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Use of Management Accounting Artifacts in Agricultural Cooperativees from Minas Gerais and Its Relation with Size and Financial Performance

Abstract

The aim in this study was to verify the use of traditional and modern management accounting artifacts in agricultural cooperatives and to analyze the relation with their size and financial performance. The research contributed to the literature, showing that, although a specific branch is analyzed, the results are similar to earlier studies undertaken in Brazil and abroad. A quantitative, empirical and analytic survey was carried out. The data were collected through a structured questionnaire, used in earlier studies, and adaptations were made for this study. The questionnaire was forwarded by e-mail in April 2011 to 92 cooperatives that, after being contacted, were willing to participate in the research, resulting in 69 answers. The total population consists of 203 cooperatives. The data were submitted to the non-parametrical statistical test of significance of means for two independent samples. The empirical evidence indicates that the cooperatives use artifacts and that, with regard to the performance and size, no difference was found between the cooperatives that use modern and/or traditional management accounting artifacts.

Key words: Management Accounting; Modern and Traditional Artifacts; Agricultural Cooperatives.

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1. Introduction

To support the managers in the performance of their activities, management accounting, considered as "the product of the operational and financial information production process for managers inside an organization" (Soutes, 2006, p. 9), has methods, management philosophies and models, tools, systems and instruments at its disposal which are called artifacts (Borinelli, 2006; Soutes, 2006).

Studies have been carried out abroad, such as Sulaiman, Ahmad and Alwi (2004), Chenhall and Langfield-Smith (1998), and in Brazil, such as Soutes (2006), Soutes and Guerreiro (2007), Espejo (2008), Teixeira, Gonzaga, Santos and Nossa (2011), Guerreiro, Cornachione and Soutes (2010), Reginato (2010), Matos (2010) and Gonzaga, Da Luz, Guimarães and Valerio (2010), to verify the use of management accounting artifacts (or tools).

The artifacts have been divided into traditional and modern, also observing the stage classification by the International Management Accounting Practice - IMAP 1 (Sulaiman *et al*., 2004; Soutes & De Zen, 2005). The following are considered as traditional artifacts: variable costing, standard costing, absorption costing, budget, decentralization, present value, constant currency and transfer price. Modern artifacts are: theory of constraints, activity-based costing (ABC), benchmarking, just-in-time, *kaizen*, target costing, simulation, balanced scorecard, Economic Value Added (EVA) and Gecon.

Studies about artifacts, whether isolated and/or in combination, also look for evidence regarding the relation between their use and company size and financial performance (Soutes, 2006; Espejo, 2008; Teixeira *et al*., 2009; Reginato, 2010; Matos, 2010; Gonzaga *et al*., 2010). Soutes (2006) and Teixeira *et al*., (2009) evidenced diverging results in terms of financial performance. Differences were also found in studies that identified the prevalent use of traditional artifacts (Chenhall & Langfield-Smith, 1998; Sulaiman *et al*., 2004), thus affirming a gap between theory and the use of artifacts in comparison with studies that identified the prevalent use of modern artifacts (Soutes & Guerreiro, 2007), indicating a lag on the existence of this gap.

This study is justified as a form of contribution to existing research, and will add tests in agricultural cooperatives in a Brazilian state. Using cooperatives from a single segment, differences in size, profitability and strategies can be assessed in a specific sector, differently from earlier studies, whose samples contained companies from different segments.

The objective was to verify the use of traditional and modern management accounting artifacts in cooperatives and analyze whether a relation exists with their size and financial performance. The research question is: **What is the relation between the choice of certain management accounting artifacts and the cooperatives' size and economic-financial performance?**

Besides this introduction, the study is divided in five other chapters. Chapter 2 presents the theoretical framework, including the concepts of cooperatives, agricultural cooperatives, management accounting and artifacts; chapter 3 earlier studies and the research hypotheses; chapter 4 the method with the research design, data collection, sample and analysis method; chapter 5 presents the data analysis and comparison with earlier studies; and chapter 6 the conclusions drawn from the statistical analysis.

2. Theoretical Framework

2.1 Cooperative Societies

Law 5.764/71, Art. 4, defines cooperatives as "[...] enterprises of people, with a characteristic legal form or nature, civil, not subject to bankruptcy, constituted to deliver services to their members, distinguishing themselves from other enterprises" by a range of characteristics, including voluntary and free adherence, the untransferability of quotas to third parties external to the enterprise and to the singular voting rights, except for unions, federations and confederations (Law 5.764, 1971).

According to Carvalho and Bialoskorski Neto (2007, p. 1):

> Agricultural cooperatives are organization of rural producers, which play an important role in agriculture, as they allow the producers the storage and trading of their production, scale gains, bargaining power, the industrialization of raw material to add value, as also allow the dissemination and democratization of access to technology and technical assistance.

Data from the *Anuário do Cooperativismo Mineiro de 2010*, issued by the *Organização das Cooperativas do Estado de Minas Gerais* [OCEMG] (2010, p. 16), inform that 8.7 out of every 100 economically active individuals are affiliated with some cooperative in the state. They also affirm that 6.4% of the GDP in Minas, equivalent to 18.5 billion *reais*, derives from cooperativism, 48.31% of which from agricultural cooperatives. The same publication reveals that agricultural cooperatives, moving 8.9 billion *reais* per year, represent 10.7% of the state's agricultural GDP. The sector is responsible for 44.7% of milk, 43.7% of coffee and approximately 22% of poultry, avocado, corn and garlic production.

In their respective segments, the agricultural cooperatives compete with multinationals and large Brazilian companies and, in this context, they should be professionally managed for their survival.

2.2 Management Control Systems

According to Davila and Foster (2007, p. 908), "in early-stage companies start with an open slate as regards management control system" and need to define which will be implemented. They also state (Davila & Foster, 2007, p. 909) that the "companies grow, direct observation of the agents' effort – the main control approach in the absence of systems - becomes too costly and motivation and monitoring have to happen through the design of appropriate management control system".

According to Otley (1980, p. 413), "the contingency approach to management accounting is based on the premise that there is no universally appropriate accounting system which applies equally to all organisations in all circumstances." Also according to Gonzaga *et al.*, (2010, p. 2), as regards the Management Accounting System tools, "there is no pattern as to what tools the organization has to use. In addition, the structure of the MCS can vary in function of the adopted strategies, organizational needs and possible influential factors."

Management accounting, as a part of the Management Control Systems, can produce financial and non-financial information for managers to make decisions and to guarantee the use of the resources according to their goal (Horngren, Foster & Datar, 2000; Atkinson, Banker & Kaplan, 2000; Soutes, 2006).

2.3 Management Accounting

According to Soutes (2006, p. 9), "'**Management accounting**' is considered as the product of the operational and financial information production process for managers inside an organization." Atkinson *et al.* (2000, p. 36) defines it as, "the process of identifying, measuring, reporting and analyzing information about the companies' economic events."

In 1998, the Institute of Management Accountants (IMA) issued a report in 1998 called "International Accounting Management Practice 1" (IMAP 1) (International Federation of Accountants, 1998). In this report, management accounting was characterized in four evolutionary stages and, as it evolved, the change in its position in the organizational structure was evidenced, ceasing to be a merely technical activity to become a value creating activity, a full part of management, as demonstrated in Figure 1.

Evolutionary stages	Position in the organizational structure
In stage 1, before 1950, the focus was the cost determination and financial control, through the use of the budget technology and cost accounting.	In stage 1, it was considered as a technical activity needed to pursue the organizational objectives.
In stage 2, initiated in 1965, the focus changed to the supply of information for management planning and control, through the use of technologies, such as decision analysis and responsibility accounting.	In stage 2, management accounting is considered as a management activity, but in an advisory role, providing information for planning and control.
In stage 3, initiated in 1985, attention was focused on the reduction in the waste of resources used in the business processes, through the use of process analysis and cost management technologies.	In stages 3 and 4, management accounting has been considered a part of the management process, with real-time information that is directly available and with a difference between team and line management, progressively losing focus. The focus on the use of resources (including information) to create value is a part of the organizational management process.
In stage 4, initiated in 1995, the attention moved to the value creation through the effective use of resources and technologies, which assess the value drivers for the client, the value for the shareholder and organizational innovation.	

Figure 1. Evolutionary Stages and Position of Management Accounting in the Organizational Structure According to Imap 1
Source: Adapted from IMAP 1 (1998)

2.4 Artifacts

Para Borinelli (2006, p.184):

> [...] to perform their activities and functions, Controllership and Management Accounting, especially with regard to measuring and reporting economic events, need to use methods (for measuring etc.) and use instruments (for performance assessment for example). These methods, management "philosophies" and instruments have been called artifacts by some authors.

Soutes (2006, p. 9) affirms that:

> "**Artifacts** are considered as (...) activities, tools, instruments, management philosophies, production philosophies, management models and systems that can be used by management Accounting professionals in the practice of their functions".

According to Soutes (2007), researchers have developed various modern artifacts to grant, in line with Shank and Govindarajan (1997, p. 29), a "more comprehensive perspective to traditional management accounting".

Chenhall and Langfield-Smith (1998) state that "increasing levels of global competition have intensified the challenges" made management accounting, in response to the changes and to maintain its relevance, create a range of new management techniques. According to the same authors, "traditional management accounting practices focus on concerns internal to the organization and are financially-oriented. In contrast, more contemporary management accounting techniques combine both financial and non-financial information and take an explicit strategic focus."

Stages	Artifacts
1st Stage	Absorption costing, variable costing, standard costing and return on investment.
2nd Stage	Transfer price, constant currency, present value, budget and decentralization.
3rd Stage	Activity Based Costing (ABC), target costing, benchmarking, *Kaizen*, just-in-time (JIT), theory of constraints, strategic planning and activity based management (ABM).
4th Stage	EVA (Economic Value Added), simulation, Gecon and balanced scorecard.

Figure 2. Management Accounting Artifacts per Stage
Source: Adapted from Soutes (2006)

Soutes (2006) divides the categories into traditional and modern, adopting the method suggested by Soutes e De Zen (2005) and the distribution of categories between traditional and modern suggested by Sulaiman *et al.* (2004), also observing the stage classification by the International Management Accounting Practice (IMAP 1).

Soutes (2006, p. 9) considers "traditional management accounting artifacts as those that attend to the objectives of the 1st and 2nd stage of management accounting proposed by the Institute of Management Accountants (IMA) [...]" and modern artifacts as those that attend to the 3rd and 4th stages. The artifacts are separated, according to Soutes (2006, p. 24), as displayed in Figure 2.

3. Hypotheses

Chenhall and Langfield-Smith (1998) presented a study about the adoption and benefits of management accounting practices in 78 of the largest Australian industries disseminated by the *Business Review Weekly*. The authors found evidence that traditional artifacts are more adopted than modern ones and that the use of traditional artifacts offers greater benefits.

Sulaiman *et al.* (2004), through a literature review about the use of management accounting artifacts in companies from four Asian countries (Singapore, Malaysia, China and India), identified the lack of usage of modern management accounting artifacts, while traditional artifacts remained strongly used.

Soutes and Guerreiro (2007) studied the 500 largest Brazilian companies in sales figures in 2004, according to the publication *Melhores e Maiores* by the magazine *Exame,* published in July 2005, based on the year 2004, and 44 companies indicated for the ANEFAC-FIPECAFI-SERASA Transparency Award between 1996 and 2004, and identified that 52% used modern management accounting artifacts and presented a distinguished performance when compared to companies that used traditional management accounting artifacts.

Teixeira *et al.* (2009) analyzed the use of traditional and modern accounting artifacts in the 200 largest companies in the State of Espírito Santo, according to the ranking by the magazine Findes, and found no evidence of a relation between the use of one or another artifact and the companies' financial performance. According to the authors, the result differs from the earlier study by Soutes and Guerreiro (2007).

Gonzaga *et al.* (2010), also using the 200 largest companies from the State of Espírito Santo as a reference, according to a ranking by the magazine Findes, found a relation between size (represented by total assets) and the larger number and intensity of the use of some management accounting artifacts.

In accordance with the results of earlier studies by Sulaiman *et al.* (2004), Soutes (2006), Soutes and Guerreiro (2007), Teixeira *et al.* (2009) and Guerreiro *et al.* (2010), three hypotheses will be tested.

- **H1:** The agricultural cooperatives from the State of Minas Gerais do not use modern management accounting artifacts.
- **H2:** The use of modern management accounting artifacts implies a distinguished size.
- **H3:** The use of modern management accounting artifacts implies a distinguished financial performance.

4. Methodological Aspects

In methodological terms, an empirical-analytic (Martins, 2000, p. 26) survey (Creswell, 2007; Martins, 2000) was undertaken.

The sample is considered as a non-probabilistic intentional or convenience sample (Martins, 2000; Oliveira *et al.*, 2003).

According to the *Anuário do Cooperativismo Mineiro*, published by the *Organização das Cooperativas do Estado de Minas Gerais* (OCEMG) (2010, p. 14), in August 2010, the population consisted of 203 agricultural cooperatives in the State of Minas Gerais.

The list with the names, addresses, telephones and e-mails of the agricultural cooperatives was available in the same publication (2010, p. 116). All of them were contacted by telephone. Initially, the accountant was contacted and informed about the research, requesting authorization to forward the e-mail with the questionnaire. Besides the accountant, whenever possible or requested, the e-mail was sent to the managers, directors or presidents of the cooperatives.

Of all cooperatives that could be contacted, as the informed telephone number was left unanswered sometimes, 92 cooperatives authorized the forwarding of the questionnaire and were willing to participate, some of which observed that they would only answer if the board of directors authorized the participation. The questionnaire was sent by e-mail on April 7th 2011 to these 92 cooperatives. To facilitate the completion of the data, the same questionnaire was made available through a Google Docs link. By October 19th 2011, 69 questionnaires had been received.

The questionnaire was structured in 13 blocs. The first six included the questions formulated by Soutes (2006); the seventh and eighth were questions developed by Teixeira *et al.* (2009); and the remainder were questions developed in the Fucape management research of the 200 largest companies in the State of Espírito Santo –2010 Editions. Proper adaptations were made for the branch under investigation. Figure 3 presents the division of the questionnaire.

Blocs	Information
1	About the respondent and the cooperative.
2	About the use of the external consulting services.
3	About the number of employees of the cooperative.
4	About the management model.
5	About the existence of a specific management accounting department and the main tasks of the department.
6	About the adopted management accounting practices.
7	About benefits of the implementation of the tools.
8	About factors that motivate or restrict the implementation of the tools.
9	About financial information from the last ten years about the net surplus before the destination to the compulsory funds or losses2, net equity, total assets and cash generation.
10	About the size, using billing information and total assets from the last ten years.
11	Specific information about the use of the budget.
12	About the existence of incentives for managers.
13	Related to the strategic positioning, accounting standard and governance.

Figure 3. Division of the Questionnaire in Blocs

Source: Research data

With regard to blocs 9 and 10, the respondents were asked to inform about surpluses/losses, net equity, billing and total assets for the last ten years. Few responds were willing to provide the data for such a long period. Therefore, they were asked to provide the data for 2009 and 2010 only. What the cash generation is concerned, although only the last two years were requested, few cooperatives were willing to provide this information, which is why the researcher informed the respondent that this information was not necessary if (s)he did not have it or did not want to provide this information. The intention was to incorporate these data into the list of variables used as performance measures, as a complement to the study by Soutes (2006), which could not be done.

4.1 Analysis methods

Similar to the study by Soutes (2006), non-parametrical statistical tests were applied (Hill & Hill, 2005, p. 195), submitting the data to the significance test of means of two independent samples, called Wilcoxon-Mann-Whitney or simple Mann-Whitney test (Marôco, 2010, p. 321).

After collecting the data about the use of each of the artifacts, the sample was divided between cooperatives that used and did not used each of the artifacts, as well as the group that used traditional management accounting artifacts and the group that used modern management accounting artifacts.

Each artifact was tested with regard to the performance and size of the cooperatives that affirmed using or not using it. For the performance analysis, the surpluses or losses were used as a reference, as well as the profitability of the net equity and profitability of the asset. To analyze the size, in accordance with Soutes (2006), total assets and billing were used as references.

The division of the groups between traditional and modern followed a method similar to Soutes (2006). On the list of artifacts selected for the study, the following are modern: theory of constraints, activity based costing, benchmarking, just-in-time, *kaizen*, target costing, simulation, balanced scorecard, economic value added and Gecon, as they figure in the 3rd and 4th stages of management accounting proposed by the Institute of Management Accountants, listed in Figure 2.

In bloc 6 of the questionnaire, the respondent was asked about the management accounting artifacts used in the cooperative. It included 24 questions about the use of the 18 management accounting artifacts analyzed in this study. Among the 24 questions, 13 related to the modern artifacts. Like in Soutes (2006), in some questions, the question about the use of the artifact was asked directly. To give an example: **For management purposes, is the product cost calculated based on the variable costing method?** In others, the question was asked indirectly, about a procedure or concept that implied the assertion or information about the use of a specific artifact. To give an example: the cooperative uses the contribution margin concept (revenues minus variable product costs and variables)?

The respondent was asked to mark, using a Likert scale, his agreement level with each of the questions, according to the following options: I completely disagree (CD), disagree (D), neither agree nor disagree (NA/ND), agree (A), completely agree (CA). The cooperatives that marked "I completely agree" or "I partially agree" on at least 7 out of 13 questions were classified in the group that use modern accounting artifacts, adopting the same criterion as in Soutes (2006). This criterion defined the classification of the cooperative as modern, independently of the number of questions that were answered with "I completely agree" or "I partially agree" about the artifacts classified as traditional.

To analyze the relation with performance, using the mean surplus or loss, asset profitability and net equity profitability of each cooperative for 2009 and 2010, the Mann-Whitney test was applied to identify the statistical difference, with a 5% two-tailed significance level, that is, 2.5% in both directions, between the means of the variables that represented the performance of each of the two groups that used each of the artifacts analyzed or not. Next, the same test was applied to the group of cooperatives that used the traditional artifacts, comparing it with the group that used not only traditional, but also modern artifacts.

To analyze the relation with size, using the mean billing and total assets for 2009 and 2010, the Mann-Whitney test was also applied to assess a possible relation with the use of traditional and modern artifacts with a 5% significance level.

5. Data Analysis

The data analysis is presented as a sample of 69 questionnaires received. Although the cooperatives belong to the agricultural sector, question 1.6 in the questionnaire asked them to inform the main input purchased from the associates. Based on the answers, it could be identified that, among the 69 respondents, the main product of 36 (52.17%) is milk, 11 (15.94%) coffee, 4 (5.79%) soy and 4 (5.79%) corn.

As regards the number of employees, 29 cooperatives (42.03%) have less than 50 employees, 10 (14.49%) between 50 and 100 employees and 30 cooperatives (43.48%) more than 100 employees.

5.1 Profile of the Respondents

Block 1 requested information about the respondent and the cooperative. In terms of education, the data revealed that 36 (52.17%) respondents hold a degree in Accountancy, 14 (20.29%) in Business Administration and the remainder in other knowledge areas. In total, two hold a Master's degree, five are specialists, 49 hold an undergraduate degree and 13 respondents did not finish their higher education program. It is interesting to observe that, out of 69 respondents, 65 affirmed that they participate in recycling programs, evidencing constant concern with updated knowledge.

As regards the time on the job, the data show that 32 (46.38%) have been on the job for less than five years, 13 (18.84%) between five and ten years, and only 14 (20.29%) for more than 15 years, indicating a possible renewal of these professionals in the cooperatives.

Question 1.2 requested information about the graduation year of the management accounting responsible. Similar to the results found by Soutes (2006) and Teixeira *et al.* (2009), the data indicate that, in 34 (66.67%) out of 51 replies, the time on the job as responsible for management accounting, considering the year of graduation, is less than 10 years. As the mean length of the cooperatives' existence is 38.29 years, it can be affirmed that the data indicate the renewal of these professionals in the agricultural cooperatives.

5.2 About the Use of External Consulting

In block 2 of the questionnaire, the questions addressed the use of external consulting. In the first question, the respondent was supposed to inform whether the cooperative used external consulting services. In case of a positive answer, (s)he should mark in what areas, choosing from a pre-established list, including the possibility to mark consulting in other areas not listed.

According to the data, 56 (81.16%) out of 69 respondents affirmed that they use external consulting, in accordance with the studies by Soutes (2006), in which 82 (91.11%) out of 90 respondents affirmed the same.

The result about the types is also in accordance with Soutes (2006): the six types of consulting the cooperatives used most include strategic planning (30%), total quality management (28.60%), costs (28.6%) and budget (17.9%). Based on the analysis of the data, the finding is highlighted that tax planning ranks first, used by 44.6% of the cooperatives with external consulting, with an additional 8.9% using fiscal and tax consulting, disclosing great concern with the area. Other areas mentioned were: implementation of logistics management, implementation of value-based management, legal consulting, occupational safety, industrial construction projects and environmental consulting.

5.3 Formalization of the Management Model and the Management Accounting Department

The objective of the questions asked in block 4 was to verify the formalization level of the management model. The respondents were expected to mark their agreement level on a Likert scale, choosing among: I completely disagree (CD), disagree (D), neither agree nor disagree (NA/ND), agree (A), completely agree (CA).

The results coincided with Soutes (2006). On average, 73.84% of the respondents who marked complete and partial agreement indicate a high level of formalization of the management model in the agricultural cooperatives.

The fifth block consisted of five questions about the existence of a department or specific sector to treat management accounting information and its main tasks. The results are similar to the findings of Soutes (2006), indicating that, for 61 (88.5%) of the respondents who affirmed complete or partial agreement, a specific department is responsible for the accounting-management information. These results are not surprising, in function of the legal requirements for the cooperatives to use this financial "status" and the tax benefits, mainly related to the taxes IRPJ (income tax for legal entities), CSLL (Social Contribution on Net Income), PIS (Employees' Profit Participation Program) and Cofins (Social Contribution on Billings).

Also, for 88.5% of the cooperatives, one of the main functions of management accounting is to advise the board of directors and all managers on aspects related to economic-financial impacts.

It is highlighted that the high rates of formalization of the management model as well as of the existence of a specific management accounting department may be biased, as most answers came from the accountants or administrative manager of the cooperatives. The same structure of respondents was not found in other studies, but the management structure, mainly regarding accounting, is related to the legal requirements in terms of financial structure and fiscal benefits.

5.4 Benefits of Implementing the Tools

The results about the respondents' perceived benefits of implementing the management accounting artifacts are shown in Table 1.

Table 1
Benefits of Implementing the Tools (Scale from 1 to 7)

Benefits perceived by the respondent	Mean
Support for decision making	2.58
Improvement in cost management control	2.88
Other	2.94
Improvement in performance measures	3.09
Support to prepare financial reports	3.39
Improvement in budgetary control	3.72
Improvement in value engineering process	3.87

Source: Research Data

The question in block 7 of the questionnaire asked the respondent to mark, in order of priority from 1 to 7 (1 for the most important and 7 for the least important), the perceived benefits of the implementation of the management accounting artifacts.

According to the ranking, the most important item in the implementation of the tools is the support for decision making, with the lowest average, 2.58, followed by the improvement in the control of cost management, with a mean 2.88. As regards the most important items, the results are identical to those of Teixeira *et al.* (2009) and Soutes and De Zen (2005). The least important items were the improvement in the value engineering process, with a mean 3.87, and the improvement in budgetary control, with a mean 3.72. It is important to highlight the difference in the respondents' criterion, with 39 (56.5%) marking in increasing order from 1 to 7, and 30 (43.5%), without following this order, sometimes repeating the same priority ranking for more than one item. This fact does not seem to have compromised the result.

5.5 Restrictive and Motivating Factors for the Implementation of the Tools

The questions in block 8 asked the respondents to mark, in order of priority from 1 to 7 (1 for the most important and 7 for the least important), what factors they considered as restrictive and motivating for the implementation of management accounting tools. The results are displayed in Tables 2 and 3.

Table 2
Factors Motivating the Adoption of the Tools

Factors that can motivate the adoption	Mean
Lack of participation/commitment of stakeholders	2.72
Others	2.72
Lack of knowledge and experience in the team	3.01
Lack of resources	3.09
Lack of appropriate technology	3.10
Cost versus benefit relation	3.61
Lack of need to use these tools	3.67

Source: Research Data

According to the order marked by the respondents, the item that most motivates the adoption of the tools, with the lowest average, 2.72, is the lack of participation/commitment of the stakeholders. The results are similar to the findings by Teixeira *et al.* (2009). The least motivating factors from the respondents' perspective are the lack of need to use the tools, with a mean 3.67, and the cost versus benefit relation, with a mean 3.61.

Table 3
Factors Restricting the Adoption of the Tools

Factors that can restrict the adoption	Mean
Complete/partial commitment of the stakeholders in the process	3.09
Knowledge and experience of the internally available team	3.19
Availability of these tools inside the standard ERP	3.22
Availability of appropriate technology	3.32
Available resources	3.55
Cost versus benefit relation	3.86
Adoption of these tools by the competitors	4.57

Source: Research Data

According to the order marked by the respondents (Table 3), the item that most restricts the adoption of the tools is the complete/partial commitment of the stakeholders in the process, with a mean 3.09, followed by the knowledge and experience of the internally available team. The results are similar to the findings by Teixeira *et al.* (2009) and Soutes and De Zen (2005). It is important to highlight that, the commitment of the stakeholders in the process is considered as the factor that can most strongly motivate and, at the same time, restrict the adoption of the management accounting tools. The least restrictive factors from the respondents' perspective are the adoption of these tools by the competition, with a mean 4.57, and the cost versus benefit relation with a mean 3.86.

5.6 Incentive Systems

In block 12, it was asked whether the cooperative has some incentive system for the managers and other employees, indicating the annual bonus, the result participation program and the long-term incentive plans as alternatives, with the possibility to indicate any other existing alternatives. As regards the annual bonus and the result participation program - RPP, 8 (11.59%) cooperatives answered that they do and 61 (88.41%) that they do not practice these incentives. What the long-term incentive plans are concerned, the 69 (100%) cooperatives answered "no".

5.7 Use of Management Accounting Artifacts

In block 6 of the questionnaire, the respondent was asked about the management accounting artifacts used in the cooperative.

Table 4 presents the data for 68 cooperatives: one of the respondents refused to inform the data related to surpluses, net equity, billing and total assets, which are fundamental to analyze the relation between the use of the artifacts, profitability and size.

In accordance with the method adopted for this study, the results indicate the following as the most used artifacts in the agricultural cooperatives: simulation (77.9%), absorption costing and budget (64.7%), and variable costing (63.2%). The least used artifacts, coincidentally all modern, are the balanced scorecard and the *kaizen* philosophy (14.7%), EVA (20.6%), ABC (28%) and just-in-time and target costing (29.4%). In Teixeira *et al.* (2009), the most used artifacts are: the management information system, the budget, absorption costing and analysis per responsibility center. The least used ones are the same found in the agricultural cooperatives shown above. In Soutes (2006), the most used artifacts are simulations, benchmarking, variable costing, decentralization and absorption costing. The least used ones are: ABC, just-in-time, kaizen, transfer price and target costing. In Reginato (2010), the most used artifacts are the budget, EBITDA, ROI, simulation and variable costing. The least used artifacts are the theory of constraints, *Kaizen*, EVA, just-in-time and the balanced scorecard. In comparison with earlier studies, coincidences can be observed in the most used tools, and even greater coincidences in the least used ones.

Table 4

Management Accounting Practices

Management Accounting Practices	CD	D	NA/ND	A	CA	TOTAL
Budget	14.7	8.8	11.8	30.9	33.8	100%
Simulation (1)	4.4	2.9	14.7	35.3	42.6	100%
Simulation (2)	19.1	5.9	16.2	32.4	26.5	100%
Variable costing (1)	20.6	7.4	11.8	22.1	38.2	100%
Decentralization	29.4	11.8	23.5	23.5	11.8	100%
Variable costing (2)	8.8	13.2	14.7	25.0	38.2	100%
Theory of constraints (1)	29.4	11.8	19.1	20.6	19.1	100%
Standard costing (1)	10.3	5.9	23.5	38.2	22.1	100%
Standard costing (2)	22.1	8.8	22.1	25.0	22.1	100%
Activity based costing (ABC)	38.2	5.9	27.9	22.1	5.9	100%
Benchmarking (1)	16.2	7.4	19.1	29.4	27.9	100%
Benchmarking (2)	23.5	5.9	20.6	29.4	20.6	100%
Balanced Scorecard	54.4	4.4	26.5	11.8	2.9	100%
Economic Value Added (EVA)	45.6	5.9	27.9	14.7	5.9	100%
Theory of constraints (2)	16.2	2.9	22.1	32.4	26.5	100%
Present value	16.2	2.9	19.1	27.9	33.8	100%
Constant currency	17.6	1.5	19.1	27.9	33.8	100%
Transfer price (1)	17.6	2.9	19.1	20.6	39.7	100%
Transfer price (2)	36.8	7.4	16.2	25.0	14.7	100%
Gecon	22.1	2.9	11.8	20.6	42.6	100%
Just-in-time	39.7	4.4	26.5	19.1	10.3	100%
Kaizen	47.1	5.9	32.4	11.8	2.9	100%
Target costing	35.3	4.4	30.9	16.2	13.2	100%
Absorption costing	4.4	0.0	30.9	29.4	35.3	100%
Block 6 – (General Mean)	24.6	5.9	21.1	24.6	23.8	100%

Source: Research Data

The relation between the use of the artifacts and the performance was analyzed based on data for 2009 and 2010 regarding the mean surpluses before the destination to compulsory funds or losses, the profitability of net equity and the asset profitability. The use of the artifacts and size were also analyzed based on the mean data for 2009 and 2010 with regard to billing and total assets. The use of data for these years was justified by the fact that most cooperatives did not provide earlier data. It is highlighted that, in line with Soutes (2006), the question "The cooperative calculates the financial cost of the inventories" is associated with the Gecon (Economic Management) system.

Based on each question in block 6 of the questionnaire, the analysis was processed for each of the management accounting artifacts, dividing the cooperatives in two groups: on the one hand those that indicated complete or partial agreement and, on the other, those that marked complete or partial disagreement and neither agreement nor disagreement. Finally, the analyses of the relation with performance and size were processes by dividing the cooperatives in two groups: traditional and modern.

5.7.1 Results per Stage

Each line in Tables 5 to 8, according to the evolutionary stages of management accounting, presents the result of the significance level (*Asymp. Sig*) in function of the Mann-Whitney test results for each sample group.

Table 5
Traditional Artifacts (1st Stage)

Artifacts	Surpluses	NE Profitability	Asset Profitability	Billing	Total Assets
Variable costing (1)	0.251	0.817	0.740	0.463	0.519
Variable costing (2)	0.250	0.087	0.176	0.442	0.755
Standard costing (1)	0.778	0.441	0.535	0.836	0.511
Standard costing (2)	0.302	0.606	0.539	0.291	0.572
Absorption costing	0.555	0.342	0.426	0.293	0.228

Source: Research Data

Table 6
Traditional Artifacts (2nd Stage)

Artifacts	Surpluses	NE Profitability	Asset Profitability	Billing	Total Assets
Budget	0.040	0.010	0.015	0.170	0.218
Decentralization	0.355	0.336	0.182	0.349	0.441
Present Value	0.870	0.350	0.325	0.781	0.412
Constant Currency	0.496	0.158	0.231	0.910	0.724
Transfer Price (1)	0.905	0.560	0.955	0.325	0.721
Transfer Price (2)	0.768	0.141	0.159	0.527	0.995

Source: Research Data

Table 7
Modern Artifacts (3rd Stage)

Artifacts	Surpluses	NE Profitability	Asset Profitability	Billing	Total Assets
Theory of Constraints (1)	0.665	0.730	0.535	0.797	0.535
Theory of Constraints (2)	0.065	0.645	0.213	0.100	0.132
ABC	0.465	0.727	0.571	0.206	0.424
Benchmarking (1)	0.660	0.468	0.438	0.123	0.132
Benchmarking (2)	0.768	0.632	0.650	0.206	0.173
Just-in-Time	0.904	0.829	0.419	0.914	0.946
Kaizen	0.568	0.904	0.436	0.299	0.755
Target Costing	0.270	0.716	0.788	0.518	0.353

Source: Research Data

Table 8
Modern Artifacts (4th stage)

Artifacts	Surpluses	NE Profitability	Asset Profitability	Billing	Total Assets
Simulation (1)	0.217	0.002	0.021	0.935	0.830
Simulation (2)	0.575	0.301	0.418	0.672	0.755
Balanced Scorecard	0.917	0.972	0.678	0.166	0.283
Economic Value Added	0.467	0.457	0.617	0.396	0.750
Gecon	0.924	0.294	0.300	0.894	0.804

Source: Research Data

For the large majority of the artifacts, there is no evidence of statistically significant differences with regard to the profitability and size of the companies that informed using and not using each of them. Also, the large majority of the results coincide with Soutes (2006).

Statistically significant differences were only found in performance terms, for the budget artifacts and question 1 about the simulation of revenues, costs and margin. These differences were identified in the variables "asset profitability" and "profitability of net equity", but were not disclosed for the surpluses or losses.

5.7.2 Modern and Traditional Artifacts

In the list of questions in block 6 of the questionnaire, 13 questions were related to artifacts classified as modern, as they are included in the 3rd and 4th stages of management accounting proposed by the Institute of Management Accountants. The cooperatives that marked seven or more of these artifacts were classified as **modern**, while the remainder was classified as traditional. After the analysis, it was identified that only 19 out of 68 respondents were classified as modern, as displayed in Table 9.

Table 9
Classification between Traditional and Modern

	Frequency	Percentage
Traditional artifacts	49	72.06
Modern artifacts	19	27.94
Total	68	100.0

Source: Research Data

Table 10 evidences the results of the Mann-Whitney and Wilcoxon tests and Z statistics, besides the result of the significance level (Asymp. Sig). After the classification, tests were applied to check for evidences of a statistically significant difference between the cooperatives that use and do not use modern management accounting practices.

Table 10
Statistical Test (Modern and Traditional Artifacts)

	Surpluses	Profitability NE	Asset Profitability	Billing	Total Assets
Mann-Whitney U	417.000	444.000	452.000	455.000	459.000
Wilcoxon W	607.000	1669.000	1677.000	1680.000	649.000
Z	-0.663	-0.294	-0.185	-0.144	-0.089
Asymp. Sig. (2-tailed)	0.507	0.769	0.854	0.886	0.929

Source: Research Data

The analysis of the relation with performance based on surpluses, asset profitability and the profitability of net equity reveals that there exists no statistically significant difference for the group of companies that use and do not use the modern artifacts. The result differs from Soutes (2006) but converges with Teixeira *et al.* (2009). In the analysis related to size, no evidence was found of a statistically significance difference for total assets and billing. This aspect converges with Soutes (2006). The analysis related to size was not developed in Teixeira *et al.* (2009).

6. Final Considerations

The aim in this study was to verify the use of traditional and modern management accounting artifacts and its relation with size and financial performance. The research was undertaken among 68 agricultural cooperatives in the State of Minas Gerais and the main respondents were their accountants and managers.

Based on earlier studies, three hypotheses were tested. Hypothesis 1 affirmed that the agricultural cooperatives from the State of Minas Gerais did not use the modern management accounting artifacts. The results partially confirmed this, as they revealed the prevalent use of traditional management accounting artifacts in most cooperatives, 49 out of 69. Therefore, they converge with the studies by Sulaiman *et al.* (2004), Chenhall and Langfield-Smith (1998), Teixeira *et al.* (2009) and Reginato (2010), but diverge from the studies by Soutes (2006).

For the agricultural cooperatives from Minas Gerais, also partially, the gap between theory and practice was confirmed, as discussed in Langfield-Smith (2008), which differs from the assertions by Soutes and Guerreiro (2007), according to which considerations about the existence of this gap might be outdated.

Hypothesis 2 associated the use of modern artifacts with different sizes. The size variables used were the mean billing and total assets for 2009 and 2010. The results found rejected the hypothesis, without any evidence of a statistical difference between the cooperatives classified as traditional and those classified as modern. The result converges with Soutes (2006). Nevertheless, the 19 cooperatives classified as modern present, respectively, mean billings and assets 2.04 and 3.41 times higher than those classified as traditional. In this perspective, the data are in accordance with Langfield-Smith (1998), for whom there is a possible relation between size and resources for the use of new accounting artifacts. The relation between size and greater use of some artifacts is also in line with evidence by Gonzaga *et al.* (2010).

Hypothesis 3 associated the use of modern artifacts with a distinguished financial performance. The performance variables used were the mean surpluses/losses before the destination to compulsory funds, the profitability of net equity and asset profitability for 2009 and 2010. This hypothesis was also rejected. The results found did not evidence any relation between the use of modern artifacts and a distinguished financial performance, that is, the group classified as traditional revealed the same mean performance as the group classified as modern. The result converges with Teixeira *et al.* (2009), but differs from Soutes (2006).

In the analysis of each artifact, considering the group of cooperatives that affirmed using them in comparison to the group that affirmed not using them, a statistically significant difference was only found with regard to the budget and the simulation of revenues, costs and margin. The evidence was related to performance, in the net equity profitability and asset profitability variables, but not to surpluses/losses. Specifically with regard to the budget, Espejo (2008) found an association between some attributes and financial performance.

The main contribution of this study to the literature was the broader sampling space, using data from cooperatives in a single state, Minas Gerais; from a specific segment, agricultural cooperativism, differently from earlier studies, in which the sample was selected based on the size criterion (Soutes, 2006; Espejo, 2008; Teixeira *et al.*, 2009; Reginato, 2010; Matos, 2010 & Gonzaga *et al.*, 2010).

In addition, the results could be compared with earlier studies in Brazil and abroad. It is important to highlight that, even when using a sample of companies from a specific segment and a single state, the results are similar to past research findings. Coincident results are found with regard to the most used (simulation, absorption costing and variable costing) and the least used management accounting artifacts (balanced scorecard, *Kaizen*, EVA, ABC, just-in-time and target costing) when compared to Soutes (2006), Teixeira *et al.* (2009) and Reginato (2010).

The data regarding the renewal of the professionals responsible for management accounting, the existence of a specific management accounting department, the formalization of the management model, the use of external consulting, benefits deriving from the implementation of the artifacts and restrictive and motivating factors for its adoption are similar to the findings of Soutes (2006) and Teixeira *et al.* (2009).

As regards the incentive systems for managers and other employees, the cooperatives practically do not use these. Only 11.59% have an annual bonus and result participation plan. None of the cooperatives use long-term incentive plans.

The limitations of this analysis should be highlighted. The research was applied through a questionnaire sent by e-mail and, although most respondents hold a degree in Accounting or Business Administration, which could enhance the reliability of the answers, they may not have completely or partially understood some questions, which could have been better discussed in an interview and, in case of doubts, could have been solved. In an interview, the perceived use or not of some tool could also have been better disclosed. The results of the study can be extended neither to other branches of cooperativism nor to other states.

For further research, the expansion of the statistical analysis tools and the extension of the research to other branches of cooperativism in Minas Gerais and to cooperatives from other Brazilian states are suggested. The same research can also be undertaken for Brazilian agriculture, looking for more and better evidence for the use of management accounting artifacts and the respective benefits for Brazilian cooperatives.

7. References

Atkinson, A.T., Banker, R.D., & Kaplan, R.S. (2000). *Contabilidade Gerencial*. (1a ed.). São Paulo: Atlas.

Borinelli, M. L. (2006). *Estrutura conceitual básica de controladoria: sistematização à luz da teoria e da práxis*. Tese de Doutorado, Faculdade de Economia, Administração e Contabilidade da USP, São Paulo, SP, Brasil.

Lei 5.764, de 16 de dezembro de 1971 (1971). Define a Política Nacional de Cooperativismo, institui o regime jurídico das sociedades cooperativas, e dá outras providências. Diário Oficial da União. Brasília, DF: Ministério da Fazenda.

Carvalho, F.L. de, & Bialoskorski, S. Neto. (2007). Um Ensaio sobre a Análise de Desempenho em Cooperativas Agropecuárias. *Anais do Congresso USP de Controladoria e Contabilidade*, São Paulo, SP, Brasil, 7.

Chenhall, R.H., & Langfield-Smith, K. (1998). Adoption and benefits of management accounting practices: an Australian study. *Management Accounting Research*, *9*(1), 1-19.

Creswell, J.W. (2007). *Projeto de pesquisa: métodos qualitativo, quantitativo e misto.* (2a ed.). Porto Alegre: Artmed.

Davila, A., & Foster, G. (2007). Management control systems in early-stage startup companies. *Accounting Review*, *82*(4), 907-937.

Espejo, M.M. dos S.B. (2008). *Perfil dos atributos do sistema orçamentário sob a perspectiva contingencial: uma abordagem multivariada*. Tese de Doutorado Faculdade de Economia, Administração e Contabilidade da USP, São Paulo, SP, Brasil. Recuperado de http://www.teses.usp.br/teses/disponiveis/12/12136/tde-30062008-141909/

Gonzaga, R. P., Da Luz, A.T.M., Guimarães, T.N., & Valerio Jr., V.B. (2010). Associação entre práticas de contabilidade gerencial e tamanho das empresas: um estudo empírico. *Anais da Associação Nacional Dos Programas De Pós-Graduação Em Ciências Contábeis*, Natal, RN, Brasil, 4.

Guerreiro, R. Cornachione Jr. E.B., & Soutes, D.O. (2010). A Utilização de Artefatos Modernos de Contabilidade Gerencial por Empresas Brasileiras. *Anais do Encontro Da Anpad,* Rio de Janeiro, RJ, Brasil, 34.

Hill, M.M., & Hill, A. (2005). *Investigação por questionário*. (2a ed.) Lisboa.

Horngren, C.T., Foster, G., & Datar, S.M. (2000). *Contabilidade de Custos* (9a ed.) Rio de Janeiro: LTC.

International Federation of Accountants. (1998). *International Management Accounting Practice 1*. Recuperado de http://www.mia.org.my/handbook/guide/imap/imap_1.htm

Langfield-Smith, K. (2008). Strategic management accounting: how far have we come in 25 years? *Accounting, Auditing & Accountability Journal*, *21*(2), 204-228.

Marôco, J. (2010). *Análise estatística com o PASW statistics*. (1a ed). Pêro Pinheiro: ReportNumber.

Martins, G. de A. (2000). *Manual para elaboração de monografias e dissertações*. (2a ed.) São Paulo: Atlas.

Matos, E.R.J. de. (2010). *Perfil do sistema de controle gerencial sob a perspectiva da teoria da contingência*. Tese de Doutorado, Faculdade de Economia, Administração e Contabilidade, USP, São Paulo, SP, Brasil. Recuperado de http://www.teses.usp.br/teses/disponiveis/12/12136/tde-10052010-143511/

Organização das Cooperativas do Estado de Minas Gerais. (2010). *Anuário do Cooperativismo Mineiro – Maiores Cooperativas de Minas Gerais ano 2010*. Recuperado de http://www.ocemg.org.br/pagina/146/anuario-do-cooperativismo-mineiro.aspx

Oliveira, A.B.S., Célice, E.S., Cecconello, A.R., & Di G, W.A.B., Kounrouzan, M.C., Barbosa, C.B. (2003). *Métodos e técnicas de pesquisa em contabilidade*. (1a ed.) São Paulo: Saraiva.

Otley, D.T. (1980). The Contingency theory or management accounting: achievements and prognosis. *Accounting Organizations and Society*. *5*(4), 413-428.

Reginato, L. (2010). *Um estudo setorial sobre as relações entre variáveis ambientais externas, modelos de gestão, controles gerenciais e desempenhos das empresas*. 2010. Tese de Doutorado, Faculdade de Economia, Administração e Contabilidade da USP, São Paulo, SP, Brasil. Recuperado de http://www.teses.usp.br/teses/disponiveis/12/12136/tde-15042010-132200/

Shank, J.K., & Govindarajan, V. (1997). *A Revolução dos custos*: como reinventar e redefinir sua estratégia de custos para vencer em mercados crescentemente competitivos. (2a ed.) Rio de Janeiro: Campus.

Soutes, D.O., & De Zen, M.J. de C.M. (2005). Estágios evolutivos da Contabilidade Gerencial em empresas brasileiras. *Anais do Congresso USP De Contabilidade*, São Paulo, SP, Brasil, 5.

Soutes, D.O. (2006). *Uma investigação do uso de artefatos da contabilidade gerencial por empresas brasileiras*. Dissertação de Mestrado, Faculdade de Economia, Administração e Contabilidade da USP, São Paulo, SP, Brasil.

Soutes, D.O. (2007) Custo Total de Propriedade (TCO): É importante? Para quem? *Ciências Sociais Aplicadas em Revista*, *7*(13), 83-105. 2007. Paraná: Unioeste

Soutes, D.O., & Guerreiro, R. (2007). Uma investigação do uso de artefatos da contabilidade gerencial por empresas brasileiras. *Anais do Encontro da Anpad*, Rio de janeiro, RJ, Brasil, 31.

Sulaiman, M. bt., Ahmad, N.N.N., & Alwi, N. (2004). Management accounting practices in selected Asian countries: A review of the literature. *Managerial Auditing Journal*, *4*(19), 493-508.

Teixeira, A., Gonzaga, R.P., Santos, A.V.S.M., & Nossa, V. (2011). A Utilização de ferramentas de contabilidade gerencial nas empresas do estado do Espírito Santo. *Brazilian Business Review, 8*(3), 108-127.