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Assessing the Critical Success Factors for Aquaculture Enterprise Development in South Africa

Bernadette Brown-Webb^{1,2}, Azwihangwisi E. Nesamvuni¹, Melanie de Bruyn¹, Johan A. Van Niekerk¹, Parsuramen Pillay²

¹Department of Sustainable Food Systems and Development, University of the Free State, P.O. Box 339, Bloemfontein, 9300, South Africa, ²South Africa Council for Scientific and Industrial Research, 15 Lower Hope Road, Rosebank, Cape Town

nesamvunie@gmail.com

Abstract. In South Africa, small enterprise development is an important strategy for the economic growth, transformation and eradication of poverty and inequality. The government also promotes the development of the aquaculture sector to provide food security, contribute to wealth and job creation, provide livelihood opportunities, and contribute to transformation. South African businesses unfortunately have a low rate of business sustainability. This study investigated the critical success factors enabling aquaculture enterprises in South Africa to become self-sustainable, and the potential reasons for failure including those enterprises that received public funding. The study was conducted on the West Coast of the Western Cape, South Africa. A multiple-case study approach was followed, focusing on the marine mussel farming sub-sector in Saldanha Bay. Semi-structured interviews were conducted with the owners or managers of ten mussel farming enterprises, and with nine representatives of role players with responsibility or experience in aquaculture, agriculture, or enterprise development. The results of the study indicated that aquaculture farmers and role players have a similar understanding of the concept of self-sustainability in aquaculture agribusinesses, especially the need for profitability and independence. The most critical success factors for self-sustainable aquaculture enterprises include environmentally responsible and sustainable farming practices, efficiently addressing economic challenges and opportunities, cultivating good business leadership and management, and a supportive business and enabling environment. The main reasons for failing to become self-sustainable include environmentally unsustainable farming practices, economic challenges, weak business leadership and management, and challenges related to the business and enabling environment. The paper argues that commercially focused aquaculture ventures could achieve social benefits, however, socially-focused ventures are unlikely to achieve commercial benefits. The study recommends interventions that could assist aquaculture enterprises in addressing the critical factors described in this paper, to achieve self-sustainability in the long term.

Keywords. Aquaculture, enterprise, success factors, self-sustainable

1. Introduction

In South Africa, the development of the small, medium, and micro-sized enterprises (SMMEs) is an important strategy for the development and growth of the economy, transformation, and

eradication of poverty and inequality. Supporting initiatives include the implementation of a National Small Business Act (No. 102 of 1996), as amended, setting up of the national Department of Small Business Development, the establishment of the Small Enterprise Development Agency (SEDA), and establishment of the Small Enterprise Finance Agency (SEFA). The development and growth of the aquaculture sector are seen as a way to provide a stable source of food, contribute to wealth and job creation, provide livelihood opportunities and contribute to transformation (DAFF, 2012, 2013). Therefore, the government supports the creation and development of SMMEs in this sector, through financial and non-financial support measures. The implementation of an initiative called Operation Phakisa: Ocean's Economy (Aquaculture workstream) in 2014 led to an investment of more than R1.2 billion private and public funding into 35 aquaculture projects by 2017. Of these, 28 projects were SMMEs (DAFF, 2018).

Enterprises need to be successful or sustainable in the long term to contribute to sector growth expectations and targets. However, data collected by the Global Entrepreneurship Monitor (GEM) points to a 5-fold loss of South African businesses from start-up to established business ownership, a high business discontinuation rate, and thus a problem in maintaining business sustainability (Herrington and Kew, 2018). Start-ups, therefore, struggle to reach a point where they are self-sustainable (able to sustain their operations from income derived from the sales of their goods and services, without external financial support). To increase participation of historically disadvantaged or marginalised individuals and communities, aquaculture development projects include enterprises with a commercial focus, social focus or a mix of the two (such as community-based aquaculture). Commercial aquaculture differs from rural or subsistence aquaculture in that it entails the rearing of aquatic organisms with a profit motive, is done mainly by the private sector and does not need direct assistance from donor or government sources. It also has a business orientation and uses labour instead of relying on family members. However, it is understood that operations that began for subsistence, could develop into small-scale commercial ventures under the right conditions (Percy and Hishamunda, 2001).

The sustainable growth and development of the aquaculture sector depend on an enabling environment, and the success of individual enterprises. However, even with financial and non-financial support, many small enterprises still struggle to become self-sustainable. The main purpose of this paper was to investigate critical success factors for aquaculture enterprises in South Africa and to understand the potential reasons for the failure of especially public-funded aquaculture agribusiness enterprises.

2. Material and Methods

The concept of sustainability is broadly derived from the United Nations definition of sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). It is not grounded in a rigorous theoretical foundation and is context-specific (Purvis, 2019). Although the concept of sustainability in aquaculture is not clearly defined (Boyd *et al.*, 2020), for this study sustainable aquaculture is understood to integrate environmental protection with social responsibility and economic gain.

Similarly, there are many interpretations for the concept of a viable, sustainable or successful business or enterprise. A financially viable business is deemed to be profitable, meaning it brings in more revenue than it is spending on the costs of running the business. The term self-sustaining refers to the ability to maintain oneself by independent effort. Therefore,

taking into account the complexities and context of enterprise development in South Africa, this study assumes that enterprises should aim to become financially self-sustainable in the long term. A self-sustainable enterprise is defined as one that can sustain its operations from income derived from the sales of goods and services, without external financial support.

Success factors are those things that affect the chances of an enterprise being successful. The concept of critical success factors was originally developed as a method for managers to determine what information they need to fulfil their roles and responsibilities. A detailed definition is ‘the limited number of areas in which satisfactory results will ensure successful competitive performance for the individual, department or organization’ (Bullen and Rockart, 1981). The concept evolved over time and for this study, is understood as the key areas that a business should focus on and try to get right, to achieve its goals. It is also understood that critical success factors are subjective and different for each organization.

This study, therefore, aimed to understand the critical success factors that would enable aquaculture enterprises to achieve their sustainability goals. The study was mainly based on semi-structured interviews with marine mussel producers and role players in the sector. The mussel farming industry provided a good case study of these impacts, as it is the largest contributor to aquaculture production in South Africa (DAFF, 2017).

2.1. Study area

The study focused on the marine mussel aquaculture industry in South Africa. The study area was Saldanha Bay, on the West Coast of South Africa, and included three bivalve shellfish (mussel and oyster) farming areas totalling 460 ha. The survey population included 27 bivalve shellfish farming enterprises in the study area that were approached through the Bivalve Shellfish Farmers Association of South Africa and the Western Cape Provincial Department of Agriculture. The sample size included nine of the existing enterprises listing mussel cultivation as a primary or secondary activity and one that had ceased operations. The selection was mainly based on willingness to be involved in the study. The mix of enterprises included commercially focused, empowerment and community-based/collective-type initiatives.

The survey population also included role players in South Africa with responsibility or experience in aquaculture, agriculture or enterprise development. The selection was based on willingness to be involved in the study, and availability. The role player categories included two national and provincial government departments with responsibility for aquaculture, three aquaculture associations, two universities and two individuals with experience or expertise in aquaculture farming and enterprise development. These role players were, therefore, able to provide insights on aquaculture and enterprise development from Southern African, government, industry, research, education, and practitioner perspectives.

Table 1: Role player categories with their associated spheres of influence

Role Player Category	Sphere of influence or representation	Number of persons interviewed
National and provincial government departments with responsibility for aquaculture or agriculture	1. National aquaculture sector (freshwater and marine) 2. Western Cape provincial aquaculture sector (freshwater and marine)	2
Aquaculture associations	1. Aquaculture stakeholders in Southern Africa; 2. Seven freshwater and marine aquaculture producer associations in South Africa 3. All bivalve shellfish producers in South Africa	3
Universities	1. Agricultural Sciences including Aquaculture research, training and development; Commercial aquaculture development expertise 2. Social dimensions of the fishing, aquaculture and coastal sectors	2
Individual - Experienced aquaculture farmer and mentor	South African commercial aquaculture and development expert with practical experience in mentoring emerging aquaculture farmers	1
Individual - Enterprise development expert	Expert in enterprise development, technology transfer, business incubation and strategy/programme design and implementation in South Africa	1
Total		9

2.2.Data collection

An empirical, phenomenological approach was followed, as described in the literature (Remenyi *et al.*, 2010). A case study approach was selected as a suitable method, as it is a scientific research method in its own right and can generate context-dependent knowledge as described by several researchers (Flyvbjerg, 2006; Yin, 2009; Remenyi *et al.*, 2010). Semi-structured interviews were conducted with the owners or managers of bivalve shellfish farming enterprises selected as case studies, and with the representatives of role, players selected. A qualitative approach was followed to conduct the research. Due to the implementation of COVID-19 restrictions on movement during the time the study was conducted, interviews mostly took place via video-conferencing or cellular phone platforms. Interview questions were structured around the themes of informants' definition of self-sustainability, critical success factors for aquaculture enterprises and the potential reasons for the failure of public-funded

agribusiness and aquaculture enterprises. This information was communicated before interviews as part of the Participant Consent forms.

2.3. Sampling procedure

The sample size included nine of the enterprises in existence and one that had ceased operations. The selection was mainly based on willingness to be involved in the study. The mix of enterprises included commercially focused, empowerment and community-based/collective-type initiatives. The role player sample included two representatives from national and provincial government departments with responsibility for aquaculture, three aquaculture associations, two universities and two individuals with experience or expertise in aquaculture farming and enterprise development. The selection was based on willingness to be involved in the study, and availability. Nine role player interviews were conducted.

2.4. Data analysis

Multiple-case study analysis consisted of two stages. Firstly, a within-case analysis was conducted, where the qualitative data were analysed by identifying and copying responses from each transcription that were relevant to each of the questions asked during the interview. These responses were further analysed to create themes and sub-themes (or codes). MS Excel was used for the second stage of analysis (cross-case analysis) where a grouping of themes and sub-themes as well as summarising of codes was completed.

3. Results and Discussion

Respondents were asked for their opinions and insights regarding the definition of self-sustainability, the critical success factors for aquaculture enterprises and potential reasons for the failure of aquaculture ventures, including those that were publicly funded. The responses of enterprise case study respondents reflect the experiences of owners or managers at the producer level, whereas role player responses reflect a broader, industry-wide perspective. This must be kept in mind when analysing the results, as the two groups had different perspectives on the same subjects.

3.1. Definition of self-sustainability

The emphasis on profitability and independence in self-sustainable aquaculture enterprises points to a commercial or profit motive. Enterprise informants, as well as role players, understood self-sustainable aquaculture enterprises as those that could sustain their operations from income derived from sales of its goods and services without external financial support and make enough profit to realise shareholder objectives. A case study of aquaculture farmers in the Pacific adopted the concept of economic viability, described as “profitability without taking shortcuts’ which is being socially responsible” as the measure of farm or firm success (Bueno and Pongthanapanich, 2014).

South African marine mussel farming is a commercial sector with well-established links into the food processing, wholesale, and retail nodes. Mussels have a short shelf-life, are aimed at the high-end/premium market segment and are sold in fresh and frozen form (WCADI, 2012). Mussel farming is therefore not suitable for subsistence or small-scale farming with social (subsistence or food security) motives. The importance of a commercial rather than a social motive in the success of emerging or community-based ventures in different aquaculture value chains in South Africa is supported in the literature. (Brierly, 2003) described the difficulties of

turning a small-scale mussel farming project in Saldanha Bay (with social and commercial motives) into a sustainable business.

The poorer performance of aquaculture projects with ‘food security’ motives, in comparison to those with commercial motives, were described in a baseline study in 2004 (Rouhani and Britz, 2004). The challenges around building a profitable business and having a developmental agenda are described in a case study of an emerging trout-farming cooperative (Salie, 2011). Similarly, a study on the involvement of communities in commercial aquaculture projects (community-based aquaculture) points to the importance of developing investment-based businesses, rather than social programmes (Hara, Njokweni and Semoli, 2017). Given that public funding is a limited resource, investment of public funding must focus on commercially motivated ventures that have a chance of becoming self-sustainable, rather than socially motivated ventures that may need unlimited funding support to stay in operation.

The researcher solicited the opinions and insights of informants about their definition of self-sustainability. Most agreed with the researcher’s definition of a self-sustainable enterprise as “An enterprise that can sustain its operations from income derived from the sales of its goods and services without external financial support”. External financial support was understood to mean public or private funding needed to continue normal day-to-day operations. It, therefore, does not include public or private funding obtained for purposes of company growth or expansion. Informants also proposed several additions to the definition. These are listed in Table 2. The responses indicated a common understanding of what it means to be a self-sustainable enterprise, with an emphasis on profitability and independence. One informant described the model for a sustainable mussel farming enterprise as being one unit with a 30-ha water lease, 1000 tonnes harvest 16-18 workers and one boat. Their opinion was that sustainable expansion should take place one whole unit at a time.

Table 2: Informants’ proposed additions to definition of self-sustainable enterprise

Enterprise informant additions	Role player informant additions
“There must be money left over once everything has been paid”	“Must manage all its costs and be profitable”
“Self-fund through sales of your products”	“Able to sell its product at a price that gives it enough margin to cover all costs and grow the organisation”
“Makes profit over a long period”	“Having the capabilities to take advantage of the opportunities”
“Not being dependent on outside companies”	“It needs to be able to deliver a return on the equivalent invested capital”
“Being able to service your farm, at the same time the farm being profitable”	“Can run on its own without government support, can source its capital and produce a product at profit”

3.2. Critical success factors

Respondents were asked to describe the critical success factors for aquaculture enterprises. Enterprise case study responses are listed in Figure 1. Saldanha Bay provides an ideal environment for farming filter-feeding bivalve shellfish, due to the upwelling of cold, nutrient-rich water from the Benguela Current that stimulates plankton growth. This contributes to

premium quality products and rapid organism growth and makes the natural environment a great asset for the bivalve shellfish farmer (Olivier, Heinecken and Jackson, 2013).

The mussel farmers understand this and believe it gives them a competitive edge in terms of product quality and production. Within the sites approved for mussel farming, there are also differences between areas in terms of depth of water, circulation, exposure and other characteristics. Therefore, each farmer needs to understand the unique characteristics of their allocated water space, to maximise efficiencies of seeding, grow-out, harvest and re-seeding. Farmers need to acquire practical experience and keep good records to build this understanding. Market demand for its products should be the main reason for developing an aquaculture venture. The importance of having a market-oriented instead of a production-driven approach to aquaculture development is reflected in a Western Cape aquaculture market analysis (WCADI, 2012). Various government marketing efforts such as completing a globally recognised monitoring and certification framework were aimed at stimulating market demand for aquaculture products (DEFF, no date). In a comparative study of key players in African aquaculture (Egypt, Nigeria, and Uganda), market demand (high per capita consumption of fish) was also found to be one of the critical success factors (Adeleke *et al.*, 2020).

The rapid expansion of mussel production between 2015 and 2020, from six farms with a total annual production of 1758 t (DAFF, 2016), to 23 farms with an estimated production of 6000t (F. Endemann, personal communication 2021), introduced the risk of over-supply in the small local market. This requires the development of alternative and export markets, which could be addressed through a structure that could stimulate and increase market demand for South African mussels/bivalves, or aquaculture products in general. It would also require cooperation amongst industry players, who currently compete for the same markets. An analysis of the Mediterranean mussel farming industry indicated that the organization of local production and marketing activities into larger schemes could decrease production costs and add value to the final product (Theodorou and Tzovenis, 2017). Both formal and informal forms of cooperation have been found to contribute significantly to the survival of small-scale mussel farming in Ireland (Cush and Varley, 2013).

Funding sources for aquaculture infrastructure is readily available, however, some producers mentioned that it is difficult to obtain funding for operational support. Having a financial partner or access to funding is especially critical during the start-up years and in times of crisis such as during the COVID-19 pandemic. A study into the potential of mussel and oyster culture in Saldanha Bay pointed to the importance of access to private and public funding to increase production and economies of scale, and assist the sector in difficult times (Olivier, Heinecken and Jackson, 2013). Those mussel farms integrated with holding companies that own processing facilities, have an advantage over other farms in terms of access to markets, mentoring, funding, and support during difficult times. This is supported in the literature. Vertically integrated catfish farms in Vietnam were shown to have higher yields and revenue per hectare than non-integrated farms (Trifković, 2016). Vertical integration in the Zambian aquaculture sector has been identified as a defining commercial trend benefiting larger commercial companies more than the small-scale subsistence sector (Kaminski *et al.*, 2018).

The minimum viable size of water space for mussel farming is difficult to pinpoint, as it depends on the production system and several ropes, production efficiencies and environmental limitations. Studies to estimate the carrying capacity for bivalve shellfish cultivation in Saldanha Bay put total potential annual production over a 1000 ha area at 45 000-60 000 t y⁻¹ fresh weight (Probyn, Atkins and Pitcher, 2015), and indicated that production in 2015-2016 was below the carrying capacity of cultivation areas (Santa Marta *et al.*, 2020).

Based on a final Basic Assessment Report for the Saldanha Bay Aquaculture Development Zone, the area for aquaculture development was restricted to 884 ha and shellfish production increase limited to 10 000 tonnes per annum for the first two years. Subsequent increases were limited to 5000 t y⁻¹ to a maximum of 27 600 t y⁻¹ (DAFF, 2017b).

These limitations meant that farmers were not able to maximise the production potential of their farms in the expected time frames, with potentially negative impacts on the viability of especially new and smaller farms. An alternative view of a viable mussel farm is the production scale (t y⁻¹) needed to be financially viable. This has been estimated at 500 t y⁻¹ (DAFF, 2017a), and would require about 20 ha for raft cultivation and 15 ha for longline cultivation (F. Endemann, personal communication, 2021). This indicates that mussel farms of less than 15 ha may not be financially viable on their own. Good business leadership and management is the most important success factor, as a sustainable enterprise should be driven by entrepreneurs or managers with the business and technical skills required. Most of the producers exhibited a strong entrepreneurial spirit. They understood the value of good management practices, passion and commitment to their business, and industry knowledge in building sustainable enterprises.

The importance of partnering with established farms or mentorships is supported by the literature. One of the common themes amongst emerging agribusinesses these businesses was the requirement for connections with partners in the existing agriculture sector and agribusiness supply chains (Mabaya *et al.*, 2011). A different study of community-based aquaculture projects found that partnerships could be used for skills transfer and training (Hara, Njokweni and Semoli, 2017). The findings on critical success factors are supported by the findings of a comparative study of selected African countries that listed market demand, optimal environment, infrastructure, technology, commercialization, provision of an enabling environment and skills development as critical success factors driving aquaculture development and production output (Adeleke *et al.*, 2020).

A study of four aquaculture enterprises in the Pacific indicated four measures or strategies that enabled them to remain economically viable. These measures are comparable to the findings of this study and include the management of production risks and improvement of efficiency, management of marketing risks and better market access, environmental responsibility and social responsibility (Bueno and Pongthanapanich, 2014). Responses about the key success factors were categorised into environmental (mentioned by 80%), economic (90%) and business leadership factors (100%). The most important environmental factors were the ideal farming site (60%), constant monitoring of water (40%) and producing a good quality product (30%). In terms of the ideal farming site, respondents specifically mentioned the availability of nutrients, distance from harbours and shelter from rough waters or wind as important.

As indicated in Figure 1, the most important economic factors were the market (70%), having a financial partner or funding (70%), the minimum viable farm size (40%) and investing sweat equity (40%). One of the respondents felt that having their processing plant was critical. Market-related issues included the need to develop a business around a market, to diversify markets as the local mussel market is oversubscribed, and to do sufficient market research before starting an enterprise. Many of the respondents had a mix of private and public loans and grant funding. Funding sources included the Comprehensive Agricultural Support Programme (CASP), Aquaculture Development and Enhancement Programme (ADEP), Industrial Development Corporation (IDC), National Empowerment Fund (NEF) and Land Bank. One farmer specifically mentioned the importance of vertical integration in terms of access to funding and expertise to help the enterprise grow. Another mentioned that their financial partner

was more than just a partner, who provided them with a moratorium on loan repayments during unforeseen events and disasters. Investment of sweat equity was seen as critical by some, as it made them more credible to other potential investors. Respondents did not have the same idea of the minimum viable farm size required for a sustainable mussel farming enterprise. One informant felt that 30 ha is the minimum size for a sustainable enterprise.

Another felt that 10 ha is not viable, however, one farmer’s personal experience indicated that 10 ha was the ‘tipping point’ (after which they started making a profit). However, this was before the Environmental Impact Assessment (EIA) for the Saldanha Bay Aquaculture Development Zone (ADZ) that resulted in a temporary limitation on the maximum production allowed per hectare. All of the respondents emphasised good business leadership as a critical success factor. The most important aspects include good management (60%), passion and commitment (60%) and industry knowledge (60%). Other important business leadership traits include having entrepreneurial/ business skills, a hands-on approach, strong leadership, and a long-term vision for the business.

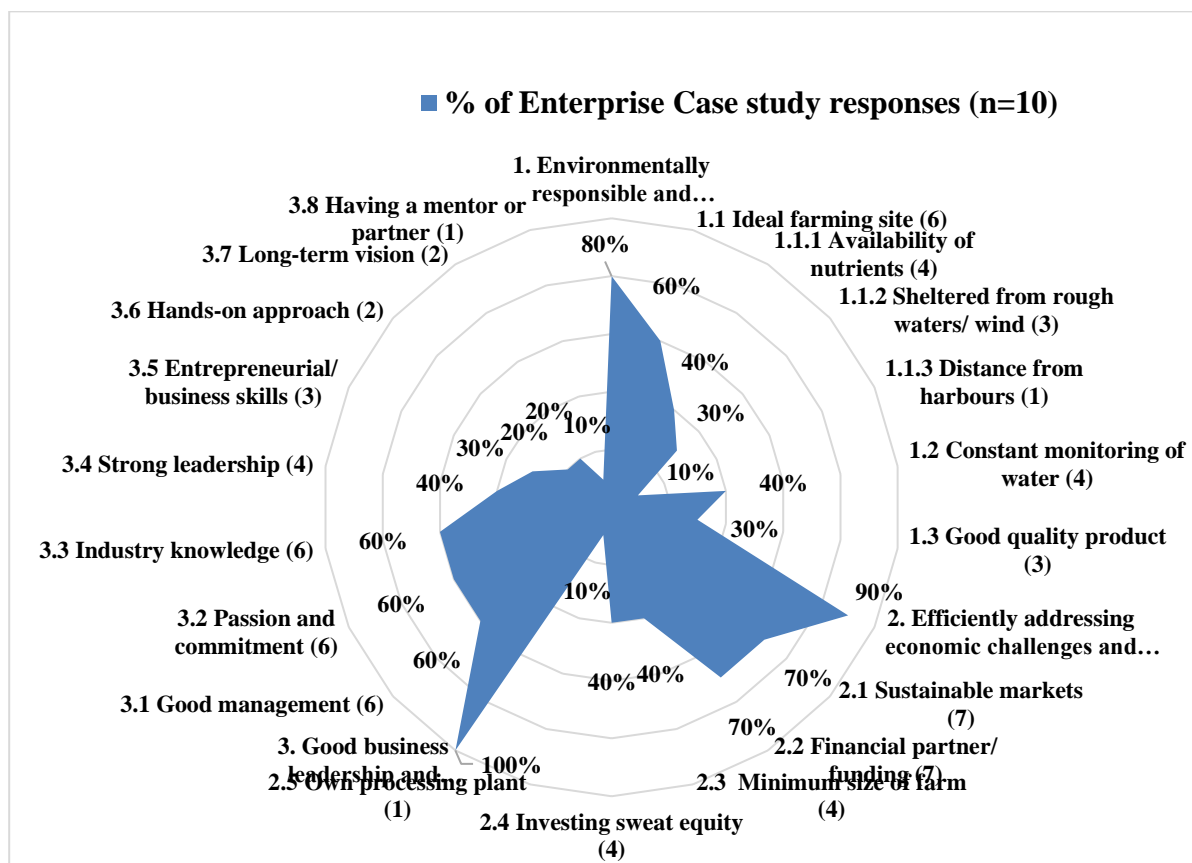


Figure 1: Enterprise case study responses on critical success factors and their associated percentages

The responses of role player informants about the critical success factors in aquaculture enterprises are summarised in Figure 2. The key success factors they identified, were categorised into environmentally responsible and sustainable farming (78%), efficiently addressing economic opportunities and challenges (89%), good business leadership and management (100%) and a supportive business and enabling environment (11%). The

environmental factors included environmental sustainability (56%), a conducive environment (22%) and good quality products. Although climate change and droughts were highlighted as environmental risks, aquaculture was regarded as environmentally sustainable if the correct species were selected for a particular environment.

The green classification of all aquaculture products by the Southern African Sustainable Seafood Initiative (SASSI) was proof that the sector is sustainable, well-managed and does not harm the environment. Cultivating a species in an altered environment also costs money, whilst competing with people producing that same species in a conducive environment.

There was also a feeling that the environmental situation will force farmers to farm smarter and more efficiently. Having a sustainable market (67%) was identified as the most important economic factor. Specific issues included the need for market diversification and increased export (which would involve product standards and certification), and sector-level promotion and awareness (which would require firms to work together). Market support would require price support, promotions and protection against imports. One role player mentioned that enterprises should make sure that the markets for their product are sustainable and in the long-term, there is an opportunity to grow that market.

Having a financial partner or funding was the second most important economic factor (44%). This was critical especially for historically disadvantaged entrants into the sector, and during the start-up phase. Two respondents thought that a commercial or profit motive was critical to ensure that a sustainable, profitable enterprise is set up from the start. In terms of business leadership, the most critical success factors included good management (67%), partnering with established farmers/processors or mentorships (56%), entrepreneurial or business skills (44%), industry knowledge (33%) and good, strong leadership (33%). Good management practices were critical in making the aquaculture sector a good employer, with many long-term benefits for workers including wages that are double the minimum agricultural wage. It also required good technical and managerial skills, ensured economies of scale, and international competitiveness.

Partnering with established farmers was regarded as important to small farmers who would benefit from the expertise of the established farmers, especially in terms of technical and business development know-how, managing product quality and improving each business' efficiencies. One respondent mentioned that the only developmental way forward is once a value chain is established by pioneer farmers, and to use those existing commercial players as development agents. Farmers were lacking entrepreneurial or business skills, especially in terms of inability to draw up good business plans and having the right skills and tools to develop successful ventures. It was mentioned that the Department of Small Business Development would do a needs analysis to determine project needs in this regard.

Industry knowledge was being built based on trial periods of research and development, growing the industry incrementally from a small scale, testing technologies and markets and getting to a proof of concept. The abalone industry was mentioned specifically as an example of an industry that started small (10 t) in the 1990s and grew to more than 1600 t. The mussel industry was also mentioned as a successful industry where pioneer farmers started farming, processing, developing markets, developing health systems and training people. This developmental path combined public money, partnerships with existing industry and value chains and mentorships to a point where diversification is possible and niche enterprises can be established. One role player mentioned that good support systems should include funding, information and extension services that feed the enterprise with the intelligence needed. This was categorized as a critical business and enabling environment factor.

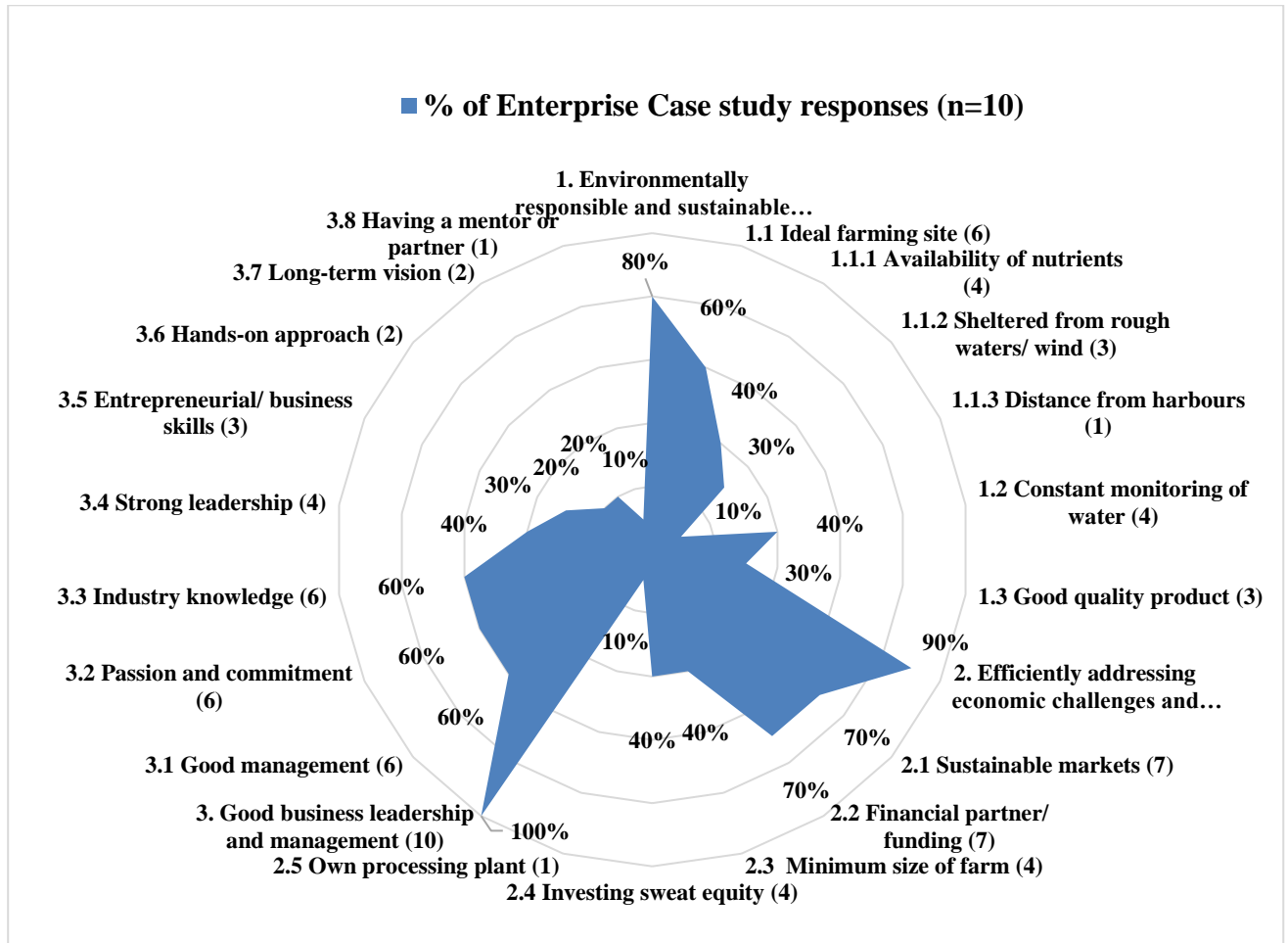


Figure 2: Role player responses about critical success factors and their associated percentages.

As illustrated in Figure 3, both enterprise case study and role player informant groups placed similar importance on environmental, economic, and business leadership factors as the most critical for success. However, enterprise case study respondents identified environmental factors directly impacting mussel farming whereas role players referred to the environmental sustainability of aquaculture in general. Both groups identified the market and having a financial partner or funding as the most important economic factors, however only the enterprise case study respondents referred to the minimum viable size of a farm as a critical success factor.

Both informant groups listed good management, industry knowledge, entrepreneurial/business skills, and passion and commitment as critical business leadership qualities required. However, role-player respondents placed more importance on partnering or mentorships with established farms than enterprise case study respondents.

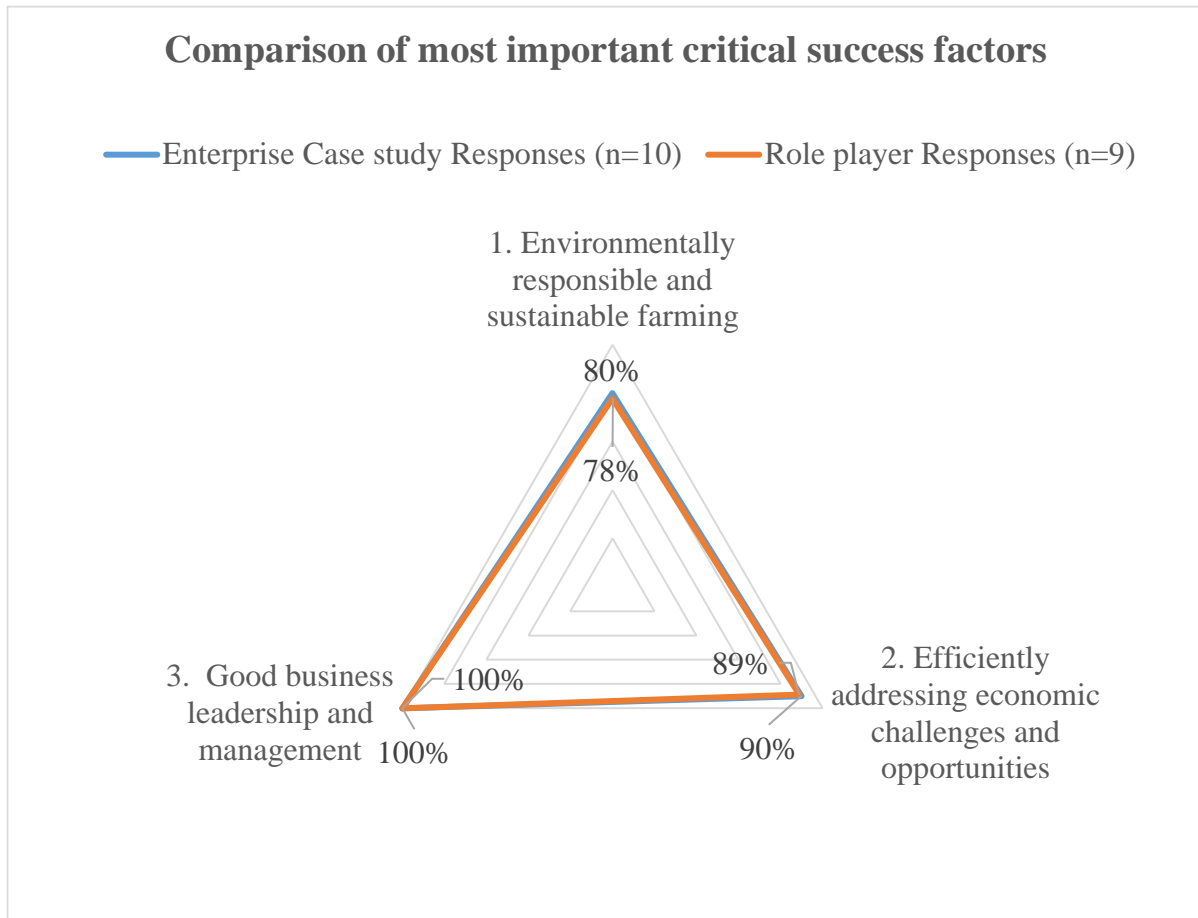


Figure 3: Comparison of responses about most critical success factors

3.3.Reasons for failing to become self-sustainable

The emphasis on the absence of good business leadership and management as one of the main reasons for failure to become self-sustainable supports the finding that this is a critical success factor. The importance of having the right attitude is reflected in the findings of a study on emerging farmers, that found one of the common themes is serendipity (farming or agribusiness presented lower risk than existing sources of income), which may point to a questionable commitment to farming and agribusiness (Mabaya *et al.*, 2011). The finding that lack of relevant skills and knowledge (especially financial and business skills) is one of the most important reasons why enterprises fail, is consistent with the findings in a study of aquaculture entrepreneurs in Ghana, where low technical, business and entrepreneurial skills and knowledge contributed to business failure (Adobor, 2020). The importance of technical and management skills was also identified as critical in the success or failure of three commercial community-based aquaculture projects (Hara, Njokweni and Semoli, 2017).

Respondents were asked for their insights into the potential reasons why some enterprises, including public-funded enterprises, fail to become self-sustainable. Figure 4 shows that the main reasons cited by enterprise case study informants could be categorized into weak business leadership and management (100%) and challenges related to the business and enabling environment (80%). Key issues related to business leadership and management factors were the wrong motivation (60%), lack of strong leadership (60%), lack of accountability

(50%), lack of business and technical skills (50%), reckless spending (40%) and in-fighting (20%).

Wrong motivation included misconceptions about how much money could be made in the industry, wanting to get rich quick, taking things for granted or using the money for different reasons than those provided. Lack of strong leadership referred to lack of purpose or determination, insufficient management, lack of a good person in charge ('jockey'), lack of discipline and commitment and lack of passion. It was specifically mentioned that community-based projects need to have management contracts with existing successful aquaculture companies to succeed. Respondents also felt that there is a lack of accountability on the side of stakeholders who invest public funding, as well as beneficiaries who do not have a complete understanding of the mussel business. There was also a feeling that there is less accountability for the money that is obtained for free, and that it is easier to give up if money does not have to be paid back. In addition to this, it was felt that beneficiaries of some publicly funded projects spent money recklessly.

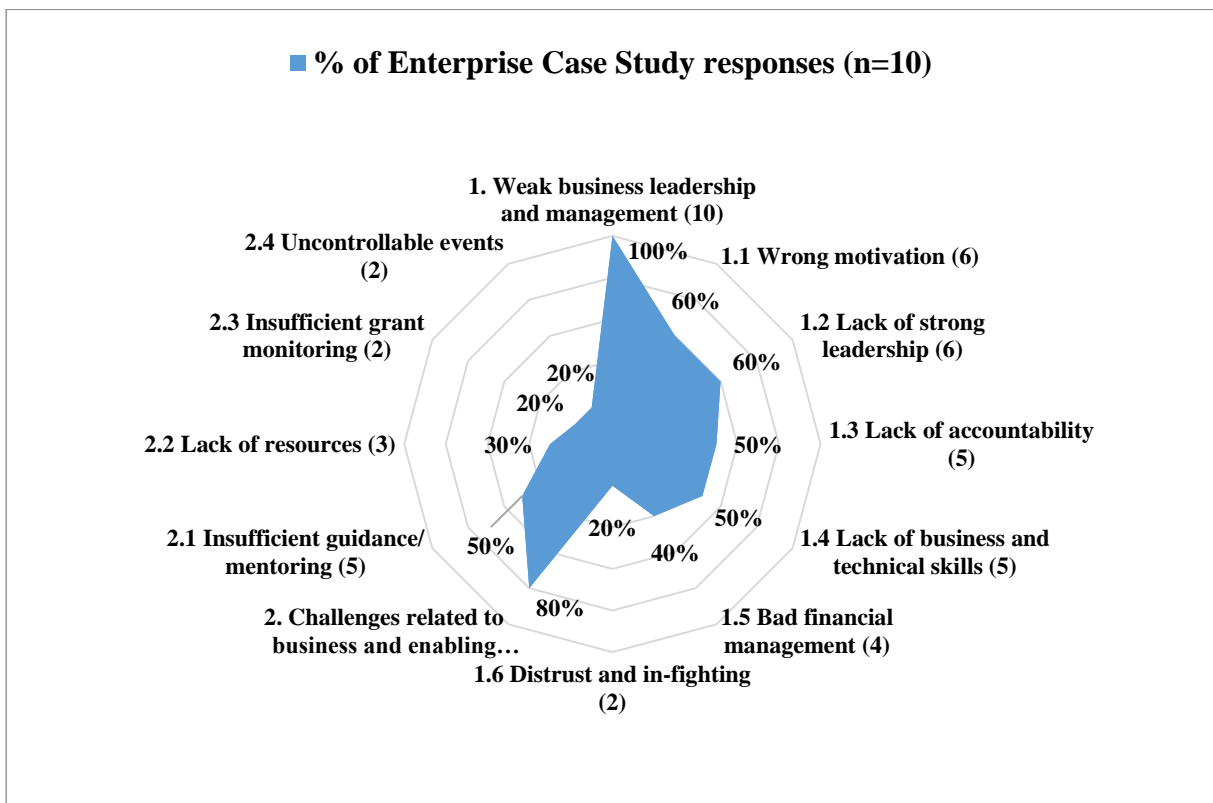


Figure 4: Enterprise case study responses and their associated percentages - reasons for failing to become self-sustainable

Respondents provided detailed descriptions of the essential skills and knowledge lacking in failed enterprises. The lack of financial, business administration, market-related and technical skills was most critical (50%). This is related especially to poor business plans and poor business skills, for example by not providing customers with a product on schedule. Most of these skills can be acquired through training. The most critical aspect of the business and the enabling environment was that there was not enough guidance or mentoring (50%). Some of

the explanations provided were that aquaculture is a non-mature industry with not many support structures and no long-term mentors.

Some felt that government lack the resources and funding required to help the industry grow or to assist with costs such as tests. Some felt that the process of accessing grants or support was problematic, while others felt that grants were not sufficiently monitored. Uncontrollable events refer to events such as storms, changes in markets and the COVID-19 pandemic.

Role player responses about the reasons why enterprises fail to become self-sustainable are summarised in Figure 5. The main reasons were categorized into environmentally unsustainable farming (44%), economic challenges (56%), weak business leadership and management (100%), and challenges related to the business and enabling environment (33%). Environmental challenges referred to issues such as farming with species that were not suited to the environment (leading to high production costs and lack of competitiveness), and exposure to natural risks such as red tide, diseases, and changes in oceanic conditions. Economic challenges included funding access (especially lack of working capital) and conditions tied to funding that led to projects being set up for social rather than commercial reasons, or people forced into partnerships where their interests may not be aligned. In some instances, markets were unstable or not receptive to the species being farmed. One respondent mentioned that some ventures failed because they could not reach the economies of scale needed for economic viability. One of the key issues related to business leadership and management was a lack of business (including finance and marketing) and technical skills. This was apparent from poor business plans, and lack of client orientation resulting in issues such as unreliable scheduling of product deliveries. The wrong attitude included lack of desire from emerging farmers to start working on their projects, the desire to create something where it is not naturally existing, lack of determination and the perception that funding from the government is considered 'free'.

In addition, lack of strong leadership pointed to farmers not keeping up with the latest technology, farmers not taking advantage of opportunities, the disempowerment of project participants and financial abuse. One respondent mentioned that the strong and entrepreneurial eventually buys up the weak. Lack of awareness of the realities referred to some farmers relying on others to run their farms without knowing what is happening, not having the right inputs at the right time, and lack of patience. One respondent specifically mentioned that commercial aquaculture (for example abalone) takes decades to become profitable. Regarding the business and enabling environment, there were conflicting opinions about how long government should support enterprises. One respondent felt that the duration of funding support was too short (two to three years), which prevented enterprises from becoming sustainable.

This reflected a short-term view by the government, resulting in many small enterprises being supported from one year to the next instead of them benefiting from long-term commitments of support. This respondent's opinion was that enterprises needed an incubation period of seven to ten years. In contrast, another respondent felt that in some cases, especially where projects were set up as social enterprises and not as profit entities, there was no time limit on government support. This contributed to the projects failing to become self-sustainable. Inadequate extension and support services referred to inadequate monitoring and evaluation of projects by extension staff, and service providers who manage projects on behalf of beneficiary groups, not possessing the specialised aquaculture skills required.

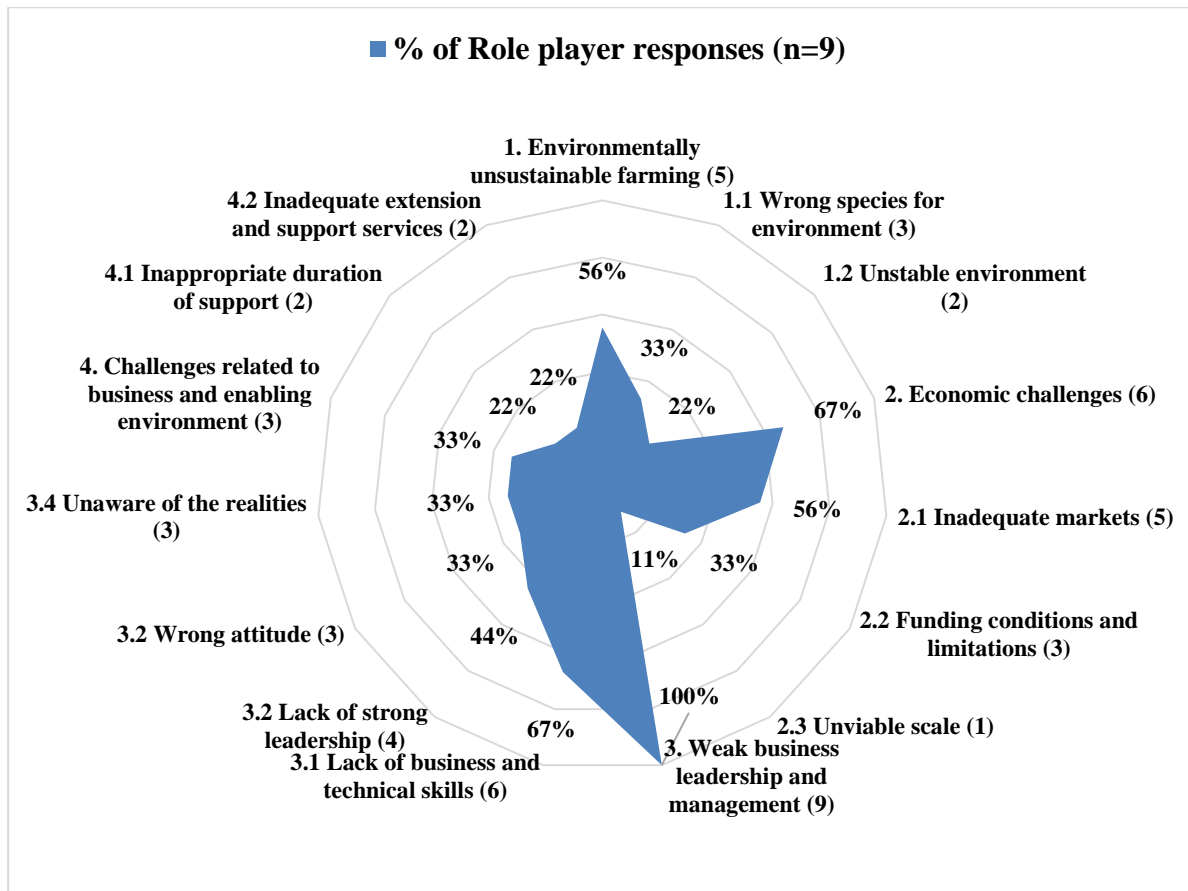


Figure 5: Role player responses and associated percentages on reasons for failing to become self-sustainable

As illustrated in Figure 6, both enterprise and role player informant groups placed the greatest emphasis on weak business leadership and management as the most important reason why enterprises, including those receiving public funding, fail to become self-sustainable. Enterprise informants placed greater emphasis on challenges related to the business and enabling environment and did not comment on environmental or economic challenges. Role player informants identified environmentally unsustainable farming and economic challenges as additional reasons for potential failure.

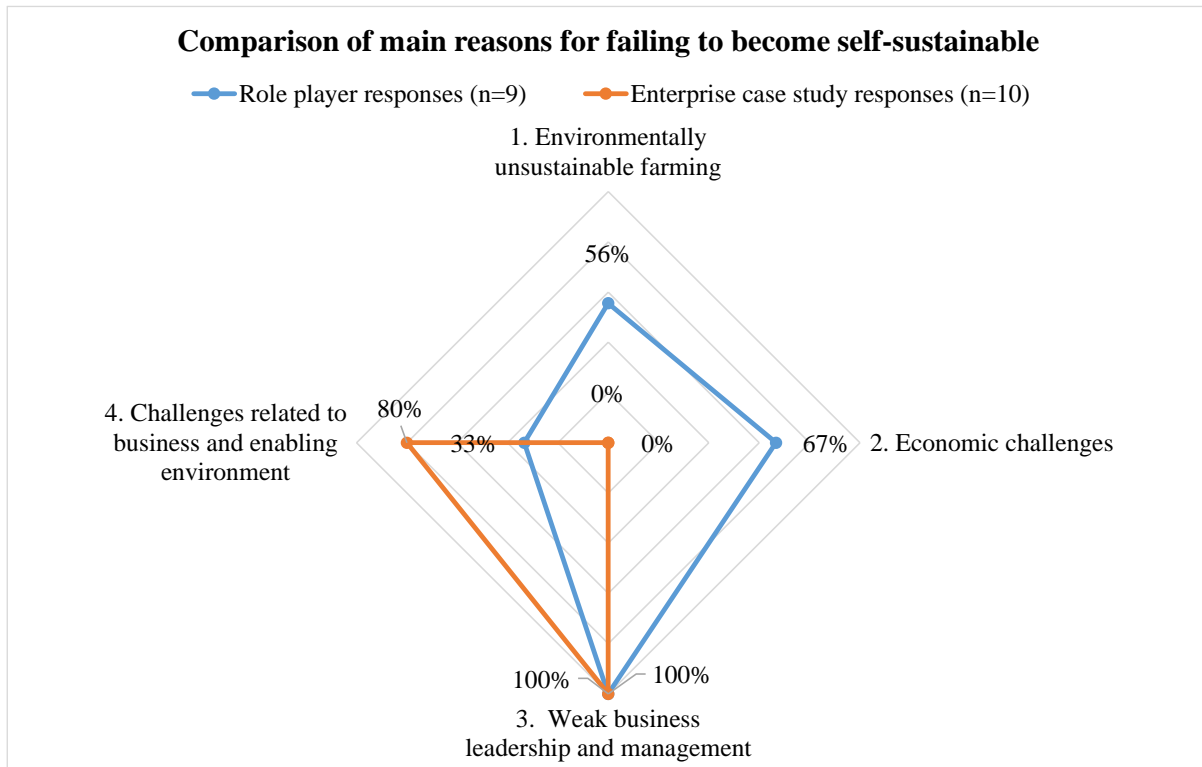


Figure 6: Comparison of main reasons for not becoming self-sustainable

3.4. Summary of critical success factors and reasons for failure

The summaries of critical success factors (Figure 7) and potential reasons for failure (Figure 8) indicate four main areas of intervention that should be addressed to assist aquaculture enterprises in becoming self-sustainable:

- a) Ensuring environmentally responsible and sustainable farming practices
- b) Efficiently addressing economic opportunities and challenges
- c) Cultivating good business leadership and management
- d) A supportive business and enabling environment.

The results from the study indicate that mussel farmers and role-players understand and agree with the importance of having a commercial motivation and making a profit to become self-sustainable. This requires the selection of species with market demand, development of products meeting market expectations and standards, and development of sustainable markets for those products. This requires a market development mechanism that could centralise product development, marketing, and networking, develop common branding and stimulate market demand.

There is also a need for a focused aquaculture development programme such as an incubator programme that could build a culture of business leadership, impart the technical and business skills needed by farmers and staff, assist new entrepreneurs with developing industry knowledge, and provide liaison and networking between farmers and other stakeholders. There is also a need for an integrated research and development programme, steered by the aquaculture industry needs, that could support the market development mechanism and

development programme. Such a programme could address trends such as climate change effects on aquaculture and fast-track the development of value chains from research to pilot and commercial stages.

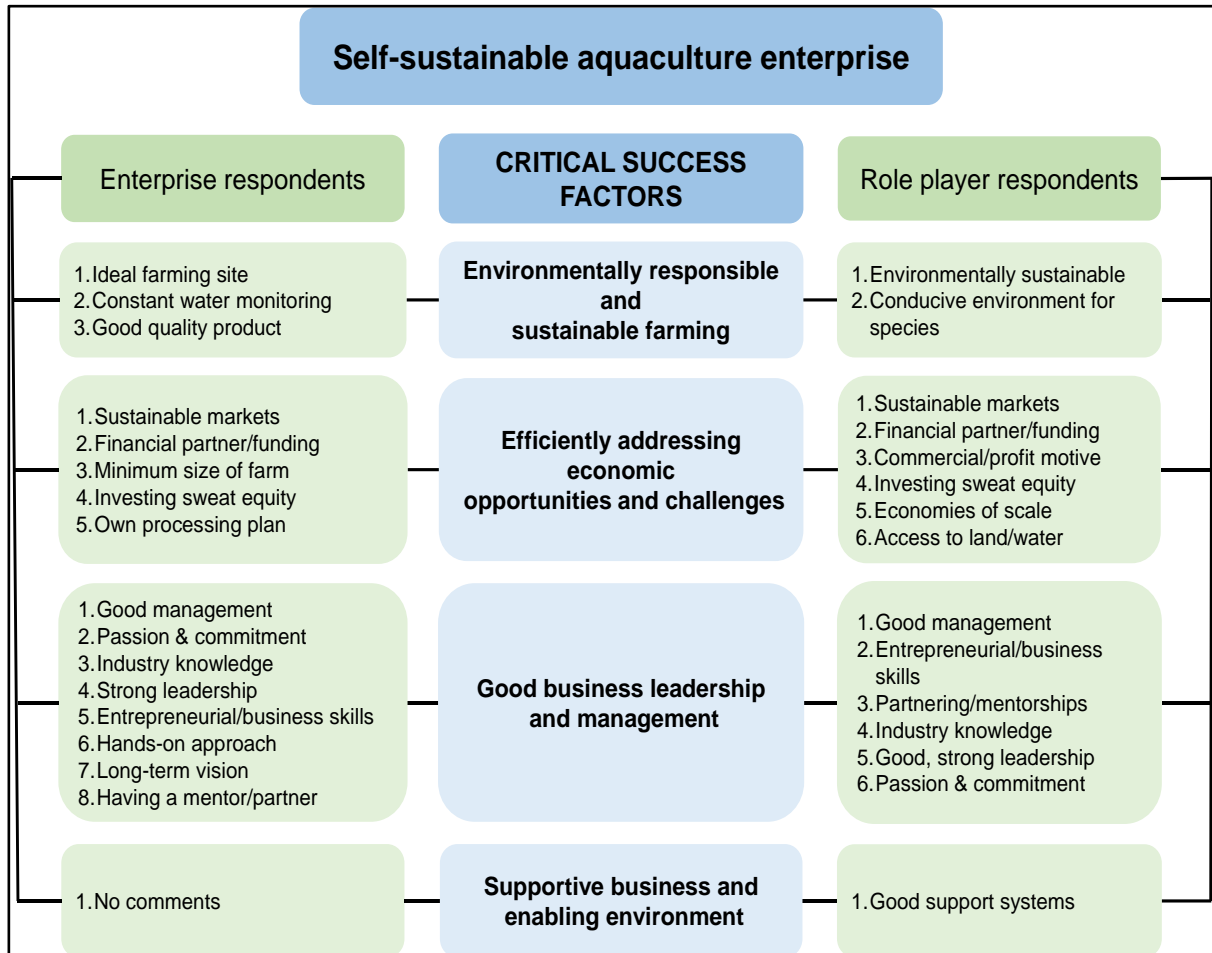


Figure 7: Summary of critical success factors to become self-sustainable



Figure 8: Summary of potential reasons for failing to become self-sustainable

4. Conclusion

Commercially focused aquaculture ventures, if correctly driven, could achieve social benefits such as job creation and transformation. However, socially-focused aquaculture ventures are unlikely to achieve commercial benefits. Commercial ventures that only focus on financial gain and do not address the environmental, social, and other aspects of sustainability, are also not likely to achieve social benefits. The most important critical success factor is good business leadership and management. A focused aquaculture development programme such as an incubator could address these issues in the development of new and emerging aquaculture entrepreneurs and farmers. Such a programme could also address issues around environmentally responsible and sustainable farming.

The second most important critical success factor is the ability to efficiently address economic opportunities and challenges. The development of sustainable markets is critical for the development of self-sustainable enterprises. A market development mechanism such as a co-operative or association could address this need. Setting up an integrated aquaculture research and development programme could provide a competitive edge to the aquaculture sector. This study identified the most important critical success factors for the development of self-sustainable aquaculture enterprises in South Africa. Addressing these factors through the proposed mechanisms could assist new and emerging aquaculture entrepreneurs and farmers in becoming financially self-sustainable in the long term.

References

- [1] Adeleke, B. *et al.* (2020) 'Aquaculture in Africa: A Comparative Review of Egypt, Nigeria, and Uganda Vis-À-Vis South Africa', *Reviews in Fisheries Science and Aquaculture*. Taylor & Francis, 0(0), pp. 1–31. doi: 10.1080/23308249.2020.1795615.
- [2] Adobor, H. (2020) 'Entrepreneurial failure in agribusiness: evidence from an emerging economy', *Journal of Small Business and Enterprise Development*, 27(2), pp. 237–258. doi: 10.1108/JSBED-04-2019-0131.
- [3] Boyd, C. E. *et al.* (2020) 'Achieving sustainable aquaculture : Historical and current perspectives and future needs and challenges', *Journal of World Aquaculture Society*, 51(October 2019), pp. 578–633. doi: 10.1111/jwas.12714.
- [4] Brierly, E. N. (2003) *The Problem of Sustainable Development : The case of the Saldanha Bay Community Mussel Farming project*. The University of the Western Cape.
- [5] Bueno, P. B. and Pongthanapanich, T. (2014) *Success Factors in Aquaculture Enterprises in the Pacific Private Aquaculture Enterprises*. Available at: <http://www.fao.org/publications/card/en/c/61293af9-f1e6-4ce6-81a8-af8a2088dbfb/>.
- [6] Bullen, C. V and Rockart, J. F. (1981) *A Primer On Critical Success Factors Christine V. Bullen John F. Rockart*. 69. Available at: <https://web.archive.org/web/20131022023955/http://18.7.29.232/bitstream/handle/1721.1/1988/SWP-1220-08368993-CISR-069.pdf?sequence=1>.
- [7] Cush, P. and Varley, T. (2013) 'Cooperation as a survival strategy among west of Ireland small-scale mussel farmers', *Maritime Studies*, 12(1), pp. 1–17. doi: 10.1186/2212-9790-12-11.
- [8] DAFF (2012) *National Aquaculture Strategic Framework (NASF) for South Africa*. Pretoria.
- [9] DAFF (2013) 'National aquaculture policy framework for South Africa', *Government Gazette*, (36920), p. 40. Available at: http://www.gov.za/sites/www.gov.za/files/36920_gon763.pdf.
- [10] DAFF (2016) *Aquaculture yearbook 2015 South Africa*. Cape Town. Available at: http://www.nda.agric.za/daaDev/sideMenu/fisheries/03_areasofwork/Aquaculture/AquacultureDocumentation/AquacultureAnnualReports/AQUACULTUREYEARBOOK2012.pdf.
- [11] DAFF (2017a) *Feasibility Study of Oyster and Mussels Aquaculture in South Africa*. Cape Town.
- [12] DAFF (2017b) *Proposed Sea-Based Aquaculture Development Zone in Saldanha Bay: Final Basic Assessment Report*. Cape Town.
- [13] DAFF (2018) *Operation Phakisa - Unlocking the oceans economy through Aquaculture Year Four Review - October 2014-2018*. Cape Town. Available at: https://www.environment.gov.za/sites/default/files/reports/operationphakisa_aquaculture201418_fouryearsreview.pdf.
- [14] DEFF (no date) *Operation Phakisa - Unlocking the Oceans Economy through Aquaculture: October 2014-2019*. Cape Town.
- [15] Flyvbjerg, B. (2006) 'Five misunderstandings about case-study research', *Qualitative Inquiry*, 12(2), pp. 219–245. doi: 10.1177/1077800405284363.
- [16] Hara, M., Njokweni, G. and Semoli, B. (2017) 'Community opportunities in commercial agriculture: Possibilities and challenges.
- [17] Herrington, M. and Kew, P. (2018) *Global Entrepreneurship Monitor South Africa 2017/18*. Available at: <https://www.gemconsortium.org/report/gem-south-africa-2017->

- 2018-report.
- [18] Kaminski, A. M. *et al.* (2018) ‘Commercialization and upgrading in the aquaculture value chain in Zambia’, *Aquaculture*, 493(December 2016), pp. 355–364. doi: 10.1016/j.aquaculture.2017.12.010.
- [19] Mabaya, E. *et al.* (eds) (2011) *Case Studies of Emerging Farmers and Agribusinesses in South Africa*. Stellenbosch: SUN Press.
- [20] Olivier, D., Heineken, L. and Jackson, S. (2013) ‘Mussel and oyster culture in Saldanha Bay, South Africa: Potential for sustainable growth, development and employment creation’, *Food Security*, 5(2), pp. 251–267. doi: 10.1007/s12571-013-0244-1.
- [21] Percy, D. R. and Hishamunda, N. (2001) *Promotion of sustainable commercial aquaculture in sub-Saharan Africa, Volume 3: Legal, Regulatory and Institutional Framework. FAO Fisheries Technical Paper. No. 408/3*. Rome: Food and Agriculture Organization of the United Nations. Available at: <http://www.fao.org/3/y1802e/y1802e00.htm#Contents>.
- [22] Probyn, T. A., Atkins, J. F. and Pitcher, G. C. (2015) ‘Saldanha Bay, South Africa III: new production and carrying capacity for bivalve aquaculture’, *African Journal of Marine Science*, 37(4), pp. 521–531. doi: 10.2989/1814232X.2015.1113203.
- [23] Purvis, B. (2019) ‘Three pillars of sustainability : in search of conceptual origins’, *Sustainability Science*. Springer Japan, 14(3), pp. 681–695. doi: 10.1007/s11625-018-0627-5.
- [24] Remenyi, D. *et al.* (2010) *Doing research in business and management - An introduction to process and method*. 1st edn. Los Angeles: Sage.
- [25] Rouhani, Q. A. and Britz, P. J. (2004) *Contribution of aquaculture to rural livelihoods in South Africa: A baseline study*.
- [26] Salie, K. (2011) ‘Hands-On Fish Farmers’ Co-operative - “Small fish in a small pond”’, in Mabaya, E. *et al.* (eds) *Case studies of emerging farmers and agribusinesses in South Africa*. First edit. Stellenbosch: SUN Press, pp. 152–171. doi: 10.18820/9781920338664.
- [27] Santa Marta, A. *et al.* (2020) ‘Sustainable shellfish aquaculture in Saldanha Bay, South Africa’, *African Journal of Marine Science*, 42(2), pp. 151–166. doi: 10.2989/1814232X.2020.1760935.
- [28] Theodorou, J. A. and Tzovenis, I. (2017) ‘Managing the risks of the Greek crisis in aquaculture: A SWOT analysis of the Mediterranean mussel farming’, *Agricultural Economics Review*, 18(2), pp. 18–29.
- [29] Trifković, N. (2016) ‘Vertical coordination and farm performance: evidence from the catfish sector in Vietnam’, *Agricultural Economics (United Kingdom)*, 47(5), pp. 547–557. doi: 10.1111/agec.12254.
- [30] WCADI (2012) *Draft Western Cape Aquaculture market analysis and development programme/strategy*. Cape Town.
- [31] World Commission on Environment and Development (1987) *Our Common Future: Report of the World Commission on Environment and Development, United Nations Commission*. Oxford: Oxford University Press. doi: 10.1080/07488008808408783.
- [32] Yin, R. K. (2009) *Case study research: design and methods*. 4th ed. Thousand Oaks: Sage Publications, Inc.