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## Conference Paper

# Model For Identification Of Management Degree In Brazilian Coffee Production

52nd Congress of the European Regional Science Association: "Regions in Motion - Breaking the Path", 21-25 August 2012, Bratislava, Slovakia

## Provided in Cooperation with:

European Regional Science Association (ERSA)

*Suggested Citation:* Bliska, Antonio; Ferraz, Antonio; Leal, Paulo; Bliska, Flavia (2012) : Model For Identification Of Management Degree In Brazilian Coffee Production, 52nd Congress of the European Regional Science Association: "Regions in Motion - Breaking the Path", 21-25 August 2012, Bratislava, Slovakia, European Regional Science Association (ERSA), Louvain-la-Neuve

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## MODEL FOR IDENTIFICATION OF MANAGEMENT DEGREE IN BRAZILIAN COFFEE PRODUCTION

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In Brazil, coffee is one of the most important crops, particularly regarding job creation and foreign exchange. Since its introduction in the country in 1727, in the North region, the coffee cultivation is spread over much of the Brazilian territory. Over nearly 300 years, coffee production has developed with different costs and competitiveness, resulting mainly from soil and climatic conditions and different levels of technology, international competition and pricing, government incentives, investments in scientific and technological development, as well as different levels of entrepreneurship, which are reflected in the degree of agribusiness management and are extremely important to increase their competitiveness and survival. Cooperatives and the coffee industry consultants have developed systems to assist the farmer in company management, particularly with respect to the systematization of production costs and planning activities for the agricultural year. But the methods developed do not provide information about the level of company management, particularly regarding quality. To overcome this deficiency, this study aims to develop a simple, easy to use and inexpensive method to analyze the points to be improved regarding the management of the coffee farms, even if it is not exhaustive. Thus, farmers may adopt foundations, criteria and quality management practices that result in the organization of their companies and contribute to local and regional rural development. This study is focused on agricultural production, and reflects the implementation of concepts and practices of agribusiness management, in order to obtain high quality products that permeate the coffee industry as a whole. This method, named Method of Identification of Management Degree (MIGG), consists of a questionnaire, originally developed for application in cut flowers sector. Later it was used in the production of flowers in pots and hydroponics and after that, adapted to coffee production. A questionnaire was compiled using specific methodologies to collect primary and secondary data, plus the Delphi technique, which was employed to establish priorities and hierarchy of parameters of the management of a

sustainable agricultural enterprise. The critical factors for the chain of coffee production and secondary data were identified in order to be confronted with the criteria used in Migg for production of cut flowers (MIGG Flowers). Then a proposal was made to implement a script management, aiming at continuous high quality standards at all stages of the coffee agribusiness system: Method of Identification of Management Degree for a coffee company (MIGG Coffee), designed and evaluated by values assigned weights based on those used in MIGG Flowers.

Keywords: Agricultural competitiveness; Regional development; Agricultural management.

## INTRODUÇÃO

In Brazil, coffee is one of the most important crops, particularly regarding job creation and foreign exchange. Since its introduction in the country in 1727, in the North region, the coffee cultivation is spread over much of the Brazilian territory. Over nearly 300 years, coffee production has developed with different costs and competitiveness, resulting mainly from soil and climatic conditions and different levels of technology, international competition and pricing, government incentives, investments in scientific and technological development, as well as different levels of entrepreneurship, which are reflected in the degree of agribusiness management and are extremely important to increase their competitiveness and survival.

Especially the last two decades, the international coffee market is seeking ways to enhance and promote the coffee quality, including important aspects regarding the sustainability of coffee production and certification. In Brazil, the market for specialty coffees and high quality drinking has grown steadily. Parallel to this demand we seek to become more competitive, mainly through differentiation of production systems, increase productivity, reduce costs and technology adoption and post-harvest appropriate for regional characteristics.

Regarding quality, the coffee is a drink that admits numerous sensory characteristics. The tastes are perceived in different regions of the tongue. The main sensorial characteristics [1] are: acidity, aroma, bitterness, body, sweetness and flavor. These characteristics result from the sum of factors that permeate the entire production chain. The main factors in determining the quality of the final drink is [2]: climate, inputs, cropping system, cultivar, production cycle, pruning, soil type, disease, pests, type of harvest, post-harvest drying process , storage, processing, roasting

and packaging. Therefore, along the production chain, there are many critical points to achieving superior quality beverage [2].

In general, the world's coffee production is concentrated on the cultivation of two species: *Coffea arabica*, which accounts for about three quarters of world production, and *Coffea canephora*, known generically as robusta coffee. Arabica coffee has a better quality of the beverage as the sensory aspects, especially in terms of flavor and aroma, and is best used for consumption as roast and ground coffee, percolated or espresso. The strong drink is considered a neutral, because it has a higher content of soluble solids, and is mostly used in the production of soluble coffee and the composition of the blends with Arabica coffee. The blends include coffee obtained by different processing systems, which can be natural, fermented or frayed. To obtain a superior quality beverage, the origin of the grains is essential, and the blend can not contain the so-called PVA beans (black beans, green and sour) [3]. In roasting, the most important factors in determining quality is the relationship between time and temperature at the point of roasting and grinding degree, this is extremely important, because its interaction with the extraction time and water temperature will influence the type of drink obtained.

With regard to coffee robusta type, the Brazilian position is disadvantageous because its production cost is one of the largest among the countries producing this type of coffee, a disadvantage for the instant coffee industry, which exports almost all of its production. As for Arabic, Brazil has prioritized the search for greater productivity and exported volumewithout major concerns about the quality, for many decades. Other producing countries prioritized the quality, such as Colombia, Mexico and some Central American countries. The Brazilian option, accelerated the reduction of its share in total world exports of coffee and has complicated the conquest of "niche" market for top quality products.

In many Brazilian regions, factor productivity is still a priority. But the coffee cultivars planted in the country produce beans with excellent potential for production of beverages of good quality. However, such coffees may result in the final product of low quality due to problems during the production chain, for example in post-harvest. Therefore, although the increase in productivity is essential to generate jobs and income, and the survival of producers, quality management is becoming continually more important to increase the competitiveness of the

sector. An example of the quality management system is the system used in the Regional Cooperative of Coffee Growers in Guaxupé Ltd. (Cooxupé), which uses its own system of quality grading, identifying the different types of coffee with a classification of RA's (Shipment sample). Moreover, there is still classification by grain size (for sieves) and beverage quality. The cooperative works with about 35 types of coffee, differentiated by quality.

The awareness campaign about the need for quality management is hard. The coffee chain involves producers of inputs, machinery and equipment, farmers, warehouses, processors, traders, cooperatives, industries roasting and grinding coffee industry, exporters, wholesalers, retailers and other players in the coffee business, responsible for all processes, from production to product placement in the destination market. The creation of the internal management mechanisms for improvement chain competitive is very important. Currently this is a major concern of companies, whether they are focused on quality of products or services. The understanding for the quality and recognition of its importance has made the certification of quality management systems essential for the micro and small companies around the world, therefore, increase customer satisfaction and customer confidence, reduce internal costs, increase productivity, improve the image and processes continuously and provide access to new markets

## **Objective**

This work aims to develop a method for farmers to identify, in a simple and rapid way, the degree of their managerial activities in accordance with the fundamentals, standards and quality management practices for structuring their business as a company organized, and for obtaining a finished product of superior quality. The specific objectives are: 1) Identify the main parameters of technical and administrative management of a farm dedicated to the coffee production, regardless of size, level of technology employed in the production process or geographic location, 2) Develop a self-administered procedure, so that farmers can identify the degree of management of their business.

## **METODOLOGY**

To implement its purpose, it was used as a reference the model developed for assessing the degree of management in the cut flowers sector, the Method to Identification of Management Degree (MIGG) [4]. On the other hand, for selection, prioritization and ranking of issues and management indicators adopted, MIGG was based on criteria established by the National Quality Foundation (FNQ) and used in its evaluation system of corporate governance, the Model for Excellence in Management ® (MEG) [5].

### **Model for Excellence in Management ® (MEG)**

The MEG is flexible and does not prescribe tools and management practices specific. Therefore, it can be used to evaluate, diagnose, and develop the management system for many types of organization. Its criteria are composed upon a basis of fundamental concepts, essential to obtaining the best performance. The MEG is recognized as an important reference for public or private organizations, for profit or not, and of any size. The model emphasizes the incorporation of the fundamental concepts of excellence in management practices of the organization, continuously, and in line with its profile and strategies. Using the MEG criteria as a reference, an organization can obtain a self-evaluation and diagnosis of their organizational management, as well as to apply for the National Quality Award ® (PNQ). For the award, trained evaluators visit companies to verify the information and performance management. This model is used as a reference for assigning other awards, for instance, PPQG - Award Paulista of Quality Management [5]. The main advantages of this method are: faster, segmentation evaluation, as the need for information, and customization of the survey. The disadvantages are: dependence on knowledge of the respondent, non-direct identification of strengths and opportunities for improvement, additional work to evaluate and consolidate the answers obtained, generating a list of practices that is sometimes hard interpret, non-permission of consensus among respondents and subjectivity in the assessment criteria "results" [5].

The MEG is based on the Foundations of Excellence (excellence criteria) in turn expressed in measurable characteristics, qualitatively or quantitatively, and distributed in requirements. The criteria incorporate their requirements in the concepts and techniques most current and successful management of organizations. Through a detailed assessment, which lists

the strengths and opportunities for improving diagnoses, MEG details what the organization should maintain as well as aspects that need to be improved in order to develop excellence in management, taking with it , to increase their competitiveness [6]. Its adoption makes the company to obtain: a) improvements in processes and products, 2) Cost reduction, 3) increase productivity and hence competitiveness, 4) Increase their credibility and public recognition; 5) Greater flexibility in the face of changes, and 6) best conditions to achieve and maintain optimum performance. Table 1 describes the eight criteria, which form the basis of MEG. These criteria are divided into themes, to evaluate the companies through a questionnaire that describes its internal organization and its processes (Table 2). Altogether there are 113 questions that comprise a framework for evaluating the stage of maturity of the organization's management and can generate up to 1000 points. From the score, the company is classified into one of the senior levels of maturity in a rising scale from 1 to 9 (Table 3).

Table 1. Excellence criteria that comprise the Management Excellence Model ® (MEG).

Criteria	Description of the criteria that comprise the MEG
Leadership	Examines the organization's leadership system, and the personal commitment of the leadership in establishing.
Strategies and plans	It examines the process of formulating strategies, emphasizing planning, organization and implementation process.
Customers	Examines how the organization segments the market, and identifies and addresses the needs and expectations of customers and markets; close relationship with its customers, it also examines how the organization assesses satisfaction and customer dissatisfaction.
Society	Examines how the organization contributes to the economic, social and environmental sustainably.
Information and knowledge	Examines the management and use of internal information and external (comparative) relevant to the organization and management of intangible assets that generate differentials.
People	Examines how the conditions are provided for developing and fully utilizing the potential of the people who make up the workforce in line with organizational strategies, it also examines the training and development, as well as efforts to create and maintain a workplace and organizational atmosphere that lead to excellence of performance, to full participation and the growth of people.
Processes	Examines how the organization identifies, manages, analyzes and improves the core business processes and support processes; also examines how the organization manages the process of relationship with suppliers and leads the management of economic and financial processes, aiming at economic sustainability business.
Results	Examines how the organization evaluates and analyzes the performance of production processes, economic, financial, customer and market, people, society and suppliers.

Source: Adapted from [6].

Table 2. Themes that comprise the criteria for excellence in Management Excellence Model ® (MEG).

Criteria and description	Themes that comprise the criteria of MEG
1. Leadership	1.1 Administration (Governance)
	1.2 Exercise of Leadership, and promoting a culture of excellence
	1.3 Analysis of organizational performance
2. Strategies and plans	2.1 Formulation of strategies
	2.2 Implementation of strategies
3. Customers	3.1 Image and market knowledge
	3.2 Customer Relationships
4. Sociedade	4.1 Social and environmental responsibility
	4.2 Social Development
5. Information and knowledge	5.1 Organization Information
	5.2 Information comparative
	5.3 Intangible assets and organizational knowledge
6. People	6.1 Work system
	6.2 Training and development
	6.3 Quality of Life
7. Processes	7.1 core business processes and support processes
	7.2 Processes of relationship with suppliers
	7.3 Processes economic and financial
8. Results	8.1 Economic and financial results
	8.2 Results related to customers and the market
	8.3 Results related to society
	8.4 Results related to persons
	8.5 Results of core business processes and support processes
	8.6 Results related to suppliers

Source: Adapted from [6].



Table 3. Maturity levels, description of maturity, and scoring bands of MEG.

Scoring bands Number	Description of the maturity of Management	Score value
9	Highly proactive approaches, refined, innovative, fully distributed, with continued use, underpinned by continuous learning and fully integrated. Favorable trends on all the results. Current level equals or exceeds the relevant references for almost all indicators. Recognized leadership in "reference of excellence" in most areas, processes or products.	851 - 1000
8	Approaches highly refined, some innovative, proactive, with continued use and well disseminated through the areas, processes, products and / or stakeholders. The learning strongly promotes innovation. Practices among items and criteria are mostly integrated. Favorable trends on all the results. Current level equals or exceeds the references relevant to almost all the results, and reference of excellence in many areas, processes or products.	751 - 850
7	Approaches appropriate for the requirements of all items, mostly refined from learning and innovation for many items. Almost all requirements are met proactively. Continued use in almost every practice, disseminated by major areas, processes, products and / or stakeholders. There are some gaps in cooperation among areas and / or stakeholders, possibly affecting integration. Almost all the results are favorable trend and has no unfavorable trend. Current level above the relevant references for most results, is the industry leader and reference of excellence in some areas, processes or products.	651 - 750
6	Approaches appropriate for the requirements of all items, and most proactive and some refined and disseminated by major areas, processes, products and / or stakeholders. Continued use in almost every practice. Management practices are consistent with the organization's strategies, the refinement result of learning and innovation for many practices of the item. There is inter-relationship among management practices, but there are still some gaps among areas of cooperation and / or stakeholders, in part affecting integration. Almost all the results are favorable trend. The current level is less than the relevant references for most of the results could be considered an industry leader.	551 - 650
5	Approaches appropriate for the requirements of almost all items, and several are proactive disseminated by major areas, processes, products and / or stakeholders. Continued use in almost every practice, working with controls. There are some many refinements and innovations resulting from learning. Management practices are consistent with the organization's strategies, there are some gaps in the inter-relationship among management practices, and there are many gaps among areas of cooperation and / or stakeholders, regularly affecting integration. Most of the results shows favorable trend. Current level is less than the relevant references to some results.	451 - 550
4	Approaches appropriate for the requirements of most items, some being proactive, widespread in most areas, processes, products and /or stakeholders, with control practices for many items. Continued use for most practices. Learning and integration occur for many items. Management practices are consistent with most of the strategies of the organization, but there are significant gaps in the inter-relationship among management practices. Most relevant results are presented as a result of the application of approaches. Some results show favorable trends. Early use of comparative information.	351 - 450
3	Approaches appropriate to the requirements of many items with proactive, being spread in some areas, processes, products and / or stakeholders. There are inconsistencies among management practices and strategies as there are many gaps in the inter-relationship between management practices. The learning, refinement and integration occur for some items. Some results from the application of relevant approaches, assessments and improvements are presented with some favorable trends.	251 - 350
2	The approaches are in early stages of development for some items, with proactive practices, in consideration of the foundations of excellence, there are significant gaps in the implementation of most of them. Some practices have integration. Begin to show some relevant results from the application of the approaches implemented	151 -250
1	Preliminary stages of development approaches, almost all reactive, associated with the foundations of excellence, considering the requirements of the Criteria. The application is local, many early-use, with few work patterns associated with the approaches developed. Learning occurs in isolation, there may be sporadic innovation. Do not place the refinement and integration. There are no significant results due to approaches implemented.	0 - 150

Source: Adapted from [6].

## **Method to Identification Management Degree for Cut Flowers (MIGG Flowers)**

### Score of Method to Identification of Management Degree (MIGG)

The evaluation through MIGG was organized by assigning points to each parameter of the Method. These are matched by an issue in the questionnaire to be applied to organizations. Authors adopted the total value of 1,000 points, also suggested in the MEG, the FNQ Method, but weighted and distributed along the issues, according to the results observed in the process of ranking criteria and issues that comprise the model, developed through the Delphi methodology . Score was considered in the ranking defined by experts specifically for the activity of cut flowers production (Table 4).

### Classification and Analysis of Degree of Management in Cut Flowers

To classify the organizations according to the degree of management, a template is used to score the responses, in accordance with Table 4. And, according to the scoring bands achieved, the organization is classified into different levels, and these could be assessed by the description of management maturity level reached (Table 5). Finally, in a detailed description of management maturity in light of the questionnaire obtained for each organization, it is possible for an expert to draw up a detailed organizational analysis, pointing out the positive trends, or not, of the company.

Table 4. Gabarito de pontuação do questionário de autoavaliação em gestão em flores de corte (MIGG Flores).

Template Score for Migg Flowers							
Criteria, measurement criteria and their scores							
1. Strategies and Plans		2. Leadership		3. Customers		4. Society	
1.1 Business Plan	15	2.1 Internal and external relationship	10	3.1 Sale Price	15	4.1 Use of biological control	10
1.2 Documentation (mission, vision, values)	15	2.2 Communication (objectives and results)	10	3.2 Durability of the product	15	4.2 Waste treatment	10
1.3 Action plan and frequency	15	2.3 Domain of the factors that affect the company	10	3.3 Customer care (SAC)	15	4.3 No use of child labor	10
1.4 Adjustment of production rate	15	2.4 Attitude toward to delegation of actions	10	3.4 Databank of the SAC	15	4.4 Associations and cooperatives	10
		2.5 Joint resolution of attrition	10	3.5 Claims	15	4.5 Royalty payment	10
				3.6 Delivery delays	15	4.6 Code of conduct	10
Subtotal: 60 points		Subtotal: 50 points		Subtotal: 90 points		Subtotal: 60 points	
Criteria, measurement criteria and their scores							
5. Information / Knowledge		6. Persons		7. Processes		8. Results	
5.1 Technical support	15	6.1 Use of E. P.	10	7.1 Improve genetic material	10	8.1 Periodic follow-up of sales	50
5.2 Access to the Internet	15	6.2 Health Plan	10	7.2 Testing of new varieties	10	8.2 Evaluation of increases in revenue	50
5.3 Training and improvement	15	6.3 Training	10	7.3 Use of substrates	10	8.3 Satisfaction (customer and market)	50
5.4 Visits and contacts with customers	15	6.4 Identification of leadership	10	7.4 Use of protected cultivation	10	8.4 Relationship (customer and market)	50
5.5 Distribution channels	15	6.5 Fast reaction to stimulus and demands	10	7.5 Matrices in greenhouse	10	8.5 Image of the company	20
5.6 Technologies, methodologies and processes	15	6.6 Ability to search for information	10	7.6 Certification of seeds and seedlings	10	8.6 Environmental compliance	20
				7.7 Analysis of soil	10	8.7 Well-being, motivation	30
				7.8 PH and CE measurer are available	10	8.8 Continuous increase of productivity	30
				7.9 Observation of harvest point	10	8.9 Compliant of the product	30
				7.10 Appropriate internal transport	10	8.10 Operational	30
				7.11 Packing house	10	8.11 Quality of suppliers	20
				7.12 Processing Unit	10	8.12 Relationship with suppliers	20
				7.13 Refrigerated vehicles	10		
				7.14 Maintenance	10		
				7.15 Cleaning and organizing	10		
				7.16 Nonconformance	10		
				7.17 Quality control	10		
				7.18 Agricultural credit	10		
				7.19 Insurance	10		
Subtotal: 90 points		Subtotal: 60 points		Subtotal: 190 points		Subtotal: 400 points	
Grand total: 1000 points							

Source: MIGG Flowers [4].

Table 5. Degree of maturity in quality management in cut flowers (MIGG Flowers).

Scoring bands Number	Description of the maturity of Management	Score value
9	Highly proactive approaches, refined, innovative, fully distributed, with continued use, underpinned by lifelong learning and fully integrated. Favorable trends on all the results. The organization has the leadership in the industry and is recognized as a "reference of excellence" in most areas, processes or products.	851 - 1000
8	Approaches highly refined, some innovative, proactive, with continued use and well disseminated to areas and processes of the organization. Favorable trends on all the results. The organization is reference of excellence in many areas, processes or products.	751 - 850
7	Approaches appropriate for the requirements of all criteria. Almost all the results are favorable trend and has no unfavorable trend. The results of the current level is high, is considered the industry leader and reference of excellence in some areas, processes or products.	651 - 750
6	Approaches appropriate for the requirements of all criteria. Management practices are consistent with the organization's strategies and refinement results from the learning and innovation for many practical criteria. Almost all the results are favorable trend. The results of the current level is above average, the organization may be considered one of the leaders in the industry.	551 - 650
5	Approaches appropriate for the requirements of almost all criteria. Management practices are consistent with the organization's strategies, there are some gaps in the inter-relationship among management practices. Most favorable results shown a tendency.	451 - 550
4	Approaches appropriate for the requirements of most criteria widespread in most areas and processes of the organization, control practices for many of them. Management practices are consistent with most of the strategies of the organization, but there are significant gaps. Most relevant results are presented as a result of the correct application of the approaches.	351 - 450
3	The organization has appropriate approaches to some criteria. There are inconsistencies among management practices and strategies. There are still many gaps in learning and refinement, but there are positive results arising from the correct application of the approaches, assessments and improvements.	251 - 350
2	The organization is in the early stages of development of quality management practices, there are significant gaps to be worked on and refined.	151 -250
1	Preliminary stages of management development.	0 - 150

Source: MIGG Flowers [4].

### Method of identification of Management Degree into the Coffee Activity (MIGG Coffee)

The MIGG Coffee was developed in four main steps:

1) First, we used the methodology Rapid Rural Appraisal (RRA) for collecting information on aspects to primary production and crop varieties, nutrition, use of pesticides and plant, materials and recycling of crop residues, harvesting, post-harvesting, packaging and logistics. Furthermore, we considered the administrative aspects of human resources, cost control, marketing and finance, among others. Then we used the method of collection and

systematization to secondary information (MECASIS), to obtain data on sector characteristics. From these data, we identified the critical factors for the chain of coffee production, as well as secondary data about the sector

2) In the second step, we used the Delphi technique, to select and rank the parameters to assess the environmental, social and economic of coffee production.

3) In the third, the critical factors for the chain of coffee production, and secondary information identified in the first stage, were confronted with the criteria used in MIGG for production of cut flowers.

4) In the fourth stage, a proposal was drawn up to implement a script management, aiming at continuous high quality standards at all stages of the coffee agribusiness system: Method of Identification of Management Degree (MIGG), the coffee company. That is, a questionnaire was designed, evaluated by values and weights assigned based on those used in MIGG Flowers.

A fifth stage, should be completed in the near future: the application of the proposed method to coffee producers of different sizes and regions, to test the viability of its application, especially regarding the understanding and objectivity of the questions at the time of completion and acceptance.

## **RESULTS**

This study was conducted between January and June 2012. Surveys were carried out using the methods RRA and MECASIS, which were complemented by results of studies conducted at the Agronomic Institute, from 2001 to 2006 and from 2007 to 2008 - the results obtained in these studies were submitted to five experts coffee sector, to review and update. Were sought information on the following topics: management, quality coffee production chain of coffee production, roasting and grinding industry, the coffee industry, competitiveness, added value, standardization, traceability, certification, consumer behavior, marketing coffee, national and international markets, among others relevant to the research.

In the period 2001 to 2006, visits were made to the areas of coffee production in the six main coffee-producing states of Brazil: Minas Gerais, Espírito Santo, São Paulo, Paraná, Rondônia and Bahia. Were interviewed representatives of the whole agribusiness chain of coffee,

as well as representatives of organizational environments and institutional issues related to the production chain, and RRA, MECASIS and Delphi methods were applied to identify the critical points of the chain, and raise the technological demands and non-technological, that should be addressed to reduce the impacts of the critical factors in the production chain. Were also held regional meetings to survey and prioritize those demands [2].

Table 6 shows the factors related to quality management in the coffee production chain, considered critical to achieving the final product of superior quality and competitiveness of the coffee activity. Between December 2007 and April 2008 were reapplied RRA, MECASIS and Delphi methodologies, to farmers and representatives of the coffee production chain in Brazil, which allowed the identification and prioritization of indicators of environmental, social and economical sustainability into the coffee production [7]. These indicators are shown in Table 7.

Information on the coffee activity shown in the tables 6 and 7 were used in the adjustment of MIGG for organizations in the coffee sector. The criteria, themes and indicators used in MIGG Flowers were mostly consistent with those identified for the coffee industry. After the selection of indicators, were developed the self-assessment questionnaire and the script, so that those responsible for organizations can identify areas where corrective actions are required. The questions comprising the questionnaire, admit two types of response: yes or no. Table 8 presents the template score for MIGG Coffee And, according the bands of score reached, the organization is classified into nine levels in the same way as that defined for Migg flowers, which enable the evaluation of description maturity management (Table 5).

The development of this method of assessing the degree of management meets a demand sector. The questionnaire on coffee estates associated with an association of farmers, in the municipality of Divinolândia, State of Sao Paulo, will be held in July 2012. The results will be used in the refinement of the Migg Coffee.

Table 6. Factors critical to quality management, productivity and profitability of coffee.

Critical Factors Segment of the production chain and the growing stage		Impacts of the critical factors on the activity
Climate	Temperatures below 18°C: frost, blocking of biological functions	Reduction in quality and yield
	Temperatures above 23 ° C: blockade of biological functions	Reduction in quality and yield
	Hydric deficit and poor water distribution	Reduction in quality and yield
	High altitude, cold winds damaging. A higher incidence of diseases (Ascochyta, Phoma)	Reduction in quality and yield
	Altitude baixa: favorece pragas e doenças	Reduction in quality and yield
Inputs	Under the ideal: it favors pests and diseases	Reduction in quality and yield
Irrigation	Inadequate use: less efficient on breaking the dormancy of the flower buds	Waste of water and nutrients (leaching) Reduction in quality and yield
Cropping system	Traditional	Micro climate favors some pests Reduction in quality and yield
	Tier	Micro climate favors certain pests and diseases Favors pests and diseases without being limiting factor, facilitates mechanization
	Compacted	Difficult crop treatment and favors pests and diseases Raises cost (more manpower) Reduction in quality and yield
Seedlings	Seeds and seedlings without phytosanitary control, spread of diseases and nematodes	Increase in the cost (certification)
	Grafting: technique little improved	Highest rate of failures in the field, replanting, risk of contamination as a drop in productivity
	Clonal multiplication	Higher cost, possibility of contamination, limitation for ratooning
Cultivars	Inappropriate use (regional adaptation)	Reduction in quality and yield
Cycle of production	Intrinsic characteristic of <i>C. arabica</i>	Biennial cycle: years of alternating high and low productivity, decreased quality
Pruning, soil correction	Yield reduction	Lower financial return, discourage cyclical, lower quality
Diseases	Rust	Reduction in quality and yield
	Antracnose, Phoma, Cercóspora, Coletotrichum	Reduction in quality and yield
Pests	Leaf miner	Reduction in quality and yield
	Coffee berry borer	Reduction in bean quality and yield
	Mealybugs and mites	Reduction in quality and yield (very high level of attack)
	Nematodes	Yield reduction (not grafted cultivars) Cost with grafted
	Occasional: Cicadas, Fly and Cochineal root, Caterpillars	Reduction in quality and yield (very high level of attack)

Continua

Table 6. Continua

Critical Factors Segment of the production chain and the growing stage			Impacts of the critical factors on the activity
Harvest	Detachment on the ground	Mixing and blending, with impurities of fruits (raisins and green)	Quality decrease
	Detachment on the cloth	Cost, mixed fruit (raisins and green)	Quality decrease
	Harvest finger	Increased manpower	Higher cost
	Mechanical harvesting	High price, higher incidence of unripe fruits	Quality decrease Infeasible for small farms
Pos-harvest	Dry (natural): impurities, mixed of grains, thickness of the grains and their movement		Quality decrease
	Via semi-wet (shelled cherry): thickness of the grains and their movement		Quality decrease
	Wet (washed, desmucilado): fermentation time		Quality decrease
Drying	Inappropriate temperature of the dryer		Quality decrease
	High initial moisture content (wet season harvesting)		Quality decrease: maior velocidade de deterioração
Storing coffee to be benefited	Humid, very hot, unventilated, with the risk of contamination by pests and / or chemicals		Quality decrease and economic losses
Roasting	Excessive		Quality decrease
Packing	Inadequate storage and marketing of coffee roasted and ground		Quality decrease in retail
	Disposal		Environmental pollution
Industrialization	Generation of waste: carbon dioxide (roasting and grinding), sludge (soluble) and pie (oil extraction)		Environmental pollution
	Inadequate processing, raw material of low quality		Quality decrease of final product (sensory, physical and microbiological)
	Productive efficiency		Quality and competitiveness decrease

Source: Results of the study.



Table 7. Selected criteria indicator of performance, based on Delphi results and field tests in Brazil.

Criteria	The criteria indicator of performance
1. Farm management	1. Coffee yield
	2. Perceived production costs
2. Economic empowerment	3. Information regarding coffee market
	4. Perceived negotiation capacity of farmers/ 4C Unit
3. Income/ Profitability	5. Perceived changes in income/salaries
	6. Price differential
4. Health and safety	7. Occupational health
	8. Housing conditions
	9. Food availability
5. Education/Child labor	10. School access
6. Social empowerment	11. Active participation in organization
	12. Work contract
7. Natural resources	13. Perceived quality of natural resources
8. Land use	14. Erosion
9. Pollution	15. Pesticides
	16. Garbage

Source: Based on [7].

Quadro 8. Gabarito de pontuação do questionário de autoavaliação em gestão em café (MIGG Café).

Template Score for Migg Coffee							
Criteria, measurement criteria and their scores							
1. Strategies and Plans		2. Leadership		3. Customers		4. Society	
1.1 Business Plan	15	2.1 Relationships with employees, suppliers and customers	10	3.1 Definition of sales prices	15	4.1 Use of biological control	10
1.2 Documentation (mission, vision, values)	15	2.2 Communication (objectives and results)	10	3.2 Classification of beans and beverage	15	4.2 Waste treatment	10
1.3 Action plan and frequency	15	2.3 Domain of the factors that affect the company	10	3.3 Serviço de atendimento ao cliente (SAC)	15	4.3 No use of child labor	10
1.4 Adjustment of production rate	15	2.4 Attitude toward to delegation of actions	10	3.4 Banco de Dados do SAC	15	4.4 Associations and cooperatives	10
		2.5 Joint resolution of attrition	10	3.5 Resolution demands of SAC	15	4.5 Fees and taxes paid (legislation)	10
				3.6 Compliance with deadlines and specifications	15	4.6 Code of conduct	10
Subtotal: 60 points		Subtotal: 50 points		Subtotal: 90 points		Subtotal: 60 points	
Criteria, measurement criteria and their scores							
5. Information / Knowledge		6. Persons		7. Processes		8. Results	
5.1 Technical support	15	6.1 Use of E. P.	10	7.1 Improve genetic material	10	8.1 Periodic follow-up of sales	50
5.2 Access to the Internet	15	6.2 Health Plan	10	7.2 Testing of new varieties	10	8.2 Evaluation of increases in revenue	50
5.3 Training and improvement	15	6.3 Training	10	7.3 Use of substrates	10	8.3 Satisfaction (customer and market)	50
5.4 Visits and contacts with customers	15	6.4 Identification of leadership	10	7.4 Use of protected cultivation: seedling production	10	8.4 Relationship (customer and market)	50
5.5 Buscamarket search or maintenance	15	6.5 Reaction to stimulus and demands	10	7.6 Certification of seeds and seedlings	10	8.5 Image of the company	20
5.6 Innovation, protocols and methods	15	6.6 Recognition of performance and ability	10	7.7 Analysis of soil	10	8.6 Environmental compliance	20
				7.8 Control of irrigation fertilized	10	8.7 Well-being, motivation	30
				7.9 Observation of harvest point	10	8.8 Continuous increase of productivity	30
				7.9 Control of parameters (harvest and post-harvest)	10	8.9 Percentage of the crop in high standards	30
				7.10 Logistics at harvest	10	8.10 Operational efficiency	30
				7.11 Installations for the appropriate post-harvest	10	8.11 Quality of suppliers	20
				7.12 beneficiation facilities	10	8.12 Relationship with suppliers	20
				7.13 Storage facilities	10		
				7.14 Maintenance	10		
				7.15 Cleaning and organizing	10		
				7.16 Nonconformance	10		
				7.17 Quality control	10		
				7.18 Agricultural credit	10		
				7.19 Insurance	10		
Subtotal: 90 points		Subtotal: 60 points		Subtotal: 190 points		Subtotal: 400 points	
Grand total: 1000 points							

Source: Results of the study.

## CONCLUSIONS

The characteristics of the model to evaluate the degree of management, developed to evaluate the organizations related to cut flowers, allow it to be suitable for other agricultural sectors, without great difficulty, since the critical points regarding the management of quality, productivity and profitability of the activity in question are identified. As the questions that make up the evaluation questionnaire are direct, objective and admit only two kinds of answer - yes or no - the subjectivity that usually accompanies the descriptive or qualitative methods is minimized.

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