

Portrait of the aquascape industry in Indonesia: Business opportunities and challenges

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Abstract. The aquascape industry is an unconventional business so that competition is still loose. However, it turns out that this business has promising opportunities, although it is necessary to pay attention to the various challenges that arise. This study aimed to describe the opportunities and challenges of the aquascape business, through a systematic review. This type of research is qualitative, using a descriptive approach method. The biggest market for this business consists of workers looking for a new hobby, many people being interested in aquascape as a means of refreshing, entertainment, or channeling a hobby in keeping fish or decorating a room. The challenge for this business is the difficulty of caring for and maintaining both the fish and the aquarium ecosystem to maintain its beauty. A SWOT analysis was proposed in order to guide a market oriented development of the aquascape business.

Key Words: aquascaping, industrial business, aquarium, ornamental fish.

Introduction. The industrial sector is one of the sectors that contributes quite a lot to Indonesia's economy. Based on data from the Central Statistics Agency (2021), the number of medium and large-scale manufacturing industries in Indonesia reached 29 thousand businesses. This does not rule out the possibility that Indonesia's number of small-scale industries is many times higher than the number of the above-mentioned medium-sized companies. Aquascape business is less developed in Indonesia, even though it can generate high revenue. The current aquascape business can indeed be considered as in development. This happens because aquascape is not only considered as a medium for keeping fish but also as art, due to its aesthetic research. This aquascape business is becoming a promising opportunity, especially during a pandemic, where many people spend time at home and start new hobbies (Rakhmawati 2022).

Aquascaping is decorating by aesthetically combining aquatic plants, soil, sand, rocks, and wood to create an artificial underwater ecosystem in an aquarium (Mohammad et al 2021; Martin 2013). An aquascape is an ecosystem in which both living and non-living things contribute not only to the overall aesthetics of the aquarium, but also to the chemical and biological balances that allow plants and animals to live (Akshitha & Girwani 2020). Aquascaping requires patience and skill, the hobby of aquascaping brings benefits in terms of emotional health and financial income if the hobby is developed into a business. Involvement in the care and maintenance of aquascapes is known to impact mental health and well-being (Clements et al 2019). Aquascapes come in various styles, including Dutch, Japanese, nature, rock formation, jungle, biotope, and pardalium. The main goal of aquascaping is to create an artistic aquatic landscape. However, technical aspects such as substrate, water quality, plants, fish, aquascaping ornaments and proper aquascaping care must also be considered (Kumari et al 2021). Aquascapes are different from ordinary fish tanks. Even though they look the same, there are significant differences between aquascapes and ordinary fish tanks. Aquascape demonstrates the beauty of the panorama with the diversity of flora, so plant care is needed (Hariyadi &

Andriawan 2022). Table 1 shows the differences between an aquarium and an aquascape (Akshitha & Girwani 2020; Hariyadi & Andriawan 2022; Kumari et al 2021).

Table 1

Difference between aquascape and aquarium

<i>Difference</i>	<i>Aquarium (Conventional)</i>	<i>Aquascape</i>
Appearance	Using imitation ornamental plants to beautify the aquarium	Bringing beautiful natural beauty in the water by planting aquatic plants
Ecosystem	Emphasizing the combination of water and fish equipment such as filters, lights, and heaters or chillers	Aquatic ecosystems consist of three combinations of elements, namely water, plants, and animals
Level of difficulty	The issue lies in keeping the fish	There issue is combining fish and aquatic plants in one container
Tool usage	Decorate using simple tools	Using high-tech tools in arranging aquascapes with high aesthetics
Light needs	Lights are used to illuminate and give the aquarium beauty	Lamps are not only for lighting but also a light source for photosynthesis
Filter type	Can use any filter according to the volume of water	It is better to use an under gravel filter, a canister filter and a biological filter
Fish selection	The choice of the type and number of fish is freer	The selection of fish takes into account the presence of aquatic plants
CO ₂ injection	It does not require CO ₂	Requires CO ₂ injection, especially in aquascapes with lots of aquatic plants
Fish type	Can keep any type of fish	Can only keep calm fish, not bottom fish, and fish that do not eat aquatic plants
Number of fish	The number of fish according to the aquarium	The number of fish is less, to maintain the balance of fish with aquatic plants
Fertilizer application	No need for fertilizer	Requires fertilizer to provide the nutrients that plants need

Source: Akshitha & Girwani (2020); Hariyadi & Andriawan (2022); Kumari et al (2021).

On the business side, the aquascape industry in Indonesia offers significant business opportunities. An aquascape can be a valuable work of art when the components such as fish, plants and decoration are carefully combined, rising the aquascape sale price (Hariyatno et al 2018). In the aquascape business, there are also challenges that the actors must face in addition to promising opportunities. The aquarium decoration technique requires high creativity and perseverance to create an attractive panorama as a work of art. There is also a high risk of damage of the glass aquarium or media during the shipping process. Ornamental fish kept in aquariums also require special maintenance (Abidin & Puspitasari 2018). This research will further discuss the portrait of Indonesia's aquascape industry, especially regarding the opportunities and challenges that the aquascape business actors must face, based on a literature review.

Material and Method. The research consists of several stages, specific to the literature review, including the selection, search and analysis of secondary information from books, papers from scientific journals and other related sources. Acquired data was analyzed to produce descriptive explanations in words, symbols and images. Creswell (2010) stated that this type of descriptive research can be carried out by conducting a literature study

to extract the appropriate information. Systematic reviews help synthesize various relevant research results. The resulting facts can later be given to policymakers to be more comprehensive and balanced. A systematic review is a research method that combines the results of primary research to provide more accurate and precise facts (Gopalakrishnan & Parasuraman 2013). The data analysis used in this study is a systematic review. A systematic review collects secondary data and synthesizes all available, relevant evidence that combines all existing primary studies for review (Cochrane 2016; Phillips & Barker 2021).

The literature search in this study used the google search engine on journal databases such as Google Scholar, Science Direct, Jstore, Researchgate and Academica. The process for conducting the systematic review in this research was:

1. objective (objective of research);
2. inclusion criteria;
3. search strategy (data search strategy/study selection);
4. data collection (data collection);
5. study quality (quality of study);
6. data synthesis results

The keywords used in obtaining literature review sources on the google search engine include aquascape industry, business, and challenges.

Results and Discussion

Aquascape business overview. The aquascape has become a business on the rise during the last pandemic. Public interest in aquascape has increased since the implementation of large-scale social restrictions, which required people to spend time at home. From this opportunity, many people began to pay attention to decorating their homes and channeling their hobbies, especially maintaining decorations. Aquascape is the art of arranging several components such as aquatic plants, wood, and stones which are positioned in the aquarium with a focus on aesthetics, to give the effect of marine life or beautiful gardens in the water. In general, aquascape uses fish as a complement. However, aquascape may contain only plants, wood and stones (Rajessa & Kutanto 2018). The process of making aquascape designs is referred to as aquascaping (Kusumadewi 2016). The primary purpose of aquascape is to create a beautiful view in the water for visual refreshing and calming the mind (Rajessa & Kutanto 2018). In realizing this goal, many aspects need to be considered, such as considering the maintenance plants and other components in water. Managing freshwater plant in aquariums can be combined with ornamental fish, as an aesthetic complement. There are three types of aquarium art: paludarium, aquascape and terrarium; their differences are presented in Table 2.

Table 2

Difference between paludarium, aquarium, and terrarium

<i>Paludarium</i>	<i>Aquascape</i>	<i>Terrarium</i>
Combination of "Palus," which means swamp, and "Arium," which means a container	Combination of "Aqua" which means water, and "Scape" of scenery	A variety of "Terra," which means land or earth, and "Arium," which means a container
A swamp habitat that combines elements of water, air, and land in a closed space	Water habitats that offer beautiful views in glass or acrylic containers can be combined with wood and stone	Terrestrial habitats decorated with small plants in open/closed glass or acrylic containers
Water filled half or quarter of the container	The container is full of water	No water need
Used to raise water animals and land animals	Used to raise aquatic animals and aquatic plants	Used for growing crops

<i>Paludarium</i>	<i>Aquascape</i>	<i>Terrarium</i>
The types of animals that can live vary, such as amphibians, fish, birds, turtles, insects	The type of animal is only a calm fish that does not eat plants, or it could be a sea monkey	They are not used for raising aquatic animals
Can grow various types of plants, both aquatic plants, or land like swamps	Can only grow aquatic plants	Can only plant crops resistant to dry conditions and do not need watering like cacti and succulents
Allows many species to live with a variety of beautiful scenery	Only allows certain fish species that adapt to aquatic plant types	It is only possible to plant dry-resistant land plants as an element of beauty
Treatment does not require more time and effort because living things are adaptable	Medicine is more critical on cleanliness, acidity, and hardness of water	Easy maintenance because it is resistant to mold and mildew. However, still, they need sunlight

Sources: Brunner (2012); Komala et al (2016).

Based on Table 2, it can be seen that aquascape is a technique for making scenery in a container totally filled with water. The components in aquascape are a combination of aquatic animals, especially fish, aquatic plants, and the water itself. Several factors that influence the success of aquascaping are lighting, oxygen, carbon dioxide diffusion, filtration, and plant nutrition. Components such as light, fertilizers or nutrients, and carbon dioxide are essential for aquatic plants. There must be sufficient availability for photosynthesis in plants. Meanwhile, the oxygen component is needed by aquatic plants and fish as respiration material. The filter in the aquascape functions to filter out impurities produced by ornamental fish, feed residue, and other particles in the water, so that the conditions in the water remain clean and do not contain toxic compounds for aquatic plants and fish that live in it (Firmani et al 2020).

Aquascape industry business opportunities in Indonesia. Based on research data from Nanda & Fitryani (2021), the selling value of betta fish has increased significantly, reaching 25% every year. Such a lucrative business makes it worth exploring the aquascaping field. Several factors influence the interest increase in aquascape, among which the most important are the benefits and a low business competition. Based on a survey, the aquarium and ornamental fish business employs 20% of the workers of the fishery industry sector (Nurhayati et al 2020). According to Hariyatno et al (2018), from the manufacture of the aquascape, the profit obtained by the craftsmen is 18.30% for aquascape model 1 and 31.24% for aquascape model two. The profit from the difference in the raw materials used reaches 10% of the costs incurred, where the profit obtained depends on uniqueness and beauty. The price of an aquarium with an aquascape concept is priced from 0.51–639.31 USD. Prices are determined based on the level of the aquascape design. The more unique and beautiful the aquascape is made with a fairly high artistic taste, the higher the price (Hariyatno et al 2018).

Aquascape business is experiencing an increasing trend from time to time. The large demand for aquascape shows that public interest in aquascape is quite high, thus making the aquascape business a very promising opportunity to pursue (Abdullah et al 2020). This condition is reflected in the increasing public interest in designing their rooms with aquascapes because the aquarium, as an aquascape medium, is filled with ornamental plants with elements of beauty. Recently, aquatic plants cannot be separated from the ornamental fish business industry (Sholichah et al 2020).

The export value of ornamental fish reached USD 34.55 million with a volume of 1.29 million kg in 2021 (Figure 1). The export value of ornamental fish increased by 12.32% compared to the previous year, which was USD 30.76 million. This figure includes supporting facilities such as ornamental plants, feed, aquariums, etc. The increasing export of ornamental fish and aquatic ornamental plants is an opportunity for the aquascape business because both are part of the aquascape component (Mohammad

et al 2021). The aquascape business competition on the island of Java, especially in big cities such as Jakarta and Yogyakarta, has also increased, although it still remains a fast source of money for creative entrepreneurs. Revenue streams are not originating only from making aquascape designs, but also from selling cultivated freshwater ornamental plants, because the ornamental plants consisted as a major component in aquascape (Mohammad et al 2021).

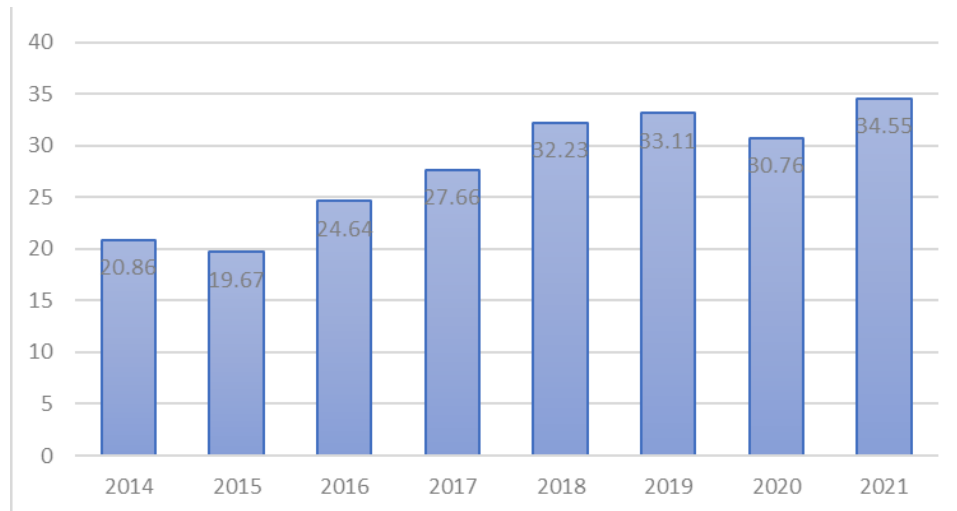


Figure 1. Ornamental fish export in Indonesia (Widi 2022).

Aquascape industry business challenges in Indonesia

Maintenance challenges. Fish that can be species kept in an aquascape are generally fish with particular characteristics. Examples of ornamental fish species include *Melanotaenia vanheurni*, *Monodactylus argenteus*, *Betta splendens*, *Poecilia reticulata*, *Amphirionin*, and *Carassius*. The care and maintenance of ornamental fish is a crucial problem that business owners must face. Each type of fish has a different way of rearing (Nanda & Fitryani 2021). The maintenance of aquatic plants in an aquascape is not much different from that in other environments. Plants will grow well if the factors for photosynthesis are met. Because the function of this aquarium plant is to decorate the house and provide a relaxed atmosphere, these aquarium plants are usually placed in a room with minimal sunlight. These conditions cause plants not to grow properly due to a lack of light for photosynthesis (Hutabarat et al 2022). After proficiency in plant maintenance, ornamental fish can be added to beautify the aquarium and increase its selling value. The higher the diversity of motifs and colors on the fish's body, the higher its sales price. Besides creativity, the central aspect of the aquascape business is the high aesthetic value. Maintaining the aquarium ecosystem is challenging, in particular regarding the plants growth and algae bloom (Mulyono & Ritonga 2019). Attention must be paid to several factors for maintaining the viability and aesthetics of the aquascape, namely: (1) maintaining good water quality for the survival of fish and aquatic plants, (2) paying attention to the content of O₂ and CO₂ in the water, (3) choosing quality feed for fish, (4) controlling the growth of microalgae, (5) providing nutrients for aquatic plants (Firmani et al 2020). The water in the aquascape must also be changed regularly and the aquarium has to be placed at an ideal temperature for fish and aquatic plants, which is 22-28°C. It can also be placed in an air-conditioned room. Consistency should be maintained between aesthetics and maintainability of the aquascape.

Challenges related to technical issues. The biggest obstacle faced by businesses in the aquaculture sector consists of technical issues. In maintaining the aquascape ecosystem, the massive growth of algae prevents plant from growing and developing optimally. However, there are ways to control algae growth. Some of the ways that can be used to prevent or eliminate algae in the aquascape are as follows:

1. Caring for algae eaters such as siamese algae eater, Amano shrimp, and red cherry shrimp;
2. Reduce the amount of feed, because the remaining fish feed that is not eaten will have the potential to trigger the emergence of algae;
3. Regularly replace water to prevent algae growth;
4. Provision of fish medicines which are used as algae exterminators and prevent the emergence of algae, such as black brush algae (BBA), blue green algae (BGA), Cladophora/Blanket, weed brown algae (Diatoms), green dust algae (GDA), green spot algae (GSA), green water, hair/thread algae, Rhizoclonium algae, Staghorn algae. Each type of algae has certain characteristics and ways to eliminate it.

An aquascape do not only depend on good decoration but also on its environment, that supports the growth of aquatic plants. Aquatic plants can grow when they can carry out the photosynthesis process, which requires supporting elements such as appropriate water parameters, nutrient fulfillment, the presence of CO₂, and balanced light. In this case, each type of plant has a different maintenance and care technique. Some of the plants that can be used in aquascapes are the amazon sword, java moss or dwarf baby tears. Some plants require low light intensity, others require high light intensity. They also require different CO₂ and pH parameters. Some can live in an acidic environment, others in an alkaline environment, thus, the pH must be adjusted accordingly, but also according to the type of fish to be kept. Freshwater fish, in general, can live at an average pH, in waters that tends to be acidic, which is 6 to 7, which will also determine a selection of plants that can grow at that pH values. Certain types of fish are known to only live at high temperatures, such as *Discus* or *Symphysodon aequifasciata*, which have native habitats in the Amazon River where they can live at temperatures above 28°C. Light also play an important role as the energy fuels the aquascape ecosystem. The power of the lamp also must be balanced with the level of CO₂ in the aquascape, as required by the plant photosynthesis.

Challenges related to business strategy. In spite of a favorable period, there is no certainty that the aquascape business will continue to progress for the decades to come, since it does not supply basic needs, but it develops following a temporary trend. this uncertainty requires abilities in taking advantage of opportunities and in expressing creativity in order to increase both the artistic and technical value of the arrangement and implicitly its sales price (Nanda & Fitriani 2021). This is done apart from being an effort to maintain the business continuity. Another challenge on the business side is related to the market orientation of the aquascape products, in an effort to reach the target consumers. For this reason, people involved in this business must collect information on market demand, consumer orientation, competitor orientation, and elaborate strategies of product marketing, in order to have a good turnover and reasonable profits (Nurhayati et al 2020).

Aquascape sales and marketing cannot be arbitrary, considering that aquascapes cannot simply be displayed in various showrooms to attract consumers' attention. If it is marketed offline, the business will not grow without an appropriate advertising. Java et al (2021) mentioned that the aquascape business has problems related to sales. The obstacle faced by aquascape businesses in Indonesia, especially those in suburban areas, is the marketing process. Some aquascape business people do not understand the use of technology with free applications and digital platforms for marketing (Amalia et al 2021). This is a serious obstacle for the aquascape business: products cannot be marketed and distributed effectively through conventional channels, and can be marketed effectively through appropriate media, including digital platforms. Through the digital promotion, the aquascape business can expand to various regions in Indonesia and adopt reliable shipping services, the products becoming accessible to all consumers. Thus, digital marketing is a viable solution to create an effective and efficient aquascape sales strategy (Java et al 2021). Table 3 shows the systematic review aquascape industry in Indonesia.

Systematic review

<i>Reference</i>	<i>Evaluation object</i>	<i>Research result</i>
Java et al (2021)	Android-based application development Business aquascape Aquascape information Aquascape plant cultivation	Produce software-based online applications to facilitate aquascape business transactions
Rajessa & Kutanto (2018)	Interest in aquascape Aquascape business opportunity	Helpful information related to aquascape and aquascape business
Hariyadi & Andriawan (2022)	Aquascape training for community empowerment Evaluation of aquascape enthusiasts	Aquascape training opens opportunities for youth groups to become entrepreneurs, so they can support funding. This activity is used as a way to introduce to the public about aquascape
Safitri et al (2022)	Aquascape training for community empowerment Aquascape work skills by the community	New skills acquired in the field of aquascape, gain skills in creating business opportunities and gain skills in product marketing both in person and online
Abdullah et al (2020)	Aquascape training for community empowerment Community empowerment through skill improvement for small and medium industries	There is an increase in commercial scale aquascape manufacturing skills for the local market, so both SMEs can sell ornamental fish production and aquariums and their contents so that the revenue from SMEs is increased
Abdullah et al (2021)	Aquascape training for community empowerment Community empowerment through skill improvement for small and medium industries	Increasing skills in making commercial-scale aquascapes for the local market and being able to sell ornamental fish production so that the income from Small and Medium Enterprises can increase
Nurhayati et al (2020)	Aquascape business market orientation Aquascape business through the sale of freshwater ornamental fish Aquascape business opportunity	The results showed that the aquascape business through the orientation level of ornamental fish cultivators in West Java production centers was categorized as high
Hariyatno et al (2018)	Value the advantages of the aquascape business	Many people who used to be just a hobby turned it into a business area because of the profits from this business. Profit from initial capital With this technology-based marketing, it is hoped that the sale of various Aquascape products can be sold maximally because the use of the internet, especially social media, is more effective and reaches all levels of society. Especially during the Covid-19 pandemic, everyone is spending time on the internet buying and selling activities online, primarily through social media and e-commerce
Amalia et al (2021)	Aquascape product marketing training for the community The use of technology in the marketing of aquascape products	
Sukaca &	Aquascape business	The aquascape business is considered

<i>Reference</i>	<i>Evaluation object</i>	<i>Research result</i>
Syamsun (2009)	prospects SWOT analysis of aquascape business	to be feasible to be grown. The calculation result of payback (PBP) shows that the aquascape business is feasible and profitable. Based on the strategy analysis using SWOT analysis, the right strategy in the business development of Bunga Air "Aqua Plantindo" Business Group is maintaining and improving product quality per the customer's wants, maintaining and improving the business/partnership relations with exporters and suppliers

Based on the results of the systematic review, it is known that so far research on aquascape in Indonesia has evaluated more from the aspect of community empowerment through training on aquascape marketing and manufacture. So that further research is needed regarding the evaluation of the aquascape business and the calculation of the profits that will be obtained from the aquascape business. In addition, research related to the challenges and potential of aquascapes must also be presented.

Business strategy. Based on the literature review results, the direction of aquascape's business strategy development is obtained. The strategies for the strengths and opportunities of the aquascape business in Indonesia are to maintain and improve product quality according to market/consumer demands, maintain and improve business relationships with exporters and suppliers, develop business partnerships, seek capital assistance from investors or financial institutions for business development, improve the quality of human resources and implement a business management system. On the other hand, the recommended strategy to deal with the threats and weaknesses of the aquascape business in Indonesia is to improve business relationships and business partnerships, increase production cost efficiency, maintain quality and optimize existing human resources. The strategy of the business of the aquascape industry must be considered according to internal and external factors, relating to the SWOT analysis supporting the market approach, as seen in Table 4.

Table 4

SWOT analysis

	Strengths (S)	Weaknesses (W)
Internal factors	<ol style="list-style-type: none"> 1. Good quality seeds and products 2. A good relationship with exporters and suppliers 3. Business specification and business experience of ornamental aquarium plants 4. The group leader's tenacity in managing the business 5. HR skills and loyalty 6. The business partnership is well established 7. Simple marketing path 8. The work environment is family 	<ol style="list-style-type: none"> 1. Difficulty getting certain types of seeds 2. The organizational management system is not yet supported 3. Product withers easily 4. Limited production capacity 5. Support financial conditions for business development is not good 6. Limited HR capabilities
External factors		<p>Strategy</p>

<p>Opportunities (O)</p> <ol style="list-style-type: none"> 1. The demand for ornamental aquarium plants is high 2. Consumers know product image and already have regular buyers 3. Partnership development is quite open 4. Marketing channels are still wide open 5. Prices are stable and tend to rise 6. Availability of sufficient production facilities 7. Labor wages are cheap 	<p>S-O Strategy</p> <ol style="list-style-type: none"> 1. Maintain and improve product quality according to market/consumer demands (S: 1,2,3,4,5; O: 1,2,4) 2. Maintain and improve business relations with exporters and suppliers (S: 2,3,4,5,6,7; O: 1,2,3,5) 3. Develop business partnerships (S: 2,4,6,7,8; O: 1,3,4,5,6,7) 	<p>W-O Strategy</p> <ol style="list-style-type: none"> 1. Seeking capital from investors or financial institutions for business development (W: 1,2,4,5; O: 1,2,3,4,5,6,7) 2. Improving the quality of human resources (W: 1,2,3,4,5,6; O: 1,3) 3. Implementing a business management system (W: 2.5; O: 1,3,4,6)
<p>Threats (T)</p> <ol style="list-style-type: none"> 1. New domestic and foreign competitors are increasing 2. Pests and diseases 3. Increase in production costs 4. The decline in export market share 5. Declining product quality 6. Decreasing product selling price 	<p>S-T Strategy</p> <ol style="list-style-type: none"> 1. Improving business relations and business partnerships (S: 2,3,5; T: 1) 2. Production cost efficiency (S: 6, 7; T: 3) 	<p>W-T Strategy</p> <ol style="list-style-type: none"> 1. Maintain quality to be competitive in the market and able to survive (W: 3; T: 1) 2. Optimizing existing HR (W: 2,4,5,6; T: 2)

Conclusions. The business portrait of the aquascape industry in Indonesia is known to have good potential to be developed. Since the pandemic, maintaining an aquascape has become a new hobby that most Indonesians favor. This creates an excellent opportunity for this business to successfully be developed by the community. However various challenges arise, especially in terms of fish maintenance, the maintenance of the aquascape ecosystem, and the regulation of the technical parameters, such as CO₂ levels, lighting, temperature, which also determine the selection of plant species. Appropriate business strategies regarding the market orientation must also be evaluated, according to the SWOT analysis.

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