



### Lean Accounting: A structured literature review

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## Lean Accounting: A structured literature review

### Abstract

**Purpose** – The purpose of this paper is to perform a review and analyze the literature on Lean Accounting (LA), to develop insights into how LA research is developing, offering a critique of the research to date, and underlining future research opportunities.

**Design/Methodology/Approach** – This research uses a structured literature review to categorize and analyze 39 research articles from relevant journals with a publication date from 1996 to 2020 (September) and to answer three research questions.

**Findings** – Findings demonstrated that although LA seems to be the most suitable method for lean companies, it still lacks research in terms of the role of accountants in lean organizations as well as how its concepts are integrated with the Generally Accepted Accounting Principles (GAAP).

**Practical implication** – This paper provides both academics and practitioners with valuable insights regarding the role of management accounting and accountants in the pursuit of lean transformation, presenting meaningful themes and a complete analysis of the literature along with research gaps for future research.

**Originality/value** – This paper contributes to lean manufacturing literature by providing a comprehensive structured literature review of articles regarding LA. Also, it serves as a basis for developing future research agendas in management accounting practices for lean organizations.

**Keywords** Lean Accounting, Lean Manufacturing, Management Accounting, Structured Literature Review.

**Paper type** Research paper

## 1. Introduction

Lean is a philosophical approach, based on the principles of the Toyota Production System which drives organizations to add value to their operations by continuously enhancing their processes and focusing on the elimination of wastes, thereby improving material flow and operational performance (Olesen *et al.*, 2015). These principles have been broadly accepted by organizations and applied successfully across many disciplines (Poppendieck, 2002). According to Staats *et al.* (2011), when a lean production system is implemented, the core processes are altered, resulting in improved operational performance. Indeed, both Staats *et al.* (2011) and Poppendieck (2002) found that lean projects presented better results than traditional methods, whereas Olesen *et al.* (2015) identified an improved material flow and reduced processing time when lean is used in intermodal container facilities. Hence, it is possible to observe that lean implementation contributes to operational excellence and continuous improvement in different organizational contexts.

The adoption of complex manufacturing strategies such as lean manufacturing, is a complex process that impacts not only operations but all functional areas. From an accounting perspective, both system and processes, represents a radical change, since the traditional accounting concept was designed to support a mass production environment (Ahlstrom and Karlsson, 1996). According to Fiume (2002), besides the complexity of implementing the changes to the accounting systems, the accountants **are** often reluctant in changing accounting **processes**, which might become a barrier to successfully implementing lean manufacturing.

Carnes and Hedin (2005) highlight that during this transitioning period, it is required for companies **to** change the way they control, measure and account for their processes. Johnson (2006) advocates that it is required top management support to shift from a mindset that uses mass production performance measures to control the operation, to focus on the total cost of flow, development and empowerment of employees and qualitative measures to motivate proper lean behaviors.

Indeed, some modern management accounting techniques such as Japanese Management Accounting and Strategic Management Accounting (SMA), refer to Okano and Suzuki (2006) and Guilding *et al.* (2000) respectively, are suitable for Total Quality Management (TQM) environments. However, Langfield-Smith (2008) identified that SMA techniques have not been widely adopted, nor is the term itself widely understood or used, while Japanese Management Accounting, when it comes to the implementation process, is usually regarded as difficult and even impossible due to the close association with the cultural and social features found in Japanese companies. Moreover, there is little empirical evidence that this method works well in the global environment Okano and Suzuki (2006).

Given the existing gap of other management accounting practices, Lean Accounting (LA) concepts were idealized in the first Lean Accounting Summit held in 2005 in the city of Detroit – USA, where the main purpose was to present and document the principles, practices and tools of LA and to answer the call from the companies that were no longer satisfied with traditional accounting. Experts in accounting and lean manufacturing created a framework and defined the **following** pillars (Maskell and Baggaley, 2006):

- Provide accurate, timely and understandable information to motivate the lean transformation
- Use lean tools to eliminate waste from the accounting processes, while maintaining thorough financial control
- Fully comply with Generally Accepted Accounting Principles (GAAP), external regulation and internal reporting requirements

- Support lean culture by motivating investment in people, providing information that is relevant and actionable and empowering continuous improvement throughout the organization

In general, management accounting was created to portray businesses processes, therefore, it is needed to adapt the accounting systems to the manufacturing process employed (Fry and Smith, 1987). It is common for organizations to use a single model for cost allocation, product costing and general reporting, applying those to all their products and production resources. LA should support business' initiatives to become and stay lean in their production process, focusing on customer value (Ruiz-de-Arbulo-Lopez *et al.*, 2013; Maskell and Baggaley, 2006; Myrelid and Olhager, 2019).

Hence, LA can be defined as the integration between management accounting and lean manufacturing, whereby managers can utilize accounting information to identify opportunities to eliminate waste and hidden costs and to improve business processes (Slavov *et al.*, 2013). In addition, LA aims not only to implement lean tools to improve accounting processes, but to reshape accountant's role to become a business partner in the pursuit of value creation and elimination of wastes (Kennedy and Brewer, 2005; Maskell and Baggaley, 2006; Maskell and Kennedy, 2007).

Although since the first summit some advances on the body of scholar of LA has been made, it would be interesting to see how academia is responding through research into LA. Therefore, this study focuses on a systematic literature review regarding LA, to identify the most common themes of research, gaps identified and potential future research path. The remainder of this paper is structured as follows. Section 2 describes and justifies the use of a Structured Literature Review (SLR) to investigate LA research. Section 3 describes the SLR method for selecting and analyzing the articles and to offer insights and critique of the LA literature. Section 4 provides the authors arguments on the future research of LA and presents relevant unanswered research questions.

## 2. The structured literature review

A literature review is an essential feature of academic research that allows to understand the breadth and depth of the current body of work and identify gaps to explore. By summarizing, analyzing, and synthesizing a group of related literature, it is possible to test hypothesis and develop new theories (Xiao and Watson, 2017). For this review, it was followed the SLR method proposed by Massaro *et al.* (2016), that specifically outlines how to conduct a systematic literature review for accounting studies. According to the authors, an SLR is a method for studying a corpus of scholarly literature, develop insights, critical reflections, future research paths and research questions (Massaro *et al.*, 2016). By utilizing specific rules, this approach goes beyond than merely synthesizing and interpreting previous contributions and provides a transparent research methodology for assessing and classifying each study (Bisogno *et al.*, 2018).

SLR complements traditional literature reviews because it helps to yield different outcomes that are defensible, helping experienced scholars to develop new and interesting research path by assessing and analyzing a considerable volume of scholarly works (Massaro *et al.*, 2016). This approach has been successfully used to study interdisciplinary fields of accounting, such as: integrated reporting (Dumay *et al.*, 2016); intellectual capital (Dumay and Cai, 2014; Cuozzo *et al.*, 2017; Buenechea-Elberdin, 2017; Bisogno *et al.*, 2018); auditing and accountability (Guthrie and Parker, 2012) and consolidated financial statements in the public sector (Santis, *et al.*, 2018).

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3 While the body of knowledge regarding lean manufacturing is continuously evolving in the  
4 operations management and engineering fields, Carnes and Hedin (2005) argue that the  
5 management accounting literature and curricula lag the adoption of lean accounting practices.  
6 Hence, it was examined the foundations of LA research to understand the role of management  
7 accounting to meet the demands and objectives of lean organizations, so that we can derive  
8 insights into, critique and make recommendations towards the future of LA research. Although  
9 quantitative research has become the mainstream of many accounting journals, qualitative  
10 research is still important to answer research questions and to explore accounting in ways not  
11 available on quantitative accounting research methods (Fraser, 2014; de Villiers *et al.*, 2019).  
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14 Commonly used in management research, the traditional review method, the researcher  
15 summarizes and interpret previous contributions in a subjective and narrative fashion (Denyer  
16 and Tranfield, 2006), however, this review type may not be comprehensive or balanced in their  
17 selection and use of discussion material (Petticrew and Roberts, 2008).  
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19 In contrast, conducting literature reviews systematically can enhance the quality,  
20 replicability and validity of the review (Xiao and Watson, 2019), since the differentiating  
21 feature of this method relies on a pre-defined set of “rigid” rules, while traditional literature  
22 review tends to be more flexible or, according to the authors, a “no rules” approach (Massaro  
23 *et al.*, 2016). Thus, the selection of this method is justified on the grounds of reproducibility  
24 and formality. The review process is structured in ten different steps as demonstrated in Figure  
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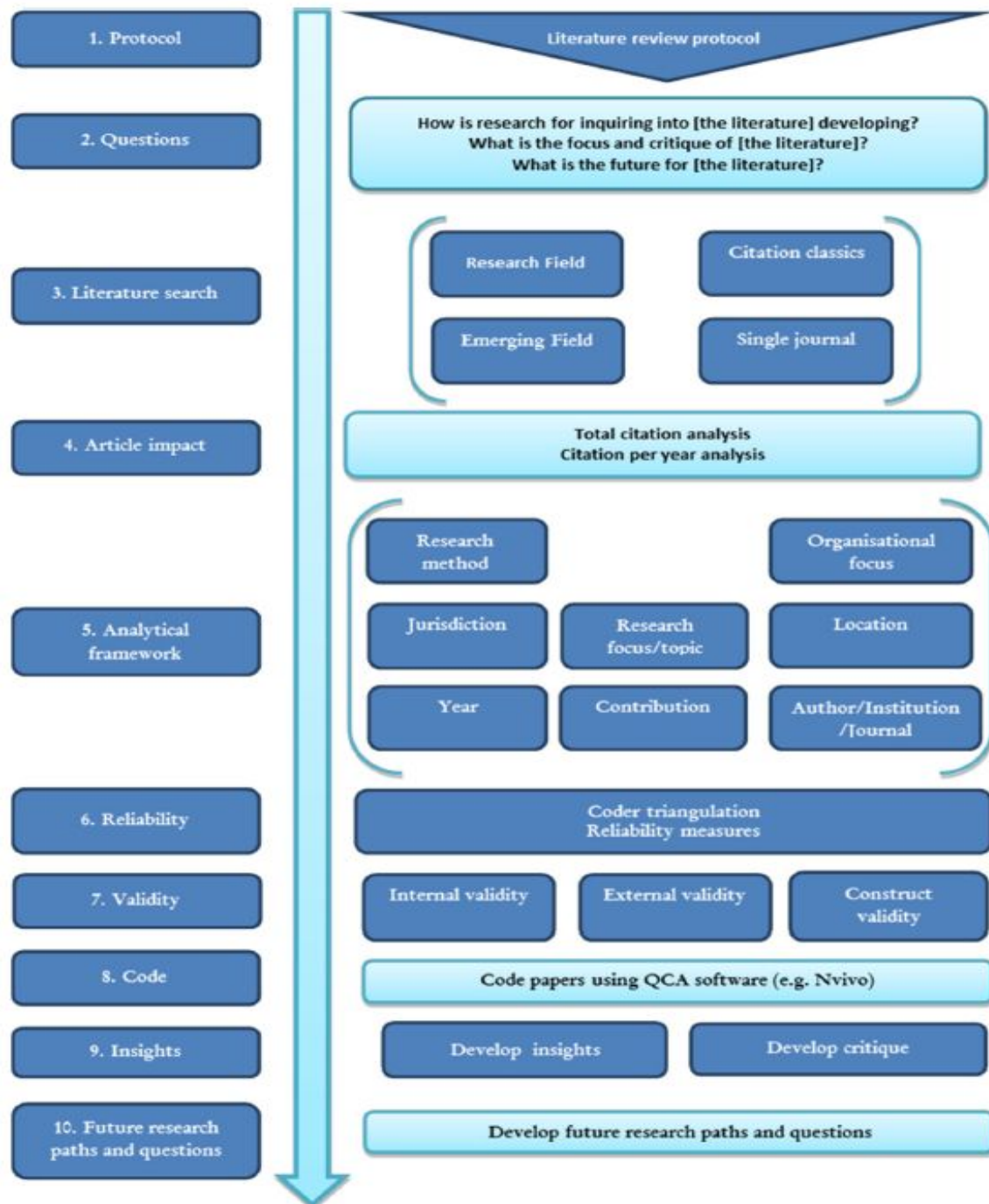


Figure 1: The process to develop a structured literature review (adapted from Massaro *et al.*, 2016).

### 2.1 The literature review protocol

The starting point is to outline a review protocol to document the procedures followed to undertake and to develop the literature review. A protocol is required to increase reliability of the research and to allow the readers to evaluate and replicate the adopted criteria (Santis, *et al.*, 2018). Hence, this study seeks to present a review and critique of the articles addressing LA published from 1996 to 2020 and to suggest future research lines based on the gaps found as a result of an analysis of extant literature. Given this objective, the population of articles that will support the analysis was adapted from by Buenechea-Elberding (2017), to consider studies that are:



- Empirical, because empirical works analyzing one or several companies are the most suitable for developing a better understanding of a business practice, in this case, what is the role of management accounting in lean organizations
- published in peer-review journals and conference papers, which contributes to a higher level of quality, based on the strict refinement process inherent in publication
- published from 1996 to 2020, as the seminal work was published by Åhlström and Karlsson, to assess the management accounting systems role in the adoption process towards lean production and
- written in English, since it's deemed to be the official language of academia

Furthermore, it has been nearly 25 years since the first study to address the integration between management accounting and lean manufacturing and 15 years since the first Lean Accounting Summit, therefore, it is timely to do a literature review. Despite this is not a research gap since LA accounting is a new concept and its practical effects are still incipient, the knowledge systematization can benefit both practitioners and researchers.

Hence, this review offers an overview of the state of the research on LA, highlighting the main issues identified in previous works and discussing the findings regarding the adoption of LA accounting practices, as well as the benefits when accounting information provided in a "lean format" can bring to the operations management personnel, in the pursuit of sustaining or developing lean manufacturing practices.

## 2.2 Research questions

Literature reviews are research inquiries that should be guided by a research question that will drive the entire review process, from narrowing down the selection of studies to be included, data extraction methodology, synthetization until reporting the findings (Xiao and Watson, 2019). Considering prior SLR studies, the protocol document identifies three standard research questions that were adapted to suit this review's purpose:

1. How is research for inquiring into lean accounting developing?
2. What is the focus and critique of the lean accounting literature?
3. What is the future for lean accounting research?

The first question aims to provide a background of existing literature to date and present how prior studies contributions lead to where LA stands today. The second question seeks to establish the most frequent issues and themes of research, by analyzing the focus areas and main characteristics of the articles, as well as to identify who the influential authors are. Finally, the third question points out opportunities and directions for future research. Answers to these questions are provided in the sections "Insights and Critique" and "Discussions and Implications".

## 2.3 The literature search

This section explains the selection of studies based on the definition of keywords and the databases to be used. A keyword search can help researchers to find relevant articles in a field, however, it is important to be careful in the selection criteria, so that it will generate the data being sought to (Massaro *et al.*, 2016; Cronin *et al.*, 2008). This step also highlights the inclusion/exclusion criteria of articles, as well as defining where to perform the keyword search, which according to Massaro *et al.* (2016), is recommended to search in the article's title, abstracts and keywords. For the selection of papers, it was used primary academic databases of Scopus, ISI Web of Science (WoS) and Engineering Village. Because no database

includes the complete set of published materials, a systematic search for literature should draw from multiple databases (Xiao and Watson, 2019).

For instance, Scopus database provides wider coverage of the academic journals, since it comprises over 20,000 peer-reviewed journals (Mishra *et al.*, 2017). Although 97% of papers indexed in WoS are also enclosed in Scopus (Waltman, 2016), the authors decided to also use WoS because it was the only international and multidisciplinary database available to obtain the literature of various fields until 2004 (Chadegani *et al.*, 2013). Finally, Engineering Village was also used because it provides access to 14 engineering document databases from a wide range of sources, and widely considered to be the most comprehensive database for engineering literature (Elsevier, 2021).

In addition, it was included Google Scholar citations to measure the academic impact of the articles and provide insight into the evolution of literature. The initial selection criteria for this review were based on the following keywords: “lean accounting” OR “accounting for lean manufacturing” OR “management accounting” AND “lean manufacturing”, with no limitations.

The first round obtained 62 articles (22 in Scopus, 27 in ISI WOS and 13 in Engineering Village), however, since the two constructs being studied may be also known by different terms, such as “Lean thinking”, “Lean production” or “Lean management”, as well as “managerial accounting”, a second round was performed in the same databases using a new search string: “Lean accounting” OR “accounting for lean manufacturing” OR “manag\* accounting\*” AND “Lean\*”. The research spanned from January 1996 to August 2020 with no limitations. The second round retrieved 160 articles (93 in Scopus, 42 in ISI WOS and 25 in Engineering Village), which were cataloged in Mendeley library.

Subsequently, it was removed any documents that were not papers, such as exposures, book chapters and new digests (32 documents), as well as all duplications (54 papers), since several papers were included in more than one database. Additionally, a restrictive selection was carried out based on a detailed quality assessment of the selected papers, where it was examined the article’s title, abstracts and keywords, and eventually the full content of the article to ensure that these are relevant for this review.

After this analysis, it was removed papers not falling into our research goals (35 documents), such as studies that only focused on lean manufacturing (without further exploring any aspect of management accounting) and articles with no specific association to lean accounting or lean manufacturing (for instance, some papers discuss other accounting methods that were not designed to lean organizations or presented in different production environments). Finally, after these exclusions, 39 relevant papers were obtained as demonstrated in table I.

Table I: The search of relevant articles

	Scopus	Database		Total
		ISI WoS	Engineering Village	
Keyword search of the title, abstract and keywords	93	42	25	160
Number of duplicates				-54
Number of books & book chapters				-32
Articles concerning other fields of accounting				-35
Relevant papers				39



## 2.4 Article impact

This step consists of measuring the academic impact of the articles and provide insight into the evolution of the literature. Citation counts were downloaded using Harzing's Publish or Perish software as of 21 August 2020, where table II shows the top ten articles by total citation (TC) and their ranking as citation per year (CPY). According to Dumay and Cai (2014), since older articles have had more time to collect citations than recent articles, the average citation per year (CPY) serves as a counterbalance to avoid the bias due to the year, allowing to identify the most influential papers. As evidenced in the table II, changing the measure affected only the position of the articles within the lists, meaning these are the most relevant studies regarding LA.

Table II: Top ten articles by total citations and citation per year

Authors	Title	Year	Journal	Total Citation	Rank as CPY	CPY score
Al-Omiri, M. Drury, C.	A survey of factors influencing the choice of product costing systems in UK organizations	2007	Management Accounting Research	394	2	30.31
Fullerton, R. R. <i>et al.</i>	Lean manufacturing and firm performance: The incremental contribution of lean management accounting practices	2014	Journal of Operations Management	340	1	56.67
Kennedy, F. A. Widener, S. K.	A control framework: Insights from evidence on lean accounting	2008	Management Accounting Research	258	4	21.5
Fullerton, R. R. <i>et al.</i>	Management accounting and control practices in a lean manufacturing environment	2013	Accounting, Organizations and Society	203	3	29
Åhlström, P. Karlsson, C.	Change processes towards lean production: The role of the management accounting system	1996	International Journal of Operations and Production Management	181	8	7.54
Ruiz-de-Arbulo-Lopez, P. <i>et al.</i>	Lean manufacturing: Costing the value stream	2013	Industrial Management and Data Systems	110	6	15.71

Authors	Title	Year	Journal	Total Citation	Rank as CPY	CPY score
Hadid, W. Afshin Mansouri, S.	The lean-performance relationship in services: A theoretical model	2014	International Journal of Operations and Production Management	101	5	16.83
Chiarini, A.	Lean production: Mistakes and limitations of accounting systems inside the SME sector	2012	Journal of Manufacturing Technology Management	96	7	12
Li, X. <i>et al.</i>	A comparative analysis of management accounting systems' impact on lean implementation	2012	International Journal of Technology Management	55	9	6.88
Alsmadi, M. <i>et al.</i>	implementing an integrated ABC and TOC approach to enhance decision making in a lean context a case study	2014	International Journal of Quality and Reliability Management	25	10	4.17

Given the frequency and number of citations, Fullerton, Kennedy, and Widener dominates the list with a total of 801 citations, followed by Al-Omir and Drury and Åhlström and Karlsson with 394 and 181 citations respectively. This result means that those studies served as the basis for several other research, contributing considerably to the development of management accounting practices more suitable to lean manufacturing principles.

Additionally, understanding who the most cited authors are is important because it provides evidence of the presence or absence of the Matthew or Superstar effect (Merton, 1968), whereby one or two authors dominate a specific research focus.

Regarding the journals where the full list of articles was published, table III demonstrates the number of papers published and total citations these articles produced per journal. It's interesting to observe that journals specifically focused on accounting (i.e.: Management Accounting Research, Accounting, Organizations and Society, Journal of Corporate Accounting & Finance, etc.) represents 20% of the list, while the remainder is mainly related to business or operations management and engineering.

Table III: List of journals by total citation

Journal	# of papers	Total Citation
Management Accounting Research	2	652
Journal of Operations Management	1	340
International Journal of Operations and Production Management	2	282
Accounting, Organizations and Society	1	203
Industrial Management and Data Systems	2	128
Journal of Manufacturing Technology Management	1	96
International Journal of Technology Management	1	55
International Journal of Quality and Reliability Management	1	25
Journal of Industrial Engineering and Management	1	21
International Journal of Productivity and Quality Management	1	18
Procedia Manufacturing	1	12
International Journal of Production Economics	1	4
Forest Science	1	3
Dyna (Spain)	1	3
Engineering Economics	2	2
Polish Journal of Management Studies	1	2
Production Planning and Control	2	1
Gestao e Producao	1	0
BMJ Quality and Safety	1	0
Industry Week	1	0
International Journal of Business and Systems Research	1	0
Jurnal Pengurusan	1	0
Procedia Engineering	1	0
Managerial Auditing Journal	1	0
Journal of Corporate Accounting & Finance	1	0
Journal of Engineering and Applied Sciences	1	0
Mediterranean Journal of Social Sciences	1	0
Periodicals of Engineering and Natural Sciences	1	0
Financial Accountability and Management	1	0
Industrial Engineer	1	0
Journal of Education for Business	1	0
International Journal of Production Management and Engineering	1	0
Lect. Notes Eng. Comput. Sci.	1	0
EDPACS	1	0

Although most of the journals analyzed are in nature business management or production/operations related, the issues being studied focused on the inconsistencies that traditional accounting systems provide in terms of product cost information as well as how misleading traditional accounting reports can be, when used to report the benefits of lean manufacturing. More details are going to be discussed later in the “Insight and Critique” section, however, it seems that operations are more interested in solving the limitations from

standard accounting processes when applied to complex manufacturing environments than accountants.

From an article evolution standpoint, the trend of the research papers developed over the years is depicted in Figure II. As noted, since the study from Åhlström and Karlsson (1996), no other study took place until 2004, with another gap of publications until 2007. After this period, it kept stable from 2010 until 2013 when it reached 4 publications. It is interesting to observe that after 2013 (8 years after the first Lean Accounting Summit), the number of papers has significantly increased. More recent publications reinforce this trend given the 21 papers published in the last 5 year.

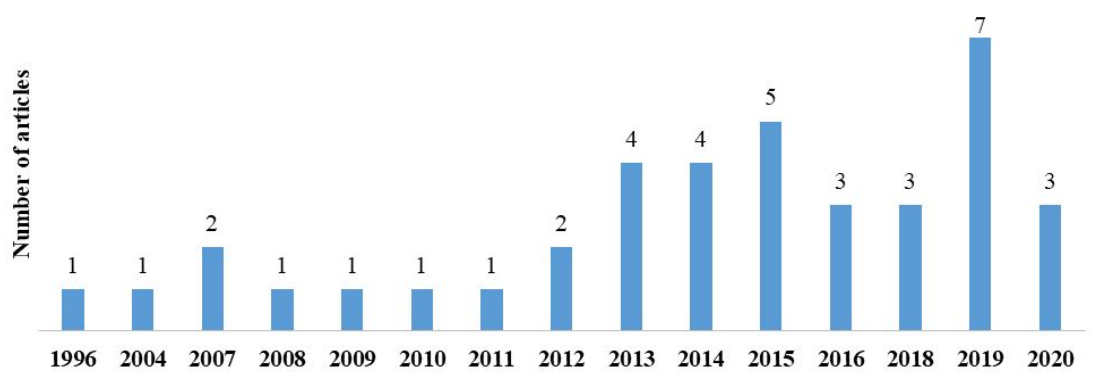


Figure II: Distribution of papers over the timeframe between 1996-2020.

### 2.5 Define the analytical framework

The fifth step defines the analytical framework as per table IV. To develop the framework, it was adopted the criteria as previously used by Guthrie *et al.* (2012) and Dumay and Garanina (2013). The articles were first coded by the lead author, then checked for consistency by the other authors to determine the suitability of the adopted framework and to check if any other criteria or attributes needed to be changed. Also, the analytical framework developed was continuously updated as the authors progressed with the review process and the changes, additions and deletions were outlined at the beginning of the corresponding item in the data analysis section.

Table IV: Results of analysis of LA articles.

Code	Description			
A	Jurisdiction		B	Organisational focus
A1	Supra-national/International/Comparative - General	10	B1	Publicly listed
A1.1	Supra-national/International/Comparative - Industry	0	B2	Private - SMEs
A1.2	Supra-national/International/Comparative - Organizational	2	B3	Private - Others
A2	National - General	0	B4	Public sector
A2.1	National - Industry	2	B5	Not-for-profit
A2.2	National - Organisational	11	B6	General/Other
A3	One Organisation	14		Total
	Total	39		39

Code	Description			
C	Country of research		D	Accounting focus
C1	USA/Canada	12	D1	Cost accounting methodology 16
C2	Australasia	4	D2	Management accounting systems & Control practices 18
C3	United Kingdom	4	D3	Performance measurement 3
C4	European Union	17	D4	Closing & Reporting 0
C5	Africa	0	D5	Other (including general) 2
C6	Latin America/Other	2		Total 39
	Total	39		
E	Research methods		F	Framework and models
E1	Case/Field study/interviews	20	F1	None proposed 14
E2	Content analysis/Historical analysis	1	F2	Applies or consider previous 15
E3	Survey/Questionnaire/Other empirical	10	F3	Proposes a new 10
E4	Commentary/Normative/Policy	5		Total 39
E5	Quantitative/Combined approach	2		
E6	Literature review	1		
	Total	39		

## 2.6 Developing reliability

SLR utilizes coding to examine articles to search for a unit of analysis in the analytical framework (Massaro *et al.*, 2016). According to Thomé *et al.* (2016), inter-codes reliability checks should be conducted before deciding to include or excluding any study during the entire data entry and analysis process, so it can be measured how well coders agree about the concepts, classification and outcomes of the studies.

To this end, the lead author independently read the top five articles as per the CPY list and recorded the codes on a separated spreadsheet, while the second author also repeated this process separately. This process allowed the authors to use a statistical measure to test coding reliability. As recommended by Massaro *et al.* (2016), it was also used Krippendorff's alpha inter-coder reliability test (Hayes and Krippendorff, 2007; Krippendorff, 2013).

In the first round, it was found a K-alpha score of 0.28 which is under the recommended score of 0.80 (Krippendorff, 2013). Further discussion between the authors identified the major sources of discrepancy on Jurisdiction and Frameworks and Models. Further discussion was held to reviewing and clarifying the issues, after that, a second round was performed and a new score of 0,7820 was retrieved, which according to Krippendorff (2013) is considered for drawing tentative conclusions. No additional reliability checking was performed, as the authors did not deem it necessary given the new K-alpha score and the discussions between the authors to fine tune the coding.

## 2.7 Testing literature review validity

In general, researchers must overcome the temptation to jump to a conclusion just because there is some evidence that led in an interesting direction. Therefore, it is vital to have varying controls in place to help researchers reduce the risk of bias when developing the analytical framework and coding, so the outcome generated is accurate (Silverman, 2013; Massaro *et al.*,

2016). Therefore, within this study, internal and external validity tests were performed. Per White and McBurney (2012), external validity is concerned whether the results of a study can be generalized, to that end, the authors executed several queries to check whether the selected articles were representative of the available literature.

As described in section 3.3, since the initial keyword search had no limitations and was run using three different databases, our starting point of analysis was the total population of articles concerning “lean accounting” or “management accounting practices” for lean enterprises.

Internal validity seeks to establish casual relationships (White and McBurney, 2012) and one form of checking internal validity is to run time-series analysis Yin (2014), both comparing the numbers of articles and their citation impact to analyze the development of the literature (see section 3.3). The authors also started with a reduced list of articles that were used as a pilot to test a preliminary classification and then used the expended framework to analyze all the articles.

## 2.8 Article coding

Once finalized the analytical framework’s reliability checks, the next step consisted of developing the coding framework. According to Stanley (2001, p. 135), “after reducing the sample of studies to those that contain some relevant empirical estimate, test or finding, the next step is to identify important characteristics of the studies and code them”. The top 5 articles listed in the CPY (table II), were first coded manually by the lead author in an Excel spreadsheet as a pilot test, then checked for consistency with the research team members to solve discrepancies and discuss the results found.

To keep coding consistency, the same process was repeated to code the remaining articles selected for this study and the results are depicted as per table IV. The coding rules and examples applied to each category are provided in their respective sections. Additionally, as an open code approach was adopted, categories were constantly reviewed and adjusted, in case any relevant new attribute or category was discovered, this characteristic just reinforces how the SLR process is flexible and developed interactively.

## 3. Insights and critique

In this section, it was used descriptive statistics and content analysis to answer the first two research questions of this study:

- RQ1. How is research for inquiring into lean accounting developing?
- RQ2. What is the focus and critique of the lean accounting literature?

However, rather than describe the entire SLR framework, the authors addressed each criterion by describing the reason it was chosen followed by the analysis and insights and the critique developed from our results.

### 3.1 Jurisdiction

It was adopted the Jurisdiction (A) criterion from Dumay *et al.* (2016), which is determined by the dominant focus of the study. Papers that may be generalized to an international setting, such as articles on methodology, theoretical papers and broad literature reviews, were classified as A1 (26%) Ruiz-de-Arbulo-Lopez *et al.*, 2013; Hadid and Afshin Mansouri, 2014). Since some articles have different perspectives regarding their location, it was kept the same



subclassification of attributes used by the authors such as Industry or Organizational, either from a Supra-National or National perspective, that is: A1.2 (5%), including papers that used evidence from one or more organizations from multiple industries or countries (e.g., Al-Omiri and Drury, 2007; Schonberger, 2020); A2.1 (5%), including papers belonging to a specific industry from one single country (e.g., Andersch *et al.*, 2013; Collatto *et al.*, 2016) and A2.2 (28%), which was used to classify studies from organizations belonging to one country (e.g., Fullerton *et al.*, 2014; Agbejule and Burrowes, 2007).

The remaining studies (36%) were classified as “One Organization” (A3) (e.g., Kennedy and Widener, 2008; Åhlström and Karlsson, 1996; Chiarini, 2012), which highlight a bottom-up approach of research, since those studies avoid generalizing findings across multiple companies. To this point, Fullerton *et al.* (2014) argue that because of the limited number of firms that have actually changed their management accounting practices in support of lean initiatives, collecting data related to LA is particularly difficult.

Thus, the tendency to examine LA from an organizational perspective indicates that only a few practitioners have incorporated its broader scope. Given that those studies either compare different accounting practices or propose theoretical frameworks to facilitate the understanding of accounting practices within lean organizations, it contributes to the claim made by Ruiz-de-Arbulo-Lopez *et al.* (2013), that the lack of prior research regarding the steps to fully implement LA still prevents the adoption of more organizations.

### 3.2 Organizational focus

For the Organizational Focus criterion (B), it was used six different attributes: B1: Publicly listed organizations; B2: Private – SME; B3: Private – Others; B4: Public sector; B5: Not-for-profit and for organizations not falling into any of these categories or that authors kept confidentiality regarding company’s information as B6: General/Other. Apart from General/Other (69%) (e.g., Allawi *et al.*, 2019; Myrelid and Olhager, 2019), the most common type of organization researched was Private – Others (8%) with 3 articles (Åhlström and Karlsson, 1996; Kennedy and Widener, 2008; Mate *et al.*, 2020), followed by Private – SMEs (13%) (e.g., Chiarini, 2012), Publicly listed (5%) (e.g., Schonberger, 2020), Not-for-profit (3%) (e.g., Fortsch and Liao, 2019) and Public Sector (2%) (e.g., Holmgren Caicedo *et al.*, 2018), with one paper each.

Unsurprisingly, since most of the companies provided some sort of internal product cost information, most of the studies kept the company’s name unrevealed in order to protect its information, however, it is worth mentioning that the study from Schonberger (2020) comparing SG&A expenditures and inventory levels for 113 different companies (between manufactures and retailers/distributors) that are publicly-traded, brought some interesting perspective, since naming make the findings readily available and enhances credibility by means of fact checking and replication.

Comparing accounting information data publicly available was not a common practice the authors found during this review, we suspect this is because of the format being used for all the publicly listed companies, that must comply with US GAAP or IFRS standards, that rely on traditional accounting reporting format rather than a “Plain English” financial statements as proposed by LA authors (Maskell and Kennedy, 2007).

Apart from that, although most of the studies focused on manufacturing companies, it was interesting to observe few studies focusing on services companies (Azevedo and Sholiha, 2015; Hadid and Afshin Mansouri, 2014; Wnuk-Pel, 2018) and (Mate *et al.*, 2020) in the context of health-care organization, along with the studies from Holmgren Caicedo *et al.* (2018), that

analyzed the impact of management accountant role, after the Swedish Social Insurance Agency (SIA) implemented lean principles and Fortsch and Liao (2019), that investigated how the use of Just-In-Time contributed to decrease operation costs of non-profit community-based blood centers, which demonstrates the progress and applicability of LA practices outside the manufacturing context.

### 3.3 Country of research

This criterion demonstrates the regional focus or the geographical location and was followed the same classification scheme from Dumay *et al.* (2016), except for South Africa region being replaced by the continent Africa. Hence, the country of research was divided into six regions being: C1: USA/Canada; C2: Australasia; C3: United Kingdom; C4: European Union; C5: Africa and C6: Latin America/Other. It is important to highlight that if the regional focus or the geographical location of the research cannot be determined, it was used the first author's country reference.

The most active region was European Union (44%) with 17 articles, followed by the USA/Canada (31%) with 12 articles, United Kingdom (10%) and Australasia (10%) with 4 articles each and Latin America/Other (5%) with 2 papers, complete the full list of locations identified. Surprisingly, despite the first lean Accounting summit was held in the USA in 2005, both USA/Canada has been relatively silent, while in Europe it was noticed more progress regarding the development of LA. It is worth mentioning as well that finding research from emerging countries such as India, Brazil, China and Russia, provides interesting insight since this represents another research opportunity regarding US GAAP and IFRS in terms of how these different approaches adopted by those different locations, affect or not the implementation of LA practices.

### 3.4 Accounting focus

This criterion was adapted from Dumay *et al.* (2016), where the accounting focus was coded based on the title and purpose statement or from the keywords provided. This category aims to identify the focus accounting has for each article regarding the development of accounting practices to support lean manufacturing. The attributes considered are: D1: Cost accounting methodology (41%) (e.g., Al-Omiri and Drury, 2007; Ruiz-de-Arbulo-Lopez *et al.*, 2013); D2: Management accounting systems & Control practices (46%) (e.g., Fullerton *et al.*, 2013, 2014; Kennedy and Widener, 2008); D3: Performance measurement (8%) (e.g., Hadid and Afshin Mansouri, 2014) followed by D5: Other (5%) including general.

The results demonstrate that Cost accounting and Management accounting systems & Control Practices are the most dominant attributes, which was expected, because, as highlighted by Maskell and Kennedy (2007), companies that have chosen lean manufacturing need to substantially change their accounting controls and methods. For instance, Al-Omiri and Drury (2007) found that not only costing systems and contextual factors differ between business units in large companies, but that lean production techniques had a positive influence on the adoption of more advanced accounting techniques, such as Activity-based-costing (ABC).

Although Ruiz-de-Arbulo-Lopez *et al.* (2013) demonstrated that ABC can identify non-value-added activities accurately, it uses more resources and due to that reason, LA and Value-Stream-Costing (VSC) seemed to be more adequate, as they are linked with lean concepts of flow and VSM for instance. Indeed, lean manufacturing directly affects control components

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3 and accounting practices, so it is important for companies to apply specific control choices,  
4 accounting practices and organizational structure to maximize this model and decision-making  
5 process (Kennedy and Widener, 2008).  
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8 Additionally, this discussion emphasizes the holistic view of lean manufacturing, rather  
9 than an isolated activity in operations. One of the first research to provide empirical evidence  
10 of the management accounting practices in lean organizations, Fullerton *et al.* (2013), found  
11 that as the implementation of lean manufacturing intensifies, the companies tend to simplify  
12 its internal accounting reporting systems, by diminishing the use of non-value-added traditional  
13 accounting practices such as inventory tracking and overhead allocation, replacing them by the  
14 use of VSC. The authors also found a positive relationship between the use of LA information,  
15 that motivates behaviors that maximize lean benefits, which led to an increased financial  
16 performance (Fullerton *et al.*, 2014).  
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18  
19 Lastly, despite the benefits seemed to be clear based on prior research, there are no  
20 published articles about Closing & Reporting (D4) and potential challenges to accountants to  
21 close the books and to provide financial statements in both GAAP and LA formats, mainly  
22 from a system perspective, if they are suitable (or not) to support LA demands without  
23 overloading accountants. This is an indicative of a lack of research into how LA methodology  
24 can deal with a huge amount of transactional data generated by large companies.  
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### 26 27 3.5 Research methods

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29 The research methods criterion (E) considered the same attributes from Dumay *et al.*  
30 (2016), and considers the research methods employed within the selected articles focusing on  
31 LA. The first three relate to empirical studies, being: E1: Case/Field study/interviews (51%)  
32 (e.g., Alsmadi *et al.*, 2014; Chiarini, 2012); E3: Survey/Questionnaire/Other empirical (26%)  
33 (e.g., Fullerton *et al.*, 2014; Myrelid and Olhager, 2019), E5: Quantitative/Combined approach  
34 (5%) (e.g., Li *et al.*, 2012), E4: Commentary/Normative/Policy (12%) (e.g., Elsukova, 2015;  
35 DeBusk, 2015), E2: Content analysis/Historical Analysis (3%) (e.g., Alobaidy, 2019) and  
36 finally E6: Literature review (3%) (e.g., Hadid and Afshin Mansouri, 2014), that specifically  
37 focused on the constructs of lean service rather than LA per se.  
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39  
40 Firstly, despite the fact few authors presented some background regarding LA literature, it  
41 was not found a comprehensive literature review as the focus of the research. Furthermore,  
42 most of the studies were concentrated on cases, for example, Ruiz-de-Arbulo-Lopez *et al.*  
43 (2013) demonstrated using a real case study how to apply the Value Stream Costing  
44 methodology in a real manufacturing process, while Åhlström and Karlsson (1996) used direct  
45 observations and interviews in their case to demonstrated that not only accounting systems  
46 would have to be adapted to lean organizations, but also the behavioral aspect when transition  
47 to lean philosophy should be changed.  
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50 The second most used research method, survey, we can highlight the work from Fullerton  
51 *et al.* (2014) that used survey data from 244 US manufacturing companies that participated in  
52 the first Lean Accounting Summit in 2005, to build a structural equation model that analyzed  
53 the influence of lean management accounting practices in the firms' financial and operational  
54 performance. Finally, as highlighted by figure III, empirical research prevails as the most  
55 common research type.  
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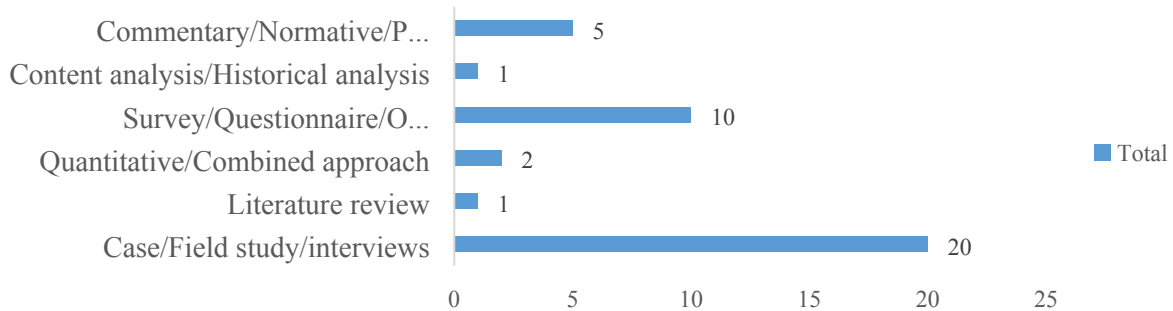


Figure III: Distribution of papers over the timeframe between 1996-2020.

### 3.6 Framework and models

For the criterion Frameworks and Models (F), the articles were coded as following: F1: None Proposed (36%) (e.g., Chiarini, 2012, 2014), F2: Applies or consider previous (38%) Ruiz-de-Arbulo-Lopez *et al.*, 2013) and F3: Proposes a new (26%) (e.g., Alsmadi *et al.*, 2014; Hadid and Afshin Mansouri, 2014). The term “Lean Accounting” appears for the first time in a presentation from Maskell (2000) and it can be defined as the attempt to derive monetary management information based on lean principles (Merwe and Thomson, 2007). Later in 2005, at the Lean Accounting Summit, it was documented the principles, practices and tools of lean accounting, which are considered for the purposes of this research the “standard” framework ad models of LA, since most authors followed this guideline.

Although most authors build up their analysis based on standard guidelines, it was found nine articles that proposed new models such as Kennedy and Widener (2008), who developed a theoretical framework to assist companies in understanding what accounting practices with lean manufacturing should be changed. Similarly, Hadid and Afshin Mansouri (2014), also developed a conceptual framework specifically designed to service firms to assess its financial performance. Another example, Myrelid and Olhager (2019), developed a hybrid manufacturing cost accounting method, where the cost allocation method to be used, should be the one that best matches the characteristics of each respective production unit along the operation process. However, considering the newness of LA, it might be too early for recommending changes or new models, as the first task should be to deal with current LA guidelines.

## 4. The future for LA?

In this section, it was answered the question “What is the future for Lean Accounting research?”, in doing so, two broad topics are addressed. Firstly, we identify and discuss the role of management account personnel in lean organizations and then we present the issues and our vision of how management account systems should evolve to support LA. Finally, we present future research questions that can advance the research on LA.

### 4.1 Accountants as business partners

In most of the companies, not only accounting systems but, accountants as well, tend to be the most significant barrier to successfully implementing lean (Fiume, 2002). According to Carnes and Hedin (2005), there are two main reasons behind this issue: 1) the slow response of accountants to lean production techniques, where the authors highlighted nine different aspects (i.e. lack of training about production processes, departmental silos, fear of downsizing,

etc.) and 2) the lag in management education, with another eleven different aspects (i.e. faculty training, silos with universities, lack of theory and complexity of methodology, etc.), that the authors suggest, if not addressed, may turn management accounting function irrelevant in terms of serving business organizations. In other words, the management accounting profession must accelerate its transformation to increase its relevance to management (Merwe and Thomson, 2007).

To bridge this gap, Kroll (2004) reinforces that not only the operations top management, but finance leaders as well, should be willing to support the required changes to adopt LA principles. It also requires a mindset shift, so that accountants can see themselves as coaches, rather than enforcers, providing more strategic analysis than transaction analysis (Fullerton *et al.*, 2014). Similarly, Rao and Bargerstock (2013) encourage accountants to engage with operations specialists to learn and implement lean tools and techniques. The results of a strong partnership between accountants and operations can benefit the manufacturing processes, which tends to increase the likelihood of superior financial results.

In their book, “Real Numbers: Management accounting in a Lean Organization”, Cunningham and Fiume (2017) propose a new perspective regarding the role of accountants in lean organizations, from “bean counters” to valuable business partners, that can provide financial input to support Kaizen activities and operations decision-making. Figure IV below represents the vision of the authors. When accountants reach this stage and take the lead of a company’s lean transition by simplifying the accounting processes, they become more involved strategic business partners and participants in continuous improvement activities (Fullerton *et al.*, 2014).

In sum, accountants and operations must overcome functional silos as the lean transformation begins and integrating accountants into operations and having them participate in lean training and Kaizen to eliminate the accounting silo (Grasso, 2005).

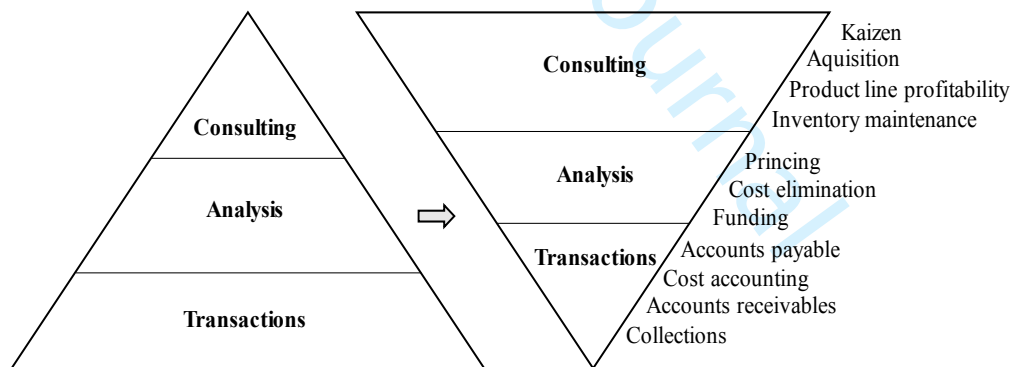


Figure IV: Accounting and finance transformation (Cunningham and Fiume, 2017, p. 23).

#### 4.2 The role of the management accounting systems

The traditional management accounting systems are not able to provide relevant information to support operations managers in the decision-making process, that will lead to actions to reduce cost and improve operational process effectiveness in the long term (Johnson and Kaplan, 1987; Maskell and Kennedy, 2007; Kennedy and Widener, 2008). Although management accounting systems play an important role in the adoption process of complex manufacturing strategies (such as lean manufacturing), in most cases, they serve as an



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impediment to the necessary changes, due to its inability to accurately portray the results of the changes happening in the operations side (Ahlstrom and Karlsson, 1996).

Given those limitations, Carnes and Hedin (2005) and Drickhamer (2004) claim that companies that embrace the lean journey will need to change the way they control, measure and account for its processes. As discussed in the prior topic, despite the fact accountants can hold the impetus for adhering to lean, some accountants do recognize that the traditional model does not fulfil the needs of lean companies and propose new techniques to better suit its principles, where the financial results are reported in a simplified and understandable fashion (Kroll, 2004; Fiume, 2002).

However, to apply the required changes, it is needed to understand how management accounting fits in the broader organizational vision. As demonstrated in figure 4, it is important to link management accounting and lean, since the organizational strategy (in this case Lean Manufacturing), actions and measures influence each other, creating a self-reinforcing cycle where the appropriate measures inform and lead to successful actions, that will turn into desirable results. Thus, the synergy between these three elements reinforces an evolving strategy, such as lean manufacturing, being measurement, management accounting's domain, a positive force enabling lean (Grasso, 2006).

According to Silvi *et al.* (2012), although LA is the solution to address the issues created by management accounting systems, the authors see those practices as deficient, as it does not support the analysis of the expected results of lean projects, which are vital in obtaining top management support. Similarly, DeBusk (2015) reinforces the need for top management support, where they need to rethink the goals and objectives and define new performance measures that will motivate lean behaviors. A very important aspect of this approach is the use of the information generated by the accounting systems, lean companies should not allow accounting data to drive the behavior at the operations, since the very essence of control for lean organizations, relies on the use and design of strong processes as well as the use of operational, rather than financial data.

In addition, since most of the accounting systems are embedded with Enterprise Resource Planning (ERP) systems, as outlined by Kennedy and Brewer (2005), some processes might need to be reviewed, since most of ERP systems were designed to control units rather than the "flow" and also have activities that do not add value to the customers. But before changing the system, Drickhamer (2004) and Kroll (2004) advocate that companies must replace the existing departmental organizational structure to a Value Stream structure, as LA tends to simplify the accounting systems when companies are structured based on Value Stream (Myrelid and Olhager, 2015).

Both operations and accountants can benefit from this simplification, as indicated by Rao and Bargerstock (2013), it is easier to keep on track of the operational and financial progress being made as well as it helps to promote the lean culture throughout the company.

This new output generated by lean oriented accounting systems, should guide companies to measure and understand the value created to the customers, so that it can be used not only to improve their relationship, but during product development, pricing and to motivate continuous improvement initiatives (Maskell and Baggaley, 2006). Another important aspect is regarding the timing, since one of the main critiques from operations is that accounting reports are often disclosure too late, so when using Value Stream Costing (VSC), it is possible to use real time reports displayed in "box scores" (Brosnahan, 2008).

Lastly, there is still an issue from an external reporting perspective. Currently, it has not been created a methodology to define the format and content of what "Lean Financial



Statement Reports” should look like, so that it can be incorporate by the International Financial Reporting Standard (IFRS). To overcome this barrier, LA proponents advocate that those lean reports are fully compliant with the standard rules and they require less effort to be generated (Maskell and Katko, 2012). Additionally, Luo and Brozovsky (2013) suggest that it should be presented along with the traditional external reports and with that, LA external reports would be naturally incorporated by the companies.

#### 4.3 Current research gaps and paths for further research

In the “insights and critique” section, it was presented the results of the analytical framework used to identify common themes emerging from the literature, as well as opportunities for further research in the future. It can be seen by analyzing table V a high number of articles concentrated in few criteria, which indicates that some research streams are dominant while others did not receive much attention from the researchers. Although some issues related to this have already been discussed in sections 4, 5.1, and 5.2, this section presents a consolidated view of the research gaps and research questions deemed to be crucial for the future development of LA.

According to Rowe (2014), the definition and formulation of the research question(s) are crucial because it defines the search and can reduce the risks of confusing results. Moreover, according to Garza-Reyes (2015), the formulation of clear and specific research questions from the analysis of a literature review, can be considered an adequate strategy to highlight potential paths for future research for a specific theme, in this case, LA. Table V demonstrates the research gaps found during this review and potential questions to guide future research paths regarding the two major themes identified during this review.

Table V: Summary of literature gaps identified and research questions to guide further research.

Research stream	Research gaps	Proposed research questions
Accountants as business partners	Lack of understanding of production processes	<ol style="list-style-type: none"> <li>1. Do accountants have the required understanding of production processes of their organizations?</li> <li>2. Do lean organizations encourage accountants to expand their understanding of business processes more than what is traditionally expected?</li> <li>3. Do management accounting researchers respond to the changes in manufacturing methodologies (such as Lean Manufacturing) in the same pace as operations researchers?</li> <li>4. Can accountants more easily comprehend business processes for certain industry types than others?</li> </ol>
	Existence of departmental silos	<ol style="list-style-type: none"> <li>1. Can the physical distance between accountants and operations (i.e: outside country shared services) influence the level of integration between them?</li> <li>2. Do accountants perceive Lean Manufacturing as a broader business strategy that affect not only operations, but all business streams (including accounting)?</li> </ol>

Research stream	Research gaps	Proposed research questions
	The lag in accounting education	<ol style="list-style-type: none"> <li>1. Do accounting schools devote the appropriate amount of time to develop knowledge regarding business and manufacturing processes?</li> <li>2. Do accountants have appropriate practical experience (i.e., faculty internship) in production facilities during college?</li> </ol>
	Support on management control and continuous improvement	<ol style="list-style-type: none"> <li>1. Are the MAS <b>well-equipped</b> to monitor work cells/processes and value stream performance?</li> <li>2. Can the outputs generated by the MAS support accountants to identify wastes from the value stream?</li> <li>3. Can the MAS provide real time data to guide operations and to compare actual results with targets?</li> </ol>
	Complex cost management processes	<ol style="list-style-type: none"> <li>1. What are the required changes to the existing MAS to support Value Stream Costing (VSC) methodology?</li> <li>2. What are the practical implications for lean organizations if they continue to use traditional cost accounting processes to value the cost of their products?</li> </ol>
Management accounting systems (MAS)	Complexity to <b>interpret</b> financial reports	<ol style="list-style-type: none"> <li>1. What are the required changes to existing MAS to automatically generate Value Stream Income Statements?</li> <li>2. Is the proposed format of Value Stream Income Statement really the most suitable for non-accounting personnel?</li> <li>3. Can a "lean oriented" MAS support accountants to clearly identify what are the main operational drivers that directly impact the company's profit?</li> <li>4. How can the companies clearly link the "sources and uses" of cash to one or multiple value streams?</li> </ol>
	Long and non-value-added financial planning cycles	<ol style="list-style-type: none"> <li>1. Are the existing types of Sales, Operations and Financial Planning, or budgets, the most suitable to lean organizations?</li> <li>2. What are the most relevant variables to create a "Lean Budget"?</li> </ol>
	Fully <b>integration</b> with the GAAP	<ol style="list-style-type: none"> <li>1. What is the current level of integration between Lean Accounting and the GAAP?</li> </ol>

In relation to the research stream "accountant as business partners", there are two main research gaps that emerged from this review that deserve attention from the researchers. The first one is regarding whether the companies really encourage and provide the means for the accountants to expand their roles and become business partners. Currently, our findings indicate that no research about the role of accountants in lean organizations has been carried out. In addition, it would be interesting to investigate lean companies organized in the traditional departmental organizational structure.

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4 Can this structure somehow inhibit accountants to broaden their scope and further learn and  
5 adopt lean principles? Secondly, are the methods to teach accounting at schools the most  
6 effective to prepare accountants for management accounting roles? According to Carnes and  
7 Hedin (2005), not much time to learn management accounting is devoted during school, also  
8 faculty internships are infrequent and often not rewarded by universities.

9  
10 The second major research gap is regarding the “management accounting systems”. The  
11 review indicates that most of the studies focused only on one organization using a case study  
12 approach, however, considering that lean Accounting is still under development, what is the  
13 long-term effect for the companies that implemented LA? Furthermore, although several  
14 studies clearly associate different management accounting elements (i.e., cost accounting,  
15 financial statements, key-performance-indicators, etc.), it was not found a more technical  
16 reference to guide the actual implementation and practice of LA. Based on that, what are the  
17 main causes that still prevent companies to fully adopt LA? To begin with, the first question to  
18 be answered should be, do lean organizations know about the existence of LA? If so, how many  
19 of those have fully implemented LA? For those that did not implement LA, why did they decide  
20 to continue with traditional management accounting systems and techniques?  
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## 24 **5. Conclusions, limitation and future research**

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26 The first goal of this paper was to answer the question “How is research for inquiring into  
27 lean accounting developing?”. It was achieved by identifying and reviewing the most  
28 influential papers and authors and what issues and conclusions they found regarding LA. More  
29 importantly, we identified how some concepts defined in the first Lean Accounting Summit  
30 were implemented over the years by practitioners and utilized by lean organizations, as well as  
31 how accountants function evolved during this period.  
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33  
34 Based on the above findings, the authors also propose an incremented definition of LA,  
35 which can be defined as the full integration between lean manufacturing practices and  
36 management accounting, so that operational inputs can be easily and timely converted into  
37 accounting information that is understandable and actionable to the entire organization (not  
38 only accountants), used to motivate behaviors to promote lean culture and drive actions to  
39 eliminate wastes from the value stream and create value to the customers.  
40

41 It was also addressed the question “What is the focus and critique of the lean accounting  
42 literature?” utilizing a meta-analysis of the articles focusing on LA, this study demonstrated  
43 that there was an increase in publications during the last decade, with a focus on European  
44 countries, specifically focusing on case studies that analyzed the effect of LA in management  
45 accounting systems and control practices and cost accounting methodology with an empirical  
46 nature of research. Further, we discussed some ways forward to answer the final question,  
47 “What is the future for lean accounting research?”  
48

49 Firstly, we identified that most of the papers had a bottom-up research approach since most  
50 of the studies focused on one organization only, which avoids generalization of findings across  
51 multiple companies. Although case studies can provide interesting insights, just observing the  
52 practice may not instigate other companies and researchers to motivate fundamental changes  
53 in this field.  
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55 In addition, **there is** still some debate whether VSC from LA is the most suitable option,  
56 since some studies compared this model with ABC, TDABC, and traditional cost accounting  
57 and it was not unanimous that VSC is the best option in all cases, especially for SME  
58 companies, given the IT costs to enhance the systems. However, **within the studies used for**  
59 **this review,** most of the authors found a positive relationship between the use of lean  
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3 management accounting practices and business financial results, as well as that control  
4 practices and management accounting can indirectly or directly affect each other in the pursuit  
5 of lean manufacturing behaviors.  
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7 Secondly, another critique is that accounting researchers have long been accused of doing  
8 research that contributes little if anything to accounting practice, and this is a challenge for  
9 accounting in general (Evans *et al.*, 2011), and research into LA is no different. More recently,  
10 Fraser and Sheehy (2020) empirically found that the research gap is wider in accounting than  
11 other academic disciplines such as engineering and medicine, and that the accounting research  
12 provides very little real-world relevance, practical usefulness and social impact. From a  
13 practitioners' perspective, academic research agenda has an impact on the future development  
14 and improvement of their profession, however, if this disconnect from real-world is not  
15 addressed, academic business researchers and business schools will become increasingly  
16 vulnerable to adverse research funding decisions in the future (Fraser *et al.*, 2020).  
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19 Furthermore, the analysis demonstrated too much focus on cost accounting methods and  
20 limitation of traditional accounting systems, but the role of accountants and the use of LA for  
21 internal and external reporting purposes have been omitted. Additionally, the authors found  
22 that there were significant advances in the role of management accounting for lean  
23 organizations and the benefits that arise from the synergy between operations and accountants,  
24 that can benefit both academics and practitioners.  
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26 Also, this study aims at providing a general overview of LA to stimulate accountants to  
27 revisit their role at manufacturing companies, so they can develop a deeper and richer  
28 understanding of how management accounting information can be used to maximize the  
29 benefits of lean manufacturing. Besides, with the proposed future research agenda, we hope to  
30 stimulate scientific research, which will lead to a better understanding of the impact on  
31 organizational performance when management accounting is used to support operations.  
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34 Finally, the findings are limited to the data analyzed and our interpretation of the results,  
35 although SLR offers more reliability than a traditional literature review, different researchers  
36 employing the same method may interpret the results differently. It is also worth mentioning  
37 that the results could vary by using a different combination of keywords as well as if authors  
38 include additional literature sources (i.e., monographs, books, book chapters, conference  
39 papers, etc.).  
40

41 In terms of future research, the authors suggest conducting a new SLR, expanding the list  
42 of studies, including conference papers, books and book chapters, to confirm there were no  
43 missing relevant studies in "grey-literature". Also, we suggest that future researchers should  
44 investigate the role and how LA has affected their jobs in companies who had successfully  
45 implemented LA and lean manufacturing. We hope that future researchers, academics and  
46 practitioners will use this study findings to develop their understanding about LA and to utilize  
47 this review as a starting point to define their research agenda in this area.  
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3 **Acknowledgments**  
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6 **Disclosure statement**  
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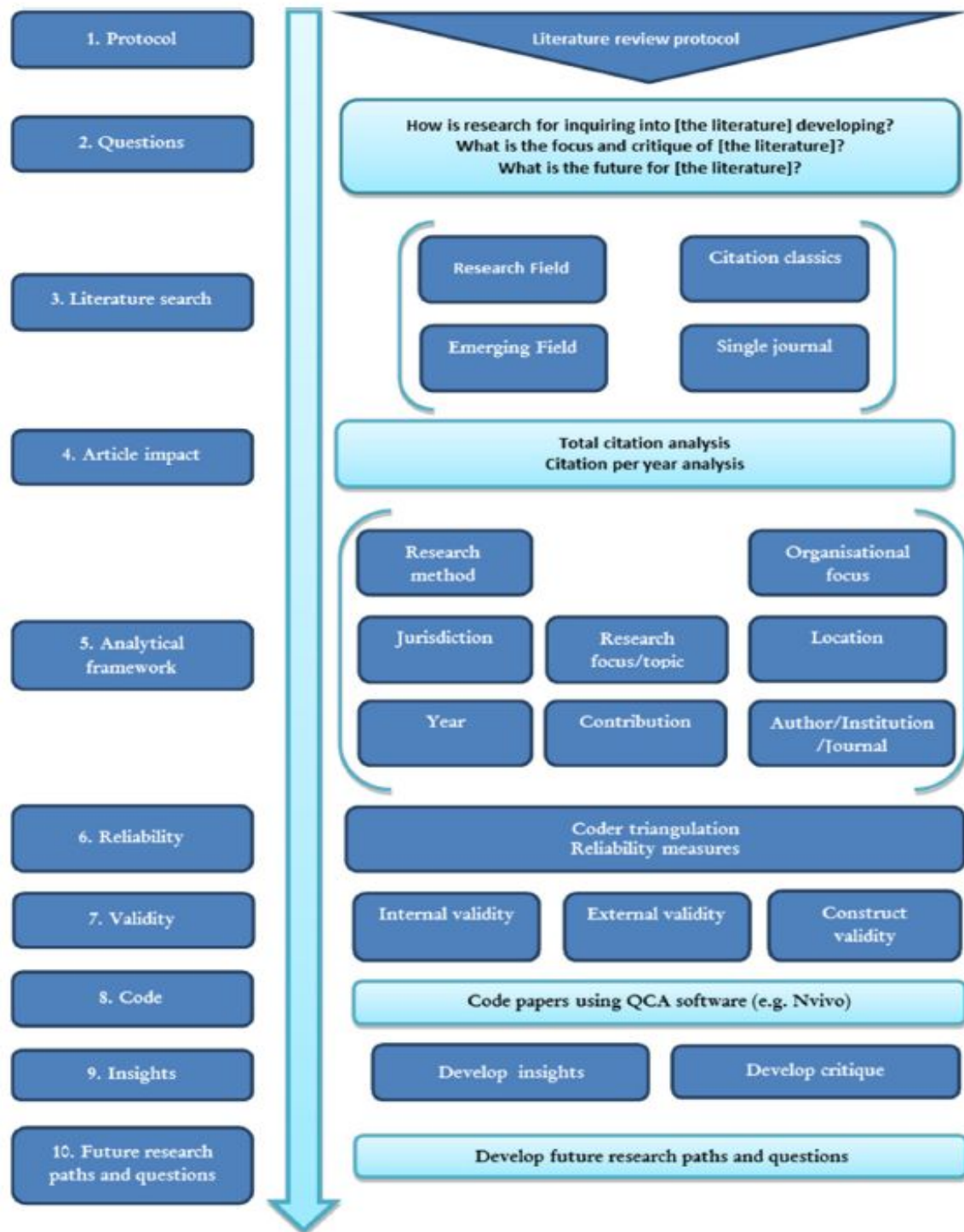
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Figure 1: The process to develop a structured literature review (adapted from Massaro *et al.*, 2016).



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Figure II: Distribution of papers over the timeframe between 1996-2020.

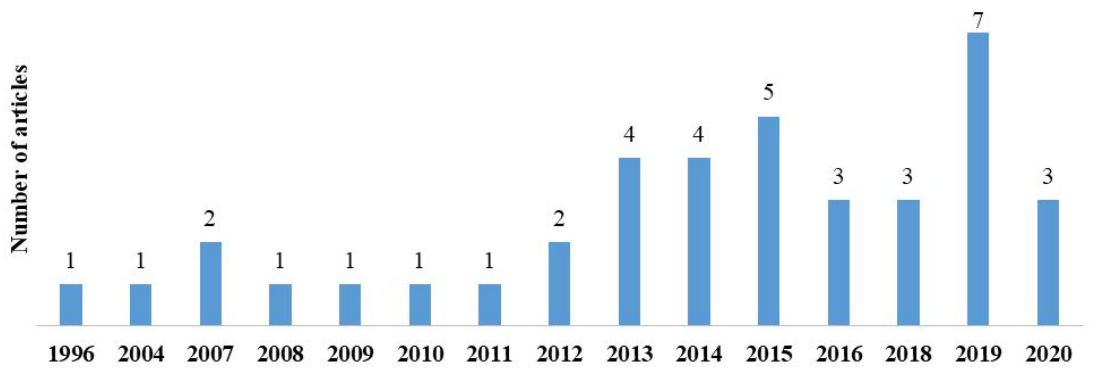


Figure III: Distribution of papers over the timeframe between 1996-2020.

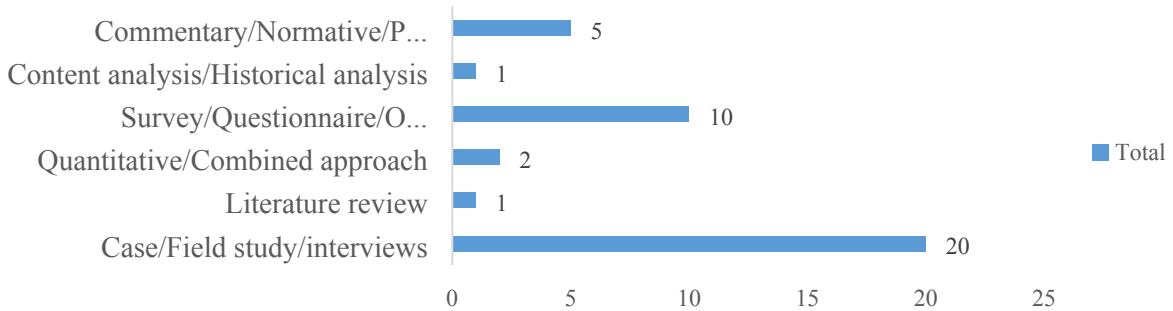


Figure IV: Accounting and finance transformation (Cunningham and Fiume, 2017, p. 23).

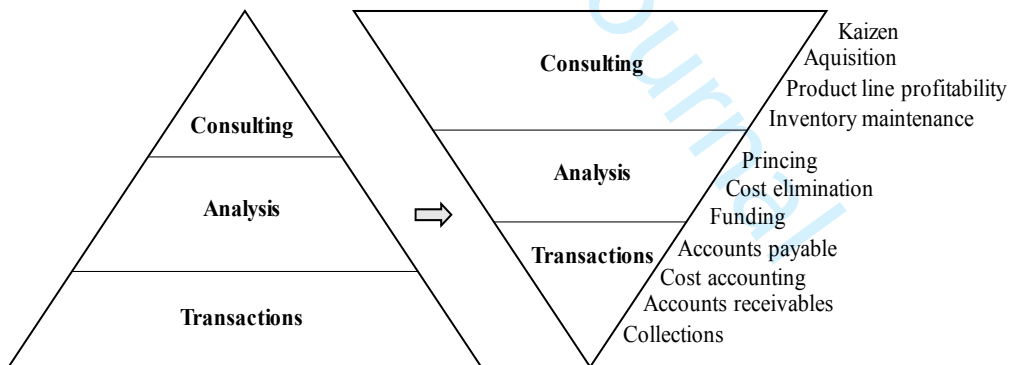


Table I: The search of relevant articles

	Scopus	Database		Total
		ISI WoS	Engineering Village	
Keyword search of the title, abstract and keywords	93	42	25	160
Number of duplicates				-54
Number of books & book chapters				-32
Articles concerning other fields of accounting				-35
Relevant papers				39

Table II: Top ten articles by total citations and citation per year

Authors	Title	Year	Journal	Total Citation	Rank as CPY	CPY score
Al-Omiri, M. Drury, C.	A survey of factors influencing the choice of product costing systems in UK organizations	2007	Management Accounting Research	394	2	30.31
Fullerton, R. R. <i>et al.</i>	Lean manufacturing and firm performance: The incremental contribution of lean management accounting practices	2014	Journal of Operations Management	340	1	56.67
Kennedy, F. A. Widener, S. K.	A control framework: Insights from evidence on lean accounting	2008	Management Accounting Research	258	4	21.5
Fullerton, R. R. <i>et al.</i>	Management accounting and control practices in a lean manufacturing environment	2013	Accounting, Organizations and Society	203	3	29
Åhlström, P. Karlsson, C.	Change processes towards lean production: The role of the management accounting system	1996	International Journal of Operations and Production Management	181	8	7.54
Ruiz-de-Arbulo-Lopez, P. <i>et al.</i>	Lean manufacturing: Costing the value stream	2013	Industrial Management and Data Systems	110	6	15.71

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5	Hadid, W.	The lean-performance		International			
6	Afshin Mansouri,	relationship in services:	2014	Journal of	101	5	16.83
7	S.	A theoretical model		Operations			
8				and			
9				Production			
10				Management			
11		Lean production:		Journal of			
12	Chiarini, A.	Mistakes and	2012	Manufacturing	96	7	12
13		limitations of		Technology			
14		accounting systems		Management			
15		inside the SME sector					
16							
17		A comparative analysis		International			
18		of management		Journal of			
19	Li, X. <i>et al.</i>	accounting systems'	2012	Technology	55	9	6.88
20		impact on lean		Management			
21		implementation					
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23		implementing an		International			
24		integrated ABC and		Journal of			
25		TOC approach to	2014	Quality and	25	10	4.17
26	Alsmadi, M. <i>et al.</i>	enhance decision		Reliability			
27		making in a lean		Management			
28		context a case study					
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Table III: List of journals by total citation

Journal	# of papers	Total Citation
Management Accounting Research	2	652
Journal of Operations Management	1	340
International Journal of Operations and Production Management	2	282
Accounting, Organizations and Society	1	203
Industrial Management and Data Systems	2	128
Journal of Manufacturing Technology Management	1	96
International Journal of Technology Management	1	55
International Journal of Quality and Reliability Management	1	25
Journal of Industrial Engineering and Management	1	21
International Journal of Productivity and Quality Management	1	18
Procedia Manufacturing	1	12
International Journal of Production Economics	1	4
Forest Science	1	3
Dyna (Spain)	1	3
Engineering Economics	2	2
Polish Journal of Management Studies	1	2
Production Planning and Control	2	1
Gestao e Producao	1	0
BMJ Quality and Safety	1	0
Industry Week	1	0
International Journal of Business and Systems Research	1	0
Jurnal Pengurusan	1	0
Procedia Engineering	1	0
Managerial Auditing Journal	1	0
Journal of Corporate Accounting & Finance	1	0
Journal of Engineering and Applied Sciences	1	0
Mediterranean Journal of Social Sciences	1	0
Periodicals of Engineering and Natural Sciences	1	0
Financial Accountability and Management	1	0
Industrial Engineer	1	0
Journal of Education for Business	1	0
International Journal of Production Management and Engineering	1	0
Lect. Notes Eng. Comput. Sci.	1	0
EDPACS	1	0

Table IV: Results of analysis of LA articles.

Code	Description			
A	Jurisdiction		B	Organisational focus
A1	Supra-national/International/Comparative - General	10	B1	Publicly listed 2
A1.1	Supra-national/International/Comparative - Industry	0	B2	Private - SMEs 5
A1.2	Supra-national/International/Comparative - Organizational	2	B3	Private - Others 3
A2	National - General	0	B4	Public sector 1
A2.1	National - Industry	2	B5	Not-for-profit 1
A2.2	National - Organisational	11	B6	General/Other 27
A3	One Organisation	14		Total 39
	Total	39		
C	Country of research		D	Accounting focus
C1	USA/Canada	12	D1	Cost accounting methodology 16
C2	Australasia	4	D2	Management accounting systems & Control practices 18
C3	United Kingdom	4	D3	Performance measurement 3
C4	European Union	17	D4	Closing & Reporting 0
C5	Africa	0	D5	Other (including general) 2
C6	Latin America/Other	2		Total 39
	Total	39		
E	Research methods		F	Framework and models
E1	Case/Field study/interviews	20	F1	None proposed 14
E2	Content analysis/Historical analysis	1	F2	Applies or consider previous 15
E3	Survey/Questionnaire/Other empirical	10	F3	Proposes a new 10
E4	Commentary/Normative/Policy	5		Total 39
E5	Quantitative/Combined approach	2		
E6	Literature review	1		
	Total	39		



Table V: Summary of literature gaps identified and research questions to guide further research.

Research stream	Research gaps	Proposed research questions
Accountants as business partners	Lack of understanding of production processes	1. Do accountants have the required understanding of production processes of their organizations?
		2. Do lean organizations encourage accountants to expand their understanding of business processes more than what is traditionally expected?
		3. Do management accounting researchers respond to the changes in manufacturing methodologies (such as Lean Manufacturing) in the same pace as operations researchers?
		4. Can accountants more easily comprehend business processes for certain industry types than others?
Accountants as business partners	Existence of departmental silos	1. Can the physical distance between accountants and operations (i.e. outside country shared services) influence the level of integration between them?
	The lag in accounting education	2. Do accountants perceive Lean Manufacturing as a broader business strategy that affect not only operations, but all business streams (including accounting)?
Management accounting systems (MAS)	Support on management control and continuous improvement	1. Do accounting schools devote the appropriate amount of time to develop knowledge regarding business and manufacturing processes?
		2. Do accountants have appropriate practical experience (i.e., faculty internship) in production facilities during college?
		1. Are the MAS well-equipped to monitor work cells/processes and value stream performance?
Management accounting systems (MAS)	Complex cost management processes	2. Can the outputs generated by the MAS support accountants to identify wastes from the value stream?
		3. Can the MAS provide real time data to guide operations and to compare actual results with targets?
Management accounting systems (MAS)	Complexity to interpret financial reports	1. What are the required changes to the existing MAS to support Value Stream Costing (VSC) methodology?
		2. What are the practical implications for lean organizations if they continue to use traditional cost accounting processes to value the cost of their products?
		1. What are the required changes to existing MAS to automatically generate Value Stream Income Statements?
		2. Is the proposed format of Value Stream Income Statement really the most suitable for non-accounting personnel?

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3. Can a "lean oriented" MAS support accountants to clearly identify what are the main operational drivers that directly impact the company's profit?

4. How ca the companies clearly link the "sources and uses" of cash to one or multiple value streams?

Long and non-value-added financial planning cycles

1. Are the existing types of Sales, Operations and Financial Planning, or budgets, the most suitable to lean organizations?

2. What are the most relevant variables to create a "Lean Budget"?

Fully integration with the GAAP

1. What is the current level of integration between Lean Accounting and the GAAP?

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