Management accounting research on farms: what is known and what needs knowing?

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Structured Abstract

Purpose – It is difficult to develop an overall picture of the practice of management accounting in farms and farm enterprises because little research has been published on the topic, and these studies are mostly discrete and unconnected to the others. The purpose of this paper is to provide an overview of the available research, develop an explanatory framework for management accounting practices in farming entities and identify some major avenues for future research on the topic.

Design/methodology/approach – This paper employs systematic literature review methods. After an extensive database search and an examination of references/citations, 41 empirical

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journal articles published between 1964 and 2016 are identified, described and analyzed in this research paper.

**Findings** – Our findings reveal that the practice of management accounting in farms is subject to information problems and that the empirical research on this topic largely lacks a theoretical explanation. Therefore, our explanatory framework of management accounting practices in farming entities reveals that these practices are subject to influencing factors such as familism, government farm policies, market competition, technological changes, the seasons and the weather/climate.

**Research limitations/implication** – The overall limited findings on the practice of management accounting in farm enterprises indicate that caution should be taken when generalizing the current knowledge on the use of management accounting practices in other organizational forms to farming entities. Moreover, future research should draw on explicit theories to explain empirical results.

**Originality/value** – This paper is the first comprehensive literature review of studies on management accounting practices in farms and farming enterprises.

**Keywords** – Management Accounting, Management Control, Family Business, Farm Management, Agriculture Subvention, Sustainability Accounting

**Paper Type** – Literature review

### 1. Introduction

From a historical point of view, it is difficult to cite an exact date for the beginning of research on farm management (Tramel and Hildreth, 1957). However, based on the studies of Taylor (1937) and Tramel and Hildreth (1957), such research is estimated to have begun around 1900. Taylor (1937, pp. 95-96) describes the function of farm management from the German perspective and states, “it is not to point the way to maximum production but to state those economic
principles of farm management which lead to maximum net”. These economic principles refer to the well-known (neo)classical theories of profit maximization under budget and capital restrictions. That is, farms usually have to cope and work with production limitations due to scarce budgets and/or scarce capital. This shows that accounting-related issues such as budgets or capital have already long played an important role for farms. In line with this notion, studies on accounting practices such as costing (Boss, 1945), budgeting or linear programming have confirmed Taylor’s (1937) statements and show that management accounting (MA) techniques were already used in farm management by the middle of the nineteenth century (Tramel and Hildreth, 1957). Freear (1970) conducts an analysis of Robert Loder’s farm accounts (from 1610 to 1620) and shows that some practices similar to MA already existed in farm management in the 17th century. The analysis conducted by Feear (1970) reveals that Robert Loder made notes in his accounting records with the aim of achieving the greatest possible return from his farm. This study shows that MA was not explicitly referred to as MA in farm management, but its practice is comparable to current MA practices.

However, although previous studies (until the middle of the 20th century) considered some aspects of MA in farms or farm enterprises (FEs), they primarily focused on general accounting, farm management and/or agriculture and rarely explicitly focused on MA. Since the middle of the 20th century, various transformations have taken place in the farm environment. These transformations have principally been attributed to economic liberalization and driven by globalization (Hazell et al., 2010). Due to these driving forces, various changes occurred in the organizational structures and management practices of FEs (Cook and Chaddad, 2000; Reardon and Barret, 2000). The activities of FEs became more mechanized, and many of them now use digitalized information systems much more intensively than they did a few years ago. The use of monitoring techniques carried out by means of sensors and automated identification in FEs also increased. Because the aforementioned aspects can be categorized as being part of
MA (Horngren et al., 2011), they could have had some major impacts on how MA is performed in FEs. Paradoxically, very little (if anything) is actually known about the current state of research on MA in FEs. Manufacturing and commercial industries mainly comprised of agroindustrial SMEs and family firms rely on farm and agriculture products as inputs for their production processes (Carter, 2007; Guo et al., 2007; Minten et al., 2009; Singh, 2002). Moreover, agriculture/farming is “one industry that has every single person as a stakeholder, relying on it for food and clothing” (Jack, 2005, p. 60). Therefore, a more detailed understanding of the MA practices of FEs and their influencing factors should be of interest to many people. The present paper is an attempt to address this gap. Our main goal is to (1) provide an overview of the current status of MA research on FEs and identify some future research opportunities. While many FEs can be considered as SMEs or family firms, FEs are mainly micro, semi-economic entities operating within the agricultural sector [2]. In turn, SMEs and family firms generally refer to more formal and larger economic entities operating in industrial, commercial, financial or agroindustrial sectors. Therefore, the existing findings on the use of MA practices in either SMEs (e.g., Lavia López and Hiebl, 2015) or family firms (e.g., Helsen et al., 2017; Quinn et al., 2018; Senftlechner and Hiebl, 2015) cannot be readily generalized to FEs. Based on these differences, we assume that some aspects of the MA practices used in FEs are specific to this field and differ from those of SMEs and family firms. Our study also aims to (2) help farmers and accounting practitioners develop a more differentiated view when generalizing the findings from the existing literature on MA in family businesses and SMEs (e.g., Helsen et al., 2017; Lavia López and Hiebl, 2015; Quinn et al., 2018; Senftlechner and Hiebl, 2015) to FEs. Since the farming sector is also more influenced by government policies (e.g., through grants provided to FEs) than most other sectors (Zhengfei and Lansink, 2006) [3], the present review could also
help policy makers better understand the impacts of government farm policies on the management choices of FEs. Therefore, this study can help identify farm policies that can enhance MA practices that better align with development and environmental goals.

In pursuing these objectives, we use systematic literature review methods to identify, describe and analyze 41 empirical articles published between 1964 and 2016 that consider MA issues in FEs. Our findings reveal that the use of MA practices in FEs is subject to information problems and is mainly based on a small number of traditional techniques, including the use of book or recordkeeping, (capital) budgeting and performance measures. Although our analysis also shows that almost all types and sizes of FEs and farm products have been investigated in the literature, the existing findings on MA in FEs largely lacks theoretical explanations. Therefore, our main findings are based on an explanatory framework for MA practices in FEs developed from the analysis of the base sample. On the basis of this framework, the literature reveals that the practice of MA in FEs is mainly driven by familism, government policies, market pressures, technologies and natural factors such as the seasons and the weather. Additionally, the leading literature on MA is almost silent concerning the outcomes of MA practices in FEs. Thus, our review findings suggest that future studies should draw on explicit theories to support their empirical results. Our findings also suggest that more research should be conducted on the outcomes of MA practices in FEs.

This paper is structured as follows: In Section 2, the terms “management accounting” and “farm(ing)” are defined, and our sample selection process is presented in detail. In Section 3, the sampled articles are described to enhance the understanding of the main characteristics of our sample (e.g., the research setting, the location of the setting, MA themes, and the methods
and theories used). Section 4 presents our main findings. Based on our findings, important avenues for further research are identified and discussed in Section 5. In the last section (Section 6), we close by making some recommendations for policy makers and accounting practitioners.

2. **Boundaries of the topic and the review approach**

2.1 **Boundaries of the review**

*Management accounting.* According to the existing literature on MA, a unique and undisputable definition of MA does not exist (Hansen and Schaltegger, 2016; Hopper *et al.*, 2009; Lavia López and Hiebl, 2015; Lukka, 2007; van Helden and Uddin, 2016). However, there is some consensus that MA encompasses the practices, processes and information used for organizational decisions, governance, control and accountability (Hopper *et al.*, 2009). The use of MA enhances the ability of a firm to achieve the goals of interorganizational decision making (Malmi and Brown, 2008) and overlaps with the tasks of management control. Moreover, MA provides managers with essential information necessary for their work and contributes to developing, maintaining and controlling the behavior of managers (Otley, 1999). Various terminologies are used to define MA and its practices: budgeting and performance evaluation are often-discussed tools of MA (Malmi and Brown, 2008) that can be used to operationalize the control systems of an economic entity (Otley, 1999). Other advanced instruments such as activity-based costing and the balanced scorecard are also defined in the literature as MA tools or instruments (Cooper and Kaplan, 1991; Lavia López and Hiebl, 2015; Malmi, 2001). Based on this brief review of the concept of MA and the studies conducted by Shields (1997), Chenhall and Smith (2011) and Harris and Durden (2012), we use the following keywords to represent our definition of MA and to search for studies in databases: "management account*" OR "managerial account*" OR “management control*” OR “managerial control*” OR “control* sys-
Farms and Farm Enterprises. Based on the literature on agriculture and farm management (e.g., Chaddad, 2000; Cook and Chaddad, 2000; Freear, 1970; Jack, 2005; Reardon and Barret, 2000; Taylor, 1937; Tramel and Hildreth, 1957), in this paper, we define farms as economic entities that hold and exploit land for agriculture and/or animal breeding purposes. Farming therefore includes the breeding processes and activities of FEs. In this article, the term “farming” refers to both farms and FEs as well as farming as a process. With regard to the differentiation of farms, there is a wide range of farm types, and they are not uniformly defined in the literature: the literature generally refers to farms using the terminology “small farms” (Carlin and Crecink, 1979; Tweeten et al., 2015) or “family farms” (Kimhi and Bollman, 1999; Lemons, 1986). Based on these definitions and other terminologies that appear in the Oxford dictionary (Kazhdan, 2005), we also use the words “grange”, “croft”, “homestead”, “peasant”, “ranch”, and “smallholding” to designate farms, small farms or family farms. Overall, the term “farm” refers in the paper to an economic entity and is therefore operationalized for our database search by the use of the following keywords: “farm*” OR “grange*” OR “croft*” OR “homestead*” OR “peasant*” OR “ranch*” OR “smallholding*”.

2.2 Review approach and sample construction

The systematic literature review approach used in this research paper is based on the guidelines provided by Tranfield et al. (2003) and Massaro et al. (2016). We chose to use a systematic literature review process because it helps to identify, analyze and synthesize the body of existing literature on a specific topic in a more transparent and replicable manner than traditional
reviews (Jesson et al., 2011; Booth et al., 2016). Initially used for medical research (Tranfield et al., 2003), the systematic literature review process has thus far been used by an important body of research in the field of (management) accounting (e.g., Hansen and Schaltegger, 2016; Hiebl, 2018; Hoque, 2014; Lavia López and Hiebl, 2015; van Helden and Uddin, 2016). The review methods suggested by Tranfield et al. (2003) are very much in the tradition of the evidence-based approach. This approach should “signal a new ‘post-ideological’ approach to public policy where evidence would take centre stage in the decision-making process” (Tranfield et al., 2003, p. 208). Applied to reviews of academic literature, systematic literature reviews as suggested by Tranfield et al. (2003) aim to identify the best available evidence and report a synthesis on such evidence. To identify such best-available evidence in the case of MA in FEs, we did not confine our analysis to any specific theoretical framework informing our review, but tried to extract an explanatory framework from the available evidence on MA in FEs.

To identify relevant articles that involve issues regarding the use of MA practices in FEs, we developed a generic keyword stream for the first search run using the following selected databases: EBSCOhost, Emerald Insight, SAGE Journals, ScienceDirect, SpringerLink, Web of Science and Wiley Online Library. The use of the Boolean operators “AND” and “OR” as well as the wildcard asterisk (*) helped us to ensure that our generic stream captured all (if possible) the variations of the original keywords [4]. Since databases technically work differently, our generic stream was adapted for a second search run according to the specifications of the databases [5]. Only journal articles written in English and listed in the journal quality lists of the ABS (Chartered Association of Business Schools) and/or the ABDC (Australian Business Deans Council) were included in the sampling process. Our reliance on the journal quality lists of the ABS and ABDC guarantees that the articles included in the sample are of an acceptable research quality (cf. Hoque, 2014). To enhance the evidence based on our findings and ensure that they are “well founded and socially robust” (Tranfield et al., 2003, p. 210), we included
only empirical articles (both quantitative and qualitative) in the present review. After we eliminated duplicates, 28 journal articles that fulfilled our inclusion and quality criteria were included in the sample for further analysis. Following the guidelines proposed by Webster and Watson (2002) and Jesson et al. (2011), the references of the sampled 28 articles were screened (backward search), and 11 additional topic-relevant journal articles that fit our inclusion criteria were identified and added to the sample. To ensure that the maximum possible number of papers are included in our review, we also conducted a crash search using the Google Scholar search engine. Consequently, two additional articles were included in the sample. Relying on some articles especially based on developing countries that used the term peasant farm(ing) to define small farms (e.g., Bayboltaeva et al., 2015; Bravo-Ureta and Evenson, 1994; Bravo-Ureta and Pinheiro, 1997), we also conducted a separate keyword search in Google Scholar and in the Journal of Peasant Studies using “peasant” in combination with our definition on MA, and no additional articles with a clear focus on MA and that fulfilled our inclusion criteria were identified. The overall search process is summarized in Table I. After all these steps, 41 journal articles (see Table 2) published between 1964 and 2016 were included in the analysis conducted in the present paper. The main characteristics of the sampled articles will now be described (Section 3), and their main findings will be synthesized (Section 4) to enhance the understanding of prior research on the use of MA practices in FEs.

Table I. Search and selection process and sample construction

<table>
<thead>
<tr>
<th>Forward search</th>
<th>1st run</th>
<th>2nd run</th>
<th>Total hits</th>
<th>Journal articles</th>
<th>English articles*</th>
<th>ABS/ABDC**</th>
<th>Non-topical/non-empirical/duplicates***</th>
<th>Sampled articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBSCOhost</td>
<td>2987</td>
<td>2310</td>
<td>5297</td>
<td>1229</td>
<td>1106</td>
<td>544</td>
<td>515</td>
<td>28</td>
</tr>
<tr>
<td>Emerald Insight</td>
<td>27</td>
<td>1907</td>
<td>1934</td>
<td>558</td>
<td>482</td>
<td>319</td>
<td>301</td>
<td>18</td>
</tr>
<tr>
<td>SAGE Journals</td>
<td>6</td>
<td>34</td>
<td>37</td>
<td>25</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ScienceDirect</td>
<td>3</td>
<td>66</td>
<td>69</td>
<td>69</td>
<td>64</td>
<td>6</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Springer Link</td>
<td>2727</td>
<td>-</td>
<td>2727</td>
<td>137</td>
<td>137</td>
<td>102</td>
<td>101</td>
<td>1</td>
</tr>
<tr>
<td>Web of Science</td>
<td>13</td>
<td>211</td>
<td>224</td>
<td>219</td>
<td>170</td>
<td>7</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Wiley Online</td>
<td>155</td>
<td>-</td>
<td>155</td>
<td>124</td>
<td>124</td>
<td>29</td>
<td>28</td>
<td>1</td>
</tr>
<tr>
<td>Google Scholar</td>
<td>54</td>
<td>-</td>
<td>54</td>
<td>-</td>
<td>7</td>
<td>7</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

| Backward search      | 11      |
| Crash search         | 2       |
| Total                | 41      |

* Articles published in English.
** Articles that fulfill our quality threshold based on the ABS and ABDC journal ranking lists for 2015.
*** Articles excluded from the sample because they are duplicates, not empirical studies or not relevant to our topic.
3. Descriptive features of the review sample

3.1 Authors and publication outlets

The analysis of our sample suggests that farm accounting may exist in a subject area beyond the conventional accounting and management fields. Based on some articles identified in the field of agricultural economics, the practice of MA looks to be assimilated into or more closely linked with the concepts of comparative analysis (e.g., Mauldon et al., 1969; Toft, 1964) and variance analysis or linear programing (Gebremeskel and Shumway, 1979) than in articles published in the conventional accounting field. The practice of comparative analysis in FEs consists of comparing FEs to each other based on their performance (Mauldon et al., 1969). It is very similar to benchmarking, which has been widely adopted by farmers in conventional accounting for business analysis or as a control tool (Gloy and LaDue, 2003). One might therefore be tempted to conclude that the interdisciplinary research on MA and agriculture or farms is still very limited (or nonexistent). Since using an interdisciplinary approach to a research question can create better synergies of knowledge and generate more insights into the question (Tranfield et al., 2003), one might be tempted to conclude that articles coauthored by accounting scholars and agriculture or agricultural economics scholars would probably offer a deeper understanding of MA issues in FEs. This approach can therefore be identified as a research opportunity for future work on MA practices in FEs.

The 41 articles on which the present review is based were published between 1964 and 2016 (52 years) in 27 academic journals. Table III shows that approximately 46% (19) of the sampled articles were published in 10 different journals that mainly focus on agriculture, agribusiness and/or agricultural economics: AJARE (5), AJAE (4), AERR (3), RMAE (1), AHV
(1), EDCC (1), RAE (1), CAER (1), JAAE (1) and JFDR (1). See Table III for the journal names and the abbreviations we use here. Approximately 44% (18) of the articles were published in 13 journals that mainly focus on either accounting (13 articles) or finance (5 articles). More precisely, the articles published in accounting journals are distributed as follows: ABACUS (2), EAR (2), JAMIS (1), ABR (1), AAR (1), JAOC (1), JAAR (1), MAR (1), QRAM (1), JA (1) and JAMAR (1). The five articles published in finance journals were published in AFR (4) and JFMA (1). The remaining four articles (approximately 10%) were published in four journals that mainly focus on organizational studies (QROM), development management (ARDR) or operations and technology management (JQME, IJSRP). Although the accounting discipline is highly represented in our sample (13 articles: approximately 32%), it is important to note that only two articles (Jack, 2005; Lu et al., 2016) were published in journals that focus on MA, i.e., MAR and JAMAR. The remaining 11 journal articles on accounting were published in journals that have either a general or financial accounting focus. This result reveals that MA journals and scholars have thus far not been particularly interested in research on MA issues in FEs.
Table II. Description of sample used in this review

<table>
<thead>
<tr>
<th>Author(s) (year of publication)</th>
<th>Farm type</th>
<th>Geographic location</th>
<th>Participants</th>
<th>Article type</th>
<th>Data collection</th>
<th>Time frame</th>
<th>Cross sectional</th>
<th>Theory-based</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatala and Mat-Zin (2013)</td>
<td>n.a. n.a.</td>
<td>Libya/n.a.</td>
<td>6 0</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>2012/2012</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Fonsah et al. (2011)</td>
<td>✔ ✔</td>
<td>USA/Georgia</td>
<td>n.a. n.a.</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>2009/2011</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Freear (1970)</td>
<td>✔ ✔</td>
<td>UK/Berkshire</td>
<td>1 1</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>1611/1620</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Gebremeskel and Shumway (1979)</td>
<td>✔ ✔</td>
<td>USA/Texas</td>
<td>1 1</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>n.a.</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Gillespie and Nehring (2013)</td>
<td>✔ ✔</td>
<td>USA/n.a.</td>
<td>64 64</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>2008/2008</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Hadrich and Olson (2011)</td>
<td>✔ ✔</td>
<td>USA/North Dakota</td>
<td>181 181</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>2000/2009</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Harsh et al. (2010)</td>
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<td>USA/Michigan</td>
<td>1 1</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>n.a.</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Hyde et al. (2007)</td>
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<td>USA/Pennsylvania</td>
<td>1 1</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>2003/2004</td>
<td>✔</td>
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</tr>
<tr>
<td>Lu et al. (2016)</td>
<td>✔ ✔</td>
<td>Australia/Victoria</td>
<td>1 1</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>2011/2012</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Ma et al. (2014)</td>
<td>✔ ✔</td>
<td>China/Beijing</td>
<td>1 1</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>2010/2010</td>
<td>✔</td>
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<tr>
<td>Mauldon et al. (1968)</td>
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<td>Australia/n.a.</td>
<td>n.a. n.a.</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>1968/1969</td>
<td>✔</td>
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<td>Mishra et al. (1999a)</td>
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<td>USA/n.a.</td>
<td>n.a. n.a.</td>
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<td>Longitudinal</td>
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<td>✔ ✔</td>
<td>USA/n.a.</td>
<td>3002 3002</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>1996</td>
<td>✔</td>
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<td>Musser et al. (1986)</td>
<td>✔ ✔</td>
<td>USA/Georgia</td>
<td>1 1</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>1981/1982</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
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<td>Rouse et al. (2010)</td>
<td>✔ ✔</td>
<td>New Zealand/Waikato, Taranaki</td>
<td>120 120</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>2004/2005</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Singh et al. (2007)</td>
<td>✔ ✔</td>
<td>USA/Kentucky</td>
<td>1 1</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>2001/2002</td>
<td>✔</td>
<td>✔</td>
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</tr>
<tr>
<td>Sprohge et al. (1989)</td>
<td>✔ ✔</td>
<td>USA/Kentucky</td>
<td>1 1</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>1989/1989</td>
<td>✔</td>
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</tr>
<tr>
<td>Toft (1964)</td>
<td>✔ ✔</td>
<td>Australia/n.a.</td>
<td>61 61</td>
<td>Quantitative</td>
<td>Longitudinal</td>
<td>1962/1963</td>
<td>✔</td>
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</tbody>
</table>

Total (41) 27 23 >9.562 >9.462 15 31 17 5 23 33 7 3 38
### 3.2 Farm types, farm products and farm locations

The number of farms or farmers involved in these studies was clearly identified in 32 articles (see Table II). Overall, our sample is indirectly based on more than 9,562 participants, of which more than 9,462 are either farmers or FEs. The farmers involved in the sample are on average between 31 years old (Freear, 1970) and more than 60 years old (Mishra et al., 1999b). In our sample, approximately 32% (13) of the articles provide some basic indication of the type of farm involved in the study [6]. On average, the surface area exploited by the farmers/FEs varies between 1.3 hectares (David, 1997) and 1,011.7 hectares (or 2,500 acres) (Hyde et al., 2007). Based on the surface area exploited by the farms (Chinnappa and Nagaraj, 2007; Singh et al., 2007), the number of employees (Halabi et al., 2010) and the number of animals/plants held (Gillespie and Nehring, 2013), the farms included in our sample can be classified as marginal-

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**Table III. Distribution of the sample by the primary focus of the journal**

<table>
<thead>
<tr>
<th>Primary focus of the journal</th>
<th>Journal’s name and abbreviation</th>
<th>Journal’s ranking</th>
<th>Number of articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, agribusiness and/or agricultural economics journals (10)</td>
<td>Agricultural Economics Research Review (AERR)</td>
<td>- C 3</td>
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<td></td>
<td>Agriculture and Human Values (AHV)</td>
<td>- B 1</td>
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<td></td>
<td>American Journal of Agricultural Economics (AJAE)</td>
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<td></td>
<td>Australian Journal of Agricultural and Resource Economics (AJARE)</td>
<td>2 A 5</td>
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<td></td>
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<td>1 C 1</td>
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<td></td>
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<td>2 B 1</td>
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<tr>
<td></td>
<td>Review of Marketing and Agricultural Economics (RMAE)</td>
<td>- C 1</td>
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<td>2</td>
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<td>Accounting and Business Research (ABR)</td>
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<td></td>
<td>European Accounting Review (EAR)</td>
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<td></td>
<td>Australian Accounting Review (AAR)</td>
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<td>Journal of Accountancy (JA)</td>
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<td></td>
<td>Journal of Accounting and Management Information Systems (JAMIS)</td>
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<td>Journal of Accounting &amp; Organizational Change (JAOC)</td>
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<td>Journal of Applied Accounting Research (JAAR)</td>
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<td>Management Accounting Research (MAR)</td>
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<td></td>
<td>Qualitative Research in Accounting &amp; Management (QRAM)</td>
<td>2 B 1</td>
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<td>Operations and technology management journals (2)</td>
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<td></td>
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<td>Qualitative Research in Organizations &amp; Management (QROM)</td>
<td>1 B 1</td>
<td>1</td>
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<tr>
<td>Management development and education journals (4)</td>
<td>African Development Review (ADR)</td>
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<td>1</td>
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<tr>
<td>Total (27)</td>
<td></td>
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<td>41</td>
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</table>
sized farms (Olagunju, 2002; Singh et al., 2007), small farms (Lu et al., 2016; Mauldon et al., 1969), medium-sized farms (Abdel-Maksoud and Abdel-Maksoud, 2015; Carey and Tanewski, 2013) or large farms (Hyde et al., 2007; Gillespie and Nehring, 2013).

The types of products produced by the FEs in our sample can be classified into two major categories: vegetal/agriculture (27 articles) products and animal (23 articles) products. Among all the agriculture products identified, cereals (e.g., Musser et al., 1986; Gebremeskel and Shumway, 1979) are the most studied farm products in the sampled literature (23 articles), eight articles involve wheat (e.g., Freear, 1970; Mugera and Nyambane, 2015), four articles involve corn (e.g., David, 1997; Obayelu et al., 2013), and the others involve rice (e.g., Dobbs and Foster, 1972; Singh et al., 2007). The remaining studies on cereals involve millet (3 articles), barley (2 articles), and rye and oats (1 article each) [7]. Apart from cereals, the remaining agriculture products include legumes, potatoes and fruits.

Among all the animal farms identified in our sample, cow farms (e.g., Gillespie and Nehring, 2013; Harsh, 2010) are the most studied type (15 articles), followed by milk farms (e.g., Rouse et al., 2010; Halabi and Carroll, 2015), with 12 articles. The remaining studies on animal farms include those on pig farms (e.g., Hadrich and Olson, 2011; Ma et al., 2014) and sheep farms (e.g., Freear (1970; Carey and Tanewski, 2013), with seven and six articles, respectively. Poultry farms (Olagunju, 2002; Argilès and Slof, 2003) and horse (Sprohge and Talbot, 1989) and pigeon breeding (Freear, 1970) are less studied than the other types of animal farms.

The 41 articles sampled were conducted in more than 12 different countries [8]. In the sample, fourteen (approximately 34%) articles are based on farms located in the United States.
(e.g., Hadrich and Olson, 2011; Gebremeskel and Shumway, 1979), and nine articles (approximately 22%) are based on Australian farms (e.g., Lu et al., 2016; Toft, 1964). Twelve (approximately 29%) articles focus on Indian farms (3 articles: e.g., Chinnappa and Nagaraj, 2007; Dobbs and Foster, 1970), Nigerian farms (3 articles: e.g., Jekayinfa et al., 2005; Olagunju, 2002), Spanish farms (3 articles: e.g., Argilés, 2001; Argilés and Slof, 2003) and British farms (3 articles: e.g., Jack, 2005; Freear, 1970). The remaining farms are split among seven different countries: Egypt (Abdel-Maksoud and Abdel-Maksoud, 2015), China (Ma et al., 2014), Kenya (David, 1997), Libya (Fatah and Mat-Zin, 2013), New Zealand (Rouse et al., 2010) and the Netherlands (Zhengfei and Lansink, 2006).

Overall, the results discussed in this section (Section 3.2) show that although the sample size may appear to be small (41 articles), the number of participants (i.e., accounting professionals, FEs and farmers) on which the findings of the sampled articles are based is extremely high—9,562, including more than 9,462 FEs and farmers. Moreover, the results also show that almost all types (i.e., vegetal and animal farms) and sizes (marginal sized, small, medium size and large) of FEs are represented in the sample of the present literature review. Therefore, the findings of this review are highly reliable and can be considered applicable to all types and sizes of farms. However, the sample description also reveals that research on MA issues in FEs is still concentrated in a very small number of countries (12): 56% (23 articles) of the studies included in the sample are based in the USA and Australia. Therefore, caution should be taken when generalizing the findings in the present paper to FEs in other countries because the influencing factors for MA practices in farms may vary between countries. Investigating MA issues in FEs in other countries could contribute to the literature by providing valuable new knowledge on MA practices in farms. This approach represents a potential direction for future studies.
3.3 Research methods and theories

Of the 41 articles included in our sample (Table 2), 26 articles (63.4%) use an empirical quantitative approach, and 10 articles (24.4%) use an empirical qualitative design. The remaining five articles (12.2%) rely on mixed methods that combine empirical quantitative and qualitative designs. Data are principally collected via surveys (13 articles), interviews (19 articles), archival databases (1 article) or a combination of interviews and questionnaires (4 articles).

Only three of the 41 (7.3%) articles in our sample are based on an explicit theory (see Table 2): they are based on Giddens's theory of structuration and new institutionalism in sociology (Jack, 2005), life-cycle costing theories (Jekayinfa et al., 2005) or agency theory approaches (Mugera and Nyambane, 2015). The remaining 38 articles (92.7%) are not based on any explicit theory; they rely more generally on the existing literature (e.g., Carey and Tanewski, 2013; Fatah and Mat-Zin, 2013; Halabi et al., 2010; Halabi and Carroll, 2015; Lu et al., 2016; Ma et al., 2014). Since theories may help in the development of more general explanations of the findings in empirical studies, one might be attempted to conclude that the empirical findings in our sample largely lack a sufficient rooting in theory. This conclusion implies that the existing findings on the MA practices used in FEs are not interconnected. This lack of interconnectivity makes a scientific discourse between the different areas and disciplines that contribute to research on MA in FEs difficult. A similar conclusion is also proposed by Suess-Reyes and Fuetsch (2016). Suess-Reyes and Fuetsch (2016) review the literature on innovative, sustainable and succession-oriented strategies in family farming and find that the literature on FEs lacks theoretical explanations. This lack of a theoretical foundation can be considered an additional research gap; future studies should consider this shortcoming because more theory-
based research can add information to the empirical findings in our sample and facilitate a scientific discourse between (management) accounting and other disciplines that consider MA issues in FEs.

3.4 Definition, practices and evolution of management accounting in farming enterprises

Table IV shows that 19 articles explicitly define MA using the terms “management account*” and/or “management control*” (e.g., Abdel-Maksoud and Abdel-Maksoud, 2015; Lu et al., 2016). In 15 articles, MA is referred to through its practices such as budgeting (e.g., Byrd et al., 2006; Ma et al., 2014), which in turn is embedded in traditional cost instruments such as gross margin and target costing (Fatah and Mat-Zin, 2013; Jack and Jones, 2008) or in modern techniques such as activity-based costing (Lu et al., 2016). In eleven articles, MA is referred to through performance measures/management (e.g., Zhengfei and Lansink, 2006; Mugera and Nyambane, 2015). Ten further articles use concepts and practices related to management information or systems (e.g., Argilés and Slof, 2003; Carey and Tanewski, 2013; Freear, 1970) and bookkeeping (e.g., Argilés and Slof, 2001) to underline the information function of MA in FEs. In the remaining articles, MA in FEs is associated with concepts and practices such as comparative analysis (e.g., Mauldon et al., 1969; Toft, 1964), variance analysis or linear programming (Gebremeskel and Shumway, 1979) and life-cycle analysis or costs (Jekayinfa et al., 2005). This description underlines the general concern in the literature that the practice of MA in FEs is subsumed by the set of traditional practices of book and recordkeeping, costing, comparative analysis, (capital) budgeting and performance measurement (Mishra et al., 1999a; Gloy and LaDue, 2003).
Table IV. The main MA practices that provide a foundation for the literature under study

<table>
<thead>
<tr>
<th>MA practices/techniques</th>
<th>Zahl</th>
<th>Author(s)</th>
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<tbody>
<tr>
<td>Management Accounting/Control</td>
<td>19</td>
<td>Abdel-Maksoud and Abdel-Maksoud (2015); Carey and Tanewski (2013); Cooke-Yarborough (1967); Fatah and Mat-Zin (2013); Freear (1970); Gloy and LaDue (2003); Gloy et al. (2002); Halabi et al. (2010); Halabi and Carroll (2015); Garcia et al. (1983); Halabi and Carroll (2015); Jack (2005); Jack and Jones (2008); Lu et al. (2016); Mauldon et al. (1968); Mauldon et al. (1969); Rouse et al. (2010); Sprohge et al. (1989); Toft (1964).</td>
</tr>
<tr>
<td>(Capital) Budgeting</td>
<td>15</td>
<td>Byrd et al. (2006); Carey and Tanewski (2013); Chinnappa and Nagaraj (2007); David (1997); Dobbs and Foster (1972); Fonsah et al. (2011); Gloy and LaDue (2003); Harsh et al. (2010); Hyde et al. (2007); Ma et al. (2014); Musser et al. (1986); Obayelu et al. (2013); Olagunju (2002); Singh et al. (2007); Sprohge et al. (1989).</td>
</tr>
<tr>
<td>Performance Measurement/Management</td>
<td>11</td>
<td>Abdel-Maksoud and Abdel-Maksoud (2015); Argilés and Slof (2003); Chinnappa and Nagaraj (2007); Gloy and LaDue (2003); Gloy et al. (2002); Hadrich and Olson (2011); Gillespie and Nehring (2013); Carey and Tanewski (2013); Mugera and Nyambane (2015); Rouse et al. (2010); Zhengfei and Lansink (2006).</td>
</tr>
<tr>
<td>Management Information/Systems</td>
<td>10</td>
<td>Argilés (2001); Argilés and Slof (2001); Argilés and Slof (2003); Carey and Tanewski (2013); Freear (1970); Halabi et al. (2010); Garcia et al. (1983); Cooke-Yarborough (1967); Halabi and Carroll (2015); Mauldon et al. (1968).</td>
</tr>
<tr>
<td>Comparative Analysis</td>
<td>3</td>
<td>Byrd et al. (2006); Mauldon et al. (1969); Toft (1964).</td>
</tr>
<tr>
<td>Traditional Costing/Cost Accounting</td>
<td>3</td>
<td>Fatah and Mat-Zin (2013); Jack and Jones (2008); Byrd et al. (2006).</td>
</tr>
<tr>
<td>Variance Analysis</td>
<td>1</td>
<td>Gebremeskel and Shamway (1979).</td>
</tr>
<tr>
<td>Activity-Based Costing</td>
<td>1</td>
<td>Lu et al. (2016).</td>
</tr>
<tr>
<td>Life-Cycle Costs</td>
<td>1</td>
<td>Jekayinfa et al. (2005).</td>
</tr>
</tbody>
</table>

Our sample reveals that the research focus on MA practices in FEs has changed over time. From 1960 to 1969, the literature mainly focused on comparative analyses (Mauldon et al., 1969; Toft, 1964) and management information (systems) (Cooke-Yarborough, 1967; Mauldon et al., 1968). Between 1970 and 1999, a clear focus could not be identified in the literature. In the first decade of the 21st century, the main focus in the studies changed from comparative analyses and management information to (capital) budgeting (Hyde et al., 2007; Byrd et al., 2006; Singh et al., 2007; Olagunju, 2002) and performance measurement/management (Jekayinfa et al., 2005; Zhengfei and Lansink, 2006). From 2010 until the present, the literature has focused on performance measurement/evaluation (Gillespie and Nehring, 2013; Mugera and Nyambane, 2015 Hadrich and Olson, 2011; Rouse et al., 2010) and budgeting (Carey and Tanewski, 2013; Fonsah et al., 2011; Ma et al., 2014; Obayelu et al., 2013). Overall, budgeting remains the most investigated MA instrument in the literature on FEs. One of the most important issues to be investigated as a result of this analysis should concern the driving forces behind these observed changes.
4. Review results

In this section, and following the guidelines proposed by Tranfield et al. (2003), our sample is analyzed to understand the main issues and changing forces regarding the practice of MA in FEs. Similar to Hiebl (2018) and van Helden and Uddin (2016), we use a thematic approach to report the results of our review. Based on our description of the sample provided in Section 3, which reveals that the existing findings on MA in FEs mostly lack a theoretical explanation, we developed an explanatory framework (see Figure I) for MA practices in FEs. Our approach connects the existing findings and should facilitate a scientific discourse between the different areas and disciplines that contribute to research on MA in FEs. After reading and analyzing the sampled papers, we identified five main themes of interrelated issues to MA practices in FEs. Each theme is linked to an activity of the agricultural extension actors/organizations as defined by Abdel-Maksoud and Abdel-Maksoud (2015) [9]. Agricultural extension is an educational process that focuses on rural populations with the aim of offering advice and information to help farmers solve their problems (Abdel-Maksoud and Abdel-Maksoud, 2015).

Worldwide, agricultural extension actors include government bodies and policy makers (i.e., ministry of agriculture and community development actors). However, these actors may also include private agricultural extension firms, non-governmental organizations, universities, research institutes and farmers’ associations. The role of agricultural extension agents is to help FEs form sound opinions and make good decisions by communicating with them and providing them with information that they need (Abdel-Maksoud and Abdel-Maksoud, 2015). To summarize, agricultural extension actors help farmers and rural families develop management capacities (related to Theme 1) that can help them cope with increasing market pressures (related to Theme 2). Moreover, they assist FEs through grants/subsidies (related to Theme 3) and provide FEs with the funds and credits necessary to finance modernization projects in FEs – for
instance, the acquisition of environmentally friendly, productive and cost-efficient technologies (related to Themes 4 and 5).

4.1 Familism and the practice of management accounting in farm enterprises

This first cluster of findings refers to the influence of the interrelated factors of familism on MA issues in FEs (e.g., Halabi and Carroll, 2015; Olagunju, 2002). In general, familism is characterized by the “subordination” of the interests and prerogatives of individuals to the values of the family in an enterprise (Senftlechner and Hiebl, 2015; Lavia López and Hiebl, 2015). In this review, familism refers to the considerable influence of family members and family ownership on the business processes of FEs. Overall, the analyzed literature suggests that familism has a “negative” impact on the diffusion and use of some MA techniques and instruments in FEs. Regarding this issue, the literature reveals that FEs are mostly family farms in which family members constitute a major portion of the workforce (e.g., Carey and Tanewski, 2013; Zhengfei and Lansink, 2006). In many cases, these family farms are managed by family members under the direction and full discretion of a husband and his wife (e.g., Halabi and Carroll,
Family ownership of farms can last for several generations (Freear, 1970; Lu et al., 2016). One consequence of the considerable influence of familism in FEs is that ownership and management authority are often concentrated in the same individual, since the owners of the farms are more likely to be family members (e.g., Halabi et al., 2010; Mauldon et al., 1968). Carey and Tanewski (2013) suggest that when the decision-making and control authority is vested in one person, agency and conflict of interest problems in FEs are reduced, and the use of external accounting techniques for internal and managerial decision-making control becomes less necessary. In listed public companies and many private companies that separate ownership and control, the use of some formal management control practices is typically necessary. Under high familism, even conflicts between family members do not significantly impact the use of planning and control practices (Carey and Tanewski, 2013). FEs are largely free from agency conflicts arising from the separation of ownership and control, which also lowers their need for MA and control practices (Carey and Tanewski, 2013). In other words, practices such as monitoring internal costs seem to be less necessary in FEs than in other types of firms because farms strongly rely on family values or members (Mugera et al., 2015). This “negative” impact of familism on the use of some MA practices such as target costing and activity-based costing in FEs could be intensified, since FEs are not usually compelled to produce financial reports due to their relatively small size (Argilés and Slof, 2003; Halabi and Carroll, 2015; Halabi et al., 2010). Because the use of some MA practices such as book/record keeping and cost accounting contributes to increased earnings and profitability in some FEs (Argilés and Slof, 2001; Gloy et al., 2002; Mishra et al., 1999a, 1999b), one might be tempted to conclude that a high degree of familism in small FEs will adversely affect performance, even if the use of financial information for management purposes is not the main performance driver for FEs (Argilés and Slof, 2001). There is some evidence that farms use accounting information as a management tool when the problems obtaining financial statements are resolved. For example, Argilés and Slof
(2001, p. 377) observe that “it is particularly striking that once accounting information is available to farmers, they very frequently use it for decision making”. This statement suggests that various family farms are confronted with problems regarding the supply and the conservation of relevant information but not regarding the use of such information. Therefore, Argilés and Slof (2003) conclude that the Farm Accountancy Data Network and IASC’s proposed International Accounting Standards on Agriculture should be key elements for improving the use of accounting by European FEs by providing them with accounting information and guidelines for income statements. Using such information for management purposes would help different stakeholders (including farmers) evaluate the ability of FEs to survive natural and market forces because the use of accounting-based information by farmers helps improve their understanding and ability to predict their farms’ viability (Argilés, 2001; Argilés and Slof, 2001).

4.2 Market competition and management accounting practices in farm enterprises

This second cluster of findings concerns the interactions among increasing globalization-induced market competition, price pressures/fluctuations and MA and control issues in FEs (e.g., Sprohge et al., 1989). Some studies suggest that farms are dependent on market conditions (Mauldon et al., 1968), which cannot be controlled by farm managers (Mugera and Nyambane, 2015; Mauldon et al., 1969). Increasing market competition could lead to a decrease in the number of farms due to the elimination of non-competitive farms but could also enable the remaining farms to become larger, more specialized and more productive (Hadrich and Olson, 2011; Hyde et al., 2007; Jekayinfa et al., 2005) due to the resulting economies of scale. The increasing size, specialization and productivity of FEs cause the remaining farms to rely on sophisticated/formal MA practices and control because the use of some sophisticated budgeting and planning practices is positively related to farm size (Carey and Tanewski, 2013). Consequently, more formal methods of planning and budgeting are adopted because the size and
scope of farms are increasing. Moreover, under increasing market and price pressures, FEs typically adopt a portfolio diversification strategy, which results in the provision of a set of different products from which they generate income/revenue. Freear (1970), Gebremeskel and Shumway (1979), Hyde et al. (2007) and Lu et al. (2016) suggest that some large farms use a portfolio diversification approach. In farms with multiple products/activities, activity-based costing could be seen as one of the most appropriate costing practices because it is market oriented (Lu et al., 2016).

In addition, farms are affected by the cyclical and seasonal fluctuations of market demand (Sprohge et al., 1989; Ma et al., 2014) as well as the costs of inputs and prices of output that are affected by increasing market pressures (Dobbs and Foster, 1979). For example, FEs are highly exposed to increasing costs for animal feed, medicines, vaccines (Olagunju, 2002) and scarce resources (Fatah and Mat-Zin, 2013) when market competition increases. Consequently, the influence of MA on the pricing decisions of farmers becomes limited (Sprohge et al., 1989) because prices are more determined by the market than by internal decision processes based on cost structures.

Overall, this cluster of findings suggests that farms are faced with increasing market pressures that could lead to their use of certain sophisticated/formal MA and control practices, for example, activity-based costing, sophisticated/formal budgeting and planning practices. However, at the same time, increasing market pressure could force some smaller farms to rely less on MA for pricing decisions. In other words, the impact of market competition on the use of MA in farms seems to be moderated by farm size under increasing market pressures. That is, in contrast to the findings reported in the more general literature on factors influencing MA usage (e.g., Chenhall, 2003; Otley, 2016), the relationship between firm size and MA usage in FEs is not linear.
4.3 Government policies and management accounting practices in farm enterprises

The third cluster of findings concerns the connection between government grants/subsidies provided to FEs by government authorities and the use of MA practices in FEs (e.g., Argilés and Slof, 2003; Obayelu et al., 2013). The findings reported by the majority of studies included in our sample indicate that government grants provided to FEs influence their managerial activities (e.g., Chinnappa and Nagaraj, 2007; Obayelu et al., 2013; Fatah and Mat-Zin, 2013) and could thereby affect their use of MA instruments. The Farm Accountancy Data Network’s structure of farms’ income statements proposed by Argilés and Slof (2001, p. 376) shows that grants/subsidies increase the reported performance of FEs, which is measured using “gross farm income”, “farm net value added” or “family farm income”. According to Obayelu et al. (2013), subventions enable various FEs to produce and sell their products at competitive market prices. Additionally, such grants allow farm(er)s to make long-term investments in new technologies such as wind turbines (Harsh et al., 2010) or irrigation projects (Fatah and Mat-Zin, 2013) that are necessary to address water and energy needs in production processes. As a condition for these grants/subsidies, government authorities generally encourage, recommend or require the beneficiary FEs to undertake important structural and managerial changes that aim to improve market and customer satisfaction and enhance internal pricing processes (Dobbs and Foster, 1972; Fatah and Mat-Zin, 2013). Consequently, these government policies have caused some farms to use target- or activity-based costing methods (Lu et al., 2016; Jack and Jones, 2008) because these MA instruments are process-based and market or customer oriented. As indicated in Section 4.1, activity-based costing methods are market and customer oriented, as they can help farms assign different costs to their underlying activities and determine product prices accurately and transparently (Fatah and Mat-Zin, 2013). There is some evidence that these market- and customer-oriented MA and accounting instruments have in turn contributed to enhancing the decision-making processes of FEs (Argilés and Slof, 2001; Argilés and Slof,
2003; Garcia et al., 1983). For example, Chinnappa and Nagarai (2007) describe a case in which budgeting and discounted cashflow techniques were used to investigate the economic feasibility of government-supported investments in drainage technologies by farmers in Karnataka. The scholars conclude that the provision of subsurface drainage through public intervention increased the productivity of the land and provided a source of regular income to resource-poor households.

4.4 Natural environment and management accounting practices in farm enterprises

The fourth cluster of findings considers the link between the natural environment of FEs or the types of farm products and the use, diffusion and outcomes of MA practices in FEs (e.g., Zhengfei and Lansink, 2006; Rouse et al., 2010). The natural environment and the nature of farm products influence the activities of FEs and can therefore affect their management or efficiency (Lu et al., 2016; Mauldon et al., 1969; Rouse et al., 2010). In fact, nature is an additional driver of uncertainty (Lu et al., 2016) affecting farm activities (Mauldon, 1968). The processes used in agricultural production often span across multiple financial periods, and some agricultural products may remain unharvested even after they mature. Therefore, “attributing costs incurred in a particular financial period to agricultural products is therefore difficult” (Lu et al., 2016, p. 30). To cope with these difficulties, Lu et al. (2016) suggest that FEs use activity-based costing models, and they also suggest that accounting professionals/advisors and farmers should communicate with each other. Moreover, seasonal conditions/differences/changes play a crucial role, as they have a direct effect on the growth of many cultivated agriculture products (Zhengfei and Lansink, 2006) and the quality of food (Gebremeskel and Shumway, 1979). Additionally, climatic conditions also play a crucial role (Lu et al., 2016), as they can affect the production process and the productivity of FEs (Rouse et al., 2010). In some cases, farmers rely
on natural irrigation methods (Singh et al., 2007) or wind power to generate the electrical capacity necessary for their farm activities (Harsh et al., 2010). Furthermore, another common condition for subventions to farmers is the adoption of environmentally and socially friendly production processes. Consequently, the production processes used in FEs continue to be partly constrained by government pressure to address climate change (Lu et al., 2016). For example, there is government pressure to prevent ozone depletion by prohibiting the use of certain substances during production processes (Byrd et al., 2006). Moreover, natural plagues and diseases can have negative impacts on production and ultimately on the prices and profitability of farms (Lu et al., 2016). Additionally, farm activities are subject to environmental policies, since farmers should act in a manner that counteracts climate change, for example, by reducing greenhouse gas emissions. In other words, farm activities and products are mainly influenced by natural factors such as the weather, the seasons and the types of products, and it is difficult for farm management to influence or control these factors in the short term. Therefore, the use of some MA instruments such as traditional (capital) budgeting that are necessary for operational and short-term planning and decision making become less relevant for long-term farm management, especially in an uncertain environment. According to the literature, this occurs because seasonal and climatic conditions induce uncertainties that in turn limit the controllability of managerial decisions and affect the outcomes of control measures (Mauldon et al., 1969), which affect the performance of FEs (Lu et al., 2016; Rouse et al., 2010). However, it is important to note that the ability to cope with uncertainties—indeed of their nature—can also generally depend on owners’ perceptions of their ability to control changes in their environment (Carey and Tanewski, 2013). That is, despite the important influence of the natural environment, “farm owners, who view themselves as having greater control over changes in their operating environments and hold higher levels of certainty, are more likely to conduct sophisticated business planning” (Carey and Tanewski, 2013, p. 227).
4.5 Technological changes and management accounting practices in farms

The fifth cluster of findings addresses the impact of technology and technological changes on the use of MA in FEs (e.g., Halabi and Carroll, 2015; Toft, 1964). Technological changes in FEs mainly include the increasing use of modern and environmentally friendly irrigation systems and automated milking systems and/or the dependency on sophisticated computerized production processes and record-keeping systems (Gloy et al., 2002; Jack, 2005; Toft, 1964; Singh et al., 2007). According to some articles in our sample, technological changes in FEs help them become more cost-effective and time-efficient (Jack, 2005; Toft, 1964). However, other papers show that despite the significant impact of book/record keeping on the profitability of some FEs (especially some large farms), farms that use computerized record-keeping systems do not generate a significantly greater return on assets than those that elect not to use such systems (Gloy et al., 2002). Moreover, the ability to make the best use of available technologies usually depends on the financial resources available to a farm (Mugera and Nyambane, 2015).

A portion of these financial resources needed for the acquisition of new technologies is provided by banks (mostly agricultural banks), which usually require farmers to develop a business plan that includes cost planning, capital budgeting, performance measurement/reports or compliance/control practices (Zhengfei and Lansink, 2006). However, based on information provided by accountants, Halabi and Caroll (2015) find that financial reports have little decision-making value for farmers because they are only produced for compliance purposes. This perspective is also held by some farmers. Carey and Tanewsi (2013) investigate the voluntary demand of Australian farms for auditing services and find that the predominant reason farm owners conducted an internal audit was to fulfill lender requirements.

According to Jack (2005) and Lu et al. (2016), a large portion of the technology costs incurred by farmers represent overhead or indirect costs, and much of these costs can be attributed
to machines acquired by farmers for production purposes (Jack and Jones, 2008). More generally, farms have high overhead costs because when labor is needed, most of the total available workforce consists of non-family salaried workers and part-time or seasonal workers rather than family members (Hyde et al., 2007; Carey and Tanewski, 2013; Jack and Jones, 2008; Lu et al., 2016; Olagunju, 2002). High overhead costs combined with the cost and capital planning requirements of money lenders and banks lead some farms to develop depreciation plans for the machines and technologies they acquire. Consequently, high overhead costs and the need to effectively allocate them makes them an essential component of cost planning. This may explain the high reliance of many FEs on some MA practices, such as cost planning and capital budgeting, that are especially embedded in target costing (Jack and Jones, 2008). However, the literature reveals that to date, farmers have not found an efficient MA technique for managing and controlling overhead costs, which are largely driven by the increasing use of (new) machines/technologies in FEs. Jack and Jones (2008) conclude that the problem of allocating overhead costs remains irrespective of the method used for budgeting or costing (Jack and Jones, 2008). This problem is also recognized by Lu et al. (2016, p. 29), who argue that “the unique nature of agricultural production increases the difficulty in allocation of overhead costs to agricultural products.” See Section 4 for more details concerning the impact of the special nature of farm products on MA/control practices.

5. Some potential avenues for future research

Although the number of articles that examine issues involving MA practices in FEs has increased in recent years, several aspects of MA usage in FEs have not been investigated sufficiently. Furthermore, the existing results appear to be conflicting, heterogeneous and restricted to a small number of empirical studies. Consequently, an array of important questions regarding the MA practices used in FEs and their influencing factors still remains to be investigated,
which explains why we now discuss some fruitful opportunities for further research in addition to discussing the research gaps that were identified in the descriptive part of this paper (Section 3). We organize these future research questions in three main clusters, as summarized in Table V.

Table V. Potential questions for further research

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Future Research Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural environment and the use and outcomes of MA techniques</td>
<td>What rationales link a particular MA instrument to a particular type of FE? With regard to development issues and environmental or social policies, does a trade-off exist such that the outcome of the use of MA in FEs is maximized (micro-economic perspective)? What would such an MA system for FEs include? How can MA and control instruments/systems adapt to seasonal fluctuations, upon which the productivity of FEs largely depends?</td>
</tr>
<tr>
<td>Environmental MA systems and the sustainability-based performance of FEs</td>
<td>How can MA and control systems be designed to enhance the sustainability of FEs (with regard to their high dependence on changes in ecosystems and the natural environment)? Which FEs have successfully introduced environmental MA systems to enhance sustainability? What does such a system entail? Would the same environmental MA system unconditionally work for both animal and agriculture farms? How can the environmental MA systems of FEs be better aligned with the environment policies of governments?</td>
</tr>
<tr>
<td>Effectiveness and efficiency of current MA instruments used in FEs</td>
<td>How successful is the use of current MA practices in FEs? In other words, what are the outcomes of the use of MA in FEs? What are the risks and costs that FEs face when implementing MA practices? Which farms have successfully implemented modern MA techniques for operational management? What are the outcomes of such implementation? What lessons can/should be learned from FEs in which MA may not have led to the expected outcomes? What difficulties are FEs subject to when operating without formal managerial control systems? How can these difficulties be overcome through the use of MA instruments?</td>
</tr>
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</table>

5.1 Types of farms and MA practices

The findings from this review suggest that some factors, including the type of FE, the nature of its products and its natural environment (i.e., the climate and the seasons), induce additional uncertainties that influence the practice of MA by farmers and the productivity of FEs (see Section 4.4). As discussed in the descriptive part of this paper (i.e., Section 3), FEs include both animal and agriculture farms, which have different life cycles. In addition, their production
processes are affected differently by climatic, seasonal and market changes and fluctuations. Consequently, one can logically expect that the types of MA practices/instruments used and their influencing factors or outcomes also differ for animal and vegetal farms. However, this aspect is nearly ignored in the investigated literature. Understanding the differences between animal and vegetal farms would likely enhance the ability to efficiently design, implement and evaluate the outcomes of different MA and control practices in different types of FEs.

5.2 Environmental MA systems and the sustainability-based performance of farms

The performance of FEs is more affected by changes in the natural environment than other enterprises because the productivity of farms (especially agricultural farms) is more dependent on climatic and seasonal changes/fluctuations than other economic entities. In turn, FEs and their products also impact the economic environment because of the use of some chemical products in production processes that presumably have unintended consequences for land, ecosystems and subsequently climate change (particularly in the long-run). Because of the interaction between farming activities and potential changes in the ecosystem and the natural environment, one can legitimately ask the question, “How can MA and control systems be efficiently designed and implemented by FEs to enhance their environmental sustainability?”

MA is important because it can be used to identify, quantify, control and manage environmental costs (Jasch, 2003; Bartolomeo et al., 2000). Bartolomeo et al. (2000, p. 49) argue that these costs may possibly be used as “a predictor of future internal costs, if environmental legislation becomes more stringent.” Due to the negative relationship that exists between uncertainty and the efficiency of MA practices, a decrease in uncertainty related to seasonal and climatic changes could enhance the effectiveness and efficiency of MA and control in FEs. One step that should be taken to prevent climate and seasonal changes is to analyze the managerial
accounting efforts of FEs in monitoring and minimizing the potential impacts of farming processes on the ecosystem. Such managerial efforts can be materialized through the use of environmental MA and control systems by farms, such that the preservation of nature is clearly defined as a performance indicator. In addition, these efforts can help FEs better achieve environmental protection goals.

5.3 The effectiveness and efficiency of current MA instruments used in farming entities

Our analysis of the findings reveals that the existence and use of MA practices in FEs is mainly limited to the use of traditional practices such as book-keeping, costing, (capital) budgeting and performance measurement and control. As discussed in Section 4, some of the influencing factors for MA and control practices used in FEs have already been introduced or discussed in the literature: market pressures, increasing competition, subventions, farm size, farm type, etc. However, we still know little (if anything) about the outcomes of MA practices in FEs because outcome issues are rarely explicit concerns in the analyzed articles [10]. Moreover, the potential opportunities and risks that FEs face or may face when implementing new and more market-oriented MA techniques are ignored in the literature. Understanding the current outcomes of MA and the risks and costs of market-oriented MA and control practices in FEs would probably help to evaluate the benefits that farmers obtain from such practices. Thus, research on the outcomes could help farmers evaluate how MA practices are used efficiently in FEs or how necessary these practices are.

6. Discussion and conclusion

The aim of this paper was to provide an overview and a synthesis of the existing literature on the MA practices in FEs and explore some avenues for future research on this topic. We created
an explanatory framework that provides an overview of the MA techniques investigated in the literature as well as the main factors that influence the use, diffusion and outcomes of MA and control in FEs. This framework contributes to both the accounting and the agricultural literatures by laying the base for further and more focused research efforts as suggested in Section 5. In more detail, our review findings show that although the use of MA techniques by farmers is not a new phenomenon, the use of MA in FEs is still mainly confined to traditional practices such as book-keeping, (capital) budgeting and performance measurement. Moreover, our findings suggest that the use and diffusion of MA practices in FEs is mainly determined by five groups of interrelated factors.

Our first group of findings shows that many FEs have the typical characteristics of family enterprises, and many of them are micro enterprises or SMEs. Consistent with existing reviews on MA and control in family businesses (Helsen et al., 2017; Quinn et al., 2018; Senftlechner and Hiebl, 2015) and SMEs (Lavia López and Hiebl, 2015), our findings suggest that familism has a “negative” impact on the diffusion of MA practices in FEs. The domination of family-oriented goals in family enterprises (such as farms) decreases the usage and/or the relevance of MA and control systems (cf. Senftlechner and Hiebl, 2015). Moreover, the literature on the use of MA in SMEs partly explains the low diffusion of MA and control systems in FEs and the fact that these systems are limited to a small number of traditional practices. As the literature on SMEs also suggests, there is a negative relationship between familism and the usage of MA systems (Lavia López and Hiebl, 2015).

Our second cluster of findings suggests that the impact of increasing market pressure on the use, sophistication and diffusion of MA and control systems in FEs is moderated by farm size. While increasing market pressure increases the use/sophistication/diffusion of MA for pricing purposes in large farms, it decreases the use of MA practices for pricing decisions by
smaller farms. Although Lavia López and Hiebl (2015) and Senftlechner and Hiebl (2015) sug-
gest that increasing market pressure positively influences the level of sophistication of MA and
control in family firms and SMEs, they largely ignore the possible moderating role of firm size
in this relationship. The moderating role of farm size could be explained by micro-economic
theories based on the notion of economies of scale: the larger the farm size is, the greater the
possibility that a farm will increase its production and therefore (Paul et al., 2004) face increas-
ing unit cost pressures induced by increasing market competition. In this manner, large farms
can change their pricing strategy and act as price makers in the market. In contrast, since small
farms generally do not benefit from economies of scale (Paul et al., 2004), they are not able to
address increasing market-induced unit cost pressures without policy support through
grants/subsidies and will disappear from the market [11]. Consequently, small farms are not
able to define their own pricing strategies and become price takers. For this reasons, some gov-
ernments adopt equity measures and provide more support to “resource-poor farmers” than “re-
source-rich farmers” (Chinnapa and Nagaraj, 2007, p. 382). In alignment with this argument, it
is clear that FEs that are price makers are able to efficiently use MA practices for pricing pur-
poses, while those that are price takers rely less on the use of MA practices for pricing decisions,
since they cannot influence the market outcomes anyway (Paul et al., 2004). This finding is
important because it can help farmers and accounting practitioners choose a differentiated ap-
proach when making pricing recommendations for FEs and when making decisions regarding
whether or not to implement specific MA practices that may help them identify product costs.

The third cluster of findings suggests that grants provided to farms might have a positive
impact on the use and/or diffusion of some MA practices in FEs. Some farmers have adopted
MA practices (e.g., target costing and activity-based costing) to receive grants from the gov-
ernment. Dobbs and Foster (1972) investigate the incentives for investing in new agricultural
inputs in North India and find that price-support programs failed to set support levels far enough
in advance to allow farmers to engage in effective planning. Moreover, government grants and subsidies decrease the incentives of other farms to formulate appropriate pricing strategies to reduce their dependence on market prices. As Argilés and Slof (2001, p. 378) also argue, “giving the farmer a subsidy will keep him from going bankrupt for one year, but giving him management tools, e.g. accounting tools, will allow him to become self-sustainable.” This statement implies that development policies should consider the fact that subventions and subsidies (when they are applied over a long period of time) can decrease the incentives of FEs to develop or adopt MA and pricing strategies that can increase their market competitiveness and help them survive as economic entities independent from state grants. Such dynamics have not yet been discussed much in the broader literature on MA in small firms. There are several findings in this literature suggesting that external parties such as banks (e.g., Hirsch et al., 2018; Lavia López and Hiebl, 2015) or venture capital firms (e.g., Dávila and Foster, 2005; 2007; Strauss et al., 2013) often demand additional information from SMEs, which results in an increased adoption of MA and control practices in these SMEs. As discussed in Section 4.3, in some FEs, government grants or subsidies may also induce a higher usage of MA and control practices. However, following some of the reviewed studies (Argilés, 2001; Argilés and Slof, 2001, 2003), it may also be that due to government grants or subsidies, small firms such as FEs do not invest heavily in MA and control practices since the grants or subsidies take away pressure from such firms to establish practices that help them in analyzing and improving their efficiency—that is, MA and control practices. We can follow from these review findings that parties external to small firms such as the state may also contribute to the non-application—or at least, a lower application—of MA and control practices.

Our fourth group of findings suggests that the “long” production processes used by FEs, the nature of their products, seasonal fluctuations and unstable climatic changes might enhance the use of some MA techniques but makes the use of other MA instruments less necessary.
These factors generate uncertainties that either limit the use of some MA instruments or limit their efficiency or effectiveness. Therefore, FEs should choose MA practices that align with the length of their production cycles.

Our last group of findings suggests that the increasing mechanization of FEs and the diffusion of (new) technologies in FEs have led to an increase in their indirect costs and overhead costs. Therefore, managing these costs has induced some farms to adopt certain budgeting tools that are essentially based on cost planning.

Overall, our findings and the framework we developed also hold some implications for the broader literature on MA and control. Our results suggest that some influencing factors for the use of MA in FEs might differ from the factors influencing the use of MA in family businesses, SMEs, multinational organizations and (local) governments and authorities. Although similarities exist among the major findings on MA and control practices in family businesses and SMEs (Helsen et al., 2017; Lavia López and Hiebl, 2015; Quinn et al., 2018; Senftlechner and Hiebl, 2015), our results suggest that the findings on the use and the diffusion of MA in family businesses and SMEs cannot be unconditionally generalized to FEs. For instance, we find that research on farm accounting has identified antecedents to the usage of MA that have not been covered in the literature on MA and control in family firms and SMEs. That is, our review suggests that in FEs, climatic and seasonal conditions and government policies, grants and subsidies very much affect the usage of MA. These factors have so far not been widely discussed in the literature on family and small firms (Helsen et al., 2017; Lavia López and Hiebl, 2015; Quinn et al., 2018; Senftlechner and Hiebl, 2015). However, given that FEs are mostly small and family-owned, these factors can enrich and complement research on MA in family businesses and SMEs. Consequently, our review shows that research on one specific industry—farming in our case—can inform the broader MA literature (cf. Messner, 2016). The
differences that exist among FEs, family firms and SMEs should be considered by advisors and accounting practitioners when formulating recommendations for farm managers—as explained in Section 1. Our findings also suggest that very little is known about the outcomes of MA practices in FEs, and various opportunities exist for future research on this topic (see Section 5). We believe that future research should consider these avenues because the empirical basis of our findings is still limited to a very small number of articles.

Similar to other articles that use systematic review methods, this review is potentially subject to some limitations. First, as is usual in systematic literature reviews, this analysis only included empirical journal articles that could be identified and found in full text. Other types of sources (e.g., books) and other types of articles (e.g., conceptual papers) are not included, although they might potentially provide some relevant findings. Our focus on empirical articles also has implications for the setup of our review study. That is, due to the heterogeneous nature of the reviewed articles’ findings and in contrast to more theory-based reviews of the accounting literature (e.g., Englund et al., 2011; Hiebl, 2018; Otley, 2016; Plöckinger et al., 2016), we could not develop an a-priori theoretical framework and sort in the findings from the reviewed papers. Instead and in line with the evidence-based approach (Tranfield et al., 2003), we relied on a rather inductive approach and developed an explanatory framework based on an in-depth reading and analysis of the included papers. While this approach seems useful for us, it comes with the limitation that our framework is not readily compatible with more general theoretical paradigms in accounting research. Second, journal articles in languages other than English are not considered in the present review, although they might contain information that can contribute to a deeper understanding of the use and diffusion of MA and control practices in FEs. Third, although eight databases were searched using keywords (see Section 2) and the identified empirical articles were screened for their relevance to this topic, we cannot guarantee that all the articles on MA and control practices in FEs are included in the present review because our
search results depended on our keyword specifications, which may have been incomplete. Finally, our major findings rely on a rather small number of empirical articles; therefore, additional empirical studies are necessary to corroborate or challenge the findings presented in this review.

Notes

[1] However, this is not the only factor that causes farm processing and management structures to change. According to the Food and Agriculture Organization (FAO, 2015), changes in the climatic environment have also substantially contributed to changes in farm management practices.

[2] FEs are semi-economic entities in the sense that they act as a bridge between the formal and the informal economies. Drawing on the theories of mass production and mass markets, Lyson et al. (1995) analyze data collected from 115 farmers' market vendors in three regions of New York and conclude that farmers' markets are intermediate social structures that link the formal sectors of the economy to its informal sectors.


[4] Note that a considerable number of works in MA research (i.e., Lavia López and Hiebl, 2015; Hansen and Schaltegger, 2016) also rely on electronic databases for conducting literature reviews. In contrast to physical libraries, electronic databases are accessible everywhere, are relatively inexpensive to use and require little effort. Consequently, using electronic databases allows us to include the largest possible number of articles in our sample, independent of their physical location.
For example, we operationalized our keywords for use in the Wiley Online Library without hyphens (“-“) (following the user guide published by the Wiley Online Library, 2011). Furthermore, when using SpringerLink, it is not possible to use a different search field for the abstract, title and search themes. Therefore, we performed our search using the full-text search option. First, the search was conducted using “management accounting”. Second, the search results were filtered using the second set of keywords “farm” and “agricultural economy” (see the search tips at https://link.springer.com/searchhelp).

These authors include Carey and Tanewski (2013), Chinnappa and Nagaraj (2007), David (1997), Dobbs and Foster (1972), Freear (1970), Gebremeskel and Shumway (1979), Gillespie and Nehring (2013), Hyde et al. (2007), Lu et al. (2016), Musser et al. (1986), Rouse et al. (2010), Singh et al. (2007), and Sprohge et al. (1989).

However, we cannot guarantee that this list of cereals is exhaustive because many authors do not specify the types of cereals involved in their studies (e.g., Ma et al., 2014; Chinnappa and Nagaraj, 2007). Therefore, the results should be interpreted with caution.

Jack and Jones (2008) do not specify the country in which their research setting is based. Consequently, the overall number of countries could be higher than the number cited in the present article. Therefore, this number should be interpreted with caution.

Based on an interdisciplinary review of the literature (on MA and agricultural extension) combined with an empirical analysis of survey data from 274 participants (70 extension agents, 200 farmers and four heads of departments) in Egypt, Abdel-Maksoud and Abdel-Maksoud (2015) propose a performance measurement model that consists of five components (agents’ characteristics, agents’ work attitudes, services provided, use of agricultural extension services, and farmers’ satisfaction with agricultural extension services) that are linked to the objectives/strategies of agricultural extension organizations/actors through feedback and feed-forward control loops.
However, this does not include Carey and Tanewski (2013). In their analysis of the voluntary demand for auditing services by Australian farms, Carey and Tanewski (2013, p 228) find that “farm owners who conduct more sophisticated business planning are more likely to voluntarily engage an external audit compared with owners who conduct less sophisticated business planning”. Therefore, they conclude that an audit can enhance internal control by playing a complementary monitoring role.

Darnhofer et al. (2016) argue, for example, that the number of family farms is steadily declining in the European countryside, where FEs play an important role. According to these scholars, this decline is due to the increasingly turbulent contexts and growing uncertainties that they must confront; therefore, they suggest using a relational approach because it can contribute to overcoming the one-sided focus on states and stability and shift the attention to the patterns of relations that enable transformational change.

References


