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Scenario of Key Factors Development in Betta Fish Micro-Business: Leverage and ISM Approach

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ABSTRACT

Betta fish farming micro-business has good potential as an alternative income for the community, but few show the sustainability of their business. The purpose of this research is to design a scenario for future micro-business development strategies for betta fish business actors. The method of analysis uses data collected from questionnaires with micro business actors of betta ornamental fish. Testing the data used leverage test and Interpretative structural modelling (ISM). The results of the analysis showed that 18 attributes were the key factors and three scenarios of the betta micro business development strategy were obtained. The conclusion from the 18 key factors that become sub-elements obtained seven independent key factors, five linkages and six dependents. Each of the sub-elements in the three quadrants can be used as a key in formulating a scenario for the sustainability of the betta micro-business in the future.

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INTRODUCTION

The fishery is one of the sub-systems of agribusiness that has the potential and an important role in the Indonesian economy. The number of freshwater ornamental fish in the world is 1100 species, Indonesia has 400 species of freshwater ornamental fish, more than 700 species. As many as 128 species of fish are endemic, including betta fish (KKP, 2019). Betta ornamental fish (Latin: Betta splendens) apart from being a commodity that has a high economic value, it is also a source of community income because of its high selling value (Lesmana & Iwan, 2012). KKP also noted, entering the beginning of the pandemic, ornamental fish production increased by an average of 13.17% per year. Commodities that increased significantly include Guppy (82.5%), Koki (61.7%), and Betta (16.4%). Where the destination countries are dominated by Japan, Singapore, America, China, England, Korea and Malaysia. The volume of supply (domestic out) and shipment (domestic in) of betta fish also showed a positive trend. Before the pandemic, the domestic volume came out at 3,334,350. The figure increased by 92% a year later to 6,393,979. The same trend also occurred in incoming domestic volumes, from 1,813,467 to 3,294,617 tails entering the beginning of the

pandemic. Its growth is 82% (KKP, 2021) and is a source of foreign exchange income for the country (Kartamihardja et al., 2017; Khoironi & Saskara, 2017).

Many ornamental fish lovers are fond of this betta fish. This betta fish is a type of fish from the Asian continent including Indonesia, Malaysia, Thailand, Laos, and Myanmar. In the market, this betta fish is very popular and the fans are quite high. The selling price of betta fish is quite high, so its cultivation is very promising. This betta fish farming business opportunity can be said to be very profitable. Betta fish farming business is quite profitable for every business actor. The betta fish business is considered an alternative solution to the community income crisis (Sihombing et al., 2013). The development of ornamental fish production and the number of betta fish micro-business actors experienced a positive increase throughout the covid-19 pandemic. Betta fish (Betta splendens) micro-business actors generally work at home. The capacity of the number of adult fish is less than 150 tails. However, although the prospect of selling betta fish prices is good, it is necessary to predict the sustainability of this betta micro-business. Common problems in betta fish micro-business are business feasibility conditions, competition between similar business actors, access to information and market networks, infrastructure, and other business problems.

One of the co-management modelling techniques developed for strategic planning for the development of betta fish micro-business is the Interpretative structural modelling (ISM) technique. ISM is a group learning process in which structural models are generated to capture complex matters of a system, through carefully designed patterns using graphics and sentences (Eriyatno, 2003). The ISM technique is one of the systems modelling techniques to deal with hard-to-change habits of long-term planners who often apply directly operational research techniques and or descriptive statistical applications. Furthermore, Saxena et al. (1992b) explained that ISM is concerned with the interpretation of a complete object or system representation through the application of graphical theory systematically and iteratively. ISM also analyzes system elements and solves them in a graphical form of direct relationships between elements and hierarchical levels. Elements can be policy objectives, organizational targets, assessment factors and others. Direct relationships can be in various contexts (related to contextual relationships). This study is expected to provide information on the development strategy and prospects for micro-enterprise sustainability from a time-frame perspective. The purpose of this research is to design a scenario for future micro-business development strategies for betta fish business actors.

RESEARCH METHOD

Method of collecting data

The data collected in this study include primary data and secondary data. Primary data is collected based on interviews with micro-scale ornamental fish business actors, and interviews with key informants who are breeders of betta fish for commercialization, while secondary data is collected based on reports, journals and the results of studies from various related agencies. The method of determining the respondents was done purposively. This is related to the homogeneous characteristics of ornamental fish micro-business actors in terms of business scale, products produced, and the application of simple aquaculture technology.

The population in the form of betta fish breeders as well as betta fish micro-business actors are known to be 56 people, but the truly consistent breeders are fewer, which is around a dozen. The selection of micro-business was carried out using a simple random sampling system and 12 betta fish micro-business were selected. Data were collected from interviews using a semi-structured questionnaire designed to measure the attributes of each indicator on an ordinal scale (Coll et al., 2013a; Sukwika et al., 2018).

Data analysis method

Data processing is carried out using Microsoft Excel-based software tools. Data analysis was carried out qualitatively and quantitatively. The analysis in this study is a descriptive analysis using leverage analysis with root mean square (RMS) and identification analysis using Interpretative structural modeling (ISM). These two analyzes are presented simultaneously and are interrelated in the discussion.

Root mean square (RMS)

Leverage analysis provides further information about the attributes that are key factors for the development of micro-business cultivation of betta fish (Betta sp.). Leverage analysis shows which attributes contribute to the sustainability value of the resource. The effect of each attribute is observed on changes in the root mean square (RMS), especially on the x-axis for a scale of at least 2.00 RMS (Sukwika et al., 2016). The RMS formula is as follows (Borg & Groenen, 2013):

$$RMS = \sqrt{\left[\frac{\sum_{i-1}^{n}\{Vf(i,1) - Vf(,1)\}^2}{n}\right]} \quad (1)$$

Remark: Vf (i1) = MDS output value (after rotation and flipping) Vf (,1) = MDS output median in column-1.

Interpretative structural modeling **(ISM)**

ISM is a sophisticated planning methodology that is used to identify and infer various relationships between factors in a particular problem or issue (Saxena et al., 1992a). Structural models are generated to portray complex problems of a system, through patterns designed using graphics and sentences. The ISM technique can transform an abstract model into a hierarchical visible system model (Saxena et al., 1992a). This analysis is carried out through several stages, namely:

The stages in ISM begin with compiling a structural self-interaction matrix (SSIM) to produce a reachability matrix (RM). RMS that have met the transit rule are determined according to the level. The coordinate position is mapped in a power dependence (DP-P) driver quadrant which includes dependency, linkage, independent and autonomic clusters. Data processing using ISM with the ISM-VAXO method. Based on the contextual relationship, the SSIM is compiled using symbols: V if *eij* 1, *eji*=0; A if *eij*=0, *eji*=1; X if *eij*=1, *eji*=1; V if eij=0, eji=0.

RESULTS AND DISCUSSIONS

RMS (Leverage)

Based on the results of the assessment of the attributes of each aspect obtained several attributes that are key factors. The aspects assessed include business feasibility, business actor strategy, market network, infrastructure, and maintenance and handling. Each aspect coincidentally has an attribute number of seven attributes. The complete explanation of the determination of the attributes selected as key factors is presented in Table 1.

Leverage analysis shows that sensitive attributes with the largest RMS (root mean square) including the Covid-19 KUR (people's business credit) assistance (2.73) and betta fish breeding production capacity of 3.29) are attributes that are key factors. Of the 7 attributes in the strategic aspect of business actors, two sensitive attributes are considered to have the most contribution to business sustainability, including price discounts on betta fish commodities (3.82), and the diversity of betta fish species owned by sellers (4.51). In the aspect of market networking, there are at least two attributes that are key factors, namely access to market information (3.24), and exhibitions or bazaars (2.84). While the attributes on the infrastructure aspect, the most sensitive attributes are water circulation facilities (2.19), and the availability of vertical shelves (2.16). Finally, there are two

attributes in the dimensions of maintenance and handling, namely solid waste and liquid waste (2.05), and health and stamina in betta fish (2.12).

The overall results of the leverage analysis for the five aspects produce 18 attributes that are key factors in the betta fish micro-enterprise. The key factor attributes are selected based on the RMS value with a minimum value of 2.00. This key factor is important for developing a prospective betta micro-business strategy. This leveraged analysis approach is considered a practical decision support tool to identify the most desirable betta micro-business management scenario from the perspective of business actors (Coll et al., 2013b; Hasnidar, 2017; KKP, 2021), thus providing a good compromise between aspects of business feasibility, business strategy, market network, infrastructure, maintenance and handling of environmental, economic and social problems (Sukwika et al., 2018).

Table 1. Sixteen Elemens Key Factor for Betta Fish Micro-Business Attributes

Aspect	Attributes	RMS	Sub-Elemen (E) Alternatif RMS > 2,0
[1] Business feasibility	1. Business capital	2,73	1-3-4
	2. Operational costs	1,79	E1: Business capital
	3. Expenditure costs	2,18	E2: Expenditure costs
	4. Betta fish breeding production capacity	3,29	E3: Betta fish breeding production capacity
	5. Profits	1,55	
	6. Price stability	1,84	
	7. KUR (People's Business Credit) Covid-19 aid	1,47	
[2] Strategies of business actors	1. Placement of business locations	0,74	2-3-4-5-6
	2. Promotion of products	2,68	E4: Promotion of products
	3. Discounts	2,01	E5: Discounts
	4. Diversity of types of betta fish	4,51	E6: Diversity of types of betta fish
	5. Space for business premises	3,82	E7: Space for business premises
	6. Aesthetics and spatial planning	3,01	E8: Aesthetics and spatial planning
	7. Plank/banner information on business location	1,54	
[3] Market network	1. Social media community	2,66	1-2-3-4-5-7
	2. Online sales system	2,31	E9: Social media community
	3. Customer attraction	2,84	E10: Online sales system
	4. Access to market information	3,24	E11: Customer attraction
	5. Exhibition/bazzar	2,41	E12: Access to market information
	6. Exotic category fish competition	1,68	E13: Exhibition/bazzar
	7. Fish collection barter	2,12	E14: Fish collection barter
[4] Infrastructure	1. Fish media jar	1,15	5-6
	2. Aquarium	0,64	E15: Water circulation
	3. Tub/drum	1,12	E16: Vertical rack
	4. Oxygen supply	1,62	
	5. Water circulation	2,16	
	6. Vertical rack	2,19	
	7. Lighting	0,48	
[5] Maintenance and handling	1. Supporting equipment	1,20	3-5
	2. Media for breeding	1,85	E17: Health and stamina of fish
	3. Health and stamina of fish	2,12	E18: Solid and liquid waste
	4. Medicines	1,90	
	5. Solid and liquid waste	2,05	
	6. Sanitation	1,65	
	7. PH of water	1,63	

Betta fish is one of the most popular fish during the Covid-19 pandemic. The fish that was previously famous for pitting, has now become a display for ornamental fish lovers. The variety of colours and the relatively easy way of maintenance are the main attractions of this fish. The minimal means needed are just a jar or aquarium. So actually, this is very profitable business potential.

Besides the capital is not too expensive, even in this digital era, traders can sell online (Hasnidar, 2017; Karimah et al., 2012; Khoironi & Saskara, 2017).

The blessing of betta fish is felt by various groups, some are taking advantage of opportunities from the booming betta fish, such as being the host of betta fish auctions, as betta fish feed producers and there are also producers of aquariums or jars of betta fish. This is triggered by the increasing number of breeders, considering that betta fish are easy to breed and produce thousands of tillers. According to Lam & Pitcher (2012) the continuous interaction between ornamental fishery enthusiasts can lead to market demand, innovative technology for cultivation and maintenance, and emerging market micro-business.

ISM

The relationship between the power-dependence driver and the hierarchical structure of the constraint elements is presented in Figure 1. The figure shows that the Expenditure costs (E2) sub-element is in the independent cluster quadrant and has the highest driving force in encouraging the increase of key factor sub-elements at the level of five, namely betta fish breeding production capacity (E3), diversity of types of betta fish (E6), and health and stamina of fish (E17). Other improvements are directed at the level of thrust rating in fourth place, namely water circulation (E15), vertical rack (E16), and solid and liquid waste (E18) which are also in the independent sector. This means that if the elements in the independent cluster are carried out, performance improvements in the short term can fix the most common problems often faced by betta fish micro-business, namely the sub-elements in the independent cluster. Furthermore, the medium-term performance change strategy for the development of betta fish micro-business can be focused on the key factor sub-elements that are in the linkage cluster quadrant. The strengthening of key factors was focused on the sub-elements of business capital (E1), promotion of products (E4), discounts (E5), and exhibition or bazaar (E13). For the record, the sub-elements that are in this linkage cluster need to be studied carefully because the relationship between the sub-elements is unstable. Each action on these sub-elements will have an impact on other variables and the feedback on their influence can increase the impact. The effectiveness of improving performance is largely determined by the successful implementation of key factors in the independent cluster quadrant. Finally, in the long-term strategy, encouraging business actors to develop key factors for betta fish micro-businesses through strengthening key factors in the dependent cluster quadrant. The sub-elements are space for business premises (E7), aesthetics and spatial planning (E8), customer attraction (E11), access to market information (E12), and fish collection barter (E14).In this quadrant, there are generally sub-elements that are not independent or influenced by sub-elements from other quadrants.

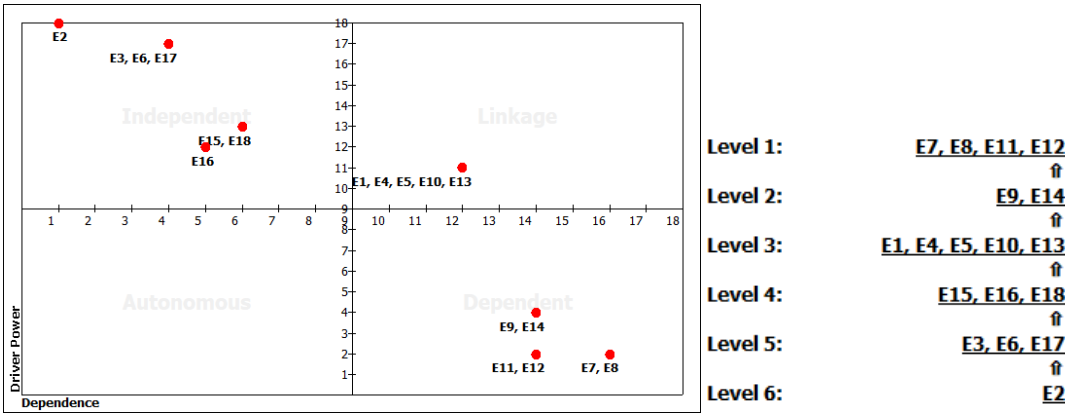

Figure 1. Map of Driver Power and Dependencies of Hierarchical Structuring for Development Scenarios of Key Factors in Betta Fish Micro-business

Based on the distribution map of the sub-elements in Figure 1, the sub-element of the cost of spending on betta fish is a top priority to find a solution. Gradually, all the sub-elements included in the independent cluster quadrant, the handling of which is prioritized in the short-term scenario. Betta fish micro-business actors are often faced with problems due to production costs and fluctuating betta fish prices. Khoironi & Saskara (2017) state that high expenditure costs in betta fish micro-business are the purchase of ornamental fish medicine which is actually more expensive than the price of the fish, and the cost of electricity expenditure. The ability of micro-business cultivators to maintain the health and stamina of betta fish is still very limited. Likewise, the ability to produce betta fish production capacity is still not optimal, not even in accordance with market demand (Anwar, 2019). Therefore, increasing human resource management capacity for micro-business cultivators can improve income and operational costs (Andriani et al., 2011).

Betta fish have their own beauty. The parameters of beauty can be measured by color and attractive physical shape (Ferdian & Fitrani, 2017; Waisapy et al., 2021). The potential factor for decreasing the price of betta fish often occurs due to the increasing number of cultivators and similar traders. Indications of this decline can be seen from the price of betta fish, which at the beginning of the boom could reach millions of rupiah and the cheapest was Rp. 100,000. While now the price is only able to survive at Rp. 30,000 which is the most expensive and even Rp. 3000 is also available. As for the anticipation, cultivators usually take the initiative to hold a betta fish contest. This is an effort to maintain the quality of its production. Including doing crosses to produce new betta fish color variants. In cultivation, the process of hatching betta fish is very easy and can be learned by ordinary people, many people are looking for profit by breeding betta fish. Betta fish consumers are very interested in the collection of betta fish species diversity. This diversity is highly dependent on the time of the cultivation process, starting from the selection of brooders, the spawning process, the maintenance of eggs and larvae, and feeding (Prasadi, 2019).

Traders often place betta fish in separate jars. On the other hand, the availability of vertical shelves for placing jars of betta fish is minimal. Thus, the fish are put together in one storage container which of course can compete with each other and cause the fish to die and or be physically disabled. Good water and air circulation facilities produce good survival rates so that they can increase the productivity of betta micro-business actors. On the other hand, poor water circulation facilities affect the water quality for betta fish. Solid waste that sinks can interfere with the betta fish hatchery and rearing process, and ultimately interfere with the betta fish production process (Yulianto et al., 2014).

Under certain conditions, if it is found that a betta fish has a disease, then throw it away immediately rather than the disease spreading to other fish. On the other hand, micro-business do not make quarantine and treatment efforts, it is considered more effective to protect healthy betta fish, and efficient to reduce costs (Khoironi & Saskara, 2017). The role of social media can help increase knowledge on ornamental fish market information. The value of ornamental fish breeding culture is determined by culture and hobbies (Lam & Pitcher, 2012). This pattern can be seen from the strategy of promoting the superior product of ornamental fish commodities, and optimizing access to market information by building the sustainability of the existing network.

CONCLUSION

There are 18 key factors that are considered to be able to determine the prospects for the sustainability of the betta micro-business. The key factors in each aspect are used as elements in the preparation of a betta micro-business development strategy in the future. Obtained six levels of mainstream betta fish micro-business development strategy. Recommendations for the implementation of strategic planning development scenarios starting from level six to one which are divided into three time periods, namely, short-term levels six, five, and four, medium-term levels three, and long-term levels two, and one.

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