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Analysis of creating value in aquaculture enterprises through economic social and environmental indicators

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Environmental issues play an important role as regard the direction of the economy and public policy. Even though fragmented scientific knowledge does not interact in dialogue and appropriate continuous flow to sustain economic development, it is placed to ensure the need to seek knowledge capable of capturing the multi-causalities and interdependence in the natural order of processes (production) and social (environmental) which determine and delineate technical, economic indicators (competitiveness). This study analyzed the environmental and technical indicators and their degree of influence on the competitive advantage of forming the value chain of aquaculture enterprises in Capitólio/ MG, Brazil. Two economic streams on business strategies guided the study evidence to a competitive advantage. The first was positioning as a performance attribute inside and outside of organizations and the second recognized the collective capabilities as components of a dynamic value chain inter-related to inclusion and recognition of these components by the market. The methods used in this research included the analysis of biophysical, political, cultural and economic dimensions, with a multidisciplinary view of the indicators in the value chain in order to determine how they can generate competitiveness. This approach used the analysis of strengths and weaknesses as an essential step in defining the interventions needed in the value chain. These interventions are defined according to the potential of creating competitive advantage in the production cycle as cost control drivers and or product differentiation drivers in the market. The results showed that strengths and weaknesses were directly related to productive activities such as the amount of administered food, stress diminishing and fish mortality, in addition to nutritional deficiencies that impair the final quality of the fish. These results express the possibility of using market share opportunities through the recognition and improvement of analyzed and defined indicators.

Key words: Value chain, core competencies, competitive, competitive intelligence, strategic planning.

INTRODUCTION

Aquaculture is the fastest growing sector in the world food economy, around 11% per year. During the last decades, this record growth signaled a fundamental change in the diet of people globally (FAO, 2012). The

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use of programs of Practice Management and Monitoring (BPGM) or Good Aquaculture Practices (GAP) in the world, has guaranteed fish farmers to a set of requirements, adjustments and traceable procedures that can be applied to production and accepted as an indicator of environmental performance. GAP in cages should note factors such as sediment, fish removal, product quality, feeding and water resources among others (BNDES Profarma, 2010). In Brazil, the fishing activity regarding economic aggregates and organizational development strategies presents difficulties of socialization of the information sector. The lack of an effective development policy limits the possibilities of technical-economic and environmental analyses of competitiveness and industrial productivity (FAERJ/REDETEC, 2010).

In the global fish market, organizational competitive advantages are evident in corporate strategies of positioning and product differentiation. These strategies emphasize a strong and recognized brand for investments in technological development and innovation, resulting in better quality products that enable greater measurement productivity gains (BNDES, 2008). The spread of these strategies is in pricing, where usually the productivity and cost are reduced with new technologies, are not passed on to the consumer by reducing prices. Examples of application of these strategic differences cod producing Port and Norway, as well as other producers in Chile and China (BNDES, 2008). Norway, a leading global producer of farmed fish, has a market with good infrastructure for storage and transportation of production, high level of scientific research to assure quality, management and the appropriate and necessary administration for the development of the activity.

In the Brazilian industry, they understand the natural habits (environment, beliefs, culture) and the technologies applied to production and are not restricted to the productive dimension, rather inter-relate to the need for technological restructuring, information, training and knowledge, which include socio-cultural changes related to the cultivation, management and also to the way of life of producers (Costa-pierce, 2007). Rodrigues et al. (2013), explained that efficiency of environmental management programs depends on the encompass of the indicators, multiple representative scales in production, knowledge, training, and technology in an interrelationship between the enterprise and the community.

In this regard, following the global market drivers, it is appropriate to find evidence in the analysis of recognition and systematization of indicators for competitiveness. This demonstrates opportunity and differential competitive advantage in training, giving knowledge for environmental management, administration exploring and analyzing how to carry out the cultivation and management activities during the production cycle (identification and compliance with good aquaculture practices). The objective of this study was to analyse the environmental and technical indicators and their degree of influence on the competitive advantage of forming the value chain of aquaculture enterprises in Capitólio/ MG, Brazil.

MATERIALS AND METHODS

The knowledge identification methodology and training of stakeholders involved in the aquaculture value chain was a systematized primary data collected by APOIA / Aquaculture System (Rodrigues et al., 2006) from August 2012. The APOIA / Aquaculture were chosen because it is considered as a milestone in the systemic evaluation of sustainability on the farm and the environment (FAO, 2010). Its dimensions and basic criteria of impact and weaknesses of production reflect a diagnosis, considering a suitable production for GAP or Production Management which is aimed at recognizing the competitive advantage.

The samples analyzed were obtained by interviewing 26 fishermen involved with the activities of the production cycle in net-cages, during training and technical improvements meetings. They were on the shores of Furnas Reservoir, in the middle course of the Rio Grande, covering the municipalities of Guapé, Capitólio, and Pimenta located at Capitólio city, Minas Gerais State.

The competitive advantage of the intervention point of view in the development of indicators and stakeholders in training, management knowledge, and administration were investigated under a set of applied questionnaire variables with stakeholders on specific technical meetings. The primary data used in the construction of the questionnaire (systematized by APOIA / Aquaculture system) was gotten from the following variables: frequency and feeding schedule, amount of feed and consumed feed, sediment quality, planning, production cycle control and used medication, final product control and record, population density tanks, water quality, procedure discarding dead fish, size measurement and weight adjustment type of food, source of fingerlings, health and mortality knowledge, thickening tanks network, and sources of pollution.

The method quantifies the competitive advantage of the indicators attributes in disarray through a technical knowledge to improve the aquaculture activity by seizing the opportunities of the market share. The analysis was carried out by knowledge type into competitive advantage by generating environmental management and knowledge in specific management and administration procedure and also by recognizing what the producer needs to increase the quantity and quality of his product.

In evaluating how and with whom the producers seek guidance for production and commercial problem solving, the responses indicate the existence or nonexistence of continuity and the dialog flow in the value chain between the different agents involved. To recognize the strengths and weaknesses of the SWOT analysis, the indicators expressing relations value chain inter-relationship should be systematized, alongside the degree of influence on the activity and type of expertise, environmental management, and administration.

Thus, with the SWOT analysis results adapted in line with the expectations of stakeholders for production in GAP, the competitive evaluation oriented positioning of companies was organized. This organization of information and integrated data (external and internal elements) allows the organization resulting in a diagnosis of customized information and support that tailored to the needs of knowledge and skills in strategic management and administration for the development of aquaculture.

Table 1. Skills for competitive advantage by the stakeholders*.

Associate and independent producers	Technical support, research rural extension	Public and community manager	Input and equipment suppliers
Management and technical development for productivity and competitiveness	Symmetrical dialogue flow in production costs and quality applied to the production cycle.	Improvement in governance network for public policy. Regulatory and legal compliance and water resources.	Symmetrical dialogue flow in efficient production, consumption and handling of feed and other aspects.

Developed by the author with data analyzes and on-site observation of production.*Prahalad (2009, 2010), Hamel and Prahalad (1993) and Teece (1997), source of competitive advantage for interaction between skills and market opportunities.

RESULTS AND DISCUSSION

The responses of those surveyed and analyzed stakeholders indicated that the institutional environment reacted positively with the introduction of management tools in the properties, and were considered strong inducers to change, either in costs or differential in the product. There was also a consensus that strategies to enter and remain in the markets demand productivity differentials, especially in quality and practices to reduce the final cost of the product. It was also identified that the flow of dialogue between stakeholders was not continuous, indicating the possibility of intervention and improvement. Priori producers share their questions, and their technical and marketing solutions among themselves. This is seen as a strong point for improvements, acceptance of knowledge and training in improved production, and dialogue flow between value chain actors. Two streams of business theories and strategies are in line with the results achieved in the search for a competitive advantage. The first positioning strategy with competitive advantage is an interior performance attribute outside of the organization. This is with the determination that the behavior of agents in the industrial structure is the main cause of failure or competitive organizational success (Porter, 1985).

Complementarily, Prahalad (2009, 2010), Hamel and Prahalad (1993) and Teece et al. (1997) opine that dynamic capabilities are a source of competitive advantage for interaction between skills and market opportunities (routine organizational processes). Table 1 summarizes the challenges and constraints to improve the competitive advantage in the value chain by stakeholders and positively aiming theories explored in producing farms tilapia in cages.The information system development process for knowledge and training in environmental management and administration covered: management, scientific and technological content in continuous dialogue. The flow of stakeholders was involved and presented as challenges that must move towards the recognition of human intelligence and technology in collective synergy. In general, the organizations in their strategic planning have difficulty in collecting and storing information for decision-making, and to process them to become useful in the process (Porter, 1991, 1996; Davenport, 2000; Santos, 2000) (holism view the information environment).

The analyses indicate that there is a natural connection between information management and strategic organizational management, which remains undeveloped as an integration tool in the management of the organization. Table 2 shows inducers strengths, drivers of cost control, and differentiating the product and its correlation influence on the supply chain which allows the identification of the relative production unit in need of intervention. The analysis and definition of the strengths and weaknesses in the production process helped in identifying potential indicators of competitive advantage that can be reduced or eliminated with interventions of knowledge and training processes (Goldschmidt, 2006; Duncan et al., 1998).

The analyzed organizational challenges visualized a greater need for professionalism of producers not only on the production cycle but mainly on environmental management and business administration. This will ratify the need for alignment (vertical and horizontal) in the dialog flow between the value chain stakeholders, improving the relationship of technical information and the effective gains provided by environmental management and administration of companies. Table 3 shows weaknesses in drivers and cost control inductors and product differentiation, highlighting the influence of the indicator in the production chain and its drive for intervention.

Conclusions

The positive indicators of the analysis indicate a direction to better tune with the market and the pursuit of excellence valuing information, knowledge and training, as part of strategic organizational resources capable of providing a competitive edge against competition for rural producers (Prahalad, 2010). Some features such as production cost and differentiation for quality in the value chain and its links for better placement in the market should be improved in rural enterprises.

Identifying the perceptions of stakeholders in the production process in conjunction with the organizational systematization of indicators determines the intervention knowledge and training in management and administration, allowing the adjustment of production and

Table 2. Potential for competitive advantage creation*.

Indicators strengths	Influences on chain production value**	Production cycle step for Intervention
Strengths: Drivers of Cost Control*		
Frequency time feed	The number of daily treatment schedules and fixed supply of feed are important to prevent waste or lack of food and disease.	*** Feeding
Amount of feed and calculation consumption	It is Necessary to monitor the amount of administered food, because it interferes directly on mortality and feed consumption	*** Feeding
Knowledge medicines use	The use of medicines indiscriminately cannot provide effective correction of the problem burdening the cost of production.	Animal health
Population density in the cages	In the ideal growing conditions in cages, it is expected 95 % survival.	*** Feeding
Strengths: Drivers for product differentiation *		
Quality sediments	The amount of phosphorus and nitrate are a record of the cumulative effects of deficiencies with respect to organic matter and other indicators.	Quality of sediments
Planning productive cycle	Track tilapia cultivation in cages contributes to implementation of management and administration in the production strategies.	Management and operations.
Final control and product registration	It allows introduction of traceability technology, indicating the origin of the fish	Animal health

Made with primary research data.* Prahalad, 2010; Porter and Schwab, 2009; Goldschmidt, 2006; Duncan et al., 1998. **FAO, 2010; 2013 and Rodrigues et al., 2006, 2013. *** Feeding: the act of distributing food to planning and rule.

the redirection of competitive advantage of creating sources (Queyras and Quoniam, 2006).

Good aquaculture practices add value to products with management models capable of capturing the basis of competitiveness. This is recognized as an opportunity for skills development involving the collective work, enabling the deployment of creative lower cost solutions, increased efficiency in the value chain and its stakeholders *(*Prahalad and Hamel, 2009; Montgomery and Porter, 1998). By sharing expertise in management techniques and to develop organizational flexibility, it is easier for the rural organization to adapt to new market models that strive for dialogue with consumers and stake holders. The systemized indicators point to less likely aquaculture owner of intervention necessary for the improvement of competitive differentials in knowledge management and administration of its production (FAERJ/REDETEC, 2010; FAO, 2012; BNDES, 2010; Rodrigues et al., 2013).

The farms directed to sustainable development, need improvement and training for production growth. Small adjustments, better use of synergies and dialogue among stakeholders, should be presented as tools for the exploitation of potential opportunities to create competitive advantage in decision making and planning by landowners (Montgomery and Porter, 1998). An efficient and profitable rural enterprise depends on the producer of the field of process, production techniques and the management of its production, the actions or the production process operations work as product differentiators and consequential cost; thus creating competitive advantages (Davenport, 2000).The analysis of the technical and environmental indicators (BPA) in accordance with the difficulties reported by producers, have access to management tools, management and production costs of the properties. Similarly, the answers point to the producer's need to understand productivity and competitiveness in production through the improvement in food quality and performance of production, improvement in knowledge and training in the management of the activities within the production cycle.

Creative solutions for training and knowledge of producers identified in the analyses are associated with management indicators recognized in the daily actions of training in production cycle (formal and informal), creating and using monitoring sheets, exchange of learning and improving dialogue with stakeholders supplier of input and governance (Costa-pierce, 2007).Thus the results demonstrate that the indicators of environmental management and identified administration in the analysis,

Table 3. Potential competitive advantage creation*

Indicators of strengths	Influences on the value chain **	Intervention in the production cycle
Weaknesses - Drivers of cost control *		
Measuring size and Weight	Biometry of fish every 15 or 30 days and control of dead fish every day.	Fish Removal and Product Quality
Feed type	The nutritional status of the fish depends on the quantity and quality of feed nutrients.	*** Feeding
Health and Mortality	Indicators of nutritional deficiencies that impair growth, and increase the incidence of disease and mortality.	Management and Operations
Densification of fish in the cages	The increase in density interferes with the quality of water and food, limiting productivity.	Space Organization
Distance to source of pollution	Available amounts of oxygen and toxic gas concentration limit productivity.	Space Organization
Weaknesses - Drivers for product differentiation*		
Water quality	Turbidity and dissolved oxygen indicators Interfere with the amount of food consumed by the fish.	Water Quality
Dead fish removal procedure	Dead fish need to be removed and buried.in the cooler hours of the day to minimize stress and fish mortality increases.	Animal Health
Origin of fingerlings	Fish good genetic quality respond positively to the intensive management (cages).	Animal health

Made with primary research data. * Prahalad, 2010; Porter and Schwab, 2009; Duncan et al., 1998. ** FAO, 2010, 2013 and Rodrigues et al., 2006, 2013. *** Feeding: the act of distributing food to planning and rule.

stand out as opportunity for improvement in the production chain efficiency and in the information to understand the natural habits (environment, beliefs, culture) beyond technology applied to production. Also, they are key to achieving competitiveness for tilapia cultivation in cages in the Capitólio/ MG region. Economic indicators, environmental competitiveness in aquaculture companies in tanks - network recognizes important inputs on competitiveness were the proposed systematization. This study only identified the impact of the training and knowledge in environmental management and administration in organizations, using standards GAP.

Conflict of Interests

The authors have not declared any conflict of interests.

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