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Coffee Production: An Analysis of Opportunities for Competitiveness

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***Abstract*—** *This study involved rural properties of the Brazilian Cerrado, which are necessarily consistent with the requirements of good agricultural practices for quality, innovation, and technology in the production and management of properties. Based on the knowledge and information as value-added production factors, we sought to highlight the opportunities for improving competitiveness, and thus a review of the literature on competitiveness, knowledge, and information as a differential factor for production with added value, innovation, and territorial technology as well as entrepreneurship. With the data from the field study, the objective was to show how knowledge and information, applied in production and social capital, can leverage competitiveness. The analyzes carried out using AHP indicate that some initiatives already aid in the promotion of innovation and technology applied to production, making it necessary, however, to encourage knowledge and information among producers and other stakeholders collectively, for the best costs and results. They also point to the low concern of producers with training and other productivity improvement techniques, such as selective harvesting. Authenticated that the producers opt for the sale of their production via commodity, aiming to profit quickly. Reasons for this are, in the non-perception of value added (sales in commodity); in the absence of rural structure for the processing and harvesting of the coffee required for special sale; in the precariousness of collective export agents (cooperatives are dependent on traders) and deficiencies in management for positioning in the properties (most work in scale).*

***Keywords*— Knowledge, Social Capital. value added.**

I. INTRODUCTION

Brazilian coffee growing over the years has survived numerous economic crises, which have resulted in severe losses to coffee farmers and the nation.

The monitoring of production costs and social capital, up to the mid-1990s, was not a constant administrative activity in the processes of management of coffee growers, limiting the strategies of positioning in competitiveness.

At present, administrative management strategies point to a knowledge of production costs and synergy of the workforce with innovations and productive technologies, as factors for the decision-maker of the coffee grower, for the search for greater competitiveness and permanence in the marketplace.

In the productive context of coffee for the 21st century, increasing consumption boosts new markets or specific niches (market positioning) and, on the other hand, the search for new partnerships, better agronomic practices (irrigation, management, precision and integration) and create opportunities to reduce costs and risks in the production cycle.

The scale production characteristics for coffee plantations require effective cost controls, thus becoming a factor influencing the quality of the final product. However, there is little visibility in the perception of profit and empowerment for the producer when it comes to the production of special coffees with high added value for sale.

In Brazil, Arabica coffee is usually worked as a special quality coffee and receives added value when is sold. The total area planted in Brazil, with coffee cultivation (arabica and conilon) totals 2,223,464.1 hectares, for the 2016 harvest. Only for arabica coffee the area planted in Brazil amounts to 1,759,730.1 hectares, which corresponds to 79.13% of the existing area with coffee plantations (IBGE, 2017).

Minas Gerais has the largest Arabica production area, with 1,184,384 hectares, corresponding to 67.3% of the area occupied (UFLA / BUREAU, 2016). For the 2016 harvest, considering the two species (arabica and conilon), an average yield of 26.33 sc/ha is estimated, equivalent to a gain of 17.1% concerning the last harvest, (CONAB, 2017). Favorable climatic conditions in the main Arabica producing regions of Brazil, coupled with

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the cycle of the positive biennial, favored crops and justify gains in productivity in most states.

The greatest productivity gains were observed in São Paulo, with 46.7%, Mato Grosso, with 39.4% and Minas Gerais, with 32.2%. According to data released by CONAB and UFLA, in 2016 the minimum price of coffee paid to arabica mining producers for 2016 was R $ 490.73 / sc. In general, the coffee activity in Cerrado Mineiro received a great stimulus from governmental policies, be it in research, generating technological innovations, or in the financing and regulation of the market (FARINA, 1997).

In the Cerrado of Minas Gerais the irrigation of the agriculture, is predominantly obligatory in the production, differing of the other producing States. Because of the spatially differentiated productive arrangements, the use of both partial and total mechanical harvesting becomes an important tool for improving profitability.

A mechanical harvester harvests on average 60 sacks of coffee per hour, working 18 to 22 hours a day uninterruptedly, thus replacing approximately 120 workers in one day's service. As for the cost of production, for a mechanized and irrigated crop, according to experts, there is an average reduction of 30% in costs compared to the manual.

It is also important to emphasize that mechanical harvesting improves the quality of harvested coffee, not the same as for manual harvesting. Reason for this is that it is not feasible economically (manual and selective harvesting) to make a separation of the "cherry-coffee" (ripe fruit) and the green fruit (FUNDAÇÃO PRO CAFÉ, JACTO, 2004).

As Cerrado coffee cultivation develops in relatively flat areas, mechanization is present at all stages of production, from soil preparation, crop, phytosanitary and nutritional treatments, to harvesting (ORTEGA & JESUS, 2011).

The definition of climate stations constitutes the great trump of the Cerrado, allowing recognition as the first geographical designation of coffee production in Brazil and the World, according to the World Intellectual Property Organization. Irrigation has provided highly positive results on crop productivity, so it has observed that irrigation is increasingly by coffee farmers in the Cerrado and Brazil. (SANTINATO et al., 2008).

IBGE / CONAB - 2016 data indicate that the Cerrado region has a large influence on the volume sold of specialty coffee in Brazil, but there is still a gap between the quality differential of production and the respective sale as special coffee, directly by the producer. In this way, this study shows if the lack of knowledge and information (management) constitute the main barrier to the exploration of opportunities for inclusion and differentiation in the coffee market for rural producers.

The objective of this article was to find evidence of the contribution of management and the adoption of good management practices in coffee production, identifying knowledge and management indicators that influence the differential in the product and create opportunities to increase the sale of value-added production.

II. THEORETICAL FOUNDATION

Recognized as the first geographical denomination of coffee in Brazil and the world, according to World Intellectual Property Organization rules, the Cerrado Mineiro has achieved with the use of irrigation, highly positive results in crop productivity, with product innovation, according to Santinato et al. 2008, every day more is used by coffee growers.

The process of globalization of the world economy, witnessed by the introduction of the environmental concept in the economy, has been responsible for the significant changes that have occurred in the economic, social and political activities of the agricultural sector. Is understood that this process is collective, guided by a set of forces and actors, such as government policies, technological progress and central management of production management (value chain).

Michel Porter, 1985 expands the context of an organization's value chain concept with the definition of activities focused on an "extended and collective" value system. Currently, these concepts permeate the value chains of suppliers, distributors, employees, shareholders, financiers, among others, such as APL's (LASTRES, and CASSIOLATO, 2005) and the exploitation of collective synergies among stakeholders (PRAHALAD, 2010).

Prahalad (2010) points out in his concepts that the globalized economy opens space for innovation and collective efficiency in companies, since a management process needs for its development and consolidation, to share tools for proposition and identification of solutions.

Already before Porter (1985), he introduced in his analyzes of business practices the results of collective efficiencies, such as the integration of the different forms of relationship, between organizational entities and human work networks, whether formal or informal, internal or outside.

In this way, PRAHALAD (2010), PORTER (1985) and SCHMITZ (2005) retake and introduce economic concepts, about gains with collective efficiency. It thought by Marshal (1920), for whom, often, these collective gains were in the value chain in an intangible way and represented by human capital (social capital).

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Considering in this study that the indicators for environmental management and social capital are often intangible, the evaluation of impacts resulting from organizational, environmental and institutional interventions, are also in agreement with the current concepts of UTTING (2009). These concepts used in the analysis of the production of fair trade coffee in Nicaragua, where it was sought to recognize the relevant stakeholders and possibly conflicting interests to achieve competitiveness in agricultural production.

To complement the exploration of the influence and recognition of the components of efficiency, economies of scale and technological progress in organizations, competitiveness is understood to be a description of the capacity of a firm, a sector or a nation to remain competitive, and reflects the ability to protect and / or improve its position in relation to competitors operating in the same sector (BOJNEC, FERTÖ, 2009, LATRUFFE, 2010).

When analyzing opportunities, we highlight indicators that influence performance, improve the production management environment and consequently have a reflection on production in quality and value added.

The innovation principles of the Oslo Manual (OECD, 2005) were instrumental in recognizing evidence in organizational activities, with the ultimate goal of improving performance and gaining the market advantage.

Still in UNICAFFEE, 2017 are some opportunities for growth and differential in coffee production, divided into actions to dominate the indicators of climate change (emergence of new areas, vertical integration and development of new varieties of cultivars), cost indicators production (stimulation of precision agriculture, mechanization and integrated and participatory management) and quality and market indicators (traceability, appellation of origin, certifications, production in terroir).

III. MATERIALS AND METHODS

In these analyzes the validation and improvement of the indicators and variables used obtained through the responses of the owners, technical consultants in technical assistance, to extrapolate the results and analyzes better.

To improve the validations, the AHP (Analytic Hierarchy Process) data analysis methodology, adapted to the sample, was used. The cerrado region was besides being the largest producer of Brazilian special coffees, and it has as an appropriate great use of techniques of management, mechanization, and irrigation in its rural properties. In addition to the owners' responses, technicians and technical assistance consultants were heard to extrapolate the results and analyze better.

The Cerrado Mineiro region, which is a determinant of data collection, is located in the State of Minas Gerais, Brazil, and is considered a vital coffee production area with differentiated quality.

The application of a questionnaire in five properties was instrumental in recognizing in the analysis of the results, evidence of the influence of knowledge management and training (producer and social capital) for competitiveness and the hierarchical importance dispensed in the management of production by the producer in his decision-making.

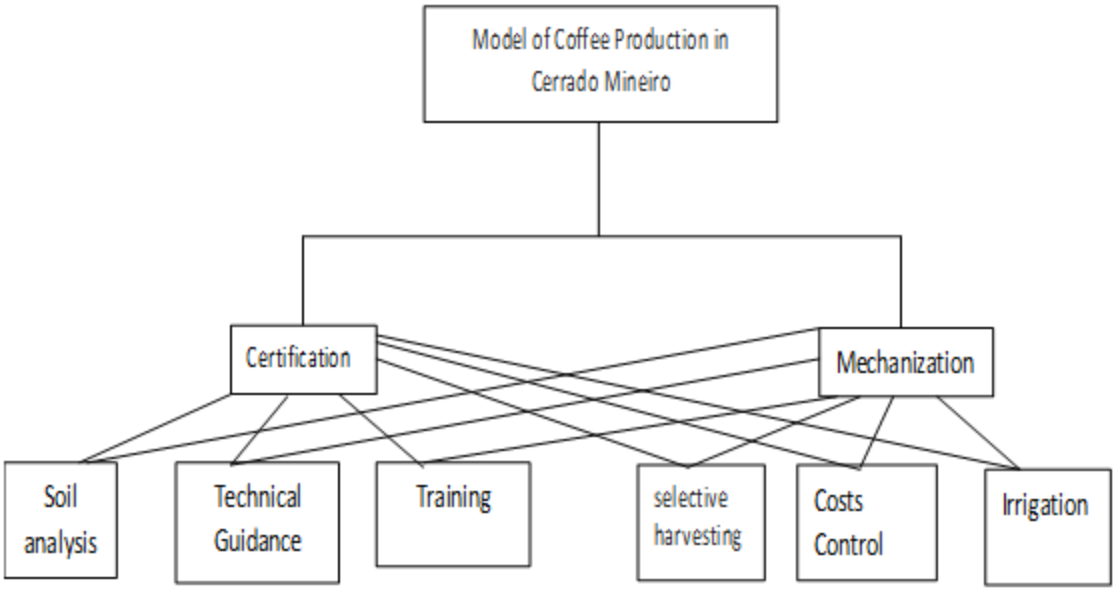

Fig.1: *Model for Hierarchy Formation in Decision Making*

Source: AHP

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Firstly, a questionnaire was applied for AHP analysis, taking into account the non-individualization by alternatives of the production model, that is, the options for capacity and form of coffee production were considered similar in the four farms where the data collected.

In order to construct the hierarchical global consolidation and understanding of the priority decision making, in the four rural properties, the applied questions addressed comparisons between the indicators of certification and mechanization, sub-levels of indicators of soil analysis, technical guidance and training and selective harvesting , control of costs and irrigation, respectively, as visualized in (Fig.1).

The analyzes of the knowledge and information applied in the Cerrado Mineiro coffee production were carried out with a questionnaire composed of 64 questions grouped in three dimensions (analysis of coffee farms in Nicaragua by UTTING in 2009).

The socio-environmental and economic indicators of the questions divided into the management of the production environment, production management, social capital management, with analyzes of the general characteristics, implementation, innovation, technology and are of quantitative and qualitative scope.

The construction of the questionnaires of analyzes of economic, environmental and social capital performance (UTTING, 2009; LATRUFFE, 2010), encompasses the dimensions of environmental management (production, management, machinery and improvements), social capital management (quality of life, welfare and legal compliance) and economic management (ownership and characterization of the organization).

The indicators grouped in environmental management consists of 35 indicators, divided into the dimensions, of machinery and equipment management, production management and management, to show the characteristics of the production environment as to the quality of the presented conditions.

The economic management dimension was investigated with 17 indicators for property management and management, involving information on productive efficiency. It includes indicators on an income of the establishment, the diversity of sources and the distribution of income among those involved in the productive processes among other data of compliance with good agricultural practices.

The third set, the social management dimension is composed of 12 indicators, to verify the consolidation of integration mechanisms among the actors of the chain for continuous improvement. Is because buyers and consumers of coffee, have demanded products with differentiated quality, in addition to preserving respect for the environment and social responsibility, requiring an effort of the producers to maintain their improvements continuously.

This third dimension also includes considerations on the quality of life of the residents of the property, access to education, essential services, characteristics related to quality and benefits, occupational safety and health, and employment opportunities at a qualified place.

To environmental, social and economic balance forces of the analyzes, the indicators grouped into 11 variables of each dimension (Fig 2). In the economic dimension, the indicators of the area of the property, planted area, total production in bags, productivity per hectare, cost per bag, cost per hectare, certification and quantity of sacks harvested, the percentage of coffee sold with added value, production by input and number of fixed employees.

The 11 indicators chosen for analysis of environmental management of machines and improvements, production environment and management and production, are formed by quantity of tractor, irrigation, amount of chemical fertilization, amount of organic fertilization, insecticide, fungicide, mechanically harvested area, orientation technique, cost control, number of plots, number of tables, soil analysis, selective harvesting.

In order to verify the social balance of properties, the indicators selected are: types of labor used and quantity, compliance with labor standards, housing and housing, access to safe drinking water and safety equipment, portfolio and social security registration, training, and training, heirs give continuity to the activity and children of employees remain in the activity.

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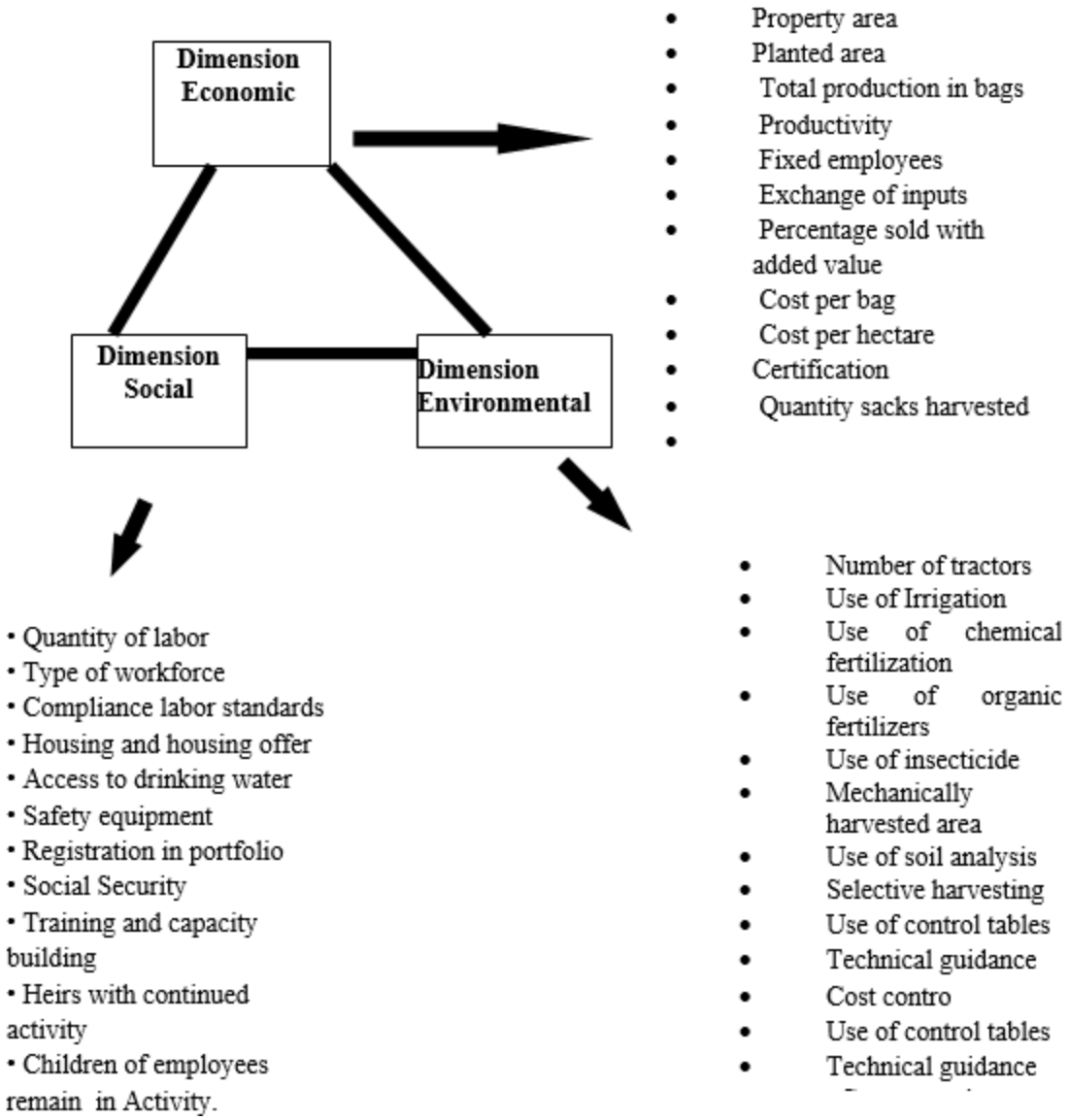

Fig.2: Equilibrium Analysis of Environmental, Social and Economic Forces

IV. RESULTS AND DISCUSSIONS

From the comparative analysis carried out between the data collected in the IBGE and CONAB database in 2016 and analyzes of the responses of the owners of the farms investigated, it inferred that. Although the Cerrado region has a significant influence on the volume sold of specialty coffee for Brazil, the differential for the sale of this production does not necessarily reach the producer.

To mainly because the producers sell their coffee as a runner (traditional sale), that is, they only do the first post-harvest harvesting. In this type of harvesting process, the selective separation of the grains with better quality not favored.

In Costa Rica, for example, a country where producers (from a given region) receive a collective processing unit from the government, for the 2015/2016 crop, 1,634,000 60-kilogram coffee bags were produced and 995 thousand bags exported.

In contrast, Brazil in the Cerrado Mineiro region produced 7,401 thousand coffee bags in the same period of 2015/2016, but the statistics show a weak performance in Brazilian exports of differentiated coffee, for the 2015/2016 harvest period, there is a total export of 2,170 thousand bags of coffee of 60 kilos, according to CECAFE, 2017.

While it is the case that Costa Rica exports 61% of the exceptional coffee, the Cerrado Mineiro exports only 30%. This finding is consistent with the evidence presented and analyzed in the data collection. When the value-added production sold, the surveyed farms are not in line with the average for the Cerrado of Minas Gerais.

Only one farm effective sales of coffee produced special type on the market, even so with 25% of

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its production. Still only the 01 farm, uses 20 hectares of its area for other plantations, in the corn case.

The commercialization of the coffee produced in the runner (traditional) by the farms 02,03 and 04 and to a lesser extent by the farm 01, causes that the information about the quality of the coffee drink produced is often completely lost or ignored by the producer, and consequently not recognized as part of the remuneration received.

Thus it is common for the producer to perceive little incentive to produce high-quality coffees since besides not privileging the quality of his coffee, he still does not receive a remuneration that values and encourages it.

Although farms 02,03 and 04 refer to themselves as producers of exceptional coffee, a prioritization of the management of the properties for production in scale in the search for higher productivity is common to the three farms. In these properties, the production of differentiated and special coffee is sold to the market, together with the other grains harvested, without an improvement in the separation of the grains of a better sieve and lower defect.

When collecting data on the farms surveyed, the technical assistance areas (private or public), observe that the rural owner prefers to offer his total production to the market, rather than worrying about small differentiated lots and particular lots, even though aware of the need, benefits, and costs of innovation and technology applied to their properties.

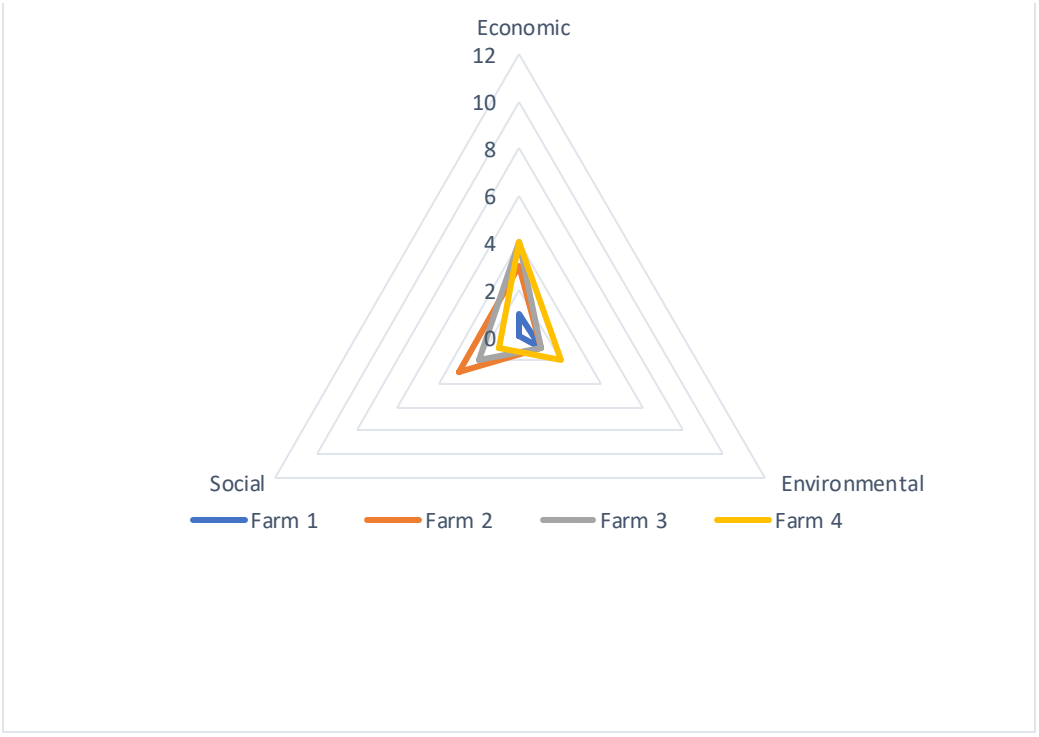
The economic management analyzes of the investigated farms do not observe considerable variations between the costs per bag, as well as the productivity per hectare in 2016, year of data collection. It can notice that the average productivity of the Cerrado (IBGE, 2016) is well above the Brazilian average, and the higher productivity is associated mainly with modern coffee cultivation, with appropriate use of irrigation, mechanization (favorable topography) and fertilization.

The production areas of farms 01 and 02 are equivalent in 42 ha, reaching productivity of 40 and 45 sacks per hectare. The productivity of farm 03 highlighted because it is a productive maturation period for the cultivar so that the negative biennium characteristic of coffee does not appear in this harvest of 2016 specifically.

In the analyzes for the determination of the balance between the social, environmental and economic dimensions, for the 36 indicators analyzed, Farm 01 accounts for 94% and Farms 02, 03 and 04 account for 80%. When analyzing the dimensions individually, it can see that there are opportunities for improvement in the economic dimension more markedly and environmentally, since they are further away from the zero reference axis, according to graph 1.

The application of the AHP model for coffee production in the region investigated characterized by harmony with the other analyzes of the data collected with the IBGE / CONAB 2016, as well as the responses of the rural owners to the analysis model of the balance of social, environmental and economic dimensions.

Graph.1: Analysis of social, environmental and economic dimensions by farm



Source: Prepared by the Author

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In the comparative analysis between Certification or Mechanization (AHP), as an investment option, 26.2% of the owners indicated that they preferred to obtain certification and the remaining 73.8% recognized opportunities for improvement in the improvement of mechanization in their properties.

Is observed that in the priorities of the owners, cost control (44.5%) is the most critical variable and influence for their production and market decisions. The producers comply with the good agricultural practices that demand the attention of the consumer market, according to the answers to the questions about environmental and social management.

Soil analysis and technical assistance, both with 10.9% influence on the productive decisions of the owners in comparison to the priority given to the selective harvest (4.9%), which can provide higher quality for the beverage and grain produced. Fig. 3 consolidates the general priorities in decision making and their respective degree of influence for the owners and application in their management of the properties.

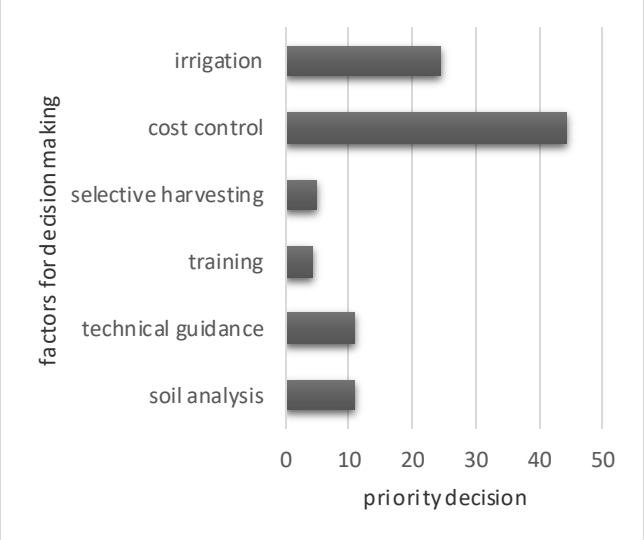

*Fig.3**Error! Reference source not found.**: Priority of Factors for Decision Making in Coffee Farms*
Source: AHP

The analyzes of the social capital management of farms 01 and 02 show in the indicators of fixed employees, tractors and crop worker small differences, which reflect the line of environmental management of the individual production of each property.

In these variables of social capital and technology the farm 01 (sells 25% of its production to the market of differentiated quality and price), presents differential of allocation for the costs of production, being that it has 20 ha of its total area with corn production.

However, in the analysis of the number of employees in farms 3 and 4, we can see a predominance of traditional and intensive labor, indicating a paradox, since we do not observe the full use of this intensive social capital when selling value-added or selective harvesting.

According to several authors and studies (SANTINATO et al., 2008, CONAB, 2016, IBGE, 2016, BRADESCO, 2016), the mechanized harvesting of coffee reduces, on average, 30% harvest costs about the manual.

It is important to point out that mechanical harvesting improves the quality of harvested coffee, not the case of manual harvesting, as it is not economically feasible to separate the "cherry coffee" (ripe fruit) and the green fruit. In the cerrado, the labor costs represent 40%, and the expenses with pesticides and fertilizers account for 22%. (BRADESCO, 2016).

Comparatively, in the southern region of Minas Gerais, the labor costs applied to the coffee crop account for 53% of operating costs and the use of pesticides and fertilizers for 24%. Labor costs are high because most of the harvest is manual, due to the topography of the region that makes operation with harvesters difficult. (BRADESCO, 2016).

As Cerrado coffee cultivation develops in relatively flat areas, mechanization is present at all stages of production, from soil preparation, crop, phytosanitary and nutritional treatments, to harvesting (ORTEGA & JESUS, 2011). It is possible to consider the 02 farm more intensive in mechanization and the farm 01 more intensive in social capital, respectively 25 fixed and crop employees against nine fixed and crop employees of the farm 02 (Table 1).

Table.1:Comparative Social Capital x Mechanization x Productivity

Indicators/2016	**Farm 01**	**Farm 02**	**Farm 03**	**Farm 04**
Fixed Employeers	5	2	60	12
Tractors	1	3	26	5
Crop Employeers	20	7	40	15
Total Production /scs	2100	1800	60000	3652
*revenue total/000R$	1066900	883315	29443800	1792146

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**revenue total 000R$	294000	n/a	n/a	n/a
***loss of revenue		252000	8400000	511280
Production area/000/ha	42	42	1300	160
Productivity sc/ha	40	45	75	30

Source: search data

* estimated according to price index CONAB/CACCER

** estimated by the sale price informed by the farm 01, calculated as 25% of the production as value-added sales

*** by the non-sale of special coffee (at least 25%)

The use of labor-intensive can provide the opportunity for a selective harvest for lots of coffee, which add value.

As far as the perception of the proprietary farmers about their living standards and their collaborators, there was no statistically significant difference. The four farms comply with the basic standards of good agricultural practices, as well as interact in legal compliance with the benefits and obligations of their collaborators.

The improvements regarding knowledge and information, permeate the value chain of Brazilian coffee in a general and unique way.

V. CONCLUSIONS

The results recognized in the proposed analyzes indicate that the management of the production environment and social capital are dynamic differentials for the diversity, pioneering and entrepreneurship of the region in the search for and maintenance of quality production.

The application of the concept of the value chain allows us to find answers to the reasons why the rural landowner who uses technological advance (irrigation, mechanization, and BPA) in their production, at the moment of sale does not seek added value (to the product with differential quality).

The answers to the hypotheses of the work respond that: it is in the predisposition to the sale in the run spout and the non-perception of the added value to the product by the producer. Moreover, a second answer presents itself in recognized opportunities, when analyzing the balance of social, environmental and economic dimensions in the farms surveyed.

The analysis of the indicators of competitive advantage allows indicating opportunities for new sources and practices of business management, mainly in what concerns the evaluation and promotion of profitability in product sales, positioning in the particular and differentiated market. In the farms analyzed, the low predisposition for producing special coffee (with quality and consequently of lower value added), justifies the search for innovations, knowledge, and training applied to employees and along the value chain.

Is also noted that small actions to implement micro innovations to improve the routines and organization of the coffee farms researched, exploring the potential of the various stakeholders of the value chain in the processing and processing of coffee, can reverberate positively.

Higher availability of special grains, with improved costs and the remuneration of sales in specific lots, brings better prospects for the profitability of the business and consequently the quality of life of the community and the environment. From the standpoint of knowledge and capacity building of the social capital of the analyzed farms (owners and labor), there are opportunities for initiatives of competitiveness and product quality.

REFERENCES

[1] BRADESCO – DEPEC - CAFÉ DEZEMBRO DE 2016, disponível em http://www.economiaemdia.com.br/vgn-ext-templating/v/index.jsp?vgnextoid=29fece2f8d741310VgnVCM100000882810acRCRD acessado em Janeiro de 2017

[2] BARUCH, L. Intangibles: management, measurement, and reporting. Washington, D.C.: Brookings Institution Press, 2000.

[3] BOJNEC, S.; FERTÖ, I.Agro-food trade competitiveness of Central European and Balkan countries. Food Policy, London, v. 34, p. 417-425, 2009.

[4] CAFÉ DO CERRADO. Cerrado mineiro: a primeira denominação geográfica para café. 2010. Disponível em: www.cerradomineiro.com.br , Acesso em: março 2017

[5] COMPANHIA NACIONAL DE ABASTECIMENTO (Conab). Acompanhamento da safra brasileira de café, safra 2016, segunda estimativa. 2016. Disponível em: . Acesso em: março/2017

[6] CRONBACH, L.J., MEEHL, P.E. Construct validity in psychological tests. Psychological Bulletin, v.52, n.4, p.281-302, 1995.

https://dx.doi.org/10.22161/ijaers.5.8.20 *ISSN: 2349-6495(P) | 2456-1908(O)*

[7] FARINA, M. M. Q. E. 1997 Competitividade e coordenação de sistemas agroindustriais: um ensaio conceitual. Revista Gestão e Produção, v.6, n.3, p.147-161.

[8] FUNDAÇÃO PRO CAFÉ, JACTO, 2004 acessado em março de 2017, disponivel em http://fundacaoprocafe.com.br/sites/default/files/publicacoes/pdf/1%20-%20Evolu%C3%A7%C3%A3o%20da%20colheita%20mec%C3%A2nica%20do%20caf%C3%A9%20da%20planta.pdf

[9] GIL, A.C. Métodos e técnicas de pesquisa social. 4. ed. São Paulo: Atlas, 1995.

[10] GONÇALVES, Carlos A.; FILHO, Cid G.; NETO, Mário T. R. Estratégia empresarial: o desafio nas organizações. São Paulo: Saraiva, 2006.

[11] HILL, P. Tangibles, intangibles, and services: a new taxonomy for the classification of output. Canadian Journal of Economics, Montreal, v. 32, n. 2, 1999.

[12] INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA. PESQUISA DE INOVAÇÃO (IBGE) 2011. Rio de Janeiro. 2013. Disponível em: < http://www.pintec.ibge.gov.br/index.php?option=com_content&view=article&id=45&Itemid=12> Acesso em: abril de 2017.

[13] INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA (IBGE). Levantamento sistemático da produção agrícola. 2010. Disponível em: . Acesso em: março/2017.

[14] JARDIM, G. F. Estruturas de governança e a capacidade e inovação em pequenas empresas: caso da indústria brasileira de torrefação e moagem de café. São Paulo, 2012. 104 p.

[15] LASTRES, H.; CASSIOLATO, J. E. Innovation systems, and local productive arrangements: new strategies to promote the generation, acquisition, and diffusion of knowledge. Innovation and Economic Development, v. 7, n. 2, 2005.

[16] LATRUFFE, L. "Competitiveness, Productivity, and Efficiency in the Agricultural and Agri-Food Sectors," *OECD Food, Agriculture and Fisheries Papers*, No. 30, OECD,Paris.http://dx.doi.org/10.1787/5km91nkdt6d6-en, 2010.

[17] MARSHALL, A., Principles of economic.8thedition.Londres: Macmillan,1920.

[18] OCDE. Manual de Oslo: Diretrizes para coleta e interpretação de dados sobre inovação. 3ª ed. Tradução e publicação FINEP, 2005.

[19] ORTEGA, A. C. e JESUS, C. M., Território Café do Cerrado: transformações na estrutura produtiva e seus impactos sobre o pessoal ocupado. RESR, Piracicaba, SP, vol. 49, nº 03, p. 771-800, jul/set 2011 – Impressa em novembro 2011

[20] PRAHALAD, C.K. 2010. Why Sustainability is now the key driver of Innovation. Harvard Business Review. Disponível em:< http://hbr.org>. Acessado em: março,2017.

[21] PORTER, M. E. Vantagem competitiva: criando e sustentando um desempenho superior. Rio de Janeiro: Campus, 1985.

[22] SANTINATO, R.; FERNANDES, A. L. T.; FERNANDES, D. R. Irrigação na cultura do café. 2. ed. Belo Horizonte: O Lutador, 2008.

[23] SCHMITZ, H. Aglomerações produtivas locais e cadeias de valor: como a organização das empresas influencia o aprimoramento produtivo. In: LASTRES, H.; CASSIOLATO, J. E.; ARROIO, A. (Comp.). *Conhecimento, sistemas de inovação e desenvolvimento*. Rio de Janeiro: Editora UFRJ/Contraponto, 2005

[24] SILVA, J.C.T. Tecnologia: conceitos e dimensões. Curitiba, 2002.

[25] STEENSMA, H. K. Acquiring technological competencies through inter-organizational collaboration: an organizational learning perspective. Journal of Engineering and Technology Management, v. 12, p. 267-86, 1996.

[26] TEEB - The Economics of Ecosystems and Biodiversity (TEEB), disponível em http://www.teebweb.org/, acessado em março de 2017

[27] UFLA – OBSERVATORIO BUREAU DE INTELIGÊNCIA COMPETITIVA DO CAFÉ, 2016 – Centro de Inteligência em Mercados de Administração e Economia

[28] UNICAFFE, 2017 Inovações na Agricultura. FEA – PENSA – USP.

[29] UTTING, K. J Bus Ethics 86 (Suppl 1): 127. https://doi.org/10.1007/s10551-008-9761-9,2009.

[30] WEBER, M. *Economia y sociedad*. México: Ed. Fondo de Cultura, 1964.

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