability, and expansion plans.

Located in Dhabeji, Sindh, the farm illustrates how modern aquaculture technologies can turn Pakistan's coastal resources into a commercially viable, export-oriented industry. Unlike conventional shrimp farming, it operates under an export-oriented production model based on modern farming systems and commercial investment, which offers a practical example of how shrimp aquaculture can be expanded across Pakistan.

5.2 Production System and Performance

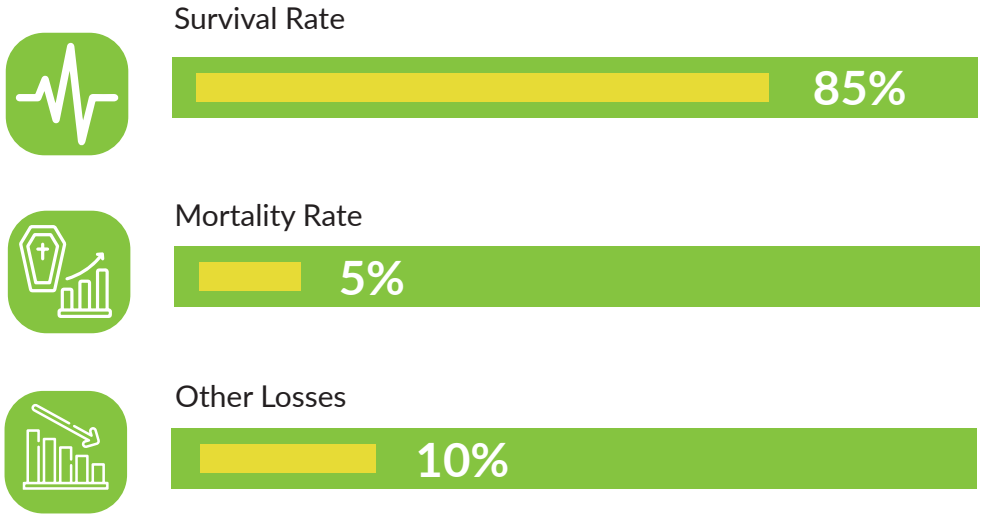
Dhabeji Farm operates a super-intensive shrimp farming system, which differs substantially from the traditional extensive and semi-intensive farming practices commonly used in Pakistan. The farm currently comprises 12 commercial ponds covering approximately 400 acres and completes two production cycles annually, with each cycle lasting around 120 days. High stocking densities, commercial feed, continuous aeration, regular water-quality monitoring, and strict biosecurity measures together keep productivity high and production risk low. The farm also benefits from direct access to seawater, providing suitable salinity and water quality for shrimp cultivation. These production practices result in higher yields and better survival rates than those achieved under conventional shrimp farming systems.

Figure 4. Operational performance of Dhabeji Shrimp Farm, 2025 production season.



During the 2025 production season, the farm produced approximately 122.4 metric tonnes of shrimp from its 12 commercial ponds across two production cycles, up substantially from 24 metric tonnes harvested from five ponds in 2024. Farm management projects production reaching approximately 4,200 tonnes annually by 2028, once the full 400-acre site is developed.

Figure 5: Shrimp production outcomes (Data Source:
Structured Interview with Farm Management Staff at Dhabeji Farm)



As seen in Figure 5, Dhabeji had an 85 percent survival rate and only 5 percent mortality, with 10 percent being operational losses during the production cycle. This survival rate is significantly higher than the survival rate of the conventional farming system in Pakistan. All the production is exported from the farm, with an estimated export value of USD 0.48 million per year. The farm has successfully participated in international seafood value chains, exporting shrimp products mainly to China, Thailand, Sri Lanka, Viet Nam and other regional markets.

5.3 Economic Performance

Based on the structured interviews with management it show that the Dhabeji Shrimp Farm has an estimated annual revenue of PKR 134 million, while the estimated annual operating cost is PKR 87 million, resulting in an estimated annual profit of PKR 47 million. The findings indicate that commercial shrimp production is economically profitable if modern production technologies and good farm management are used.

The profitability of the farm comes from the implementation of super-intensive production technologies: high stocking densities, controlled feeding, continuous aeration, monitoring water quality and biosecurity measures, which are all technologies that increase productivity and minimize losses in production. Under conventional farming systems, Dhabeji currently stocks around 150 shrimp per square metre, with the potential to increase stocking density to 250 to 300 shrimp per square metre, compared with around 45 shrimp per square metre in conventional farming system (Pakistan Business Council, 2024). This is a significant increase in stocking density, which allows for higher production per unit area and more efficient use of resources.

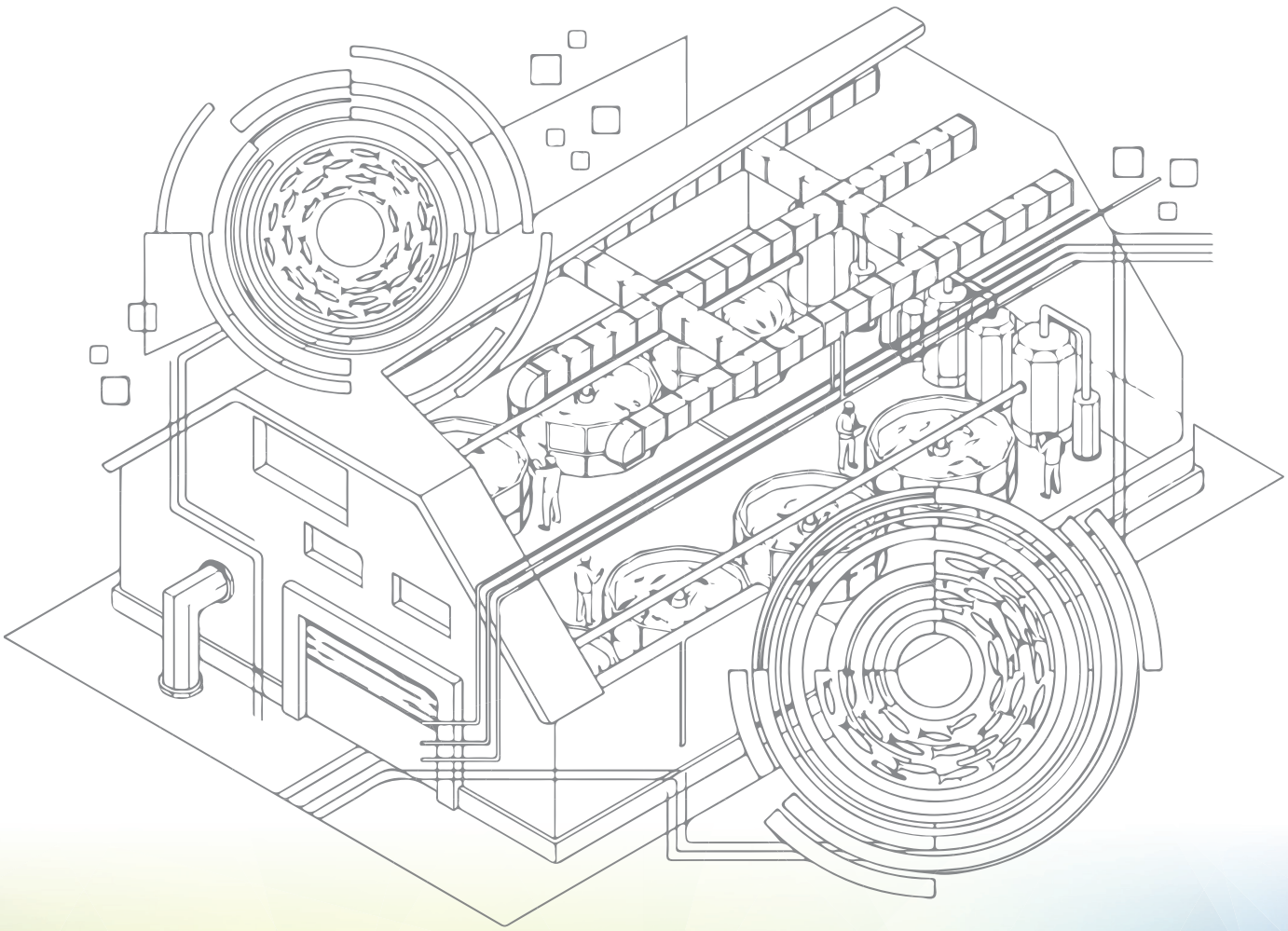


Figure 6. SWOT analysis of the Dhabeji shrimp farm model

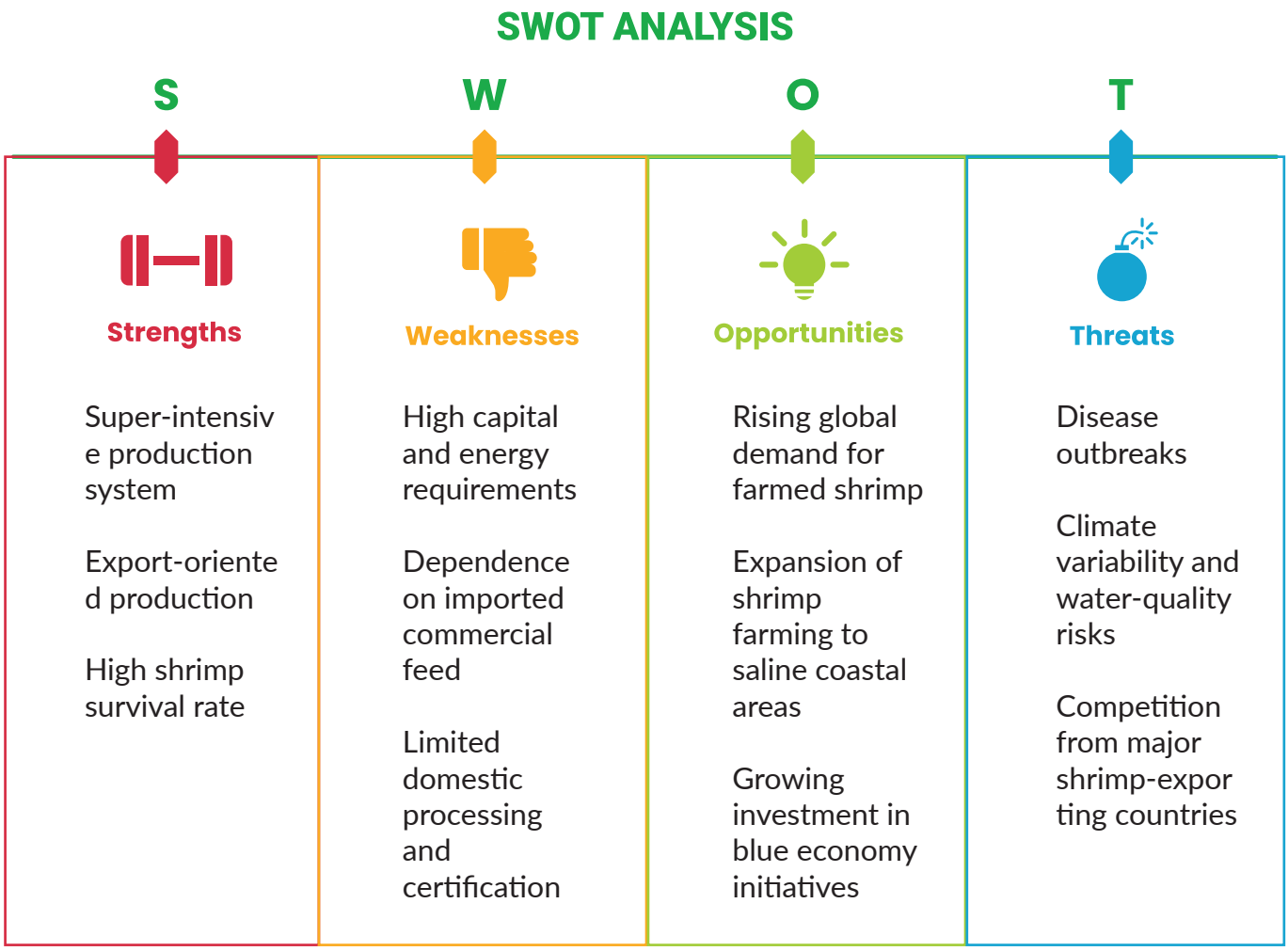


Figure 6 presents the SWOT analysis of Dhabeji's commercial performance in a wider risk context. The model's strengths (high survival rate, export orientation, and super-intensive production) make it commercially replicable, while its main weaknesses (high capital and energy needs, reliance on commercial feed imports, and inadequate domestic processing and certification facilities) set the investment barriers for any scaling-up strategy. The opportunity side is positive, with increasing demand for farmed shrimp in the world, more saline coastal land and increased interest in investment in the Blue Economy. The threats identified, however (disease outbreaks, climate variability and water-quality risk, and competition from established exporters such as India, Ecuador, and Viet Nam), are the same categories of risk that have caused production crashes in other major shrimp-exporting countries. Therefore, implementing the Dhabeji model elsewhere should be accompanied by robust biosecurity, water-management and site-selection measures - not just on production potential.

The Dhabeji case highlights the institutional gap that Pakistan faces: the primary problem is not the lack of natural resources, but the lack of production systems and supporting institutions to manage them. National scale up of shrimp farming will require expansion of hatchery capacity, implementation of super intensive shrimp production technologies, establishment of certified processing and cold chain infrastructure, establishment of coastal farming clusters in Sindh and Balochistan and technical training and research. The policy recommendations at the end of this brief are based on these priorities, as well as the comparator evidence in Table 2 and the risk profile in Figure 7.

5.4 Illustrative Scenario: Facilitated Scale-Up

The growth of Dhabeji is a good case study of the role that the government can play in supporting private investment. With the entire 400 acre site fully developed, production is projected to grow from 122.4 tonnes in 2025 to approximately 4,200 tonnes by 2028, according to the farm management's projections. The project is being funded privately for this expansion. But there are a number of ways the government can help speed up the process. An Aquaculture Park can be established with shared facilities like hatcheries, feed storage, processing units, cold-chain etc. This would enable several farms to share the same facilities, which would decrease the initial investment needed for each new pond. This concept aligns with the aquaculture infrastructure programme in Indonesia supported by the Asian Development Bank (2025). Similarly, the process of leasing land near saline areas could be streamlined, thus minimizing the time needed to develop new farming areas. Newly established farms could also be able to reach international markets earlier due to the faster certification and export approval processes, especially as farmed shrimp is already exempt from TED requirements. These recommendations are also in line with the farmers' opinions. The survey of saline aquaculture farmers in 2024 in Sindh and Punjab revealed that all respondents agreed that the government should provide more support, especially in the areas of training, input subsidies, and assistance in pond construction (Khalid et al., 2024). This indicates that policy support is required beyond a single commercial farm.

These measures would not increase the productivity of an individual pond. Rather, they would shorten the time required to start new farms and put them into production. The anticipated 2028 production target could be accelerated by several months if there are any delays in construction or certification, which is equivalent to about one 120-day production cycle at the scale of Dhabeji. More important, the most important advantage of government facilitation is that it can be replicated rather than expanded at one site. If the same support is provided to new farms found by mapping using GIS, it could influence the number of Dhabeji type farms in Pakistan by 2030. This wider issue of replication is the foundation for the national scalability framework that is explored in the next section.

6. Toward a National Scalability Framework

The recommendations in this brief are interrelated and are best viewed as a series of steps in a national plan for the development of shrimp aquaculture in Pakistan. They collectively provide a viable roadmap from identifying suitable sites to establishing a competitive export industry.

The first step is site identification. GIS and remote sensing technologies can be employed to identify coastal saline, brackish-water and inland saline areas suitable for commercial shrimp farming. The potential sites should be evaluated based on the conditions that have made Dhabeji successful, such as access to seawater, salinity conditions, and availability of contiguous land for large-scale commercial production. The identification of these sites prior to construction would help minimise investment risk and project planning.

The next step is demonstration. The Dhabeji production model could be adapted in the coastal districts of Sindh and Balochistan with the establishment of pilot clusters in suitable areas. These pilot projects would help to create investor confidence before encouraging larger-scale private investment, as they will prove technical and commercial viability.

After the model is demonstrated, the emphasis should be on the development of integrated Aquaculture Parks. Shared facilities like SPF hatcheries, feed supply centres, processing plants, cold-chain infra-structure, quality-testing laboratories and training centres can lower entry costs for new investors and boost the entire production and export value chain.

The last step is value-chain integration. With growing production, certified processing plants and effective export logistics will be increasingly significant to absorb the additional production in the international markets. For long-term industry growth, the linkage of future production with the export opportunities identified in Table 3 will be crucial.

The performance of Dhabeji is also a good indicator for future projects. The farm will yield about 4,200 tonnes of shrimp per year from 400 acres, or about 10.5 tonnes per acre per year at full development. This is useful for new sites as a reference but should not be taken as a reference for other sites. Local water quality, salinity, farm management and production technology will remain important factors for productivity.

There is one major omission, though. Pakistan has not yet a detailed inventory of coastal and inland saline land suitable for commercial shrimp farming. Thus, the first practical action to take in the implementation of this framework should be the preparation of such an inventory. It would give the proof to take the conceptual strategy to a national development plan with a budget.

7. Conclusion

The shrimp aquaculture industry is endowed with all the required conditions in Pakistan, such as coastline, saline land, and increased external demand, but these conditions have not been sufficient so far. What Dhabeji shows is that it is not a lack of resources, but a lack of production system and institutional support that has been the missing link: one commercial site became a working example of the potential of the sector at scale through the use of modern farming technology, disciplined management and an export orientation. The USD 6,538.38 million that was identified in this brief as untapped export potential is small in comparison to the total exports that Pakistan is already making, but small gaps are the easiest to fill. The questions of facilitation and scalability raised above (1 and 2) will be crucial to closing it and building on it: can government support speed up farms like Dhabeji and can the enabling framework recommended in Section 6 help to translate one success into several.

Policy Possibilities and Observations

- Carry out GIS and remote sensing mapping of coastal saline, brackish-water and inland saline areas to determine appropriate sites for Shrimp Aquaculture Development Zones. Scientific site selection can help reduce production risks, promote sustainable land use, and provide a sound basis for future investment in commercial shrimp farming.

- Provide technical assistance, access to finance, pond rehabilitation and farmer training for the productive use of village ponds, seasonal ponds, and suitable inland saline area for aquaculture production and to create employment opportunities for the rural population.

- Improve processing, certification and export infrastructure by investing in internationally certified seafood processing facilities, cold chain logistics, traceability systems and quality testing laboratories to enhance compliance with international standards and boost Pakistan's market access in premium seafood markets.

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