ISSN:1991-8178

Australian Journal of Basic and Applied Sciences

Journal home page: www.ajbasweb.com

Environmental and Management Indicators as Competitive Differentials in Aquaculture Production

[1]Luísa A. Paseto, [2]Marco Túlio Ospina Patino, [3]Milla Reis de Alcantara and [4]Helenita R. da Silva Tamashiro

[1] *UNICAMP – University of Campinas, Pos Graduation Program in Agricultural Engineering* , FEAGRI, Campinas. Brasil.
[2] *University of Campinas (UNICAMP) – Master's and Doctoral Program in Agricultural Engineering, Campinas, Brazil*
[3] *University of Campinas (UNICAMP) – Pos Graduation Program in Agricultural Engineering, Campinas, Brazil*
[4] *FMU – Laureate International Universities – Post Graduation Program in Administration of Organizations, São Paulo, Brazil. Reges College – Professor of Graduation in Administration, Ribeirão Preto, Brazil.*

ARTICLE INFO

Article history:
Received 3 October 2015
Accepted 31 October 2015
Published Online 17 December

Keywords:
Strategic planning, core competencies, value chain, competitive advantage, market intelligence.

ABSTRACT

Scientific knowledge for sustainable economic development is faced with the need to provide solutions that integrate social and environmental indicators and their related production and management processes. In this study, multidimensional and functional indicators of aquaculture production activities were analyzed based on the concepts of industrial organization and the development of the value chain. The objective was to analyze and identify production and management activities, which generate competitive advantage in aquaculture enterprises. The universe investigated was represented by 26 aquaculture enterprises, located at the Furnas Reservoir in the Capitolio region of Minas Gerais, Brazil. The results demonstrate that environmental management indicators and management practices stand out as opportunity for improvement in the production chain. Technology and scientific knowledge transferred to aquaculture producers are key factors to achieve competitiveness.

To Cite This Article: Luísa A. Paseto, Marco Túlio Ospina Patino, Milla Reis de Alcantara, Helenita R. da Silva Tamashiro., Environmental and Management Indicators as Competitive Differentials in Aquaculture Production. ***Aust. J. Basic & Appl. Sci.,*** *9(33): 229-233, 2015*

INTRODUCTION

Aquaculture is the fastest growing sector in world food economy with 11% annual growth over the last decades this record growth signals a fundamental change in the diet of people globally (FAO, 2012). The use of programs of Best Management Practices (BMP) in aquaculture properties has guaranteed the fish farmers a set of requirements, adjustments and traceable procedures applied to production allow the acceptance of the procedure as a performance indicator environmental, recognized in the market and end consumers and social responsibility of the products and aggregate quality.

To ensure good management and monitoring practices (BPGM) in net tanks should be noted factors such as sediment in reservoirs and ponds, fish removal and product quality, feeding and water resources among others (FAO, 2012). Prahalad (2009, 2010) in its concepts corroborates the BPGM recognized as an opportunity to develop skills involving collective work of the stakeholders involved.

The implementation of creative solutions to lower cost; increase value chain efficiency and its stakeholders, taking advantage of expertise in management techniques for production less carbon-intensive operations; and the development of organizational flexibility to adapt to new models of dialogue with consumers and stakeholders, adds value to products with management models able to capture the foundations of competitiveness.

In the global fish market, organizational competitive advantages are highlighted in business strategies of positioning and product differentiation. These strategies emphasize a strong and recognized brand, investments in technological development and innovation, resulting in better quality products that enhance the measurement of productivity gains (FAO, 2012).

In the Norwegian system, a leading global producer of farmed fish, the producer has good infrastructure for storage and transportation of production and high level of scientific research to ensure the quality, management and appropriate and necessary management to sustainable development and competitive activity.

For the Brazilian context, understanding the natural habits (environment, beliefs, culture) and the

Corresponding Author: Luísa A. Paseto, UNICAMP – University of Campinas, Pos Graduation Program in Agricultural Engineering , FEAGRI, Campinas. Brasil.
Tel: 55 19 992023785; E-mail: luisa.paseto@feagri.unicamp.br

technologies applied to aquaculture is not restricted to the productive dimension of activity, but also the need for planning and technological and informational restructuring related to the cultivation, management and the livelihoods of producers involved in the value chain.

Rodrigues *et al*., (2013) explained that efficiency of organizational planning programs with environmental management depends on the inclusion in the analysis of indicators with multiple representative scales about production, knowledge, skills and technology in an interrelationship between the stakeholders in order to identify opportunities for improvement in productivity and competitiveness.

In this sense the hypothesis of this study is associated with the identification of training needs in environmental management as a competitive advantage generator element in aquaculture ventures. Therefore the aim was to analyze and identify production and management activities, which generate competitive advantage in aquaculture enterprises.

MATERIALS AND METHODS

The identification of competitive advantage in selected aquaculture ventures, was started by choosing the data collected by the APOIA/Aquaculture system. This system (APOIA/Aquaculture), was chosen because it is considered an efficient systematic approach in the evaluation of sustainability in agriculture and the environment (FAO, 2012). The APOIA system is devoted to the knowledge and training of the stakeholders involved in the aquaculture value chain. Its dimensions and basic criteria of impacts and weaknesses of production reflect a diagnosis considering a suitable production to good aquaculture practices (GAP) and or production management (Rodrigues *et al*., 2006).

The primary data for the creation of the questionnaire were collected from the APOIA system considering variables in technical disarray such as: frequency and feeding schedule, amount of feed and consumption calculation, sediment quality, production cycle planning, control and use of medicines, control and registration of the final product, population density, water quality, dead fish disposal procedure, measuring size and weight, feed adjustment, source of fingerlings, knowledge about health and mortality, and distance from pollution sources.

The universe investigated by the study was represented by 26 aquaculture enterprises, located in the Capitolio region of Minas Gerais, on the shores of Furnas Reservoir, in the middle reaches of the Grande river, Brazil. The group of stakeholders who answered the questions was composed of 17 producers, six employees belonging to the technical assistance, research and extension teams, a representative of the public administration, a community organizer and a supplier of feed, supplies and equipment.

The first two questions analyzed and identified the profile and characteristics of respondents. This profile showed that 35% of them have experience of up to 5 years in aquaculture production in tanks-net and the rest 65% have up to 10 years of experience. Among the producers, 55% have other activities that compound their total income and 45% derive their income exclusively from aquaculture activities.

The other questions focused on obtaining answers to four levels of knowledge. First, the type of technical expertise, second, the knowledge in environmental management, third, knowledge in management and organizational management, and fourth, asking about the synergy and dialogue between the stakeholders involved in the value chain.

The approach applied to identify the less used variables in generating competitive advantage of aquaculture enterprises (Gallopín, 1996 and Mangabeira *et al*., 2002) uses an indicator of influence or priority with a scale of values from 1 to 5, where five indicated the total absence of influence or priority of the variable and one strong influence or priority associated with the whole production activities.

The first level interrogative (question number 3) provided information about the type of technical knowledge that the producer considers a priority to improve their activity and enjoy participation opportunities in the market. In this questioning level the answer choices were: population density of tanks-net, work size and weight measurement, frequency and feeding schedule, set the type and amount of feed and feed consumption calculation.

The focus on the second level (question 4) intended to know what kind of knowledge in environmental management generates competitive advantage in aquaculture production. The answer choices presented as training needs indicators were: density in the tank-net, distance from the source of pollution, water quality, sediment quality and origin of the fry.

Knowledge management and administration skills that the producers believe that are necessary to create competitive advantage in their product, was the focus of the third level (question 5) and considered variables such as planning of the production cycle, knowledge on health and mortality, knowledge and use of medicines, disposal procedures / disposal of dead fish and control and registration of the final product.

The last level (question number 6) included questions to evaluate how and with whom the stakeholders seek guidance for troubleshooting production and trade, allowed an insight into the dialog within the value chain between the stakeholders.

The analysis of the strengths and weaknesses of

aquaculture enterprises are particularly important to identify key elements for the management and administration by establishing priorities for action in the preparation of strategies for growth, opportunities and organizational risks resolution (Soares *et al*, 2008).

The studies of Goldschmidt, 2006 and Duncan *et al*., 1988 explored a vision for competitive advantage where a strong or weak point to affect the operation of the company, causes the need to improve, turning this into an organizational opportunity. These authors consider that the degree of administrative influence of drivers indicators of cost control and or product differentiation can be classified and identified as differentiating inducing product (uniqueness driver) or inducers cost of differentiation (cost driver) when creating competitive advantages.

RESULTS AND DISCUSSION

According to the respondents out of the fifteen (15) indicators identified as disrupt activities by the APOIA system, only six (6) stands out as priorities for technical training and knowledge. These indicators are: frequency and feeding schedule, measuring of size and weight, origin of fingerlings, sediment quality, procedures and disposal of dead fish and knowledge and use of medicines (Table 1).

Table 1: Key technical and administrative indicators (activities) to increase competitiveness.

Influence	1	2	3	4	5
1. Population density in tanks-net	13 (50%)	8	3	1	2
2. Amount and calculation of feed	8	7 (27%)	7	2	2
3. Adjust the feed Type	1	6	8 (30%)	9	2
4. Frequency and feeding schedule	4	3	3	7(27%)	9
5. Measurement of size and weight	0	2	5	7	11(42%)
6. Water quality	11(42%)	11	2	1	1
7. Distance from the source of pollution	6	9(34%)	3	1	7
8. Population density of the tanks- net	1	4	9(34%)	9	3
9. Origin of fingerlings	7	1	5	8(31%)	5
10. Sediment quality	1	1	7	7	10(38%)
11. Planning of the production cycle	20(77%)	4	0	0	2
12. Product registration and control Final	2	10(38%)	5	4	5
13. Knowledge of health and Mortality	3	7	10(38%)	5	1
14.Procedures and disposal of dead fish	1	1	5	11(42%)	8
15. Knowledge and use of Medicines	0	4	6	6	10(38%)
Source: Created by the authors					

An increase in training and knowledge of indicators related to use of medicines and feeding frequency and time would provide reduction on the cost of production, avoiding losses in the supply of feed and medication. Since realignment in relation to the importance of preserving, the quality of sediment indicates a difference in product quality perceived by the market.

Similarly, monitoring of training and knowledge of aquaculture producers regarding the measuring of size and weight of the fish, source of fingerlings and disposal procedures for the dead fish, induce a production that responds best in quality, efficiency and productivity.

The responses about the dialogue among stakeholders in the value chain indicate that the producers (58%), primarily share with each other their doubts regarding technical and marketing solutions, however a there is a recognition (50%) of the significant importance of the dialogue with the stakeholders in charge of the technical assistance, research and extension. A weak point in the analysis is aimed at supplier's stakeholder inputs and equipment 58% of respondents indicates low influence. Communication with public and community managers was indicated for 35% of respondents as low influential and deserves attention for synergistic enhancement.

Hence the challenges and constraints of creating competitive advantage by improving the dialogue between the stakeholders of the value chain determines diverse tasks when looking for knowledge for solving technical and business problems.

Associated and independent producers will have to look for the necessary professionalism in management, administration and technical development in order to get productivity gains and competitiveness.

Technical support, research and rural extension officials have to improve the dialogue with end users with information about improvement in production costs and quality applied to the entire production cycle.

Public and community managers have to develop awareness and networking of relationship with confidence and common purpose, focusing on water quality, regulatory and legal compliance of the activity and water resources.

Suppliers of raw material and equipment will have to develop linkages with associated and independent producers for more efficient production, and final product handling and transportation to the markets.

It is noteworthy in Andrade and Rossetti (2004) that some features for better placement in rural business market should be improved because when added value to the final product, a competitive

advantage can be achieved, recognized in the sum of the involvement of the parties and the recognition enhancements for training, knowledge and information management and environmental management.

In the survey, the stakeholders indicated that the business institutional environment reacts positively with the introduction of management in aquaculture properties and 73% of stakeholders accept management as a tool to inducing positive changes. There was consensus in 69% of members and independent owners, that the organizational strategies of access and participation in the markets, require productivity differentials identified in quality and cost of the final product.

These results are in concordance with surveyed literature indicating that the domain that the producer has on the process, techniques and management of their organizational activity (external and internal) influences an efficient and profitable rural business (Mangabeira *et al*. (2002); Gallopín, (1996); Oliveira *et al*. (2013); Soares *et al*. (2008)).

Also, the analysis of competitiveness and productivity in Porter's studies (1985), indicate that the gap value chain dialog flow, business has strategic importance for social responsibility and it is a potential to differentiate each business process (competitive intelligence), contributing to the optimization of the final value of the product in the market. Whereas this author (Porter, 1998) and also Prahalad, (2009) consider the competitive intelligence in a strategic planning vision were a collective analysis and the study of the behavior of agents within the industrial structure, are responsible for organizational competitive failure or success; Davenport (2000) and Santos (2000) describe competitive intelligence, as a holistic design vision of the informational environment, internal and external at the company.

The positive results of the analysis of indicators of this study indicate a direction to better tuning of rural enterprises with the market and the pursuit of excellence of rural enterprises. It can be seen in the analysis of responses to valuation information, knowledge and training, as part of the strategic resources, able to provide competitive advantage against the competition (Prahalad, 2009; Hamel, 1993; Brinkman, 1987).

Pointing out a direction for better alignment of the farm with the market in Brazil, opens up possibilities of technical-economic and environmental analysis for recognition and improvement of competitiveness and productivity in the sector (FAERJ/REDETEC, 2010).

Conclusions:

Using the concepts of business strategies related to the positioning performance attribute inside and outside of the organization (Porter, 1985), and its dynamic capabilities (Prahalad and Hamel, 1990 and Prahalad, 2010), allows multidimensional analysis for recognition of competitive advantage in the interaction between skills and market opportunities (routine of organizational processes).

The analysis of technical, social and environmental indicators for good environmental management practices that generate competitiveness showed similarities with the difficulties reported by farmers, when it comes to access to management tools, administration and production costs for planning and rural farming.

The different levels of analysis of the understanding of stakeholders, pointed out the specific need of aquaculture producers to understand productivity and competitiveness built from the performance and quality within the production process. The improvement in knowledge and training in the management of the activities within their production cycle generate a possibility of a production at lower cost. The development of skills and knowledge in environmental management and administration systems should include management, scientific and technological content in continuous dialogue and flow of the stakeholders involved.

The results also indicate that environmental management indicators and management practices stand out as opportunity for improvement in the production chain efficiency. Technology and scientific knowledge applied to production are key to achieving competitiveness of tilapia production in tanks-net in the Capitolio/MG region and the synergy of dialogue between stakeholders is the challenge to be pursued.

ACKNOWLEDGEMENTS

The authors would like to express thanks to EMBRAPA Environment for helping in data collection, technical guidance, referential support and use of the APOIA Aquaculture system.

REFERENCES

Andrade, A., J.P. Rossetti, 2004. Governança Corporativa: Fundamentos, Desenvolvimento e Tendências. Editora Atlas. São Paulo, 594.

Brinkman, L.G., 1987. The Competitive Position of Canadian Agriculture - Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie, 37: 263-288.

Davenport, T.H., 2000. Ecologia da informação: por que só a tecnologia não basta para o sucesso na era da informação. Tradução de Bernadette Siqueira Abrão. 3. ed. São Paulo: Futura.

Duncan, J.W., 1988. Competitive advantage and internal organizational assessment, Academy of Management Executive, 12-3. Disponível em: <http://turbo.kean.edu/~jmcgill/assess.pdf>.
Acessado em: 20 set..

FAERJ/REDETEC, 2010. Diagnostico Da

Cadeia Produtiva Do Pescado Fluminense. Disponível em <http://www.querodiscutiromeuestado.rj.gov.br/CMS/uploads/publicacoes/09.08.13-09.37.56-diagnostico_pesca_maritima_comercial_rio_de_janeiro.pdf>. Acessado em: 20 set. 2013.

FAO, 2012. Organização das Nações Unidas para Agricultura e Alimentação. The state of world fisheries and aquaculture. Roma. Disponível em: <http://www.fao.org/docrep/016/i2727e/i2727e00.htm>. Acessado em: 05 jul. 2013.

_____, 2012. Fishery and aquaculture country profile. Disponível em:<http://www.fao.org/fishery/countrysector/FI-CP_CN/5/ >. Acessado em: 17 set. 2013.

Freeman, R.E., D.L. Reed, 1984. Stockholders and Stakeholders: A New Perspective on Corporate Governance. California Management Review. Spring, 83(25): 3-88. Academic Journal.

Gallopín, G., 1996. Environmental and sustainability indicators and the concept of situational indicators. A systems approach. Environmental Modeling and Assessment, 1(3): 101-117.

Gallopín, G.C., 1997. Indicators and their use: information for decision-making .In MOLDAN, B.; BILLHARDZ, S. Sustainability Indicators: report of project on indicators of sustainable development. New York: J.Wiley and Sons.

Goldschmidt, A., 2006. Análise SWOT na captação de recursos – avaliação de oportunidades, ameaças, pontos fortes e pontos fracos. Disponível em: < http://integracao.fgvsp.br/ano6/06/financiadores.htm >. Acessado em: 14 abr. 2014.

Hamel, G., C.K. Prahalad, 1993. Strategy as stretch and leverage. Harvard Business Review, 71(3): 75-84.

Mangabeira, J.A., C. De, A.R. Romeiro, E.C. Azevedo, De, M.M.H. Zaroni, 2002. Tipificação de sistemas de produção rural: a abordagem da análise de correspondência múltipla em Machadinho d Oeste-RO. Campinas: Embrapa, 2002. 30 p. (Embrapa monitoramento por satélite - circular técnica, 8).

Oliveira, T.B.A., A.C. Bornia, M.W. Oliveira, 2013. Gestão do conhecimento na produção de cana-de-açúcar. Anais. XIII SEPROSUL - Semana de la Ingeniería de Producción Sudamericana- Junho de, Gramado – Brasil. Meio magnético.

Porter, M., 1980. Competitive strategy. New York: Free Press.

_____, M., 1985. Vantagem Competitiva: Criando e sustentando um desempenho superior. Ed. Campos, RJ.

_____, M., 1991. Towards a dynamic theory of strategy. Strategic Management Journal, 12: 95-117. Winter.

_____, M., 1996. What is strategy? Harvard Business Review, 74-6.

_____, 1998. A vantagem competitiva das nações. Rio de Janeiro: Campus.

Porter, M., K. Schwab, 2009. The Global Competitiveness Report, Geneva Swiss. Published by the World Economic Forum within the framework of the Global Competitiveness Network.

Prahalad, C.K., G. Hamel, 1990. The core competence of the corporation. Harvard Business Review, 68-3.

Prahalad, C.K., 2009. Em busca do novo – Entrevista Revista HSM.

_____, 2010. Why Sustainability is now the key driver of Innovation. Harvard Business Review. Disponível em:< http://hbr.org>. Acessado em.

Queyras, J; Quoniam, L. Inteligência competitiva. In: TARAPANOFF, K (Org.). Inteligência, informação e conhecimento. Brasília: IBICT; UNESCO, 2006. p. 73-97.

Rodrigues, G. S.; Campanhola, C.; Rodrigues, I.; Frighetto, R. T. S.; Valarini, P. J.; Ramos-Filho, L. O., 2006. Gestão ambiental de atividades rurais: estudo de caso em agroturismo e agricultura orgânica. Agricultura em São Paulo. v. 53, n. 1.

Rodrigues, G.S., J.F. Queiroz, de, R.T.S. Frighetto, F.G. Sampaio, C.M.D. Frasca-Scorvo, K.R. Couto, I.A. Rodrigues, 2013. Best Management Practices and Environmental Management in Aquaculture – Indicators for Monitoring in Multiple Scales. 4th International Workshop Advances in Cleaner Production. São Paulo, Brazil. Disponível em: <http://www.advancesincleanerproduction.net/fourth/files/sessoes/6B/7/rodrigues_gs_et_al_work.pdf>.Acessado em: 13 ago. 2013.

Santos, R.N.M., Dos, 2000. Métodos e ferramentas para gestão de inteligência e do conhecimento. Perspectivas em Ciência da Informação, Belo Horizonte, 5(2): 205-215.

Soares, I., C. Pinho, J.E. Couto, J. Moreira, 2008. Decisões de Investimento - Análise financeira de projectos. Lisboa: Edições Silabo.