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Lean Accounting: A Connection to Strategic Partnership & Collaboration Between Management Accountants and Operations Managers

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Abstract

Technological advances, such as automation and artificial intelligence, have transformed the accounting profession. There is a consensus in the academic and practitioner literature that management accountants must move from their traditional role into one that serves as a strategic partner. However, literature that examines how management accountants have moved from this traditional role to one that is more strategic is limited. This study combines concepts from three different literature streams to explore how utilizing lean accounting practices relate to management accountant's participation in strategic decision making, partnership with operations managers, and overall operational performance in manufacturing firms utilizing a lean manufacturing strategy. This study found evidence that utilizing lean accounting (LA) practices on its own related to strategic partnership, collaboration, and operational performance. However, it found varying evidence of how these variables interacted with each other to ultimately impact operational performance. Implications of these findings, limitations, and future directions are discussed.

Keywords: Lean accounting, strategic management accounting, management accounting, organizational integration, lean manufacturing, strategic decision making

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Philippians 4:13, “I can do all this through Him who gives me strength.” (NIV)

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Chapter 1: Introduction

Management accountants (MAs) are key to providing information to managers for decision-making. Management accounting systems provide measurements and controls that monitor organizational performance. Like many other professions, technological advances are transforming the work of MAs. Traditionally, MAs focused on reporting historical financial data for decision analysis and budgetary control (Appelbaum et al., 2017), but today their role is evolving more into a business-oriented and strategic role (Appelbaum, et al., 2017; Brands & Holtzblatt, 2015; Huerta & Jensen, 2017; Rikhardsson & Yigitbasioglu, 2018). Practitioner and academic literature suggest that for management accountants to remain relevant and add value to the organization, they must serve more as business partners and strategic advisors to their cross functional peers (Paul & Cokins, 2020; Pickering, & Byrnes, 2016). To do this, MAs must build close relationships with non-accounting personnel and assume the role of the liaison across "functional boundaries and between levels of management" (Cadez & Guilding, 2000, p.840), all of which would enhance organizational integration.

Although there is a consensus that MAs must serve as a strategic partner, in some companies MAs remain in their functional silo (Cunningham et al., 2011) and are not highly integrated with operations or other functional groups. According to an ongoing study being conducted by the Managerial Costing Taskforce of the Institute of Management Accountants (IMA), more than half of operations and supply chain professionals do not believe that the accounting information that they currently receive is helpful or valuable for their decision-making (Lawson & White, 2018). Practitioner literature and operations academic research often criticize MAs for not updating their

accounting processes to align with changes in manufacturing, specifically changes that implement a lean manufacturing culture or process (Cunningham et al., 2011; Curry & Curry, 2019; 2018; Fullerton, et al., 2014; Jackson, 2019). Lean Accounting (LA) was developed and has been used to provide relevant and useful accounting information to lean manufacturers (Kennedy & Widener, 2008; Maskell, et al., 2011), however the extent of its use is not well-known. LA involves two practice areas. First, it involves applying lean thinking and tools in accounting to improve processes, and second it provides useful information to support management decision making in a lean manufacturing environment.

In this study, we examine the integration of management accountants and operations managers in firms utilizing a lean manufacturing strategy. Based on the organizational integration and management accounting literature, it is likely that MAs participation in strategic decision making and their use of LA could serve as mechanisms for achieving this cross functional integration.

Contingency theory serves as the foundational lens through which this study is conducted to determine any relationships between integration between management accounting and operations, MA participation in strategic decision making, use of lean accounting, and plant performance for large firms who have adopted a lean manufacturing strategy.

Background

Over the last few decades, manufacturers operating in rapidly changing and highly competitive markets have adopted the lean manufacturing (LM) philosophy and its related principles (Fullerton, et al., 2014). These principles include techniques such as

just-in-time inventory management (JIT), total quality management (TQM), and total preventative maintenance (TPM) (Kennedy & Widener, 2008). The goal of LM is to reduce or eliminate waste in the operational process, so that high quality products and services are delivered to customers at the lowest cost (Danese et al., 2018; Fullerton, et al., 2014; Kennedy & Widener, 2008). To reach its full potential, LM must be adopted holistically across the entire organization and not be isolated in operations (Fullerton, et al., 2014). Since LM requires information flow and collaboration for continuous improvements, high levels of organizational integration within firms adopting the LM strategy would be advantageous.

Organizational integration refers to cross-functional cooperation or collaboration within an organization (Droge et al., 2004; Swink & Song, 2007; Turkulainen & Ketokivi, 2012). It is achieved when information is transferred efficiently across functions, functional silos do not exist, and the agendas of each functional group are aligned (Turkulainen & Ketokivi, 2012). Studies show that achieved integration is positively associated with operational and firm performance (Swink & Schoenherr, 2015; Turkulainen & Ketokivi, 2012) and can improve the speed and quality of a firm's reaction to changes in the marketplace (Cadez & Guilding, 2008). This study focused on how MAs contribute to organizational integration, which is likely through their participation in strategic decision-making processes and their utilization of strategic management accounting (SMA) processes such as LA.

As a strategic partner, MAs will likely participate to some degree in a firm's strategic decision-making processes. When participating in strategic decision-making processes, MAs may have a motive or feel more pressured to add value to the process and

utilize different accounting innovations that are more strategic in nature (Cadez & Guilding, 2008). LA is a good example of a SMA process that may enhance MAs contribution to the strategic decision-making process and organizational integration in lean manufacturing firms. According to Cadez and Guilding (2008), a MA's participation in strategic decision making is positively associated with performance.

LA principles and practices were established to provide relevant and useful accounting information to lean manufacturers (Kennedy & Widener, 2008; Maskell et al., 2011). LA involves using accounting processes and reporting that support a lean manufacturing transformation along with eliminating waste from business accounting processes (Kennedy & Brewer, 2005). LA processes positively and significantly impact operational and firm performance (Fullerton et al., 2014) and will likely impact integration between MAs and operational managers.

Problem Statement

In manufacturing firms, MAs work closely with operational and supply chain managers. Ideally, this would be a strategic partnership, but as described earlier, the relationship too often has not evolved as such. MAs could influence behaviors by providing insights and supporting decisions along with stimulating investigation of problems and discovery of new knowledge by generating questions and bringing forth relevant information (Paul & Cokins, 2020). Although there is a consensus in the accounting literature that MAs must act as a strategic partner in organizations, in many lean manufacturers MAs still remain in their functional silo and are on the sidelines instead of being an integral part of the organization (Cunningham et al., 2011) and its strategic decision-making processes. They have not adjusted their accounting practices,

skills and competencies to align with lean operational changes (Cunningham et al., 2011), and do not contribute significantly to the business decisions of operation and supply chain managers (Lawson & White, 2018). This may cause a low or non-existent integration between management accounting and operations and supply chain, which could ultimately impact the performance of the organization.

Significance & Purpose of the Study

The purpose of this study is to investigate mechanisms for achieved integration between management accounting and operations management and increased operational performance in midsized to large manufacturing firms that have adopted a lean manufacturing strategy. Based on the management accounting literature, it is likely that MAs participation in the strategic decision-making process and their use of LA may serve as mechanisms for this integration.

There is limited empirical evidence on the management accounting and operations management working relationship and how it contributes to organizational integration. In addition, much of the literature urging MAs to operate as a strategic partner are conceptual and are not empirically tested and there is not much research on the impacts of MAs involvement in the strategic decision-making process. Although LA has been in existence since the 1990s, there is limited empirical evidence regarding outcomes and performance when LA is applied. Existing academic LA studies have not considered the impact it may have on management accounting and operations management integration, although practitioner literature make claims that LA has impacts on MAs becoming strategic partners (Cunningham et al., 2011).

This study contributes to the research on organizational integration, management accounting, strategic management accounting, and lean accounting. Additionally, the study bridges the gap between accounting and operations literature, answering the call to integrate accounting and operations through research and practice (Curry & Curry, 2018;2019).

Theoretical Foundation

Contingency theory served as the foundational lens through which this study was conducted. Contingency theory suggests that management accounting processes must be adapted to firm specific factors such as the environment, technology, strategy, and firm size (Chenhall, 2003; Gerdin & Greeve, 2004; Otley, 1980; Otley, 2016). This study helps to understand if lean accounting practices and the integration of two functional groups within an organization could together relate and contribute to positive performance in firms that have adopted a lean manufacturing strategy.

Definitions

This study combines concepts from different streams of literature included in organizational theory, operations management, and management accounting research. In many cases, these concepts have been defined in different ways in prior research. Therefore, it is necessary to provide the definitions for how these terms are used in this study. Table 1.1 provides these definitions.

Table 1.1

Key Concepts

Term	Definition
Lean Manufacturing	Manufacturing strategy that focuses on customer value and continuous improvement through eliminating waste and reducing inventory levels. Common techniques include: just-in-time inventory management (JIT), total quality management (TQM), and total preventative maintenance (TPM). (Kennedy & Widener, 2008)
Achieved Integration	Capability of functional sub-units within an organization to "transfer, process, interpret, and exploit information efficiently" (Turkulainen & Ketokivi, 2012, p.450).
Strategic Management Accounting (SMA)	Management accounting processes with a strategic, external, and forward-looking orientation with both financial and non-financial measures and management accounting's involvement with strategic decision making (Cadez & Guilding, 2000; Guilding, Cravens, & Tayles, 2000)

Participation in Strategic Decision Making	Middle accounting management's active role in identifying problems and objectives, generating and evaluating options, and taking necessary steps to put change into place as it relates to the strategic management (Cadez & Guilding, 2000; Wooldrige & Floyd, 1990)
Lean Accounting (LA)	Collection of management accounting practices that involve practicing lean thinking and using lean tools to improve accounting processes along with providing useful and timely information to support the lean manufacturing transformation (Katko, 2020; BMA, 2020; Kennedy & Widener, 2008; Maskell & Baggaley, 2006)

Chapter 2: Literature Review

Introduction

The literature presented in Chapter 2 explores the achieved integration between management accounting and operations management by linking concepts from three specific streams of literature – organizational theory, strategic management accounting, and lean accounting. Chapter 2 begins with a discussion of the theoretical lens which informed this study followed by a background on lean manufacturing strategy and its connection to organizational integration. A review of the management accounting and strategic management accounting literature follows, indicating the potential role that MAs have in internal organizational integration. The review concludes with information on lean accounting as a potential mechanism for achieving integration between management accounting and operations in firms utilizing a lean manufacturing strategy.

Theoretical Foundation

Contingency theory is a widely accepted theory used in organizational theory research. Today, it is the most widely accepted and predominate theory used in management accounting research (Gerdin & Greve, 2004). Woodward (1965) was the early pioneer of contingency theory, but the most well-known work is that of Lawrence and Lorsch (1967). The theory was later extended by Galbraith (1977), while Otley (1980; 2016) introduced the theory to the management accounting field.

Contingency theory suggests that there is no best design for an organization and that its designs and systems are contingent upon factors such as the environment, technology, strategy, and firm size (Chenhall, 2003; Gerdin & Greeve, 2004; Otley, 1980; Otley, 2016). According to Otley (1980), there is no "universally appropriate accounting system that applies equally to all organizations in all circumstances" (p. 413). Accounting systems and practices and how they influence behavior in an organization cannot be understood by only focusing on their technical characteristics (Messner, 2016). It is important to understand the bigger context or situational factors in which the accounting system or practices exist (Messner, 2016; Otley, 1980). It is through the lens of contingency theory that research can determine specific aspects of accounting practices that match with certain organizational circumstances (Otley, 1980). Organizations must determine what accounting systems and practices to adopt based on their environment, size, technology, and strategy.

One of the most important concepts in contingency theory is the idea of "fit". Fundamentally, contingency theory suggests that company performance is a result of an appropriate fit between its structure and context (Gerdin & Greve, 2004). Therefore, less

compatible combinations of contexts and structure may result in low performing companies, while highly compatible combinations of contexts and structures may result in high performing companies. In their review of accounting literature using contingency theory, Gerdin & Greve (2004) found multiple approaches to studying contingency fit. Contingency theory serves as the foundational lens through which this study is conducted to determine any relationships between integration between management accounting and operations managers, MA participation in strategic decision making, use of lean accounting, and plant performance for firms who have adopted a lean manufacturing strategy.

Lean Manufacturing Strategy

Over the last few decades, many manufactures have adopted a lean manufacturing (LM) strategy to survive a business environment that is increasingly competitive and uncertain (Fullerton, et al., 2014). LM originated from the Toyota Production System and the term "lean production" was made popular by Womack, Jones, and Roos (1990) in their book The Machine that Changed the World (cited in Fullerton et al., 2014; Samuel et al., 2015). The goal of LM is to reduce or eliminate waste in operations to deliver high-quality products and services as fast as required by the customer at the lowest cost (Bhamu & Singh, 2014; Danese, et al., 2018; Fullerton et al., 2014; Kennedy & Widener, 2008). LM focuses on building customer value and its core principle is continuous improvement through enhancing processes, eliminating waste, and reducing inventory levels (Pickering & Byrnes, 2011). A lean manufacturing strategy employs techniques such as just-in-time inventory management (JIT), total quality management (TQM), and total preventative maintenance (TPM) (Kennedy & Widener, 2008).

Many global companies, such as Nike, Caterpillar, Intel, and John Deere, have adopted a lean manufacturing strategy. The U.S. Small Business Administration (SBA) defines a SME in manufacturing as a company which has fewer than 500 employees. While it is unclear from the literature how prevalent lean manufacturing strategies are in small and mid-size enterprises (SME), the operations literature states that large manufactures are more likely than small manufacturers to implement lean manufacturing (Bhamu & Singh, 2014). However, the literature also mentions that due to limited knowledge and financial resources, SMEs may partially adopt lean practices (Alkhoraif, et al., 2019; Yadav et al., 2019; Zhou, 2012; 2016). Additionally, some organizations have reported huge benefits from implementing a lean manufacturing strategy while others have not obtained their desired results (Bhamu & Singh, 2014).

Adopting a lean philosophy involves changes in management systems, organizational structures & processes, performance measures, culture, and employee skills and rewards (Pickering & Byrnes, 2016), which can be challenging. LM reaches its full potential when it is implemented holistically across the organization (Fullerton, et al., 2014), where other functional groups align with operations to be engaged and committed to continuous improvement. The idea of LM being a holistic business strategy implies that in a LM environment, where information flow and collaboration are needed for continuous improvements, organizational integration would be important and necessary for success. Studies show that integration can improve the speed and quality of an organization's reaction to changes in the marketplace (Cadez & Guilding, 2008) which also demonstrates the need for organizational integration in LM firms.

Achieved Organizational Integration

Organizational integration is an established concept that refers to cross-functional cooperation or collaboration within an organization (Barki & Pinsonneault, 2005; Droge, et al., 2004; Swink & Song, 2007; Turkulainen & Ketokivi, 2012). It was introduced in the organizational management literature by Hayes & Wheelwright (1994). However, according to Turkulainen & Ketokivi (2011) it has been "conceptualized, defined, and operationalized in drastically different ways" (p. 449) with many studies measuring intended integration rather than integration that has been achieved. The authors note that researchers analyzing intended integration rather than achieved integration causes the theoretical basis of organizational integration to remain fragmented (Turkulainen & Ketokivi, 2012). Therefore, this study focused on achieved integration.

Achieved integration is when an organization works as a "unified whole and the capability of the organization to transfer, process, interpret and exploit information across functional sub-units is frictionless" (Turkulainen & Ketokivi, 2012, p. 450). When achieved integration is high, information is transferred efficiently across functions, functional silos do not exist, and there are no functional groups that pursue their own agendas at the expense of others or the overall organization (Turkulainen & Ketokivi, 2012). According to Swink & Schoenherr (2015), an achieved integration "helps workers across functions to process gathered information better and faster, to develop a shared understanding, and distribute it to the most appropriate constituents within the firm, thus providing an important infrastructural support for value-creating processes" (p. 69). It is important to note that integration does not automatically result from the use of cross-functional teams (Gerwin & Barrowman, 2002; Turkulainen & Ketokivi, 2012) and

integration does not mean that functional groups have somehow merged into one single entity (Turkulainen & Ketokivi, 2012). Mechanisms for organizational integration include standardization of all work and activities, especially when work is complex and less structured (Barki & Pinsonneault, 2005). Barriers to organizational integration include specialization and differences among functional groups and power and political plays within the organization (Barki & Pinsonneault, 2005).

The organizational integration literature presents differing evidence and opinions on the outcomes of integration on organizational effectiveness. It has been found to be positively associated with operational performance leading to positive firm performance (Turkulainen & Ketokivi, 2012) and it has a positive relationship with profitability, process efficiency, and asset productivity (Swink & Schoenherr, 2015). However, disadvantages of integration include information overlap, increased workplace conflict, compromise of product appropriateness, and generation of work overload (Perez-Luno et al., 2019). Integration can also consume additional time and resources as well as cause low production innovation (Perez-Luno et al., 2019).

Turkulainen & Ketokivi (2013) found that the outcomes of integration are contingent upon an organization's complexity. Specifically, the authors found that integration has more positive outcomes on organizational effectiveness under conditions of higher organizational and task complexity and therefore claim that this may explain the mixed outcomes in the literature (Turkulainen & Ketokivi, 2013). Firms with higher organizational and task complexity experience challenges with information processing, increasing communication channels, and slower decision making due to the number of levels in which information will be processed (Turkulainen & Ketokivi, 2013). It is in

this context that integration would be most beneficial to lessen the challenges. This study considers the complexity of firms when measuring achieved integration.

High levels of integration are difficult to achieve and maintain when organizational, political, and resource-related challenges exist (Barki & Pinsonneault, 2005; Swink & Schoenherr, 2015). However, when high levels of integration exist, the foundation of processing and sharing information enables better decision making (Swink & Schoenherr, 2015). The operations management literature implies that managers in firms utilizing a lean manufacturing strategy could benefit from an environment where information flows freely, enabling better decision making to meet the goals of the LM strategy.

There is limited knowledge on the role that the management accounting function plays in organizational integration and the mechanisms for achieved integration, specifically in a lean manufacturing environment. Recent studies on integration or cross-functional work tend to focus on teams for product innovation. This study expands and contributes to the literature on achieved integration by focusing on the management accounting and operations cross-functional integration in manufacturing firms using a LM strategy. Management accounting and the MAs role in organizational integration is introduced in the next section. Following is a discussion of a current management accounting challenge that hinders organizational integration and a potential solution for that hindrance.

Management Accounting

Management accounting is the area of accounting that focuses on providing information that will facilitate internal organizational decision-making. Traditionally,

MAs focused on providing financial and budgetary control information to managers (Appelbaum, et al., 2017), with most of their work being transactional. But more recently, the work of MAs is increasingly transforming into that of a strategic partner, which involves operating more as a consultant to their cross functional peers while participating in strategic cost management (SCM), implementing management and operational controls, performing internal cost activities, and preparing financial statements (Brands & Holtzblatt, 2015; Appelbaum et al., 2017).

Today, MAs are challenged with providing information that meet the needs of managers in their organization. This challenge is evidenced by recent reports by the Managerial Costing Taskforce of the Institute of Management Accountants (IMA), that more than half of operations and supply chain professionals do not believe that the accounting information that they currently receive is helpful or valuable for their decision-making (Lawson & White, 2018). Additionally, recent management accounting service quality literature has focused on developing constructs that can be used to gather perceptions from non-accountants on desirable characteristics in MAs and their information provision services (Fleischman, et al., 2017).

The usefulness and relevance of accounting information has been debated for years. The well-known work of Johnson and Kaplan (1987) deemed traditional accounting for internal reporting and decision making is not useful and is not timely. As a result of this work, many new accounting methods, procedures, and reporting techniques, like ABC costing, emerged over the years claiming to improve the usefulness of accounting information for internal decision making (Andon, et al., 2015). Despite the new accounting methods and techniques that have emerged, recent management and

operations management research still asserts that accounting information is not useful and relevant. Some management researchers actually argue that accounting is not inherently useful, stating that it is a summary of complex assumptions, values, and interests (Andon et al., 2015). However, they believe that accounting information can be made more useful (Andon et al., 2015).

Practitioner literature highlights that MAs add more value to their firms when they act as a strategic partner (Paul & Cokins, 2020; Pickering, & Byrnes, 2016) and the strategic partner role also contributes to organizational integration. To act as a strategic partner, MAs must build close relationships with non-accounting personnel, where they assume the "role of the liaison across functional boundaries and between levels of management" (Cadez & Guilding, 2000, p.840). It is likely that this role as the liaison could increase levels of integration with the functional groups for which the MAs work. Although management accounting service quality literature has placed greater emphasis on the technical quality of MA information, it has also brought to light the importance of interactions with MA personnel and reputational image of the MA among non-accountants (Fleischman, et al., 2017).

Management Accounting & Operations Management Integration

Due to the technical nature of accounting, non-accountants in an organization rely heavily on MAs to provide them with financial and non-financial information that is useful for making decisions. MAs inability to provide useful, relevant, and timely information to operations managers could hinder them from fulfilling their role as a strategic partner and contributing to organizational integration.

Practitioner literature and operations academic research claim that traditional management accounting systems are anti-lean and do not provide relevant and useful information to operations managers in firms that have adopted a lean strategy (Cunningham et al., 2011; Curry & Curry, 2019; 2018; Fullerton et al., 2014; Jackson, 2019). Practitioner's state that accounting information arrives late and is often misleading and many managers do not fully understand what is presented in accounting reports (Cunningham et al., 2011). MAs are also criticized for not updating their accounting processes to provide relevant and useful information to operations managers in lean manufacturing firms (Cunningham et al., 2011; Curry & Curry, 2019; 2018; Fullerton et al., 2014; Jackson, 2019). Therefore, it is important to understand the working relationship between accounting and operations and how the two functional groups could achieve better integration in a lean environment. Understanding this relationship would help accounting managers develop ways in which traditional management accounting systems can be transformed, allowing MAs to contribute more fully to achieving integration with operations management.

Accounting literature often focuses on accounting practices within such firms as the Big Four accounting firms. The Big Four accounting firms and other smaller firms are the largest employers of accountants worldwide. However, a large majority of management accountants are employed in commerce, industry, and the public sector (Cunningham et al., 2011), where lean strategies have been implemented. There are few studies that explicitly study how management accountants work with other functional groups, specifically operations management in lean manufacturing environments.

The operations management literature calls for more useful information flow between accounting and operations (Cunningham et al., 2011; Curry & Curry, 2019; 2018; Fullerton et al., 2014; Jackson, 2019) and based on the organizational integration literature, an achieved integration between management accounting and operations could lead to improved performance, higher profitability (Turkulainen & Ketokivi, 2012; Swink & Schoenherr, 2015), and increased service quality (Barki & Pinsonneault, 2005). Academic research suggests that a likely mechanism for achieved integration between management accounting and operations management in a lean manufacturing environment may be the development and utilization of processes that align with strategic management accounting (SMA). The use of Lean Accounting (LA) processes is outward and forward looking. Therefore, these processes are considered examples of SMA and are explored in this study.

Conceptual Model

Drawing on Turkulainen & Ketokivi's (2011) view of achieved integration and Cadez & Guilding's (2008) view of SMA, Fig. 2.1 presents a conceptual model of potential mechanisms and impacts of an achieved integration between management accountants and operations managers in mid to large manufacturing firms that have adopted a lean manufacturing strategy. The relationships among the variables in the model will be discussed in the following sections.

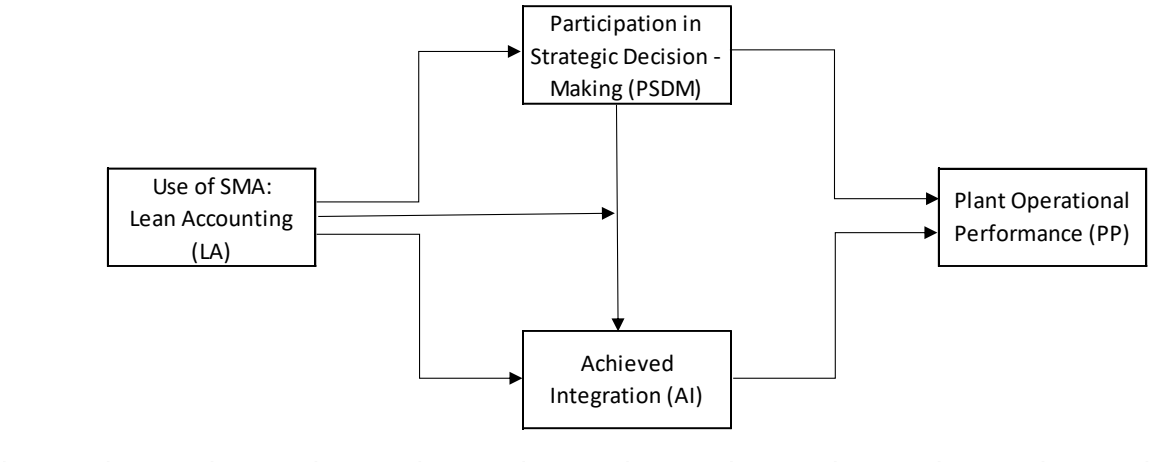


Figure 2.1. Potential mechanisms and impacts of achieved integration of management accounting and operations in a lean manufacturing firm

Strategic Management Accounting (SMA)

Over 35 years ago, Simmonds (1981) introduced the concept of SMA. To this day there is still no consensus on the definition (Bromwich, 1990; Langfield-Smith, 2008; Ma & Tayles, 2009; Roslender & Hart, 2003; and Simmonds, 1981). However, many definitions include common elements such as management accounting with a strategic, external, and forward-looking orientation using both financial and non-financial measures. There also seems to be consensus on the purpose of SMA, which is to provide strategic information to organizational management.

Management accounting literature indicates that SMA can be divided into two focal points (Cadez & Guilding, 2000; Guilding, et al., 2000). The first describes the use of a wide range of SMA practices. According to Guilding et al. (2000), SMA practices can be broken down into five broad categories: costing; planning, control & performance management; strategic decision making; competitor accounting; and customer

accounting. These practices include techniques exhibiting a strategic orientation such as activity-based costing, benchmarking, target costing, value chain costing, strategic pricing, competitor cost assessment, customer profitability analysis, valuation of customers as assets, and others (Guilding et al., 2000). These management accounting techniques support strategic decisions by providing financial and non-financial internal and external information to managers (Cescon et al., 2019).

The second focus of SMA is the MA's involvement in the corporate strategic decision-making process. The increase in technological advances, such as automation and artificial intelligence, have transformed the nature of management accounting. This transformation has even led many to think that MAs could become obsolete (Hopper & Bui, 2016; Lawson & White, 2018; Nixon & Burns, 2012), as the more traditional mundane accounting tasks are being increasingly automated. But the increase in automation is also presenting an opportunity for MAs to become more involved in broader management activity (Cadez & Guilding, 2008; Chenhall, 2003, Lambert & Sponem, 2012).

Researchers assert that MAs are able to add more value to the firm when they participate in an organization's strategic decision-making processes (Appelbaum et al., 2017; Brands & Holtzblatt, 2015; Huerta & Jensen, 2017; Rikhardsson & Yigitbasioglu, 2018). Participating in strategic decision-making processes involves more than providing information to managers. It also involves having an active role in identifying problems and objectives, generating and evaluating options, and taking the necessary steps to put change into place (Woolridge & Floyd, 1990). According to the literature, it is likely that management accountant's involvement in strategic decision making improves the quality

of decisions and levels of consensus about strategy therefore improving performance (Wooldrige & Floyd, 1990).

Strategy literature states that strategic decision-making occurs at different management levels in an organization – top manager level, middle manager level, and operating manager level (Floyd & Lane, 2000). Therefore, it is likely that MAs at different levels of an organization are involved in the strategic decision-making process or being asked to do so. However, this study will focus on accounting middle level management's involvement within a firm.

The concept of SMA builds on MAs close relationship with other non-accountants (Cadez & Guilding, 2008). Therefore, it is likely that MAs involvement in strategic decision-making processes may have a direct impact on the level of integration between MAs and operations managers. This rationale has motivated the following hypothesis.

Hypothesis 1: Greater MA participation in strategic decision-making processes is positively associated with achieved integration between management accountants and operations managers.

There is limited research on the MA's role in the strategic decision-making process and what an effective strategic partnership entails. Much of the published research claiming that MAs should form strategic partnerships is conceptual but not well-defined and the concepts have not been empirically tested. Although SMA has been studied for decades, most of the studies focus on executive characteristics (Pavlatos & Kostakis, 2018), firm attributes and external environments (Cadez & Guilding, 2008; Cescon et al., 2019) that affect the adoption and use of SMA, with little empirical

research on how SMA techniques are applied in firms. In addition, there is little research on the impacts of the use of SMA techniques and the MAs strategic partnership. This study contributes to the SMA literature by focusing on the impacts of the use of SMA techniques and MA's participation in strategic decision making. This study provides more information on the relationship between MA's participation in strategic decision making, achieved integration between management accounting and operations management, plant performance, and the use of LA. In this study, LA is considered a SMA practice for the reasons discussed below.

Lean Accounting (LA)

According to a panel discussion held by Lean Enterprise Institute (2019), LA is a term first used by Jim Huntzinger, President and Founder of Lean Frontiers. He used the term to refer to a way of thinking about how accounting information fits into an organization that has adopted a lean management strategy (Lean Enterprise Institute, 2019). Based on practitioner and operations management literature, LA specifically refers to a collection of management accounting practices that are used for two main initiatives.

The first initiative involves simply practicing lean thinking and using lean tools in accounting and is sometimes referred to as "Lean in Accounting" (Katko, 2020). Lean thinking calls for a focus on customer value, continuous improvement, and the elimination of waste or non-value-added activities (Danese, et al., 2018; Fullerton et al., 2014; Kennedy & Widener, 2008; Pickering & Byrnes, 2011). Wasteful activities consume resources and time that otherwise could be used for tasks that create more value for customers (Katko, 2020). LA practices specifically involve taking steps to continuously identify and minimize or eliminate waste from accounting transaction

processes, reports, and other accounting methods (Katko, 2020; Kennedy & Widener, 2008; Maskell & Baggaley, 2006), while also maintaining thorough financial control and compliance with generally accepted accounting principles (GAAP), external reporting regulations, and internal reporting requirements (Maskell & Baggaley, 2006). Examples of accounting waste include large numbers of transaction errors, significant amount of time waiting on approvals and balancing reports, and unnecessary accruals or other journal entries (Katko, 2020). Lean tools, such as the Plan-Do-Check-Act model (Katko, 2020), 5 Whys (Pickering & Byrnes, 2016), and Kaizen events (Cunningham et. al., 2007) can be used to identify and improve accounting processes.

The second initiative involves supporting lean manufacturing by providing relevant, timely, and reliable information to internal users to improve decision making (BMA, 2020; Kennedy & Widener, 2008; Maskell & Baggaley, 2006; Maskell, et al., 2011) and referred to as "Accounting for Lean" (Katko, 2020). The second LA initiative involves MAs seeing operations workers and managers as internal customers. It involves MAs getting to know their internal customer's needs along with understanding the company's manufacturing processes, so that more relevant and useful information can be provided to operations (Grasso, 2007). Additionally, it involves changing accounting systems and processes when necessary to support the internal customer. It is also likely that MAs adopting lean thinking in accounting could lead to more time for MAs to focus on supporting a firm's lean transformation. LA will be the term used in this study to refer to both initiatives.

It is important to know that LA practices could potentially be used at varying degrees and firms can be at different levels of their lean production implementation (Rao

& Bargerstock, 2013) that may impact the use of LA practices. LA is generally implemented gradually with traditional accounting processes that are simplified or dropped as management gets comfortable with the adequacy of the new processes (Pickering & Byrnes, 2016). Practitioner literature states that resistance to lean accounting is typically a resistance to change of the management system and culture along with other organizational, educational, professional, and individual barriers (Grasso, 2006). Huntzinger (2007) mentions that there is also reluctance to change from traditional management accounting processes due to manufacturing executives and leaders lacking an understanding of what is needed and what existing systems are and are not capable of doing. This study focuses on the most common LA tools and techniques described in current literature.

LA Practices & Tools. There is no comprehensive list of LA processes and techniques. In some cases, the term "LA" is not even used but can be implied in studies with references to accounting processes in a lean manufacturing environment. Maskell & Baggeley (2006) made the first attempt to provide a comprehensive list of LA principles, practices, and tools in LA literature. The authors broke LA into five key principles: lean and simple business accounting, accounting processes that support the lean transformation, clear and timely communication of information, planning and budgeting from a lean perspective, and strengthening internal accounting control (Maskell & Baggaley, 2006). These principles along with their corresponding practices and tools are summarized in Table 2.1.

Table 2.1

Principles, Practices, and Tools of Lean Accounting (Maskell and Baggaley, 2006)

Principles of Lean Acctg	**Practices**	**Tools**
Lean and simple business accounting	Transaction processes, reports, and accounting methods throughout the organization in which waste has been eliminated	Value stream maps (current and future state), kaizen (lean continuous improvement), and the Plan-Do-Check Act (PDCA) problem-solving approach
Accounting processes that support the lean transformation	Processes provide information that drive continuous improvement and helps managers to measure and understand customer value so that customer relationships, product design, product pricing and lean improvement are enhanced	Visual performance measures, continuous improvement, value stream costing, target costing, visual management, and decision-making and box scores
Clear and timely communication of information	Reports that are timely and understandable by all in the company	"Plain English" financial statements, simple accounting, reporting using visual performance boards, incremental cost & profitability using value stream costing and box scores
Planning and budgeting in a lean environment	Using tools for an extensive outlook on short- and medium-term planning, business strategy, capital planning, and the focus on lean tools instead of people	Hoshin policy deployment, Sales Operations and Finance Planning (SOFP), and 3P

Internal accounting control	Ensuring that internal accounting controls are not weakened by the change	Internal auditors are involved early in the LA transition to ensure that processes strengthen internal accounting controls.

Additionally, the Institute of Management Accounting (IMA) addresses the following LA practices in several Statements on Management Accounting: value stream costing, decision making methods without using standard costing as a base, product-family view of product costs, budgets and financial planning reflecting a value stream reporting structure, simple visual management methods, performance measurement linkage to value streams, waste identification in accounting/finance processes, and target costing (IMA, 2014). More recently, BMA, Inc., a lean consulting firm founded by Brian Maskell, mentioned 8 essential lean accounting principles that included: lean thinking in accounting, understanding value, identifying waste, visibility, respect for people, improvement, lean financial management, and lean financial leadership (Katko, 2020).

The most recent LA empirical literature focused on the following LA practices and will be the focus for this study: Value stream costing, visual performance measurement, inventory tracking, and simplified management accounting practices/continuous improvement. These practices are described below.

Value stream costing. Lean manufacturing firms are organized in value streams versus departments or by product produced. A value stream considers the entire flow of materials through operations considering the entire supply chain (Carvalho, et al., 2019). Personnel are assigned to work activities in each value stream, and they require relevant information to manage bottlenecks, capacity, and costs related to that value stream

(Fullerton et al., 2011; Kennedy & Widener,2008). Traditional costing systems would allocate costs to each value stream, however with value stream costing there are minimal allocations with most costs being direct product costs within the value stream. The reduction of arbitrary accounting allocations allows for personnel to focus on costs directly related to their value stream.

Visual performance measurement. As stated above, personnel require information that facilitates work activities within their value stream. Traditional accounting would provide high-level information on outcomes that are not straight-forward enough to be relevant to employees on the shop floor where real-time visual results are required (Fullerton et al., 2011). In Kennedy & Widener's (2008) LA case study, they found that after the organization adopted lean manufacturing, financial and non-financial visual performance measures were reported daily or weekly, made available to all operational team members, and usually displayed on a metric board. The visual performance measures helped the firm solve problems and practice better communication (Kennedy & Widener, 2008).

Inventory tracking. In LA, inventory tracking is minimal. One of the goals in lean manufacturing is to minimize inventory. This is done by producing to customer order. Researchers have claimed that detailed inventory tracking can impede lean implementations (Fullerton et al., 2011) by encouraging firms to build high levels of inventory and allowing inefficiencies in recording of inventory transactions (Maskell & Kennedy, 2007). After implementing lean manufacturing, one firm found that their perpetual inventory system was no longer needed due to the low inventory levels (Maskell & Kennedy, 2007).

Simplified management accounting practices/continuous improvement. When lean thinking has been extended to accounting, the result is simplified management accounting practices. The strategy in accounting becomes streamlining processes and reducing processing (Fullerton et al., 2011) continuously (Maskell & Kennedy, 2007). In Kennedy and Widener's case study (2008), in a LA transition the accounting department took steps to reduce transaction processing by converting purchase orders to annual blanket purchase orders in which they used to order product when necessary and paid electronically once the product arrived instead of requiring an invoice. When lean thinking has been extended into accounting processes, simplified processes extend into simplified reporting.

Gaps in LA Literature. LA has been the subject of many books and practitioner articles over the years, but empirical research on LA has been limited. Most of the empirical research exists in the operations management literature, where traditional accounting processes and ABC costing are criticized. Most of the research focuses on one or several LA principles or practices at a time and does not provide a complete breakdown and assessment of all LA principles and practices. LA literature is mostly descriptive with limited theoretical development and fails to provide strong empirical support on the application of LA and its impacts on the organization. Additionally, Danese, et al., (2018) found in their systematic literature review on recent lean research that there is still a need to clarify and conceptualize processes such as LA.

Although LA literature is limited, practitioner literature and empirical research reveal two common themes. First, lean manufacturing implementations are hindered by traditional accounting practices and must rely on LA. Rao & Bargerstock (2013) found

that it is possible that accounting initiatives for lean implementation are inadequate in the US. Most practitioner and operations management literature highlight that traditional accounting systems impede an organization's lean transformation (Cunningham et al., 2011; Grasso, 2006; Huntzinger, 2007; Jackson, 2019; Maskell & Katko, 2007; Pickering & Byrnes, 2016). Common criticisms include accounting reports providing little help to operating managers, inaccurate product costs, and traditional costing processes motivating questionable decision-making in a lean environment. Accounting reports are produced weeks into the next month which makes it impossible to identify and resolve problems that occurred weeks sooner (Pickering & Byrnes, 2016) or give any indication of actions operating managers should take to reduce costs and improve productivity (Huntzinger, 2007). Additionally, complex variance reports are difficult for non-accountants to understand (Cunningham et al., 2011; Pickering & Brynes, 2016). Standard costing is not helpful in manufacturing environments with multiple processes and products as arbitrary allocations are used to produce inaccurate estimates of product costs (Huntzinger, 2007; Maskell & Katko, 2007; Pickering & Byrnes, 2016). Additionally, standard costing processes, such as full absorption costing, contribute to decisions that reinforce behaviors that go against lean principles (Huntzinger, 2007). Full absorption costing motivates over production to allow for the reporting of a reduced cost per unit and in the process causes high levels of inventory contributing to space issues, obsolescence, and the lack of flexibility (Pickering & Byrnes, 2016).

Much of the literature suggests ways in which the traditional accounting system can be changed to be more helpful and still comply with GAAP. However, there has been limited empirical evidence regarding the application of LA. In one case study of a firm in

the industrial manufacturing industry, it was found that LA mediates the relationship between lean manufacturing initiatives and the accounting control system (Kennedy & Widener, 2008). In a study of 244 US companies interested in LA, Fullerton et al., (2013) found a positive relationship between the extent of lean manufacturing strategy in an organization and its reliance on a simplified internal accounting system, value stream costing, and visual performance measurement, along with positive impacts to employee empowerment.

Secondly, the LA literature reveals the benefits of LA, specifically positive impacts on operational and firm performance. Fullerton et al., (2013) found that operational and firm performance is enhanced when a holistic lean strategy that is comprised of both lean manufacturing and lean management accounting practices are adopted. Additionally, LA can be used by operational managers to focus on removing waste, reducing throughput cycle times, and improving productivity (Cokins, 2019). Practitioners even suggest blending LA with ABC costing (Cokins, 2019). One contribution of this study is linking the practices of LA to SMA practices.

LA as a SMA practice. No direct discussion establishing LA as a SMA technique is present in the literature. However, management accounting literature suggests that lean implementation and the accounting support for this implementation are strategic choices (Rao & Bargerstock, 2013), as they focus on long-term actions of the organization. Additionally, practitioner LA literature has suggested that implementing LA processes would cause MAs to be recognized as true business partners (Cunningham et al., 2011), but this has not been explored empirically. Lastly, Guilding et al., (2000) lists value stream costing, a LA technique, as an example of an SMA practice. The

concept of SMA builds on MA's close relationship with other non-accountants (Cadez & Guilding, 2008). When using SMA practices, MAs may be in a better position to have information and analytical tools that can be utilized to provide information that is more useful for the strategic decision-making processes. MAs would likely feel more comfortable participating in the process and will do so to a greater extent. Therefore, in this study LA was regarded as a SMA process.

Research has identified a direct relationship between MA participation in strategic decision-making processes and the adoption and use of SMA practices. Cadez and Guilding (2008) identified in their research on the development of an SMA model that accountant's engagement in the strategic decision-making process related positively to firm performance through the accountants' adoption and use of SMA practices. When participating in strategic decision-making processes, MAs may have a motive or feel more pressured to add value to the process and initiate accounting innovations that are more strategic in nature (Cadez and Guilding, 2008). Additionally, they found that contingent factors such as business strategy, deliberate strategy formation, market orientation, and company size, may impact SMA systems and organizational performance (Cadez and Guilding, 2008). This research suggests that MAs involvement in strategic decision-making processes may have a direct impact on the adoption and use of SMA practices. However, the authors did not explore the reverse relationship, as it is also likely that the adoption and use of SMA could directly impact the level of participation in strategic decision-making processes. In this study, LA was considered a SMA practice that motivated the following hypothesis.

Hypothesis 2a: Greater use of LA practices is positively associated with greater MA participation in strategic decision-making processes.

Practitioners also suggest that by implementing LA processes, MAs will not be left on the sidelines when important business decisions are made and instead will be recognized as a true business partner (Cunningham et al., 2011). As a SMA practice, the use of LA with participation in strategic management decision making likely serves as a mechanism for the integration between MAs and operations managers. There has been no empirical research that links the three variables; however, this study explored this linkage with the following hypotheses.

Hypothesis 2b: Greater use of LA practices is positively associated with higher levels of achieved integration between management accountants and operations managers.

Hypothesis 2c: Participation in strategic management decision making together with the use of LA practices is positively associated with higher levels of achieved integration between management accountants and operations managers than through participation in strategic management decision making alone.

LA and plant performance. Although Fullerton et al., (2013) found that operational and firm performance is enhanced with the use of lean management accounting practices, the study did not determine the specific reasons why this is the case. The authors indicate that lean management accounting practices have direct and indirect effects on operational and financial performance (Fullerton et al., 2013). Additionally, both participation in strategic decision making (Cadez & Guilding, 2008) and

organizational integration (Swink & Schoenherr, 2015; Turkulainen & Ketokivi, 2012) have been linked to positive performance. It is therefore likely that MA's participation in strategic decision making and an achieved integration between MAs and operations managers could mediate the relationship between LA and plant operational performance which motivated the following hypotheses:

Hypothesis 3a: Greater use of LA practices is positively associated with plant operational performance through MA's participation in strategic decision-making.

Hypothesis 3b: Greater use of LA practices is positively associated with plant operational performance through achieved integration between MAs and operation managers.

Summary

The literature presented in Chapter 2 combines three streams of literature as it relates to achieved integration between management accounting and operations management in firms that have adopted the LM strategy. Chapter 2 first provided background on LM strategy and its connection to internal organizational integration. Next, management accounting and strategic management accounting literature reviewed highlighting the potential role that MAs play in internal organizational integration. Finally, LA literature was reviewed identifying LA as a potential mechanism for achieved integration between management accounting and operations in firms utilizing a lean manufacturing strategy. Table 2.2 provides a summary of the hypotheses motivated from the literature review. Chapter 3 will provide more information on how these

hypotheses were tested in this study, as it will present an overview of the study's methodology and data collection and analysis procedures.

Table 2.2

Table of Hypotheses

No.	Hypothesis
H1	Greater MA participation in strategic decision-making processes is positively associated with achieved integration between management accountants and operations managers.
H2a	Greater use of LA practices is positively associated with greater MA participation in strategic decision-making processes.
H2b	Greater use of LA practices is positively associated with higher levels of achieved integration between management accountants and operations managers.
H2c	Participation in strategic management decision making together with the use of LA practices is positively associated with higher levels of achieved integration between management accountants and operations managers than through participation in strategic management decision making alone.
H3a	Greater use of LA practices is positively associated with plant operational performance through MA's participation in strategic decision-making.
H3b	Greater use of LA practices is positively associated with plant operational performance through achieved integration between MAs and operation managers.

Chapter 3: Method

The purpose of this chapter is to introduce the methodology utilized to empirically investigate the impacts of utilizing LA practices on the achieved integration between management accounting and operations management and operational performance in companies that have adopted a lean manufacturing strategy. This study was conducted through the lens of contingency theory and tested the fit of the variable relationships in a lean manufacturing environment. A quantitative cross-sectional nonexperimental survey design was used to determine possible associations between the study variables. This chapter will provide the details and rationale for the research design, measures, and the procedures taken for sampling, participant recruitment and participation, data collection, and data analysis. In addition, the chapter will discuss ethical considerations and limitations in the study design.

Research Design

A quantitative cross-sectional nonexperimental design was used to determine the relationship between the use of LA practices, MA's participation in strategic decision making, achieved integration of MAs and operations managers, and plant performance. A study utilizing a cross-sectional research design collects data from multiple cases at a single point of time to establish patterns of associations between variables (Bryman, 2012). Unlike experimental designs, the variables are not manipulated and therefore findings would potentially produce associations but not establish causal direction (Bryman, 2012).

A cross-sectional nonexperimental design was deemed appropriate for this study because the purpose of the analysis was to determine potential relationships between the

identified variables. It is possible that organizations utilize different LA techniques, so it was important to obtain information from multiple cases to determine possible relationships. Participants in this study were surveyed to determine LA practices used in their organization, levels of MA's participation in strategic decision-making processes, the level of achieved integration between MAs and operations management in their organization, and plant performance. An online survey was utilized versus structured interviews for rapid turnaround in the data collection process.

Ethical Considerations & Procedures

All ethical principles and standards for social research were followed throughout the study. The main areas of concern related to ethical practices in social research were as follows: harm to participants, lack of informed consent, invasion of privacy, and deception (Bryman, 2012). This study did not present any physical or emotional harm to its participants. Participants were not expected to disclose harmful information in the survey. Additionally, its online survey design, ensured that each participant's identity was kept confidential, and findings could be reported while protecting the respondent's anonymity.

All care was taken to ensure that this study was conducted with integrity, quality, and transparency. The purpose of the study was fully disclosed to all participants via a short introduction letter prior to completing the survey. Participation in this study was voluntary and participation could have been ended at any point during the study. Participants were asked to sign an informed consent prior to completing the survey. The signed informed consent ensured that each participant acknowledged that they understood the purpose of the research, his or her involvement in the research, and the right to

privacy. Plans for this study were reviewed and approved by the Institutional Review Board (IRB) at the University of Missouri-St. Louis prior to conducting the study. All research steps and findings are reported thoroughly and accurately to ensure no deception. Research practices were monitored throughout the study to ensure ethical practices.

Target Population & Sample Size

A sample was drawn from a population of MAs and operations managers employed in manufacturing firms. The number of organizations using a lean manufacturing strategy and LA is unknown and some accountants may be using LA techniques unwittingly. Middle-level supervisors and managers in the accounting and operations functions of a company are the most familiar with the lean manufacturing and accounting practices of a firm and therefore better informed this study. In addition, both groups were able to provide their perception on their involvement with LA and strategic decision-making processes, along with the level of integration between MAs and operations management. All participants were required to be over the age of 18 and currently working or previously retired from a manufacturing company which utilize a lean manufacturing strategy. A nonrandom sample was used due to availability and accessibility.

A power analysis was conducted to determine a sample size appropriate for stable and meaningful results in this study. Statistical power refers to the ability of a statistical test detecting a relationship or difference. Statistical power is also referred to as the probability that the null hypothesis will be rejected when it is false (Murphy, 2004). In

other words, we will reject the null hypothesis when we should. Statistical power is determined by a significance criterion (typically p<.05), expected magnitude of the effect of the analysis, and sample size (Murphy, 2004). G*Power 3.1.9.7 software was used to conduct an *a priori* power analysis by estimating and specifying the level of power (.80), magnitude of the effect (medium), and significance criteria (P<.05). Based on this analysis the target sample size for this study was 77 participants to achieve 80% power.

Recruitment and Participation

Participants were recruited through Lean Frontiers, the Institute of Management Accountant's Indianapolis and Dallas Chapters, and LinkedIn social media. Lean Frontiers, Inc. is an organization that hosts learning events for the lean community (Lean Frontiers, 2020). Since 2005, Lean Frontiers has hosted the annual Lean Accounting Summit where attendees and LA thought leaders consort to discuss and learn more about accounting for lean operations (Lean Frontiers, 2020). Additionally, Lean Frontiers hosts the annual Lean Leadership Week and other Lean events, trainings, and coaching. Individuals on the distribution list of Lean Frontiers were attendees of one or more of their events. Attendees of these events are likely utilizing or have interest in LA and can provide insight on the use of LA and the impacts of its use in their organization. Lean Frontiers has approximately 1000+ contacts on their distribution list.

The IMA is a global professional association for management accountants in 150 countries and has 300 chapters (IMA, 2020). The organization oversees the "CMA" credential and promotes professional networking, practical developments, research, education, and knowledge sharing as it relates to management accountants and management accounting (IMA, 2020). The IMA Indianapolis and Dallas chapter together

have over 285 members. In addition, the researcher posted multiple posts on LinkedIn social media in interest groups specific to lean manufacturing and management accounting to recruit participants for the study.

Both Lean Frontiers and the IMA – Indianapolis chapter sent one initial email and one reminder email to their distribution list requesting that their contacts and members participate in the research study. The emails included a flyer with information on the study. The IMA – Dallas chapter included the flyer in its monthly newsletter. The researcher posted the same flyer in several LinkedIn social groups that contained members that were interested in Lean manufacturing and management accounting.

Data Collection Procedures

The survey was administered online through Qualtrics June 2021 to September 2021. The survey, as shown in Appendix A, consisted of three parts. Part 1 collected basic demographic information about the participant. Part 2 collected company demographics as well as information on a single manufacturing plant within the participant's company that has adopted a lean manufacturing strategy and one which the management accounting division regularly oversees. Part 3 consisted of previously used and validated instruments to test the relationships in Fig 3.1 below.

Prior to administering the survey, the questions were pretested by two practitioners (a controller and senior level accountant) and seven academic researchers, who did not participate in the main study. To improve response rates, it was important that the survey questions were clear, unambiguous, and interesting (Bryman, 2012). Pretesting a survey helps improve response rates and reduce data-collection errors. Participants in the pretest were asked to take the survey and identify any issues with

readability, completeness, and clarity. Each participant was given one week to take the full pretest survey. A debrief session with the two practitioners was conducted immediately after they took the survey. The debrief session was crucial in learning how the two practitioners interpreted the survey. Six of the academic researchers sent their comments and recommendations via email and one academic researcher provided his comments and recommendations in a meeting. The pretest feedback helped to identify potential concerns with misinterpreting survey questions and answer choices and typos and errors. Survey questions, format, and instructions were finalized based on the feedback from the pretest. To encourage participation, all participants who completed the survey were entered in a raffle to win one of five $50 Amazon gift cards.

As mentioned above, flyers were distributed to potential participants by Lean Frontiers, IMA – Indianapolis and Dallas chapters, and by the researcher on social media. The initial flyer included a link for all potential participants to access the online survey immediately. This process unfortunately allowed for a bot, a web robot that executes automated tasks over the internet, to gain access to the survey.

The bot generated over 75 fictitious responses on June 10, 2021, which were all received within a 5-hour time frame. The issue was discovered quickly because the researcher was receiving alerts when responses were completed. Once the suspicious activity was detected, the survey was paused for further investigation. The investigation revealed that many of the responses received during this timeframe showed unreasonable and illogical responses, inconsistent answers to demographic questions, identical survey responses received at the same time, and impossible completion times. The survey link was deactivated immediately to prevent any further response. Based on the experiences

shared by other researchers in online research chat groups, the researcher derived several strategies to detect and avoid bots moving forward. First, all responses received that showed the issues discussed above were removed.

Before releasing the survey for the second time, data collection processes were changed to decrease the likelihood of a bot accessing the survey and to build in more ways to detect bot activity. These changes were necessary to protect the integrity of the data. To decrease the chances of a bot accessing the survey, a new sign-up survey was created in Qualtrics. The research flyer was updated with the new link and sent out again. The signup survey asked each participant for their name, email address to which the survey link should be sent, and an answer to the following question, “Tell us why you have an interest in Lean Accounting?”. Once participants signed up for the survey, the researcher would review the signup form for suspicious names, email addresses, and answers. If no suspicious activity was detected, the participant would receive an individual link to the survey within 24 hours.

The main survey link was only sent out to participants once they had completed the new sign-up survey. The researcher received two suspicious requests and did not provide the main survey link to these individuals. The sign-up survey was not linked to the participant’s responses. Additionally, the individual survey link could only be used once to submit a survey and the researcher had visibility to if the link had been used. The survey was available for up to two weeks and reminder emails were sent to non-respondents after three, seven and fourteen days. The participant signup prescreening process allowed for more control over who received access to the survey. Additionally, the survey was embedded with a captcha to prevent bots from gaining access to the

survey. Open-ended questions were added to the survey and reviewed during data screening to detect any bot activity. Additionally, the researcher monitored the time and speed of survey completion to detect any bot activity.

Data Collection Results

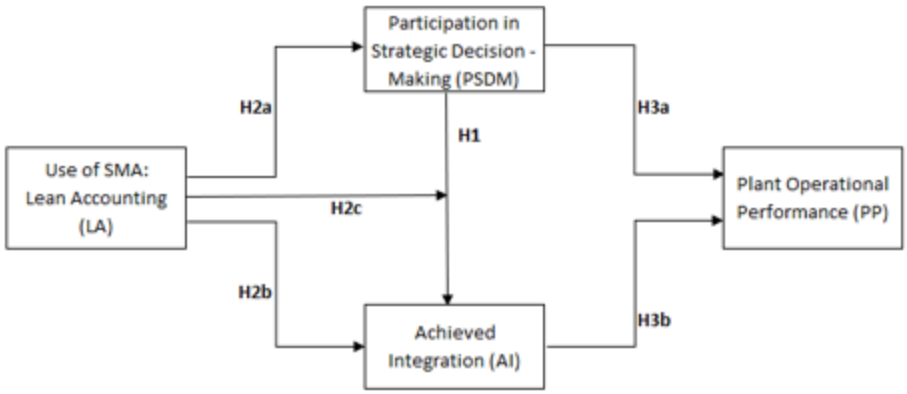
Approximately 1,285 individuals were invited to participate in the study. Of those who signed up for the survey, 82% completed the survey. There were 143 total responses to the survey. However, 82 responses, all received on the same day of the bot attack, were removed leaving 61 responses. After the second round of data collection, a further review for unreasonable and logically inconsistent responses to the survey revealed 9 additional responses that needed to be removed, leaving 52 usable responses for this study. When determining the response rate, it is important to exclude surveys in which the respondent shows clear indications that they did not take the questionnaire seriously (Bryman, 2012). Therefore, the survey response rate was 4%.

Measures

Four primary variables were used to test the hypotheses displayed in Figure 3.1. These primary variables include use of LA, MA participation in strategic decision making, achieved integration between management accountants and operations managers, and plant operational performance

Validity and reliability of the measures used in this study were accessed. Validity refers to the extent to which a survey instrument measures what it is intended to measure (Carmines & Zeller, 1979) and is generally checked with factor analysis. Factor analysis generally takes a larger sample than what could be achieved with this study. Since each scale was established and used in similar prior studies with good validity and reliability,

factor analysis was not conducted. However, the reliability of all measurement scales utilized in this study were confirmed. Reliability refers to the extent to which a survey instrument "yields the same results on repeated trials" (Carmines & Zeller, 1979, p.11). According to Creswell & Creswell (2018), the original validity and reliability of an instrument may not hold true if it is modified or combined with others. This study modified and combined instruments. Therefore, it was important to confirm the reliability of the instruments in this study. The Cronbach's alpha statistic was calculated to determine the reliability of all measurement scales used. The optimal value range for this statistic is between .7 and .9 (Creswell & Creswell, 2018). Each item was reviewed individually to determine if its removal would be reasonable and increase the reliability of the scale. All variables had sufficient reliability. Likert type items were combined into a single composite score using the mean for each of the four main variables. More details on the variables and their specific measurements follow.



H1	Greater MA participation in strategic decision-making processes is positively associated with achieved integration between management accountants and operations managers.
H2a	Greater use of LA practices is positively associated with greater MA participation in strategic decision-making processes.
H2b	Greater use of LA practices is positively associated with higher levels of achieved integration between management accountants and operations managers.
H2c	Participation in strategic management decision making together with the use of LA practices is positively associated with higher levels of achieved integration between management accountants and operations managers than through participation in strategic management decision making
H3a	Greater use of LA practices is positively associated with plant operational performance through MA's participation in strategic decision-making.
H3b	Greater use of LA practices is positively associated with plant operational performance through achieved integration between MAs and operation managers.

Figure 3.1: Conceptual Model with Hypotheses

Management Accounting Participation in Strategic Decision Making (PSDM)

This variable was measured using two different instruments – the first being more specific to a participant's personal involvement in strategic decision making, while the second is focused on the management accounting department as a whole. The first is a five-item validated instrument that derived from Wooldridge and Floyd's (1990) and utilized in (Cadez & Guilding, 2008) to measure middle management's involvement with strategic decision-making. The second is a six-item instrument used by Kim and Sung-choon (2013) to study the impact of strategic partnership in HR functions on firm performance. The instrument was adapted to apply to management accounting, since it is also a supporting function within organizations. Additionally, both instruments were adapted to apply to plant-level strategic participation. Participants were asked to provide

their perception on the extent that their individual and management accounting leadership contributes to plant level business strategy. Participants responded using a Likert-type scale ranging from "1" (not at all), to "7" (a great deal). The mean scores for each of the instruments measured MA involvement in strategic decision-making processes. In this study, the Cronbach's alpha for this measure is .86, which indicates good internal consistency.

Achieved Cross-functional Integration (AI)

A six-item validated instrument derived from Turkulainen & Ketokivi (2011) was used to measure this variable. The items were adapted to address the integration between both the accounting and operations departments. Participants responded using a seven-point Likert scale to questions such as: "Management accounting and operations managers in my firm coordinate their activities", "Management accounting and operations managers in my firm are well integrated", "Management accounting and operations managers in my firm work interactively with each other". The mean scores of the respondents for each of the scaled items were the measure of achieved integration. In this study, the Cronbach's alpha for this measure is .87.

Lean Accounting Use (LA)

The extent of LA use was measured using the approach developed and validated by Fullerton et al., (2013) in their study on how management accounting practices and controls are used in support of lean manufacturing. Cronbach's alpha for all measures were above the acceptable range (Fullerton et al., 2013). The extent of use of the most common LA processes in the literature by MAs were assessed using this instrument. These processes are value stream costing, visual performance measures, minimal

inventory tracking, and simplified strategic reporting. Participants were provided with multiple statements that describe these LA practices and a list of the additional LA tools and asked to gauge the level of use in the management accounting system in his or her firm. Participants responded using a Likert-type scale ranging from "1" (not at all), to "7" (a great deal). It is possible that participants were not aware of LA terminology and different combinations of processes could be used at different firms. Therefore, multiple questions describing the most common LA processes and describing the LA tools helped ensure that participants correctly identified LA processes that were being used at their firm. It is likely that management accountants are using other lean tools to identify accounting improvements and reports that help support lean implementations, therefore an open-ended question was added to obtain participant's feedback on other tools or methods they are using. The mean scores of the respondents for each of the scaled items measured LA use. In this study, the Cronbach's alpha for this measure is .77.

Plant Operational Performance (PP)

This variable was measured using an instrument employed by Fullerton et al., (2014), which was adapted from Shah and Ward (2003), to determine how simplified management accounting for lean manufacturing would impact plant performance. The scale consists of self-assessed improvements of scrap and rework, setup times, queue times, machine downtime, lot sizes, and cycle time over a three-year period. The instrument had a Cronbach's alpha of .81 in the study. According to LA literature, it is likely that manufacturing cost and capacity are impacted by the use of LA. Therefore, these two items were added to the measure but later removed as the result of the reliability analysis. Participants responded using a Likert-type scale ranging from "1"

(significant increase), to "7" (significant decrease). This measure relied on the judgement of the participants. According to Ketokivi & Shroeder (2004), relying on perceptual measures of operational performance are reliable and valid. In this study, the Cronbach's alpha for this measure is .75.

Data Analysis

IBM SPSS Statistics was used to perform all descriptive statistics, correlational analysis, regression analysis and moderation and mediation analysis (Hayes' PROCESS macro). The following three steps were followed to analyze the data: (a) Data screening, (b) Inferential Analyses, (c) Supplemental Analyses. Proper instrumentation checks and data screening ensured that data accurately reflected the variables we were seeking to quantify and that they met important assumptions for analysis (Meyers et al., 2017).

Data Examination & Descriptive Analysis

An analysis of the number of participants who did and did not return the survey was performed. It is possible that if non-respondents had responded, their responses would significantly change the overall results of the study (Bryman, 2012; Creswell & Creswell, 2018). In this study, non-response bias was investigated by comparing early respondents to late respondents, based on the return date of the survey.

Data was thoroughly screened for fictitious responses from bot activity, accurate reflection of participant responses, outliers, and any issues with missing data. Each survey response was reviewed for contradictory responses and non sensical responses to open ended questions. Additionally, the time and speed of survey completion was reviewed to identify participants who did not take the survey seriously or potential bot activity. All suspicious responses found during these reviews were removed.

Missing data present the risk of yielding biased results (Meyers et al., 2017, Raykov & Marcoulides, 2008). Understanding the reasons for values missing in a data set helps to handle the missing data properly (Raykov & Marcoulides, 2008). In this study, patterns of missing data were analyzed for randomness and removed when necessary. One case was eliminated due to the participant not completing the survey in full. There were three cases where there were one to two missing responses on the lean manufacturing demographic questions. These cases were not eliminated because the missing responses had no impact on the main results of the study.

A frequency analysis was conducted on all categorical demographic data to review for any data outliers. Cross tabulations were executed to review frequencies for multiple categorical variables. Measures of central tendency and dispersion were calculated for the main variables of the study. Additionally, the main variable data were screened for skewness, kurtosis, outliers, and normality. All data was screened to ensure it met important assumptions before the researcher proceeded with the main analyses.

Hypotheses Testing & Supplemental Analyses

Multiple regression was used to determine the relationship between the use of LA, MAs participation in strategic decision making, achieved integration between MAs and operations managers, and plant operational performance. All moderation and mediation were tested using Hayes's (2018) PROCESS Macro V.4. It is possible that both groups of respondents, MAs and operations managers, have a different perspective of the relationship between the variables. As part of a supplemental analyses, a Chi Square test of independence test was done to ensure no differences in responses. Additionally, a moderation analysis was conducted to further explore the impact AI has on the

relationship between LA and PSDM based on the strength of the relationship between LA and PSDM and PSDM and AI found in this study along with assertions in prior literature that MAs have better information and analytical tools when using SMA practices, such as LA.

Threats to Validity

There were several major limitations in the research design. For this study, cross-sectional data was collected from a convenience sample which presents threats to the validity and generalizability of the study. Although a cross-sectional design employs a standardized method for gauging variation between cases and increases the chances of the studies replicability, internal and external validity could be weak (Bryman, 2012). Internal validity is weak because it is difficult to establish causal relationships from cross-sectional data and if the sampling methods are not random the external validity can be weak as well (Bryman, 2012). Generalizability of the study is weakened also due to the convenience sample (Bryman, 2012). Additionally, the research design subjects the study to single source bias. Study variables were measured based on the perceptions of a single source - management accountants or operations leader in a manufacturing firm. It is possible that other accountants or operational leaders, within the same company, would have a different perception of the achieved integration, performance, or lean accounting use in the organization.

Summary

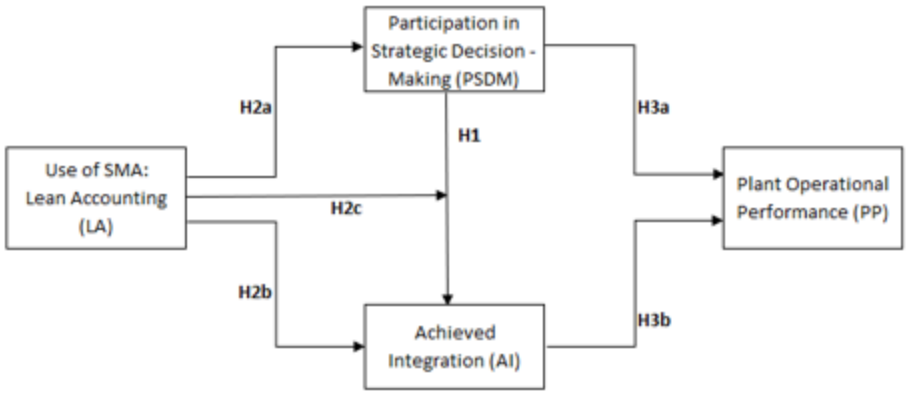
Chapter 3 presented the details and rationale for executing a quantitative cross-sectional non-experimental survey design to investigate the impacts of utilizing LA on the achieved integration between management accounting and operations management

and plant performance in firms that have adopted a lean manufacturing strategy. The chapter discussed in detail the research design and final procedures for sampling, participant recruitment and participation, data collection, and data analysis. The chapter also presented ethical considerations.

Chapter 4: Findings

The purpose of this chapter is to provide the results of our quantitative study which examined if utilizing LA practices have any impact on the level of collaboration and integration between management accounting and operations management and operational performance in manufacturers that have adopted a lean manufacturing strategy. The four main variables in this study were: (a) use of LA practices, (b) MA's participation in strategic decision making, (c) achieved integration, and (d) operational performance.

This chapter begins by briefly describing the data collection and preparation processes and the sample demographics. Following are the reliability and descriptive statistics and results of the hypotheses testing. The chapter ends with results of supplemental analyses.



H1	Greater MA participation in strategic decision-making processes is positively associated with achieved integration between management accountants and operations managers.
H2a	Greater use of LA practices is positively associated with greater MA participation in strategic decision-making processes.
H2b	Greater use of LA practices is positively associated with higher levels of achieved integration between management accountants and operations managers.
H2c	Participation in strategic management decision making together with the use of LA practices is positively associated with higher levels of achieved integration between management accountants and operations managers than through participation in strategic management decision making
H3a	Greater use of LA practices is positively associated with plant operational performance through MA's participation in strategic decision-making.
H3b	Greater use of LA practices is positively associated with plant operational performance through achieved integration between MAs and operation managers.

Figure 4.1 Model and Hypotheses

Data Collection and Preparation

A convenience sampling strategy was used to generate participation in this study. Data were collected using an online survey through Qualtrics from June 2021 to September 2021. Data was exported directly from Qualtrics to Excel and IBM SPSS Statistics for analysis.

A preliminary screening of the data was conducted for fictitious responses from bot activity, accurate reflection of participant responses, outliers, and any issues with missing data. Additionally, data was screened to ensure internal consistency and that it met important assumptions before the researcher proceeded with inferential analysis. Following are the results of these analyses.

Sample Size and Demographics

The sample size was 52. Based on an *a priori* power analysis, using G*Power 3.1.97, the target sample size was 77 participants to achieve 80% power. There were 143 total responses to the survey. However, 61 responses remained after the researcher removed fictitious responses from a web robot. A further review for unreasonable and logically inconsistent responses and missing data revealed 9 additional responses that needed to be removed, leaving 52 usable responses for this study. The survey had a 4% response rate considering the surveys that were removed. A frequency analysis was conducted on all nominal demographic questions. There were no significant outliers or any other concerns to highlight.

Participant demographics. Participants that currently worked in or retired from a position in the accounting/finance function of their organization represented 59.6% of total participants in the study, while 40.4% worked in or retired from manufacturing operations. As Table 4.1 presents, 35% of the participants were male with most participants being Caucasian. All age ranges were represented in the study, however 60% of the participants were middle age between 35-54 years old. 98% of the participants had management experience, with 46% having between 11-45 years of management experience.

Table 4.1

Participant Demographics

Variable	Category	Frequency	Percentage
Gender	Male	35	67
	Female	17	33
	Total	52	100%
Age	18-24	1	2
	25-34	9	17

	35-44	19	37
	45-54	12	23
	55-64	7	13
	Over 64	4	8
	Total	52	100%
Ethnicity	Caucasian	40	77
	Black or African American	4	8
	Hispanic, Latino, or Spanish	2	4
	Asian	3	6
	Native American	2	4
	Middle Eastern or North African	1	2
	Total	52	100%
Management Experience	Up to 3 years	8	15
	4-6 years	9	17
	7-10 years	10	19
	11-22 years	12	23
	23-45 years	12	23
	None	1	2
	Total	52	100%

Table 4.2 shows the demographics for the companies represented in this study. Most of the participants worked at manufacturing companies that were private. Based on the average sales over the last three years and the number of employees at each company, most of the companies were mid to large, in size. 65% of the participants perceived their company to have more of a hierarchical organizational structure and 90% perceived their company to use a lean manufacturing strategy to some degree.

Table 4.2

Company Demographics

Variable	Category	Frequency	Percentage
Legal Status	Public	24	46
	Private	28	54
	Total	52	100%
Average Sales (3 years)	$1M to $50M	26	50
	$51M to $1B	14	27

	Over $1B	12	23
	Total	52	100%
Employees	10-49	4	8
	50-499	22	42
	500-999	10	19
	1000-1499	1	2
	1500 or more	15	29
	Total	52	100%
Complexity	Hierarchical	34	65
	Neither or Neutral	5	10
	Flat	13	25
	Total	52	100%
Use of Lean Manufacturing	No Lean Manufacturing	2	4
	Some Use of Lean Manufacturing	9	17
	Use of Lean Manufacturing	38	73
	Don't Know	3	6
	Total	52	100%

Table 4.3 shows the demographics for the single plant that each participant used as the basis of their answers throughout the survey. Manufacturing facilities of all age ranges were represented in the study, however most of them were between 21-40 years old. The plants were mostly located in the Midwest and Southern states and a wide variety of industries were represented.

Table 4.3

Manufacturing Plant Demographics

Variable	Category	Frequency	Percentage
Plant Age	Less than 2 years	2	4
	3-10 years	11	21
	11-20 years	14	27
	21-40 years	9	17
	Over 40 years	16	31
	Total	52	100%
Plant	Midwest	18	35

Location	Northeast	9	17
	South	18	35
	West	1	2
	Puerto Rico or other US Territory	1	2
	Other	5	10
	Total	52	100%
Plant Industry	Clothing Apparel & Textiles	4	8
	Computers & Electronics	12	23
	Food & Beverage	6	12
	Machinery	4	8
	Metal	3	6
	Paper, Leather, Wood	3	6
	Petroleum, Chemicals, Plastics	4	8
	Transportation	4	8
	Other	12	23
	Total	52	100%

Reliability Analysis

Multi-item scales were used to measure the four main variables. Each scale was established and used in prior studies; therefore, factor analysis was not conducted to establish validity of the scales. However, each scale was checked for internal consistency using Cronbach's alpha. All items under .8 were reviewed for potential removal (Meyers et. al., 2017). One item being used for plant performance was removed. The item was related to the change in plant capacity over the last 3 years. The Cronbach alpha for this scale went from .716 to .747 after the removal. This item was not included in this measure in prior studies and was added by the researcher to determine if it would relate, therefore its removal was reasonable. Overall, all variables had items with a Cronbach Alpha within an acceptable range of .7 to .8 (Creswell & Creswell, 2018). Table 4.4 provides the results of the reliability analysis for each variable. Additionally, the item-total statistics for each variable can be found in Appendix B. Since all variables had sufficient reliability, the respective Likert-type items were combined into a single

composite score using the mean for each of the four main variables to be used in further analyses.

Table 4.4

Reliability Analysis

Variable	Cronbach's Alpha	Cronbach's Alpha based on Standardized Items	N of items
Participating in Strategic Management Decision-Making (PSMD)	0.858	0.858	12
Achieved Integration (AI)	0.872	0.873	6
Plant Operational Performance (PP)	0.747	0.761	7
Use of Lean Accounting (LA)	0.769	0.792	16

Data Screening

Data was screened for univariate and multivariate outliers, normality, and linearity. Additionally, the data was screened to ensure it met the assumptions for multiple regression which are homoscedasticity, normally distributed residuals, independence of errors, and no multicollinearity (Meyers et. al, 2017). There were no missing data for the main four variables and the initial sample size was N = 52.

Outlier detection. Statistical and graphical approaches were used to detect univariate and multivariate outliers. Z-scores and box plots were used to examine the data for univariate outliers. Based on Meyers et al. (2017) a z-score cutoff of 2.50 for extreme cases was used. Three potential outliers were detected. One for PSMD, with a value of 2.68; the second for AI with a value of 2.84; and the third for LA, with a value of 3.37. No outliers were detected for PP. Box plots revealed the same results, except they did not indicate a potential outlier for PSMD.

Multivariate outliers were examined using Mahalanobis distances, with a cutoff of 18.467 based on 4 df at p<.001. Mahalanobis distances indicates whether observations among all combinations of variables are reasonably distributed (Meyer et al., 2017). One case exceeded the value, with a value of 19.61. This was the same potential outlier for LA found in the examination for univariate outliers. The Q-Q plot of Mahalanobis distances revealed that the data was not perfectly multivariate normal but reasonably normal. When the outlier for AI and LA was removed, the Q-Q plot of Mahalanobis distances slightly changed for the worse. After further examination of the potential outliers, it was concluded that the outliers were legitimate observations despite their extreme values. No cases were removed; therefore, the final sample size was N=52.

Variable descriptive statistics. Descriptive statistics were used to examine the four main variables. As illustrated in Table 4.5, none of the variables showed a high level of skewness or kurtosis exceeding the cutoffs of +/- 1.00 (Meyers et al., 2017). Specifically, the skewness values ranged from -.258 to -.718 and the kurtosis ranged from –.677 to .971, indicating that these variables were likely to be normally distributed.

Table 4.5

Descriptive statistics for Main Variables

		PSMD	AI	PP	LA
N	Valid	52	52	52	52
	Missing	0	0	0	0
Mean		5.0016	4.8878	4.4148	4.9639

Std. Deviation	.74691	1.01713	.91768	.74922
Skewness	-.258	-.794	-.269	-.718
Std. Error of Skewness	.330	.330	.330	.330
Kurtosis	-.393	.598	-.677	.971
Std. Error of Kurtosis	.650	.650	.650	.650
Minimum	3.00	2.00	2.29	2.44
Maximum	6.33	6.50	5.86	6.31

Assumption testing. There are a few requirements and assumptions that must be met to perform regression analysis and interpret its results accurately. The analysis requires continuous variables and assumes the variables are linear and the data is normally distributed (Hayes, 2022, Meyers et. al, 2017). Additionally, multiple regression assumes that there is no multicollinearity, homoscedasticity, and independence of observation (Hayes, 2022, Meyers et al., 2017). Multicollinearity exists when more than two of the predictor variables are too strongly correlated (Meyers et al., 2017). Collinearity is when two predictor variables are too strongly correlated (Meyers et al., 2017). Collinearity and multicollinearity both can distort the results of a regression analysis and cause issues determining which variable contributes to a variance. Homoscedasticity or homogeneity of variance is when the dependent variables in a data set spread equally across the range of independent variables and typically does not exist when data fails to meet the normality assumption (Meyer et al., 2017). Independence of observation implies that all individual cases in a sample are independent of each other (Meyer et al., 2017).

Normality was assessed using a Shapiro Wilks test, which is used for sample sizes between 50 and 100 (Meyer et. al., 2017). The results of the Shapiro Wilks test, illustrated in Table 4.6 below, are not significant indicating that the data does not deviate

from a normal distribution. The results of this examination were that the variables met the normality assumption.

Table 4.6

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PSMD	.116	52	.077	.969	52	.184
AI	.102	52	.200*	.951	52	.033
PP	.089	52	.200*	.965	52	.131
LA	.124	52	.046	.950	52	.030

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

To assess linearity, the shapes of bivariate scatterplots were examined. The scatter plot matrix output of the four continuous variables is displayed in Figure 4.2. There appeared to be enough linearity in the relationships for most variables to proceed with analysis. However, it appears that there is no linear relationship between AI and PP. It also appears that PSMD and LA have a stronger linear relationship.

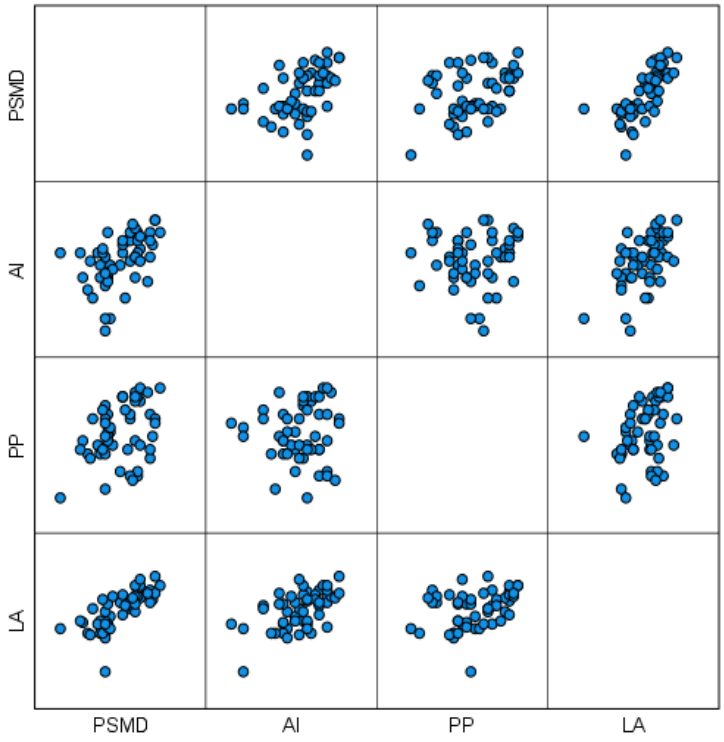


Figure 4.2 Variable Scatter Matrix

Pearson correlation coefficients were calculated and used to examine the strength of the linear relationship between all the main variables and to ensure that there was no multicollinearity. The results are summarized in Table 4.7.

Most of the variables had a moderate but significant correlation. A moderate positive correlation was found ($r(50) = .485$, $p<.001$) between PSMD and AI, indicating a significant linear relationship between the two variables. A moderate positive correlation was found ($r(50) = .362$, $p<.001$) between PSMD and PP, indicating a significant linear relationship between the two variables. A moderate positive correlation was found ($r(50) = .567$, $p<.001$) between AI and LA, indicating a significant linear relationship between the two variables. A moderate positive correlation was found ($r(50) = .334$, $p<.001$) between PP and LA, indicating a significant linear relationship between the two variables.

Table 4.7

Pearson Correlations

		LA	PP	AI	PSMD
LA	Pearson Correlation	1	.334*	.567**	.740**
	Sig. (2-tailed)		.015	.000	.000
	N	52	52	52	52
PP	Pearson Correlation	.334*	1	.034	.362**
	Sig. (2-tailed)	.015		.812	.008
	N	52	52	52	52
AI	Pearson Correlation	.567**	.034	1	.485**
	Sig. (2-tailed)	.000	.812		.000
	N	52	52	52	52
PSMD	Pearson Correlation	.740**	.362**	.485**	1
	Sig. (2-tailed)	.000	.008	.000	
	N	52	52	52	52

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

There was one weak and one strong correlation found among these variables. A weak correlation was found ($r(50) = .034$, $p>.05$) between AI and PP, indicating that these two variables are not related. A strong positive correlation was found ($r(50) = .740$, $p<.001$) between PSMD and LA, indicating a significant linear relationship between the two variables. Two predictor variables correlated in the middle .7's or higher indicate possible collinearity (Meyers et al., 2017), which does not meet the assumption of regression analysis. Since the relationship between PSMD and LA was close to the mid-point additional tests were conducted to ensure the variables were not in violation of the assumption. A variance inflation factor (VIF) and tolerance amount were used to assess collinearity between the two variables statistics. The rules of thumb for indicating a possible collinearity problem are VIF values greater than 2.5 and tolerance values less

than .40 (Meyers et al., 2017, p. 190). The results are listed in Table 4.8 and indicate that there is an absence of collinearity based on these rules of thumb.

Table 4.8

Collinearity statistics for LA and PSMD

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.338	.476		2.813	.007		
	LA	.738	.095	.740	7.787	.000	1.000	1.000

a. Dependent Variable: PSDM

Based on the results of the preliminary analysis of linearity, normality, and multicollinearity, it was reasonable to assume that there would be no violations of the homoscedasticity and normality of residuals assumptions. However, an examination of plots of standardized residuals against standardized predicted values was done, as part of the regression analyses, to confirm our assumptions and ensure independence of observations.

Results of Hypotheses Testing

Hypotheses testing for this study was completed using regression analysis. All assumptions were met for the methods used, as described above. The results are presented in the following paragraphs.

H1. Greater MA participation in strategic decision-making processes is positively associated with achieved integration between management accountants and operations managers.

PSMD was used to predict AI using a simple linear regression. Homoscedasticity, normality of residuals assumptions, and independence of observation were confirmed by examining plots of standardized residuals against standardized predicted values and a normal P-P plot. A statistically significant degree of prediction was obtained, $F(1, 50) = 15.340$, $p<.001$, with $r^2 = .235$, adjusted $r^2 = .219$. The standardized regression coefficient was .485 (SE=.168), the raw regression coefficient was .660, and the intercept was 1.588. PSMD was a positive predictor of AI and explained almost a quarter of the variance of AI. Therefore, the hypothesis was supported.

H2a. Greater use of LA practices is positively associated with greater MA participation in strategic decision-making processes.

LA was used to predict PSDM using simple linear regression. The result of the calculated Pearson correlation discussed above indicated that LA and PSDM was strongly correlated. Their correlation was slightly less than .75, however as described above the inflation factor (VIF) and tolerance amount for these variables indicated no collinearity issues. Homoscedasticity, normality of residuals, and independence of observation assumptions were confirmed by examining plots of standardized residuals against standardized predicted values and a normal P-P plot. A statistically significant degree of prediction was obtained, ($F(1, 50)=15.593$, $p<.001$), with $r^2 = .548$, adjusted $r^2 = .539$. The standardized regression coefficient was .740 (SE=.095), the raw regression coefficient was .738, and the intercept was 1.338. LA was a positive predictor of PSDM

and explained over half of the variance of PSDM. Therefore, the hypothesis was supported.

H2b. Greater use of LA practices is positively associated with higher levels of achieved integration between management accountants and operations managers.

LA was used to predict AI using simple linear regression. The result of the calculated Pearson correlation discussed above indicated that LA and AI were correlated. Homoscedasticity, normality of residuals, and independence of observation assumptions were confirmed by examining plots of standardized residuals against standardized predicted values and a normal P-P plot. A statistically significant degree of prediction was obtained, ($F(1, 50)=16.936$, $p<.001$), with $r^2 = .321$, adjusted $r^2 = .307$. The standardized regression coefficient was .567 (SE=.158), the raw regression coefficient was .769, and the intercept was 1.070. LA was a positive predictor of AI and explained over a quarter of the variance of AI. Therefore, the hypothesis was supported.

H2c. Participation in strategic management decision making together with the use of LA practices is positively associated with higher levels of achieved integration between management accountants and operations managers than through participation in strategic management decision making alone.

The Hayes's (2018) PROCESS Macro V.4 was used to examine whether the relationship between PSMD and AI was moderated by LA. Process model 1 was used for the analysis. The model containing PSMD and LA and the interaction explained a significant proportion of variance in AI ($r^2 = .3528$; $F(3, 48)=8.7211$, $p<.001$). When the interaction between LA and PSDM was included in the model, it became non-significant ($\beta =.369$, $p = .2034$). This model explained a non-significant proportion of variance

above the model with only the main effects ($\Delta r^2 = .022$; $\Delta F(1,48) = 1.6626$, $p = .203$). Thus, this hypothesis was not supported.

H3a. Greater use of LA practices is positively associated with plant operational performance through MA's participation in strategic decision-making.

The Hayes's (2018) PROCESS Macro V.4 was used to examine whether the relationship between LA and PP were mediated by PSDM. Process model 4 was used for the analysis. LA was positively and significantly related to PSMD ($b = .738$, $p<.001$). The relationship between LA and PP (the direct effect) was positive but not significant ($b = .1784$, $p=.463$) and the same results for when the model was adjusted for the effects of PSMD, as the potential mediator ($b=.313$, $p=.2023$). Therefore, this hypothesis was not supported.

H3b. Greater use of LA practices is positively associated with plant operational performance through achieved integration between MAs and operation managers.

Although the mediation analysis conducted for H3a above provides evidence of a direct link between LA and PP, the Pearson correlation calculation above indicates no evidence of a linear relationship between AI and PP. Mediation can only occur if the potential mediator AI is related to the outcome variable PP. Additionally, a linear relationship must be present to meet regression assumptions. Therefore, no further testing and analysis was conducted. This hypothesis was not supported.

Supplemental Analysis Findings

Supplemental analyses were done to ensure that there were no differences in responses among MAs and operations managers and to further explore the relationship between LA, PSDM, and AI.

Management accountants vs. operations managers. An Independent Samples t-test was conducted to analyze for differences between responses by the 31 participants that were management accountants and the 21 participants that were in operations management. An independent-samples t-test was calculated comparing each variable's mean score of participants who did not identify themselves as a management accountant. No significant difference was found for the variable PSMD ($t(50) = -1.093$, $p > .05$). No significant difference was found for the variable AI ($t(50) = 1.493$, $p > .05$). No significant difference was found for the variable PP ($t(50) = -1.469$, $p > .05$). No significant difference was found for the variable LA ($t(50) = -.260$, $p > .05$). This investigation revealed no significant differences in means between the responses of accountants and operations managers, which is different than what was suspected.

AI as the moderator. The findings in this study lead to further analysis to determine if AI had any impact on the relationship between LA and PSDM. The strongest correlation among the variables in this study was found between LA and PSDM. However, this study did not find evidence that LA along with PSDM would have a stronger impact on AI. Researchers have asserted in prior literature that MAs may initiate more strategic accounting innovations, like LA practices, when they have more motive or feel more pressured to add value to the strategic decision-making process (Cadez and Guilding, 2008). With the connection between PSDM and AI found in this study, it seemed very likely that MAs may have more motive or feel more pressured to add value when they have integrated with operations management. Based on these findings and prior literature, it was possible that AI had more of an impact on the strength of the relationship between LA and PSDM, than what we had considered to explore initially.

The Hayes's (2018) PROCESS Macro V.4 was used to examine whether the relationship between LA and PSDM was moderated by AI. Process model 1 was used for the analysis. The model containing LA and AI explained a significant proportion of variance in PSDM (r^2 = .663; (F(3, 48)=31.5151, p<.001). When the interaction between LA and AI was included in the model, it remained significant (β =.2683, p <.001). This model explained a significant proportion of variance above the model with only the main effects (ΔR2 = .11; ΔF(1,48) = 15.5317, p < .001). Thus, AI significantly moderated the relationship between LA and PSDM. Simple slopes were examined to better understand the form of the interaction between the variables. The form of the interaction is shown in the plot in Figure 4.3. At low levels of AI (i.e. 1 SD below the mean) the relationship between LA and PSMD is significant (b=.498, p<.01). At high levels of AI (i.e. 1 SD above the mean), the relationship between LA and PSMD is significant (b=1.044, p<.01).

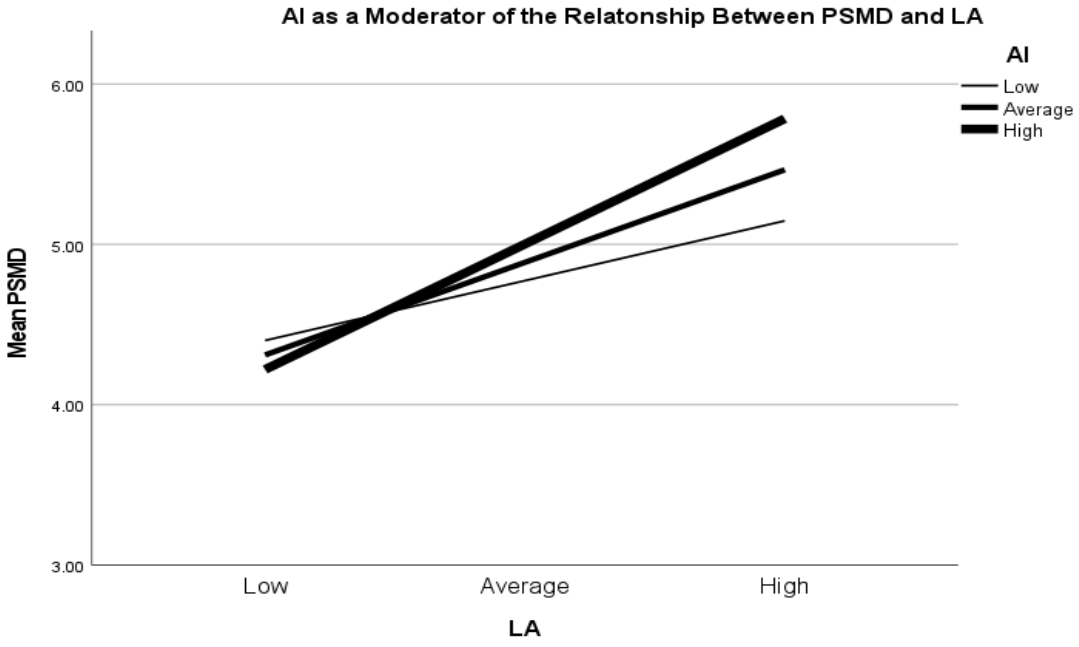


Figure 4.3 AI as a moderator of the relationship between PSMD and LA

Chapter 5: Discussion

The primary purpose of this study was to examine the impacts of utilizing lean accounting (LA) practices on management accountants (MA) participation in strategic decision making, cross-functional integration between MAs and operations managers (AI), and operational performance (PP) in manufacturing companies that have adopted a lean manufacturing strategy. This chapter discusses the study's main findings and why these findings are important to both researchers and practitioners. Additionally, the chapter will discuss research limitations and how this research topic can be expanded in the future.

Discussion of Findings

This study found evidence that simply the use of LA practices related to MAs being more engaged in strategic decision making, cross-functional collaboration between MAs and operations managers, and operational performance. However, it found varying evidence of how these variables interacted with each other to ultimately impact MA's engagement in strategic decision making and operational performance. The hypotheses and new findings are summarized in the Table 5.1 and a discussion of these findings follows.

Table 5.1

Summary of Results

Hypothesis	Description	Findings
H1	PSDM positively associated with AI	Supported
H2a	LA positively associated with PSDM	Supported
H2b	LA positively associated with AI	Supported
H2c	PSDM and LA positively associated with higher levels of AI than PSDM alone	Not Supported
H3a	LA and PP are positively associated through PSDM	Not Supported
H3b	LA and PP are positively associated through AI	Not Supported
Supplemental Analysis	LA and PSDM are more positively associated with high levels of AI.	Supported

Participation in strategic decision making and cross-functional integration. This study found evidence that MAs more involved in strategic decision making related positively to more cross-functional integration or collaboration with operations managers, just as strategic management accounting and organizational integration literature suggested. Due to the technical nature of accounting, non-accountants in an organization depend on MAs to provide them with information that can be used to make decisions. However, participating in strategic decision-making processes involves more than just providing information to managers. It involves having an active role in identifying

problems and objectives, generating and evaluating options, and taking the necessary steps to put change into place (Woolridge & Floyd, 1990), all of which are opportunities for MAs to show their value as a strategic partner in their organization.

MAs establish themselves as a strategic partner in a manufacturing setting when they participate in strategic decision making and build and maintain a close relationship with operations managers. When MAs have established themselves as a strategic partner, it is likely that they are able to influence behaviors by providing insights, stimulating investigation, and supporting decisions; all of which may lead to improved decision quality among their cross-functional partners. It is possible that as MAs are more involved in these processes as a strategic partner, they build a closer relationship with their cross-functional partners that may lead to an achieved integration between the two functions.

LA's connection to strategic partnership and cross-functional integration. This study found that utilizing LA practices had a strong positive relationship with MAs participating in strategic decision-making and a moderate relationship with cross-functional integration, just as strategic management accounting literature suggested. However, it did not find evidence that utilizing LA along with participating in strategic decision making would have a stronger impact on cross functional integration.

This study focused on MA's involvement with four key lean accounting practices found in the most recent academic literature. These practices included value stream costing with its minimal allocations, real-time visual performance management used at the shop level, minimal inventory tracking, and simplified management accounting practices and continuous improvement within accounting. The strong connection between

LA and PSDM is reasonable considering LA practices provide forward looking and strategic information that MAs could use when participating in strategic decision making. However, it is likely that utilizing any of these specific practices themselves have zero impact on the ability of the MA to build a stronger relationship with operations managers. There could be other factors, such as the quality of information, that may contribute more to this integration and must be explored further. Management accounting service quality literature has placed greater emphasis on the technical quality of MA information, interactions with MAs, and reputational image among non-accountants (Fleischman et al., 2017). It is possible that these factors matter more than the accounting practices themselves. It is also possible that there are other accounting practices and techniques, not covered in this study, that are more useful in this cross-functional integration.

Interestingly, this study also found through a supplemental analysis that cross-functional integration between MAs and operations managers had more influence over the relationship between MAs utilizing LA practices and MAs participating in strategic decision. This leads us to conclude that at higher levels of cross-functional collaboration between management accountants and operations managers, utilizing LA practices becomes more prevalent. This finding aligns with assertions by other researchers in strategic management accounting literature. When MAs act as a strategic partner, they may feel more motivated or pressured to add value to the process and initiate more strategic accounting innovations (Cadez and Guilding, 2008), like LA practices.

LA and operational performance. This study was unable to find the reason for the indirect connection between LA and operational performance that is mentioned in prior studies. Although this study found that MAs utilizing LA practices and participating

in strategic decision making both separately related to operational performance, there was no evidence found that both variables may be related to operational performance through each other. Interestingly and contrary to prior studies, no evidence was found that cross-functional integration and operational performance were related. Therefore, these results indicated utilizing LA practices did not relate to operational performance through cross-functional integration.

The common operational performance indicators used in this study included improvements in the amount of scrap and rework, setup times, queue times, machine downtime, lot sizes, and cycle time. These indicators were used in past research on lean accounting practices and their impacts on operational and financial performance (Fullerton et al., 2013). It is very likely in many firms that operations management develop their own way of tracking and improving on these performance indicators without MAs being involved and without a strategic partnership with MAs. Although these indicators could have downstream impacts on manufacturing costs and profitability, they are not traditionally tracked in accounting, and this may be the case in the firms covered in this study.

The organizational integration literature presents differing evidence and opinions on the outcomes of integration on organizational effectiveness. Turkulainen & Ketokivi (2013) found that the outcomes of integration are contingent upon an organization's complexity. Specifically, the authors found that integration has more positive outcomes on organizational effectiveness under conditions of higher organizational and task complexity and therefore claim that this may explain the mixed outcomes in the literature (Turkulainen & Ketokivi, 2013). Therefore, this could be the reason that cross-functional

integration between MAs and operations managers in this study had no relation to operational performance and should be further explored.

Implications for Research

Our findings connected three literature streams while establishing the relationship between utilizing LA practices, MAs participating in strategic decision making, and cross-functional integration between MAs and operations managers. The combined concepts in this study were from literature streams that consisted of organizational integration, strategic management accounting, and lean accounting. Additionally, the findings expanded on areas of study that have had very limited empirical research in the past.

There are very few studies that explicitly study how management accountants work with other functional groups, specifically operations management in lean manufacturing environments. Additionally, there is limited knowledge on the role that the management accounting function plays in organizational integration and the mechanisms for achieved integration, specifically in a lean manufacturing environment. This study contributed to organizational integration literature by showing that PSDM could possibly serve as a mechanism for achieved integration in a lean manufacturing environment and provided evidence of how management accountants contribute to organizational integration by being a strategic partner. Future studies should compare how management accountants contribute to organizational integration in other contexts and other potential mechanisms for integration between management accountants and operations managers.

There is limited research on the MAs role in the strategic decision-making process and what an effective strategic partnership entails. Much of the published research

claiming that MAs should form strategic partnerships are conceptual but not well-defined and the concepts have not been empirically tested. This study dived a little deeper into the concept and found that utilizing LA related positively to this strategic partnership and even more so when integration among MAs and operations management has taken place. Future studies should investigate other strategic relationships among management accountants within an organization.

Although SMA has been studied for decades, most of the studies focus on executive characteristics (Pavlatos & Kostakis, 2018), firm attributes and external environments (Cadez & Guilding, 2008; Cescon et al., 2019) that affect the adoption and use of SMA, with little empirical research on how SMA techniques are applied in firms. In this study, LA was considered a form of SMA. There is very limited empirical research on LA. In fact, Danese, et al. (2018) found in a systematic literature review on recent lean research that there is a need to clarify and conceptualize processes such as LA. This study contributed to SMA and LA literature by highlighting LA as a SMA technique and finding evidence of its relationship with MA's participation in strategic decision making. Future studies should explore more deeply LA practices individually to determine how each practice specifically impacts the relationship with MA's strategic partnerships. This study was unable to establish a connection between AI and PP and determine how LA relates to PP, so future research should further investigate these variables.

Implications for Practice

Today, practitioners must ensure they are establishing themselves as strategic partners to remain valuable to their organization. The increase in technological advances,

such as automation and artificial intelligence, have continued to transform the nature of management accounting. This transformation has even led many to think that MAs could become obsolete (Hopper & Bui, 2016; Lawson & White, 2018; Nixon & Burns, 2012), as the more traditional mundane accounting tasks are being increasingly automated. Practitioner and academic literature suggest that for management accountants to remain relevant and add value to the organization, they must serve more as business partners and strategic advisors to their cross functional peers (Paul & Cokins, 2020; Pickering, & Byrnes, 2016). However, practitioner literature and operations academic research often criticize MAs for not updating their accounting processes to align with changes in manufacturing, specifically changes that implement a lean manufacturing culture or process (Cunningham et al., 2011; Curry & Curry, 2019; 2018; Fullerton, et al., 2014; Jackson, 2019).

A practitioner's inability to provide useful, relevant, and timely information to operations managers and help make key decisions could hinder them from fulfilling their role as a strategic partner and contributing to organizational integration. It is important for practitioners to identify what tools would be helpful to fulfil the strategic partner role. This study showed that LA practices, such as value stream costing with its minimal allocations, real-time visual performance management used at the shop level, minimal inventory tracking, and simplified management accounting practices and continuous improvement within accounting, could be areas in which practitioners could use to establish and/or enhance their strategic partnership with operations management.

Limitations & Future Directions

This study sought participants from the population of accountants and operations managers in a manufacturing setting and used a convenience sample. Although many steps were taken to obtain greater participation, the response rate and sample size were low. In survey research, low response rates present the risk of yielding biased results (Bryman, 2012; Creswell & Creswell, 2018). Future research should consider expanding the scope of this research to more than just the manufacturing environment. This could potentially increase the participation level and sample size allowing for the findings to be applied to the broader population.

Secondly, the survey design in this study was convenient for both researcher and participant, however this methodology assumes that participants interpret the survey questions in the same way. Additionally, with its cross-sectional design, this study could not establish causal relationships between its key variables. Future studies should consider a longitudinal or experimental design to determine how MA's strategic partnerships are formed or the direct impacts of LA. A qualitative design should also be considered to facilitate interaction between the researcher and participants that would allow for more interpretation and a deeper contextual understanding of the MA strategic partnership and LA practices.

This study fills several gaps in the existing accounting and organizational management literatures, however there are several questions that should be explored. Future studies should consider narrowing in on specific LA practices to understand which are most useful in certain contexts and which have greater impacts on MA's strategic partnerships. Additionally, it would be interesting to find if any of the LA practices have

impacts on other strategic partnerships, such as marketing management, that MAs may have within their company. More research on the impacts LA practices have on operational and financial performance would be useful.

General Conclusions

The results of this study provide evidence that using LA practices have a positive relationship on MAs participating in strategic decision making and the cross-functional collaboration or integration between MAs and operations managers. This study is important because prior literature urges MAs to become more of a strategic partner to their cross-functional peers to remain valuable in today's organization. Thus, accounting managers must identify tools and practices that would help them to continue to build cross-functional relationships and do more than provide historical information. The results of this study provide evidence that utilizing LA practices may be helpful to managers who are interested in establishing or enhancing their strategic partnerships within their organization.

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Appendix A: Survey

Part A: Personal Background

1. What gender do you identify as?
   A. Male
   B. Female
   C. Other _____

2. What is your age?
   A. 18 - 24 years old
   B. 25 - 34 years old
   C. 35 - 44 years old
   D. 45 – 54 years old
   E. 44 - 64 years old
   F. Above 64 years old

3. What is your ethnicity:
   A. Caucasian
   B. Black or African - American
   C. Hispanic, Latino, or Spanish Origin
   D. Asian
   E. Native American
   F. Middle Eastern or North African
   G. Native Hawaiian or Pacific Islander
   H. Other _____

4. Specify your highest education level:
   A. Associates Degree
   B. Bachelor's Degree
   C. Master's Degree
   D. Doctorate's Degree

5. Specify the number of years of your management experience?
   A. 0-3 years
   B. 4-6 years
   C. 7-10 years
   D. 22-45 years

6. Specify the number of years of your experience working in the manufacturing industry?
   E. 0-3 years
   F. 4-6 years
   G. 7-10 years
   H. 22-45 years
   I. Above 45 years

7. Select all accounting/finance related designations that you hold
   A. Certified Public Accountant (CPA)
   B. Certified Management Accountant (CMA)
   C. Enrolled Agent (EA)
   D. Other _____
   E. None

Part B: Company & Plant Background

Please answer the following demographic questions as it relates to your organization. If unemployed or retired, answer questions as it relates to your last organization.

1. Is your company US-based?
   A. Yes
   B. No

2. Company legal status
   A. Private
   B. Public

3. Company's average sales over the last 3 years
   A. Less than $4 Million
   B. $4 - $7.49 Million
   C. $7.5 – $9 Million
   D. $10 – $35.9 Million
   E. $36 - $99 Million
   F. Greater than $1 Billion

4. Company's average number of employees over the last 3 years
   A. Fewer than 10
   B. 10-49
   C. 50-499
   D. 500-999
   E. 1000-1499
   F. Above 1499

5. Your years of employment with the organization
   A. 0-3 years
   B. 4-6 years
   C. 7-10 years
   D. 22-45 years

6. Number of manufacturing plants (factories) in operation for your company?
   A. 1
   B. 2-4

C. 5-10
D. More than 10

7. Percentage of the total manufacturing plants (factories) in your company that your management accounting division oversees?
   A. Less than 15%
   B. 15-24%
   C. 25-49%
   D. 50-74%
   E. 75-89%
   F. 90-100%

8. Your current (or prior) level in the organization
   A. Sr. Accountant
   B. Supervisor
   C. Controller/Manager
   D. CFO/VP Finance
   E. Other _____

Please choose a **single manufacturing plant** in your organization that has adopted a lean manufacturing strategy and that your management accounting division regularly oversees. If unemployed or retired, choose a manufacturing plant from your last company within your reporting unit. Answer the following demographic questions as it relates to the manufacturing plant you select.

9. Location of the manufacturing plant
   A. Midwest—Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, North Dakota, South Dakota, Wisconsin
   B. Northeast—Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont
   C. South—Arkansas, Alabama, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia
   D. West—Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming
   E. Puerto Rico or other U.S. territories

10. Indicate which sector of the manufacturing industry to which the manufacturing plant belongs.
    A. Clothing Apparel & Textiles
    B. Computers & Electronics
    C. Food & Beverage
    D. Furniture
    E. Machinery
    F. Metal

G. Paper, Leather, Wood
H. Petroleum, Chemicals, Plastics
I. Printing
J. Tobacco
K. Transportation
L. Other _____

11. Average number of production employees over the last 3 years within the manufacturing plant
    A. 5-175
    B. 180-300
    C. 310-750
    D. 784-160,000
    E. Above 160,000

12. How many years has it been since the manufacturing plant was established?
    A. Less than 2 years
    B. 2-10 years
    C. 11-20 years
    D. 21-40 years
    E. Over 40 years

13. Indicate if your management accounting division operates daily onsite at the manufacturing facility?
    A. Yes
    B. No

14. Lean Manufacturing. To what extent has your facility implemented the following:

1-Not at all, 2- Very Rarely, 3- Rarely, 4- Neutral, 5- Some, 6- To a Considerable Degree,7- A Great Deal

A. Standardization
B. Manufacturing cells
C. Reduced setup times
D. Kanban system
E. One-piece flow
F. Reduced lot sizes
G. Reduced buffer inventories
H. 5S
I. Kaizen (Continuous Improvement)

Part C: Perceptions on Strategic Partnership & Integration between Management Accountants and Operations Managers – Please answer the questions in the following sections with reference to practices within your accounting department and the manufacturing plant you selected above.

Section A. Management Accountant's participation in strategic decision-making
Please use the following scale to answer the questions in this section:
1-Not at all, 2- Very Rarely, 3- Rarely, 4- Neutral, 5- Some, 6- To a Considerable Degree,7- A Great Deal

1. Indicate the extent to which you are involved in the following aspects of the plant's strategic management process:

A. Identifying problems and proposing objectives
B. Generating options
C. Evaluating options
D. Developing details about options
E. Taking the necessary actions to put strategic change into place

2. Are management accounting issues closely integrated with the business strategy of the plant?

3. Is the management accounting leadership at your firm a major contributor to business strategy at the plant?

4. Does management accounting leadership at your firm substantially influence the decision-making process of operations management/plant manager?

5. Does your firm exert concrete efforts to ensure that management accounting is compatible with the business strategy of the plant?

6. Do persons in other divisions in your firm recognize the management accounting division as an architect of change and as a major partner in business for the plant?

7. Does management accounting leadership in your firm appropriately support the achievement of plant level business strategy objectives?

Section B. Integration
Please use the following scale to answer the first two questions in this section:

1- **Strongly Disagree, 2- Moderately Disagree, 3- Slightly Disagree, 4- Neither agree or disagree, 5- Slightly Agree, 6- Moderately Agree, 7- Strongly Agree**

8. Achieved Integration – Please indicate your agreement to the following statements related to the management accounting and operations functions within your organization

A. The management accounting and operations functions in our plant are well integrated

B. Problems between the management accounting and operations functions are solved easily, in this plant
C. The management accounting and operations management coordination works well in our plant
D. The management accounting and operations management functions in our plant work well together
E. Our plant's management accounting and operations management functions coordinate their activities
F. Our plant's management accounting and operations functions work interactively with each other

9. Organizational complexity – Please indicate your agreement to the following statements related to your organization

A. Our organization structure is relatively flat
B. There are few levels in our organizational hierarchy
C. Our organization is very hierarchical
D. Our organizational chart has many levels

10. Task Complexity – Please indicate the importance of the following five organizational objectives to your plant using the following scale: **1= not at all important, 2=low importance, 3= slightly important, 4= neutral, 5 = moderately important; 6 = very important , 7 = Extremely important**

A. Low unit manufacturing costs
B. Conformance-to-specifications quality
C. Design flexibility
D. Volume flexibility
E. Rapid ramp-up for new products

Section C. Performance – Please use the following scale to answer the question in this section.
1- Significant Increase, 2- Moderate Increase, 3- Slight Increase, 4- no change, 5- Slight decrease, 6- Moderate decrease, 7- Significant decrease

11. Operations Performance – Please indicate how your facility's operations have changed over the last three years:

A. Scrap and rework
B. Machine setup times
C. Queue times and move times
D. Machine downtime
E. Lot sizes
F. Cycle time
G. Manufacturing cost
H. Capacity

Section D. Lean Accounting- Please use the following scale to answer the questions in this section.

1-Not at all, 2- Very Rarely, 3- Rarely, 4- Neutral, 5- Some, 6- To a Considerable Degree,7- A Great Deal

12. Visual Performance Measures – Please indicate your agreement to the following statements related to your management accounting system and processes
    A. Many performance measures are collected on the shop floor
    B. Performance metrics are aligned with operational goals
    C. Visual boards are used to share information
    D. Information on quality performance is readily available
    E. Charts showing defect rates are posted on the shop floor
    F. We have created a visual mode of organization
    G. Information on productivity is readily available
    H. Quality data are displayed at workstations

13. Value Stream Costing – Please indicate the extent to which your facility uses value stream costing. Value stream costing includes reporting costs and/or profitability by value stream or product family.

14. Simplified MA practices – Please indicate your agreement to the following statements related to your management accounting system:
    A. Our accounting system has been simplified in the past 3 years
    B. Our accounting closing process has been streamlined
    C. Our management accounting system supports our strategic initiatives
    D. Our accounting information system facilitates strategic decision making

15. Inventory tracking – Please indicate your agreement to the following statements related to your management accounting systems:
    A. Tracking inventories is an important accounting function
    B. Assigning accurate overhead costs to product is critical
    C. Assigning labor costs to inventory is critical

16. Are there any other lean tools or processes that are performed in your accounting department to improve accounting processes, procedures, and reporting?

17. Please check the box next to all activities which are within your management accounting division responsibility as it relates to the plant chosen above:
    A. Collecting, coding, or analyzing product-cost information from financial transactions
    B. Developing product cost standards
    C. Reporting the cost of production
    D. Valuing inventory in financial accounts
    E. Administering the annual planning and budget cycle

F. Developing and populating budget templates
G. Consolidating divisional budgets into an enterprise-wide version
H. Producing monthly management reports
I. Comparison and analysis of monthly performance against budget
J. Identification of variances against standard costs
K. Researching and reporting variances against budget and standards
L. Performing ad hoc financial analysis to support operational manager and senior executive decision making
M. Assisting with change projects, such as the implementation of new systems or the development of new products.
N. Accounts Payable
O. Accounts Receivable

18. Do we have permission to contact you to follow-up with questions on your responses? Yes or No