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THE IMPORTANCE OF MANAGEMENT ACCOUNTING IN SUPPLY CHAIN MANAGEMENT – THEORETICAL FRAMEWORK AND IMPLEMENTATION OPPORTUNITIES

Abstract: Environmental, social and corporate responsibility are concepts that have received significant attention over the past three decades by researchers and practitioners. The globalized, digitized and changing business environment encourages both the private and public sector to focus on supply chains (SC) and supply chain management (SCM) in the context of sustainable and responsible business. The role of accounting, especially management accounting (MA), in considering this problem is unavoidable. Costing, planning, control techniques and tools have mostly paid attention to supply chain management but have proven to be incomplete. The need to extend cost accounting through the value chain beyond the observed organization and connect it with the organization's suppliers and customers indicates that traditional management accounting must evolve. The subject of the paper are new techniques of modern management accounting in the service of SCM, their theoretical postulates as well as possibilities for practical application. Special attention is paid to the possibility to develop MA techniques and tools that will be useful to non-accountants who most often, in practice, deal with SCM issues. The aim of the paper is to point out the connection between MA and SC through consideration of internal and external supply chain activities, but also research on the connection of SC with costs, performance, lean production and global effectiveness and flexibility of the organization. The intention of the work is to point out the possibilities of practical implementation with a special emphasis on good practices of improving SC and SCM through MA techniques.

Keywords: supply chain (SC), supply chain management (SCM), management accounting (MA), costing, sustainable business

1. INTRODUCTION

Management accounting (MA) functions as a critical component of supply chain management (SCM) in today's data-driven global business environment (Almatarneh et al., 2022). The requirement for businesses to optimize operations while cutting costs and adopting sustainable strategies makes the use of innovative management accounting techniques essential for competitive advantage. Management accounting delivers critical tools to improve decision-making

processes while boosting supply chain performance and providing cost control measures to enhance efficiency throughout supply networks (Bhimani et al., 2021; Weygandt et al., 2020).
Globalization combined with technological advancements and shifts in consumer behavior have made supply chains more complex and exposed traditional SCM practices' limitations. Traditional supply chain methods prove inadequate when it comes to cost optimization and real-time decision making as well as sustainability according to Chopra (2019). Advanced MA techniques must be adopted to provide deeper insights into cost structures and ensure supply chain operations support business goals while promoting sustainability (Hugos, 2018; Voss et al., 2002).
In addition, a greater focus on environmental, social responsibility and corporate governance (ESG) criteria complicates supply chain operations. Effective SSCM demands advanced cost accounting methods that make use of MA tools to achieve both sustainability and profitability goals (Sarkis, 2019; Marota et al., 2017). Organizations need activity-based accounting (ABC), Lean accounting and total cost of ownership (TCO) methods to achieve transparent and accountable cost views of their supply chain activities (Garrison et al., 2020; Kaplan & Cooper, 1998).
The work seeks to explore the foundational theories of managerial accounting within SCM while assessing how current managerial accounting methods can optimize supply chain operations to enhance performance (Chandak et al., 2019) maintain cost control and reach sustainability targets in a constantly changing international market. The paper will also indicate good practices and case studies that illustrate the successful implementation of MA tools in SCM, providing guidelines for improving business processes and achieving competitive advantage. The method delivers an all-inclusive view of how managerial accounting functions in supply chain management while offering theoretical and practical advice to enhance business performance amid global market changes (Bhimani et al., 2021).

2. THEORETICAL FRAMEWORK

MA is a primary function inside organizations visited by data including their gathering, preparing, and examination, which is made to business choices. MA is used by managers for decision-making and strategic and operational planning, including, for example, budgeting, cost control, profitability assessment, and financial reporting. MA has unique features that allow managers to develop a comprehensive understanding of the economic situation in the organization, optimize business processes, and allocate resources most efficiently. In a rapidly changing global business landscape, when companies must be able to respond quickly and efficiently to fluctuations in market conditions, competitors, and developments in technology: MA is, therefore, critical (NovaBay Pharmaceuticals, Inc., 2015).
Production and logistics operations management and the acquisition of raw materials to end-users involves all activities required in the production and distribution of goods or services (Supply Chain Management-SCM). SCM is a core function for modern companies that harmoniously combines resources with market demand. Reducing operational costs, speeding up deliveries, and ensuring greater flexibility to market changes is possible based on supply chain optimization (Pérez-Pérez et al., 2019). Procurement, production, storage, distribution and logistics management are the basic elements of SCM (Chopra, 2019). At the same time, the alignment of social, economic and environmental goals of the company must be accompanied by sustainability (Chopra, 2019). In fact, the set of activities that provide effective coordination and management of the flow of materials, information and resources during all stages of the chain, while ensuring maximum value for customers and minimum total costs, is SCM (Mentzer et al., 2001). In order to keep pace with globalization, technological advances and meet the changing demands of consumers, organizations must constantly modify their supply chains.
Business practices based on sustainability and the application of ethical principles are one of the focuses of today's supply chains. Scarcity of resources, climate change and the protection of workers' rights, as global challenges that the organization constantly faces, have focused attention on the implementation of environmental, social and corporate responsibility (ESCR) (Pultrone, 2020). Consequently, organizations must integrate sustainability into their SCM strategies by applying the triple bottom line (TBL) concept. This means demonstrating success through social and environmental contribution, not just through financial performance.
Although traditional MA was primarily concerned with cost control, budgeting, and variance analysis within internal business processes, it proved insufficient to address the complex challenges of modern SCM. Standard MA practices do not consider external factors such as relationships with suppliers and customers, limiting their application in the modern business environment (Kaplan & Cooper, 1998). In order to increase efficiency in supply chain management, the application of accounting methods must apply, not only to the internal operations of the organization, but also to the entire value chain. This, at the same time, implies a focus on the costs and performance of the entire supply chain, because efficiency depends on the cooperation of all participants in the supply chain, and not only on the organization itself.
Traditional costing practices become insufficiently efficient for companies whose supply chains are often spread across different countries and involve multiple stakeholders. New techniques such as Total Cost of Ownership (TCO) (Ellram, 1995) and Life-Cycle Costing (LCC) (Horngren et al., 2018) are methods that take into account both internal and external factors, i.e., they appear as methods for estimating costs within the entire value chain. By applying these techniques, a more comprehensive view of costs is gained, which affects better decisions regarding the selection of suppliers, inventory management, and overall logistics.

Modern MA systems instill into the firms not only cost information but also generate facts about supply chain efficiency and efficacy. Key performance indicators and the Balanced Scorecard (Kaplan & Norton, 2000) are examples of tools that allow companies to monitor performance at various stages of the supply chain. Closely tied to SCM goals are the principles of lean production waste minimization or efficiency maximization (SuperfastCPA, n.d.) (identifying inefficiencies, optimizing inventory levels, and improving operations). ABC is yet another recent management accounting tool that helps in the more precise identification of costs by causally linking them with activities that induce inefficiency to pinpoint where improvements are needed (Kaplan & Cooper, 1998). The long-run success of any market depends on the prompt ability of the supply chain to respond and adjust to changes in the market, supply chain disruptions, and the dynamics of changing customer demands; therefore, flexibility is a key enabler for SCM (Kleosakul & Smutkupt, 2018). Balancing costs versus flexibility is the task of MA. Flexibility in budgeting, scenario planning, and forecasting empowers organizations to take agile decisions and prepare for potential changes in demand and supply (Pérez-Pérez et al., 2019). So modern MA refers to the integration of financial and non-financial information for better understanding of supply chain performance. Many benefits arise with integration of MA into SCM despite the integration being a difficult science. It allows companies, in the minutest detail, to identify pertinent cost points, focusing on activities yielding high returns on investments (Qube Buildings, n.d.).MA application within SCM decision-making is also important regarding sustainability since it provides companies with the information they need to weigh up financial and environmental objectives, thus allowing for a more coherent integration of economic goals with broader sustainability and social responsibility goals, which are now critical to long-term market competitiveness (Qube Buildings, n.d.).

All of these have become some or the most useful modern management accounting tools; indeed their control has become or is becoming mandatory in any organization dealing with SCM so that they can outline their sustainable operations.

3. IMPLEMENTATION OF MA TECHNIQUES IN SCM: OPPORTUNITIES AND CHALLENGES

Integrating MA into SCM, helps managers had better understand the supply chain's economic dynamics, reducing inefficiencies and increasing cost transparency (Ahi & Searcy, 2013). However, implementing MA in SCM is not without its challenges. One of the main problems is the resistance of organizations to change, especially when it comes to traditional accounting methods that have been the standard for a long time. Moving to more advanced techniques, can cause resistance from employees who are used to older systems (Oyewo et. al., 2022). In addition, appropriate training and development of managers' ability to use new tools and techniques in daily decision-making is needed. These obstacles can slow the implementation process and make it more expensive in the initial phase. However, research shows that organizations that successfully integrate MA into SCM significantly progress in cost optimization and performance improvement (Jeschonowsk et al., 2009).

In addition to the technical challenges, there is also a significant challenge in how organizations approach the application of MA in the context of sustainability (Ahi & Searcy, 2013). Companies face increasing pressures to integrate environmental, social, and governance factors into their business operations in today's business environment. MA is crucial in this transition, allowing organizations to precisely monitor the costs linked to sustainable practices, such as reducing carbon emissions, sourcing sustainably, and managing waste responsibly (Marota et al., 2017; Cadez & Guilding, 2017). Using techniques such as TCO, organizations can make better decisions about balancing economic and environmental goals, ensuring sustainability throughout the product life cycle (Garrison et al., 2020).

From a competitive perspective, organizations that have implemented MA in their SCM processes have seen improved flexibility and speed of response to changing market conditions (Fedoryshyn, 2024). For instance, by enhancing cost tracking and optimizing inventory, businesses can adapt faster to shifts in demand, lower their stock levels, cut storage expenses, and boost working capital (Voss et al., 2002).

After successfully implementing MA in SCM, organizations can achieve better synergy between their functions, as cost and performance information is more accessible to all sectors within the enterprise. Organizations can better align their business strategies with supply chain optimization strategies through better coordination between finance and operations teams. Although the integration of MA into SCM comes with specific challenges, the potential benefits of this process can be significant (Jeschonowsk et al., 2009). In addition to better cost management, companies can improve their performance, increase operational efficiency, and achieve long-term business sustainability, essential in the highly competitive and globalized business environment (Ahi & Searcy, 2013).

Applying best practices, relying on successful case studies and understanding their practical effects are necessary for the successful application of MA techniques in SCM. Companies that successfully integrate MA into their SCM processes can improve operational performance, reduce costs, and achieve sustainable business. However, to apply these techniques in practice, thorough planning, coordination with all participants in the supply chain, and continuous improvement are necessary. Recognizing the most effective practices for implementing MA techniques can enable the financial sustainability of the supply chain flexibility about market demands and compliance with the principles of sustainable development.

One of the best practices for successfully implementing MA in SCM is integrating collaboration between the accounting department and the supply chain, thereby achieving a better understanding of cost drivers, performance metrics, and operational challenges. By synchronizing financial goals with operational processes, companies achieve more efficient management of resources, reduce losses, and make better decisions. In addition, good communication supported by standard tools and platforms contributes to the transparency, availability, and usability of financial data for managers outside the financial sector, especially in procurement, production, and logistics. Such coordination contributes to better cost control, more stable operations, and better strategic decision-making (Flynn et al., 2010; Cao & Zhang, 2011).

The use of real-time data and advanced analytics are key implementation practices. In order to extract valuable insights customer demand, it is necessary to use advanced data analysis tools. They enable monitoring of key results, such as: inventory turnover, order fulfilment and transportation costs, in real time. Organizations that integrate advanced analytics into their MA frameworks can make faster, data-driven decisions that optimize supply chain operations and reduce costs. Implementing these practices helps identify inefficiencies and reduce waste, thus leading to more sustainable practices (Unsustainable Magazine, n.d.) in the supply chain (Marota et al., 2017; Bag et al., 2020).

One of the very effective tools for applying MA in SCM is Lean accounting, which focuses on simplifying financial reporting by the principles of lean production. The basis of this approach is the idea of eliminating waste in production and financial processes. For example, Lean accounting pinpoints inefficiencies occurring during the movement of goods and services within a supply chain, thus illuminating certain financial insight areas for resource maximization and cost reduction. Organizations can save on costs and optimize the entire supply chain by reducing non-value-adding activities. In essence, Lean aims at reducing costs associated with goods and services and enhancing supply chain performance. Lean accounting aims at identifying non-value-adding activities related to code processes in a supply chain and therefore unlocking financial insight opportunities for enhanced resource utilization and cost reduction. By the elimination of non-value-adding activities, companies reduce costs and embrace the greater efficiency of the entire supply chain. The particular utility of this approach is in industries where cost control and operational efficiency are critical, such as manufacturing and logistics (Figueira Alves et al., 2021; Hines et al., 2002).

Case studies provide valuable insights into the success of applying MA techniques to improve SCM. This represents an example of a multinational company in the electronics industry employing the activity-based costing (ABC) approach. ABC allowed this multinational company to assign costs accurately across its complicated global supply chain while coming to identify places where indirect service costs were excessively incurred. Concentrating on activities that account for a large part of total costs (Powell, n. d.), the optimization of processes ensured negotiation of better prices with suppliers and elimination of operational inefficiencies. It thus improved the pattern of cost management and created alignment with operational goals such that financial and operation objectives are more closely aligned, thereby resulting in better supply chain performance when combined with profitability (Duh et al., 2009; Cyplik & Uberman, 2016).

Another popular application case is TCO that was applicated into another global retail company. The company applied this analysis into understanding supplier relationships and costs of sourcing goods from a certain region (Roda et al., 2019). In so doing, the company was able to know how to select suppliers by including direct and indirect procurement costs like transportation, storage, and possible customs costs. This actually yielded enormous savings and the advantage of building resilience within the supply chain. TCO will thus be having a long-term relationship with suppliers, as the company definitely did better when negotiation the terms with suppliers, based on the deeper understanding of costs and value creation throughout the supply chain (Alfonso, 2013; Degraeve et. al., 2005).

Use of COQ in supply chain management brings the real-world effect of improvement of sustainability within the supply chain. A major study case of COQ implementation was that of a leading automobile manufacturer, which partially integrated COQ to assess the costs associated with quality management through its supply chain. The company discovered significant inefficiency in the quality assurance program used by several suppliers within the supply chain, which led to inconceivably high costs incurred on fixes and mistakes. The company wholly embraced COQ and worked closely with its suppliers to boost quality control, which resulted in decreased error rates and costs, while allowing for a more sustainable supply chain. The enhanced focus on quality also helped the company improve its reputation for delivering high-quality products, increasing customer satisfaction and loyalty (Alglawe et al., 2019).

There are multiple practical benefits of applying MA tools to improve SCM. Thus, Lean Accounting and ABC reveal the opportunities for cost reduction via accurate and detailed cost allocation, enabling better supplier selection, production scheduling, and inventory management decisions (Hofmann & Bosshard, 2017). In addition, companies can use tools such as TCO and COQ to improve long-term relationships with suppliers and promote sustainable business practices. MA tools enable the organization to balance cost reduction, quality improvement, and sustainability, thereby achieving cost efficiency and environmental responsibility for supply chains. In addition, integrating sustainability into MA practices helps align strategy with broader corporate social responsibility (CSR) goals, which is a priority in today's increasingly environmentally conscious marketplace (Nartey, 2024; Alfonso, 2013). The continued use of these tools is crucial for organizations that want to remain competitive and be ready to respond to the demands of modern supply chains.

4. DISCUSSION AND FUTURE RESEARCH

The main findings of this study emphasize the essential function of MA in improving cost efficiency, operational performance, and organizational flexibility within SCM (Taschner & Charifzadeh, 2023). Analysis of relevant literature and case studies shows that the application of advanced MA techniques, such as ABC and TCO, contributes to greater transparency and better resource management in the supply chain (Taschner & Charifzadeh, 2023). Also, research has confirmed that digitization and the use of big data analytics in MA enable more accurate cost forecasting and more effective real-time decision-making (Lee & Mangalaraj, 2022).

While the integration of MA and SCM offers substantial advantages, specific constraints of this study must be acknowledged (Hald & Thrane, 2015). One key limitation relates to data availability, as companies often face challenges in collecting and analyzing accounting information in complex supply chains (Wang et al., 2016). Another limitation may be reflected in the different levels of application of MA tools among industries, which makes it difficult to generalize the findings (Taschner & Charifzadeh, 2020).

Considering the mentioned limitations, future research in the field of MA and SCM should concentrate on several key directions. First, it is necessary to explore further the role of artificial intelligence and machine learning (MENA Report, 2022) in cost analysis and supply chain optimization (Sharma et al., 2022; Kokina & Davenport, 2017). Second, future studies could address the impact of sustainable business and environmental, social, governance (ESG) factors on accounting methods in SCM, with particular emphasis on long-term profitability and social responsibility (Dasinapa, 2024). Finally, further research is needed on how non-accountant managers can more effectively use MA tools in supply chain operational decision-making (Khan et al., 2018).

Further research on these aspects can contribute to the development of new theoretical frameworks and practical solutions that will facilitate the integration of MA in SCM and improve organizations' business strategies in an increasingly complex global environment.

5. CONCLUSION

This paper explores the key role of MA in improving SCM, with a particular emphasis on applying innovative MA techniques that optimize business performance. The research results show that the integration of MA in SCM can significantly contribute to reducing costs, increasing the flexibility of organizations, and improving overall business efficiency. Additionally, the importance of introducing sustainable business practices in SCM is emphasized, as well as the use of MA tools to monitor costs related to ESG factors, which are becoming crucial in the modern business environment (Eccles et al., 2014; Jamal et al., 2019).

The practical implications of this research highlight the necessity for further development of management accounting tools that empower managers—regardless of their accounting background—to effectively utilize accounting information for optimization and strategic decision-making within the supply chain. Expanding digital tools, such as artificial intelligence and machine learning, can further improve organizations' ability to analyze costs, identify key efficiencies, and make better real-time decisions (Sharma et al., 2022; Kokina & Davenport, 2017; Toorajipour et al., 2021).

The research underscores the need to better understand the link between MA and SCM, particularly in enhancing long-term profitability and sustainability (Rezaee, 2018; Negri et al., 2024). Given that ESG factors are increasingly recognized as key to strategic decision-making, this research suggests that attention should be paid to developing new MA tools that would enable more accurate measurement and reporting of the costs and performance associated with sustainable practices (Dasinapa, 2024; Krstić et al., 2024).

Future research should focus on further developing techniques that enable the integration of ESG factors into MA models and on analyzing the challenges of implementing these new methods in organizations facing dynamic global markets. Additionally, research should expand to study how new technological trends, such as blockchain and the Internet of Things (IoT), can be implemented in SCM and linked to accounting practices, allowing for better transparency and tracking of costs throughout the supply chain (Khan et al., 2018).

Implementing MA in SCM improves operational processes and is a key factor in achieving competitive advantages (Synytsia & Puzyrova, 2024) in todays globalized and technologically advanced business environment. Future research should explore the practical aspects of implementing MA tools in SMEs, which often have limited resources to implement complex accounting techniques.

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