

SUSTAINABLE ACTIVITY-BASED COSTING IN A SMALL FLEXIBLE
MANUFACTURING ENVIRONMENT

by

John Schlaack

Dissertation

Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

This qualitative study was written to expand the understanding of the potential sustainable use of activity-based costing in a small flexible manufacturing environment. The research was designed as a multiple-site case study, targeting two diverse small manufacturers in this market segment. Information was gathered to develop an understanding of how these firms cost their products, captured base manufacturing data, and the impact their leadership had on the management of costing processes. The information was gathered from documents received and observations on the shop floor at each participant site. In addition, participants from different functions either directly impacting or indirectly influencing the costing processes were interviewed at each site. The common theme at both locations was the minimal level of management accounting knowledge beyond the individuals directly tasked with the maintenance of the costing process. The other two topic themes discussed the way the firms collected production data. The interpretation of the findings by the researcher noted the strong influence of the market and profitability constructs on the leadership's openness to change. This study will assist practitioners in emphasizing the need to understand the corporate environment before initiating any costing process change. Further research on possible optimum organizational size for the initiation of developing complex costing processes was encouraged, as the need to gain more accurate data is balanced against the day-to-day operational demands of the manufacturer. In addition, the findings noted the need to expand management accounting knowledge outside the accounting function to assist firms in understanding the impact of their actions and the impacts of process improvement initiatives.

Key words: Flexible manufacturing, activity-based costing, management accounting.

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Approvals

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Dedication

I dedicate this doctoral dissertation to my wife, Lori Schlaack, who has been my partner for many years. She has encouraged me to continue with my education while being on the road those many days away from home. This is the cumulation of all these efforts and was only possible with her patience and support.

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Section 1: Foundation of the Study

The purpose of this study was to determine the feasibility of implementing and sustaining an activity-based costing (ABC) process in a small flexible manufacturing environment. Small flexible manufacturers require a detailed understanding of how their processes and the associated products are costed for inventory valuation and pricing (Vilakazi et al., 2020). This understanding is crucial for the development of pricing and product-mix strategies and the long-term profitability of the organizations. Nartey and van der Poll (2021) noted that though small organizations need to be competitive in the market, they frequently have limited exposure to advanced management accounting (MA) tools like ABC. The researcher in the present study sought to understand the existing costing processes at multiple small flexible manufacturers and explored the potential benefits that could be gained from implementing advanced costing processes. The study maintained a key focus on the sustainability of the processes by having the necessary MA information readily available.

Section 1 presents a detailed discussion of the purpose and structure of the project, including the background of the problem, problem statements (general and specific), the purpose statement, and a series of research questions. Next, the “Nature of the Study” section includes a discussion of research paradigms and the paradigm used in the study, along with a description of the diverse types of research designs and methods. The specific design and method the researcher has chosen for the study are provided, along with the rationale for these choices. The “Nature of the Study” section also includes discussions on the use of triangulation, which strengthened the reliability of the research findings. Following this is an outline of the conceptual framework that directed the research activities. The framework includes the concepts, theories, actors, and constructs that helped define how information and actions flow through the research

process. Additionally, Section 1 includes the definition of terms utilized, as well as the assumptions, limitations, and delimitations of the study. The “Significance of the Study” section outlines the need to reduce gaps in the professional and academic literature, the implications for Biblical integration, the benefits to business practice, and the relationship to the accounting cognate. Lastly, the study includes an outline of the professional and academic literature related to the research topic. The discussions in Section 1 give the reader a detailed understanding of the foundation of the study.

In Section 2, the researcher provides details on how the project was conducted, including the role of the researcher as the primary instrument to gather the necessary information to support the purpose of the study. The research methodology is described as a flexible design, specifically a multiple case study method. Data triangulation is highlighted as one way to strengthen the study’s verifiability and validity. The participants for the research were defined from the various functions that directly impact or indirectly influence the firm’s costing processes. A key concept outlined in this section is the use of member checking to validate the data collected and the researcher’s interpretations. The researcher developed an interview guide to help guide the interviews and minimize leading questions or influencing the participants’ responses. Lastly, this section explains how data was stored, analyzed, and presented.

In Section 3, the researcher presents the findings of the study, including an overview of how firms were selected, and participants were chosen. This section highlights the common themes discovered at each site and the theme that was common at both sites, and the researcher interprets the common themes. The data analysis is presented in the figures of the data flows and the product costing calculations. Then, the findings are related to the research questions, the conceptual framework, the literature review, and the research problem. This section also includes

information on how the study's findings apply to professional practice and provides recommendations for further study. Lastly, the researcher includes reflections on how the study added to their personal and professional growth and is integrated with a Christian worldview.

Background of the Problem

MA, specifically cost accounting, is a crucial business function used in organizational management. Uyer (2019) highlighted the features produced by MA systems, such as budgeting, sales analyses, product profitability analyses, cost of quality reporting, and customer profitability analyses. The outputs of costing processes are useful tools that assist firms in achieving strategic competitive advantage. To produce the outputs, detailed and accurate product costing information must be readily available. Accurate cost data assists with controlling the expenses incurred in the production of goods and services and allows for the development of strategic cost analyses and planning. Though the need for detailed costing information exists, many firms continue to cost their products in the traditional way of allocating expenses to products based on the units produced (Afonso et al., 2021).

Over time, more comprehensive product costing methodologies have developed. Tarzibashi and Ozyapici (2019) first highlighted the development of activity-based costing (ABC) in the mid-1980s, and subsequently focused on a simplified version known as time-driven activity-based costing (TDABC). Complex costing tools, like ABC or TDABC, have been shown to benefit organizational efficiencies and financial performance. Homburg et al. (2018) noted that costing processes with a higher number of cost activity pools (as in an ABC or TDABC process) have lower levels of product costing and profitability errors. These newer processes, though more accurate, can be costly to implement and maintain (Tarzibashi & Ozyapici, 2019).

The ability to properly cost products is a basis for pricing and product-mix decisions that are essential to the long-term survival of a business. This is especially true for small businesses in the flexible manufacturing sector that frequently rely on the variable production of niche products. Flexible manufacturing is the process by which manufacturers produce a product on alternative equipment or produce the same product simultaneously on multiple pieces of equipment (Bhosale & Pawar, 2019). Small manufacturers are extremely sensitive to the pricing of their products, and improper pricing and selling products at a negative margin can be disastrous. Flexible manufacturers need to continuously determine the optimum equipment utilization to maximize their profitability. Flexible manufacturing firms are more sensitive to costing errors than firms that have fixed or dedicated processes. Fixed manufacturers can focus more on direct cost controls and asset utilization than the proper mix of equipment and products. To assist in pricing and product portfolio management, small flexible manufacturers must determine whether ABC or another complex costing process can be utilized. Previous studies by Vetchagool et al. (2020) noted that ABC has improved financial performance in both large and small firms. This research study highlights the problems of insufficient MA processes and the impact on operations, with a specific focus on small manufacturers in the flexible manufacturing environment. These firms are quite sensitive to poor pricing decision-making based on an improper understanding of the firm's actual costing structure.

Problem Statement

This study addressed the general problem of the inability to implement and sustain sufficient MA processes, resulting in improper strategic business decisions. Increasing complexity in the business environment has increased demands on MA systems. Simple cost control and execution support services are not sufficient (Davila, 2019). Costing processes help

companies manage their business, and many firms today still utilize simple traditional costing processes. Cescon et al. (2018) noted that traditional MA does not provide the level of data necessary to make the decisions needed in strategy formulation. Tarzibashi and Ozyapici (2019) wrote that traditional costing systems (such as standard and variable costing) are not capable of providing quality product valuations. This inferior information from traditional costing processes can lead to erroneous business decisions. Though many large organizations have implemented solid MA practices that have provided positive strategic benefits, small and mid-sized enterprises (SMEs) are seriously challenged in utilizing these tools to develop strategies and survive (Msomi et al., 2020). The specific problem the study addressed was the potential inability of small flexible manufacturers to implement and sustain complex costing processes, resulting in poor product pricing strategies that impact organizations' long-term profitability.

Purpose Statement

The purpose of this flexible design multiple-site case study was to expand the understanding of the practicality of complex costing processes in the small flexible manufacturing environment and the potential impact the processes have on firms' profitability. The researcher explored how manufacturers develop and utilize product and process costing in their operations and the benefits of using more complex costing processes. The study was conducted with a flexible design, utilizing qualitative research tools including in-depth interviews, detailed documentation reviews, and observations of the manufacturing processes. Using qualitative research tools helped the researcher understand existing manufacturing and costing processes and helped assess the impact of using more complex costing processes. The problem with the sustainable use of ABC was explored through multiple case studies with the

targeted population of small flexible manufacturers that support the transportation industry in southeast Michigan and southern Ontario, Canada.

Research Questions

The study asked three research questions with five sub-questions. The first question focused on issues with traditional costing processes and alternatives that have been developed. The second question determined the ways that manufacturers can benefit from the use of complex costing models and the areas of concern for implementing and sustaining these types of tools. The third question was developed to understand the impact that organizational leadership has on the implementation and utilization of complex costing processes. The study also included discussions on how the questions relate to the problem statement. When taken together, they represented a comprehensive overview of the concerns raised in the problem statement.

Traditional Costing Methods and Alternatives

- RQ1: What issues can arise from the use of traditional (volume-based) costing for product mix and pricing strategies?
 - RQ1a: What alternatives to traditional costing have been developed?

The above question was written to develop an understanding of issues that arise with the use of traditional costing systems such as standard, volume-based, or variable costing. Previous studies, such as Tarzibashi and Ozyapici's 2019 study, have stressed that simplified costing approaches do not meet organizational requirements. The authors noted that by using traditional costing methods that utilize volume-based cost drivers, accounting reports can seriously distort costing information. This is especially true for small flexible manufacturers who frequently make a wide variety of products in small or inconsistent batch sizes. Traditional costing systems also fail to provide organizations with information on the sources of the costs incurred. These factors

have led organizations to seek advanced, or complex, costing systems (Tarzibashi & Ozyapici, 2019).

As an alternative to traditional costing systems, ABC was developed in the 1980s to improve cost estimations and overall cost analyses. The ABC process assigns costs to activities and then to products and services (cost objects) by the amount of activity that is consumed by the cost objects (Tarzibashi & Ozyapici, 2019). Later, Kaplan and Anderson (2004) developed an alternative to ABC known as TDABC. TDABC uses a time equation to allocate costs directly to the cost objects instead of using the two-step ABC allocation method (Hoozee & Hansen, 2018).

Use of Complex Costing Models

- RQ2: In what ways can small flexible manufacturers derive a favorable cost-benefit from complex costing models?
 - RQ2a: What areas of concern has the small flexible manufacturing industry incurred regarding the implementation, or long-term use, of complex costing models?
 - RQ2b: What impact do enterprise resource planning (ERP) and programmable logic controller (PLC) data capture methods have on the sustainability of complex costing models at a small flexible manufacturer?

To invest resources into developing and sustaining a more complex costing process, there must be tangible benefits. Homberg et al. (2018) noted that complex costing systems provide a substantial improvement in the quality of product costing, and therefore profit planning. Having better knowledge of process and product costing allows organizations to better plan pricing and product-mix strategies, essential to a firm's long-term viability (Homberg et al., 2018).

Vetchagool et al. (2020) further researched the impact of the use of ABC on large and SME

firms in the manufacturing and non-manufacturing sectors. The authors found that ABC has a positive impact on operational performance, which leads indirectly to improvements in firms' financial performance.

Those in the industry have raised concerns about difficulties with the implementation and use of ABC. Vetchagool et al. (2020) noted that for the successful design and implementation of ABC, organizations should use a cross-functional approach. This requires the full cooperation of departments and employees from across the organization (operations, engineering, materials management, and accounting). Tarzibashi and Ozyapici (2019) found that even though ABC is a marked improvement over traditional costing, concerns have been raised about the costs of implementing and maintaining the associated models or processes. The authors recommended the use of TDABC as a simplified approach that could lower the implementation and maintenance costs. Similarly, Hoozee and Hansen (2018) also expressed concerns with ABC, but their findings showed that the use of ABC or TDABC should be situationally dependent. Their study was a detailed comparison of the accuracy of ABC and TDABC. The research showed that when resources (costs) are highly traceable to an activity, but the activity is less traceable to the product, TDABC is more accurate. ABC is more accurate when activities are more traceable to the product (Hoozee & Hansen, 2018).

One of the keys to a successful costing process is the ability to have efficient data feeds directly from existing ERP and PLC programs. Flexible manufacturing systems (FMS) optimize manufacturing flexibility and processing efficiencies (Bhosale & Pawar, 2019). FMS enables individuals to focus on flexibility in the equipment used and the routing of the production. As equipment and personnel produce each unit, data such as units produced, units scrapped, quality measurements, or cycle times can be automatically extracted from the equipment's PLC

programs. Accounting can use this data as the basis for the development of basic cost drivers. If the equipment is not capable of directly capturing production data, then the data entered manually into the ERP system for operational reporting can become a source of base data for cost modeling. Two factors need to be understood in advance: the availability of information and the effort required to capture the data. Processes that require too much effort to compile and analyze data would be difficult to sustain over time. These points could be addressed up front before finalizing the process design phase of a feasibility study.

Leadership Impact on Costing Process Utilization

- RQ3 What impact does leadership have on the successful utilization of costing processes in a manufacturing setting?
 - RQ3a What impact does leadership have on the successful implementation of new complex costing processes?
 - RQ3b What impact does leadership have on the sustainability of complex costing processes?

An organization's leadership has a significant impact on the successful use of any costing process. Costing processes need to be carefully designed, implemented and then sustained. Each one of these steps requires full support from all levels of leadership. While complex costing processes are being implemented, cooperation from across the organization is required. Allain and Laurin (2018) researched the difficulties individuals in management and accounting had with implementing ABC systems. One of the largest issues they observed was the resistance to change, caused by the lack of communication about the purpose or focus of the new process. Accountants can design ABC systems to focus on cost control or on understanding the nature of costs, which is crucial for developing pricing and product-mix strategies. Though both can be a

benefit, leaders may be resistant to the new process if they see it as restricting their authority or as a large investment to develop strategies that they view as being purely subjective (Allan & Laurin, 2018). A complex costing process requires time and effort to maintain (Tarzibashi & Ozyapici, 2019). Leaders who do not support costing processes may restrict the resources needed to sustain them or circumvent new processes by utilizing manual processes or legacy systems. As with any change in the business process, it is necessary to have a full commitment from the senior leadership and then from each level below before initiating any process change.

In the above questions, this study sought to fully address the specific problem of small flexible manufacturers being potentially unable to implement and sustain a complex costing process. The first question was written to determine the nature of the outstanding issue at the participants' organizations. Having a simplified traditional costing process may be expedient but may not provide the organization with the tools necessary to craft a solid product mix and pricing strategies. Management accountants would then need to find alternatives to traditional processes. Accountants must understand how the processes function when developing an enhanced cost modeling scenario. The second question was written to develop an understanding of how small flexible manufacturers can benefit from the implementation and use of a complex costing process like ABC or TDABC. This project's multiple case studies of small flexible manufacturers provided insight into the level of sensitivity of business processes to improve costing data for the selected firms. The participants' products and their associated markets' cost sensitivity needed to be determined, as well as the level of the overall market competitiveness. The final question was written to determine the impact of the firm's leadership on the potential implementation and use of a complex costing system. If leadership understands the benefits and is committed to installing and using the new process, then they will make the associated financial

and time investments for themselves and their staff. Without this commitment, any costing process that MA could install will not succeed.

The three questions were written to understand the existing business environment and costing processes, and the potential benefits that a more complex costing process can bring. Though the processes can create benefits for organizations, there are potential drawbacks. There may be substantial costs associated with the implementation and maintenance of the processes, and support across all functions is required. The actual costing models would be designed to match the nature of the manufacturing and support processes within the organization (activity or product-focused). Finally, as with any business process change, it is crucial to determine the level of leadership support for implementing and sustaining the new processes. Understanding the various pitfalls helped lead to the development of detailed interview questions for the participants of the research.

Nature of the Study

The nature of the study outlines the paradigm that existed in the research, the design, the methodology, and the triangulation methods that were utilized. The first section includes a review of the various research paradigms that existed. The researcher's paradigm is identified, including how this specific paradigm could have influenced the study. Secondly, the three types of research designs are defined. The design chosen for the study is noted, along with the associated rationale for its selection. The third section covers common methodologies for the selected research design and how this study's methodology was selected. Lastly, a discussion on the researcher's choice of specific triangulation methods is included, as well as the impact these methods had on supporting the reliability and validity of the research findings.

Discussion of Research Paradigms

In this discussion on research paradigms, the four different research paradigms are briefly reviewed. The paradigms are positivism, post-positivism, constructivism, and pragmatism. The researcher's paradigm that exists is noted. The match between the researcher's paradigm and the focus of the study is discussed. The positivism paradigm is defined as seeking a single sense of reality by generalizing from verifiable research (Rechberg, 2018). The focus of this paradigm is to find universal truths, or laws, based on the measurement and observation of activities in the real world. Turyahikayo (2021) noted that the positivism paradigm has its roots in the ancient Greek philosophy of Plato and Aristotle, who argued that knowledge can be gained by systematic and methodological procedures, as found in the study of natural sciences. Post-positivism is a paradigm that is defined as looking at reality from multiple perspectives and achieving a perfect agreement on knowledge although a sense of reality is not possible (Turyahikayo, 2021). In business situations, problems are frequently not specific nor can be answered by a single discipline. Input from multiple functions or individuals is necessary to find solutions. The focus is on the perspectives of the research subjects, rather than on seeking a single ultimate knowledge (Turyahikayo, 2021). Constructivism holds that the world is constructed based on individuals' social interactions, and reality is not based on natural law (Rechberg, 2018). This concept emerged in the 1990s with the thought pattern that knowledge workers create their knowledge through their interactions with others, and this knowledge will lead to organizational success. The fourth paradigm is pragmatism. This paradigm holds that there are numerous types of knowledge, but universally accepted knowledge is that which leads to positive results or consequences (Turyahikayo, 2021). The search for knowledge looks at multiple sources, but the focus is on the overall benefit to the organization. These searches are

done in the existing environment to find solutions that provide direct benefits, not to look for the ultimate answer or truth (Turyahikayo, 2021).

In this study, the researcher's paradigm is pragmatism. The researcher has experience in cost accounting in a manufacturing setting with a focus on efficiency analysis and product cost estimations. Decisions for the implementation of new processes, or process changes, are dictated through a cost-benefit focus. Though improvement in accuracy and precision may be a valid target, an understanding of the time and effort needed to reach a given precision level must be considered. This study was designed to explore the benefits that small flexible manufacturers can gain through the development of a deeper knowledge of their processes' cost structures. Leadership will only invest in more complex cost modeling if there is a return. The researcher's goal of looking for real-world solutions that benefit an organization, rather than seeking the most accurate solution, shows that the pragmatic paradigm matches the objective of the study. In such a study, care must be taken to ensure research bracketing is utilized so the research process is not tainted by the researcher's biases from previous business experiences in this area of study.

Discussion of Design

The design section of the nature of the study reviews the three types of research designs, including fixed design using quantitative methods, flexible design using qualitative methods, and mixed methods using quantitative and qualitative methods. Research designs are used to outline the basic approach of the study and to answer the research questions (Abutabenjeh & Jaradat, 2018). After defining the types of research design, this section identifies the design chosen for the study and includes discussions as to the decision's appropriateness.

Researchers that utilize a fixed design identify the research process in detail in their research proposals. Sovacool et al. (2018) noted that research projects with a fixed design utilize

quantitative methods for the testing of proposed hypotheses or to verify the relationship between variables (i.e., in correlation studies). The quantitative tools used for these types of studies include surveys, modeling, and statistical assessments. By utilizing fixed designs and quantitative methods, researchers can explore the relationship between a population and a specific phenomenon, or they can assess the validity of a hypothesis. Zyphur and Pierides (2019) noted that quantitative researchers focus on values such as validity, objectivity, and bias as they conduct these types of studies. The use of fixed design research would not have been optimal for this research as this study intended to develop an understanding of the practicality of using ABC at specific manufacturers through detailed data collection and analysis (a flexible design), not to survey whether a targeted participant group has implemented a specific type of costing process (fixed design).

In flexible design studies, the researcher develops a research plan, but specific details on testing are not fixed, as changes may be needed as the study progresses. Flexible studies utilize qualitative tools that seek input from study participants as to how they view a situation. Sovacool et al. (2018) highlighted the various tools that are utilized in qualitative information gathering such as open-ended question interviews, detailed document analysis, and direct observations. Sawatsky et al. (2019) noted that qualitative researchers study the objects of the research in their natural settings (i.e., where the participants live, work, or worship) and attempt to interpret the phenomenon or situation based on the responses, or meanings, given by the participants. Qualitative research notes a series of themes that participants hold as true, within the study's context (Sawatsky et al., 2019).

The use of a flexible design was the optimal choice for this research. The objective was to develop an understanding of the practicality of implementing and sustaining a complex

costing process at specific small flexible manufacturers and not to survey how successful implementations have been in a specific population.

A mixed-method design utilizes parts of the fixed and flexible research planning approaches and the associated tools. Portions of the research proposal have detailed procedures, but there is the potential to modify the approach after the study has begun. Sovacool et al. (2018) noted the most popular approach for the use of mixed methods research is to utilize a combination of surveys (quantitative research tool) with participant open-ended interviews (qualitative research tool). For the proposed research, a mixed method was not optimal. A mixed method design does incorporate qualitative tools like detailed interviews and observations that would meet the objectives of developing an understanding of the participants' environment. The mixed method also includes quantitative tools that researchers can use to evaluate hypotheses or quantify relationships between variables (Sovacool et al., 2018). The researcher did not utilize quantitative tools to determine whether the selected participants can benefit from the use of complex costing processes. Quantitative tools would be applicable if the study focused on past experiences an industry segment had with implementing ABC or determining whether successful implementations of ABC correlated with demographic factors like organizational size or production processes.

Discussion of Method

As noted above, the researcher chose a flexible design for the study. The following is an outline of the different flexible design methods that researchers use in their studies. From this list, the method chosen for the dissertation is highlighted, as is the rationale for this choice.

A narrative research method is defined as a study of an individual's insights regarding the subject of study (Clare, 2020). This type of flexible design method is utilized when recording

how an individual experiences a situation through open-ended interviews and observation of their actions. The individual's social and personal past experiences need to be taken into consideration as to how they may influence the participant's perceptions (Clare, 2020). Cresswell and Poth (2018) noted the need to put the individual's story into a general framework. The researcher and participant then work together to put the story in chronological order and highlight the important themes. The use of a narrative research method was not appropriate for this study. This research required gathering input from multiple sources and seeking the practicality of the use of a more complex costing process, not gaining a personal understanding of the existing situation at an organization.

During the consultation process in phenomenology studies, the reactions of several individuals to an experienced phenomenon are recorded, along with the researcher's experiences (Clare, 2020). Researchers collect participants' experiences through multiple in-depth interviews, which are then brought together to develop a joint understanding of the phenomenon. How the individuals' experiences impacted their current situations, and the impact of the experience is also studied. Cresswell and Poth (2018) noted that in phenomenology studies the researcher brackets themselves out of the research by discussing their experiences with the phenomenon. The researcher's experiences are then set aside so they can focus on the participants' experiences. The researcher's experiences can then be reexamined when developing a consolidated understanding. Maulana et al. (2022) provided examples of the use of phenomenology in the accounting field. Research on how changes in accounting affected employees in the context of work-life balance, employee commitment, and the possibility of employees committing fraud were given as examples of accounting phenomenology studies. The authors noted that researchers can extend phenomenology studies beyond employees to include

customers, suppliers, and the board of directors. The use of phenomenology as a research method was not suitable for this study, as this study's objective was not to seek to understand how individuals view an event or change in the process. Rather, in this study, the researcher investigated whether a specific market sector can sustainably utilize a complex costing process, which was best done by utilizing flexible (or qualitative) research tools.

Clare (2020) wrote that grounded theory involves an iterative process of collecting data, analyzing findings, and developing a theory based on the themes that emerged during the process. Maher et al. (2018) noted that grounded theory requires the researcher to continuously review the data collected and remain open to changes in conclusions or themes. Creswell and Poth (2018) highlighted the procedures to be taken in the inductive analysis of the data collected. Grounded theory designs are written to select one category as the focus of the theory being developed, and other categories of data collected are then gathered to form a model. The intersection of the data categories becomes the theory of the themes collected during the process. The use of grounded theory for this research project was not optimal as the researcher was not trying to determine a theme for a market segment based on the detailed analyses of the data collected. Rather, the researcher was examining the practicality of implementing and sustaining a new process at a specific manufacturer in the small flexible manufacturing market segment.

In case studies, the researcher looks at a specific situation with the analysis of the circumstances that exist within the boundaries of the case that is the subject of the study (Clare, 2020). Case study research involves the study of a case outlined in the problem statement in an existing situation. Creswell and Poth (2018) defined the case study methodology as a real-world study, within single or multiple bounded systems over time. The bounded systems can be an organization, department, or team of people. Case studies can be for single or multiple sites.

Researchers gather information through in-depth data collection activities that involve multiple sources of information (such as interviews, observations, and documentation). This information is then utilized to develop a case theme (Cresswell & Poth, 2018). The case study design was the optimal choice for this flexible research study. Interviews, observations, and reviews of detailed documents provided the researcher with an understanding of the existing environment and the potential benefits that the participant could obtain by upgrading their costing processes.

Group cultures can be described using ethnographic methods, which look for patterns in cultural norms (Clare, 2020). Participating in an ethnography research study requires an extensive amount of fieldwork and the collection of information through observations and interviews (Cresswell and Poth, 2018). The goal of an ethnographic study is to present a complete description of the group's culture through the study of their cultural themes, areas of concern, social behaviors within their group, and interactions with those outside their group. The use of ethnography was not a suitable design for this research. Ethnography may help in developing an understanding of the participant employees' culture, but it would not be useful in determining the benefits of utilizing a new costing process in a specific type of manufacturer.

The research method chosen for this dissertation was the case study method, specifically a multiple-site case study. This study's focus was to determine whether it is feasible (sustainable and cost-beneficial) to use complex costing processes at small flexible manufacturers. Multiple sites were selected within this market segment, including sites of various sizes that manufactured products for different markets. This ensured that the study's findings were not only valid for a specific situation (i.e., firms with more than one hundred employees or those in injection molding manufacturing). The researcher selected the participant organizations, and the participants' existing costing processes were reviewed for the potential to upgrade to a more

complex costing process. The need for more detailed accurate costing information differed by location. The researcher investigated the potential impact on the participants' costing processes through the testing of complex costing models. Additionally, each organization's leadership was interviewed to determine their understanding of the benefits of investing in new processes and their commitment to maintaining them. The requirements for this study were best served using the case study methodology at multiple sites within this industry segment.

Discussion of Triangulation

Triangulation captures the full picture of a situation by employing multiple research techniques and collecting data from multiple sources (Farquhar et al., 2020). Yin (2018) noted that case studies should have multiple sources of evidence. These multiple sources help provide a higher quality of information. There are four types of triangulation: sources of data, among different evaluators, perspectives of the same data, and different methods. Nielsen et al. (2020) wrote that data triangulation is achieved when multiple data sources or collection techniques are utilized. Yin (2018) further refined triangulation through the concept of the convergence and non-convergence of multiple sources of evidence. Within a single site, researchers use qualitative methods to cross-check (or converge) the data that they collect. The alternative sources of information include documents, open-ended interviews, and observations. The data from these sources are then compared to determine whether they support the same findings. Separate external studies are then performed as means of a non-convergence of evidence (to determine whether other sites would have different findings). For non-convergence studies, the researcher gathers both qualitative (site visits) and quantitative (surveys) data. The researcher then summarizes the data and compares the data with findings previously gathered in another study (Yin, 2018).

For the multi-site case study, methodological triangulation (the use of multiple sources of data) was employed utilizing qualitative methods. Before any interviews, details from the existing costing processes were requested. This information was then used as a baseline to compare to the input from interviews and observations on the shop floor. At each participant site, a series of open-ended interviews were conducted with a prearranged list of employees. The questions were written to focus on how production operated and how products were costed. The employees interviewed included leadership (the general manager, president, or owner), sales personnel, controllers, cost accountants, engineers, production operators, and IT personnel. The results of each of the interviews were cross-checked with each other and compared to the existing documentation. The input from engineering, controlling, and production on how production processes are costed provided a deeper understanding than simply interviewing the individual responsible for maintaining product cost structures. A further cross-check of information was provided through direct observations on the shop floor. These observations provided input on how the participants' shop floors were staffed, the actual throughput rate of production, and the equipment used. As this is a multi-site case study, the researcher analyzed each site's results to see whether there were any common themes between the participants.

Summary of the Nature of the Study

The nature of the study section provides the backbone of the research process. The researcher used a flexible design with qualitative methods to gather and analyze data in the study. The researcher gathered data through open-ended interviews, a review of documentation, and actual observations. The flexible design method selected for the study was the multi-case study method. Multi-case studies allowed for an in-depth review of the participants' current costing processes, and the ability to determine whether benefits are derived from the use of

complex costing tools such as ABC. The study intended to determine whether the implementation of a complex costing process is not only cost-beneficial but also sustainable over time. The use of more than one participant allowed the researcher to determine whether the results or themes from the data analyses are similar at other locations that have different demographics (i.e., number of employees or type of product manufactured). The researcher utilized methodological triangulation, including seeking multiple sources of input (interviews, document reviews, and observations) from multiple actors to cross-check the data collected. The findings noted from the different internal sources were cross-checked and compared with input from other participants in the research study. This section highlighted the researcher's pragmatism research paradigm, the paradigm defined as focusing on the problem and seeking solutions beneficial to the research subject in a real-world context. The pragmatic paradigm matches the study's objective of seeking the benefits of enhanced costing processes in the current environments of the participant manufacturers. The research expanded on current literature by looking at the use of ABC in small flexible manufacturers and determining whether this costing approach is beneficial.

Conceptual Framework

The conceptual framework provided an outline of the conditions of the problem being researched, along with factors that influenced the current organizational environment and the objectives of the proposed study. The framework includes four components: concepts, theories, actors, and constructs. The concepts outlined include the traditional costing processes' impact on pricing strategies, operational improvements that organizations gain by more complex costing processes, and the impact of leadership on process changes. The theories that are part of this conceptual framework include the Burns and Scapens Framework (BSF) and Stones' Strong

Structuration Theory (SST). Both were used to help develop an understanding of the change management process in the participating firms. A costing process review in a flexible manufacturer requires a broad range of actors, including the leadership, sales personnel, engineers, production operators, controller, cost accountants, and information technology (IT) support. The actors provide insight into the existing environment, and they are key players in any potential process change recommendations. This study outlines four different constructs that impacted the research process, including leadership style, market dynamics, profitability, and shop floor automation. The below figure provides an overview of the impact of each of the components and how they relate to each other. This diagram serves as a quick reference to the concepts and theories used in the studies, as well as the actors who are participating. The constructs in this qualitative research study are also identified to show how they influenced portions of the research or the overall environment. For each part of the conceptual framework, the results of the subsequent findings are provided to support the impact that each item had on the study.

Concepts

In the first part of the conceptual framework outline, the researcher defined three major concepts. The first concept was the impact of traditional costing processes on an organization's pricing strategy. Traditional costing processes (such as volume-based or standard costing) are not capable of providing quality product valuations (Tarzibashi & Ozyapici, 2019). This deficiency leads to the need to investigate more complex costing processes. The second concept included the benefits that organizations can gain using complex costing methodologies. The benefits for organizations, including small manufacturers, will lead to inquiries about the required steps and costs to implement and sustain tools such as ABC or TDABC. The third concept was the impact

of leadership on the implementation and sustainability of costing processes. The leadership of an organization may resist implementing new costing processes if they believe the new process restricts their authority or is purely subjective (Allan & Laurin, 2018). The leadership support concerns need to be addressed up front through full communication and commitment from senior management before initiating the research.

The three concepts highlighted above guided this study. First, the researcher needed to develop an understanding of the participants' traditional costing processes from multiple perspectives. The researcher reviewed how the actors at each participant cost their products and observed them on the shop floor. The benefits of an enhanced costing process were evidenced through potential operational improvements. By developing new costing models as part of the study, the researcher provided participants with clearer insights into the costing of their products, including which processes and products were creating returns. Lastly, the researcher needed to understand the impact that leadership had on the potential implementation and use of costing systems. Leadership at each of the participating sites must support the research project and be open to the potential of changing their costing processes before any further research on developing advanced costing processes would be initiated.

The findings of the research supported the concepts outlined in the conceptual framework. The current costing processes at both participant sites did not provide the firms with sufficient detailed costing information needed to make business decisions. Costs were either allocated based on the square footage used or on an overall facility basis. These costing methods can lead to poor product pricing decisions. By utilizing ABC, both participants could better identify the sources of costs, which can help with cost-efficiency activities. While one participant was in a cost-sensitive market, the other was in a maximum capacity situation. Both firms could

benefit from using an advanced costing process. The findings of this study highlighted the impact of leadership support. The first participant location had a common theme of support for costing changes if the benefits could be proven. The second participant site did not believe that any changes in costing processes would be cost-beneficial since they were in a niche market and were not sensitive to pricing.

Theories

Two theories used in MA research focus on why organizations implement processes in specific ways and how organizational structures impact the change management process. The two theories are Burns and Scapen's Framework (BSF), which was written in 2000 (Burns & Scapens, 2000), and Stones' Strong Structuration Theory (SST) written in 2005 (Stones, 2005). Both theories were utilized in this study, although the study did not intend to prove the validity of the theories themselves.

The BSF is a theory developed for analyzing MA changes by looking at how rules and routines impact an organization's accounting structure and the associated actions taken (ter Bogt & Scapens, 2019). Leadership and accounting teams encode (or develop) routines and rules for MA processes, which are enacted, and results are reproduced. The confirmation of the routines and rules then leads to their institutionalization over time. It should be noted that distinct groups within the organization have different views of reality and the purpose of routines and rules. These differences can lead to resistance to change and can explain why accounting processes are not implemented in the same manner between organizations, or even within an organization (ter Bogt & Scapens, 2019). In the current study, the researcher assessed each participant's organization to determine how changes in accounting processes have been implemented in the past and if firm rules were established from a leadership position or through routines established

at a working level. It is crucial to understand how organizations implement processes, noting that implementations may be unique in each participant site of the study.

After determining through interviews and observations how the current costing processes were established and maintained, the researcher in this study utilized the BSF to analyze the existing processes. The study shows how the processes were created, either through rules set by the management or by employees' routines. The results of the interviews gave the researcher an understanding of how the management and employees established the current processes. This insight led the researcher to different approaches to suggest any potential changes in costing processes. The researcher could recommend changes by having discussions with management on establishing new rules or collaborating directly with employees on how to integrate the enhanced processes.

The SST is used by researchers to analyze organizational social structures and their impact on changes in MA processes, with specific applications to MA's input on product development and associated pricing (Feeney & Pierce, 2018). By utilizing SST, researchers identify how formal management structures, based on positions, interact with what agents (or employees) do daily. The theory looks at the formal internal and external structures that influence MA practices, such as budgeting or product costing. The structures influence individuals and their acceptance of the change. Kholief and Jack (2019) highlighted this in a four-quadrant matrix that shows how internal and external structures (both formal and informal) constrain or enable change behaviors. Structures can either motivate employees to resist change, implement but not initiate change, initiate but not implement change, or initiate and implement change. From case studies, Feeney and Pierce (2018) noted that SST helps researchers understand social interactions. This understanding assists the researcher in making sense of

social actions and their impacts on the implementation of new accounting processes. This theory was applied to help the researcher in this study understand the different relationships when interviewing different actors at participant sites and when drawing themes on how changes can be received by different individuals within the organizations.

The researcher applied SST when interviewing different actors at each location. When initiating the research, a discussion with the leadership team focused on the existing formal structure. Interviews with other actors provided the researcher with insights into the existence and strength of informal structures. Individuals with power in the informal structures may influence the costing processes and the acceptance of changes on a normal basis. The researcher developed an understanding of the participants' structures that existed in each organization to have sufficient access to the necessary information and cooperation for the potential development of enhanced costing models.

The study found that BSF was utilized, as interviews and documents gathered from each location highlighted the use of both rules and routines in the MA function. The first organization had set rules on how inventory was to be valued on a full absorption basis. However, various spreadsheets were developed to direct the method of allocating overheads for indirect labor and other overheads. These spreadsheets were routines that were not formalized but were accepted by the participants. SST was not as easy to identify at the locations, especially at the second participant, which was considerably smaller in size. At this participant, the formal MA structure resided with the senior leadership. This senior leadership set the practices and no other informal organization was evident.

Actors

The researcher utilized a multi-site case study design for the research. At each participant site, actors were interviewed and observed, and the researcher consistently requested detailed documentation. The following groups were asked to participate and were asked how their input related to addressing the specific research problem: leadership (senior management), sales personnel, engineers, production operators, controllers, cost accountants, and IT support personnel.

With any change, the commitment of senior management is crucial. Allain and Laurin (2018) noted that one of the base concerns about the implementation of new costing processes is the lack of leadership agreement on what the objectives of the new system should be (i.e., controlling costs or enabling strategy development). An understanding of how products are processed with the existing equipment configuration is needed to understand how costs are added to the production process. By interviewing engineering personnel, this study sought to understand the production process flow through a review of the engineering bill of material and routing. To fully understand this flow, besides interviewing engineering personnel, production operators were observed. This step was necessary to develop a detailed understanding of how the production process adds costs to the manufacturing process, as well as to verify whether there is a difference between planned and actual production processes.

Documentation review and interviews with the controller and president provided insight into the overhead costs of the organization and the general costing processes being utilized. The knowledge gained from the interviews assisted in the development of cost pools and activity cost drivers (requirements for the development of more complex costing models). The researcher scheduled further discussions with the cost accountant to gain an understanding of the cost

accounting processes already in use. Additionally, the availability and sources of cost information needed to be understood to assist in the development of any new enhanced cost models. IT interviews were needed to determine what if any, information could be gathered automatically from the production equipment. If the level of base information (i.e., units produced, units scrapped, or setup time) could be gathered automatically or with minimal effort, it would improve the ability to sustain a complex costing process.

In the findings, the researcher used the participant selection approach outlined above and received input from the diverse functions at each location. The senior leadership and controller reviewed the existing process with the researcher and provided documentation to further support the understanding. After the researcher created the process flowcharts and costing sheets, these figures were sent back to participants to verify that the representations were correct (member checking). The other functions (i.e., engineering, IT, and production) provided insights into how base costing data were collected and about the potential of changing the existing costing processes. The other function's feedback also provided information about the level of MA understanding in the organizations beyond the individuals that directly maintained the costing process.

Constructs

In this last section of the conceptual framework, four constructs that influence the research process are outlined. The constructs are leadership style, market dynamics, profitability, and shop floor automation.

The leadership style of an organization impacts innovation and process change. Alblooshi et al. (2021) noted that leadership influences the change process as evidenced by their commitment and support of the change and the allocation of required resources. The level of

competitiveness in the participants' specific market will influence the need to produce accurate product costing (Aljabr, 2020). In this study, understanding the participants' position in the market provided input on cost-benefit decisions for any investments needed in changing costing processes. The profitability construct highlights the current and historical levels of profitability of the subject participant organizations and how profitability pressures influence the level of interest and commitment to investing in a more complex costing process. The level and quality of information technology on the shop floor may impact the decision to institute ABC (Aljabr, 2020). Having inferior quality or manual data collection processes requires additional efforts to sustain a complex costing system and lessens the potential for long-term success.

The findings of this study showed the impact of all four constructs, but especially of the market dynamics and the profitability pressures on the openness to upgrading the costing processes at the two participant sites. Due to the market positions of the two different participants and the associated profitability pressures, the openness to change was different at each site. The first participant was in a competitive market with price sensitivity. The common theme when interviewing the participants at this site was that change would be accepted if cost beneficial. The second participant existed in a niche market due to their low tooling costs and the ability to develop and manufacture a product with a short lead time. This flexible niche market had minimal costing pressures. The second participant was not motivated to analyze costs by activity, as profitability margins were acceptable by the ownership and incoming business was strong. The senior leadership at the second location did not consider further development of costing processes to be of significant benefit.

Relationship Between Concepts, Theories, Actors, and Constructs

In Figure 1, the general relationship between the components of the conceptual framework is given. The construct inputs of leadership style, the impacts of market dynamics, the pressure of profitability requirements, and the extent of shopfloor automation all impact the actors and are factors driving the need for detailed costing information. The leadership style influences how different actors work together and the joint understanding of the company's direction. The market dynamics and profitability targets drive the prioritization of company objectives. The constructs help in determining the importance of detailed costing information in the participant companies' survival and growth. Shop floor automation impacts how existing and future costing processes are developed, and the ability to sustain these processes. The controller and cost accountant, in conjunction with IT support, need to develop and sustain data collection processes that are practical for production operators to work with and for engineering and senior management to understand and have confidence in. The BSF and the SST are tools that are utilized to understand how organizations implement changes either from employee routines or organizational rules and how internal and external structures influence the initiation and implementation of MA process changes. Once this is understood, the constructs, actors, and theories are then viewed through the concepts of traditional costing, operational improvement needs, and change management to determine whether changes to existing costing processes are cost-beneficial. The goal of this process is to have the costing information necessary to make strategic business decisions, such as product pricing, product mix, and customer portfolio management.

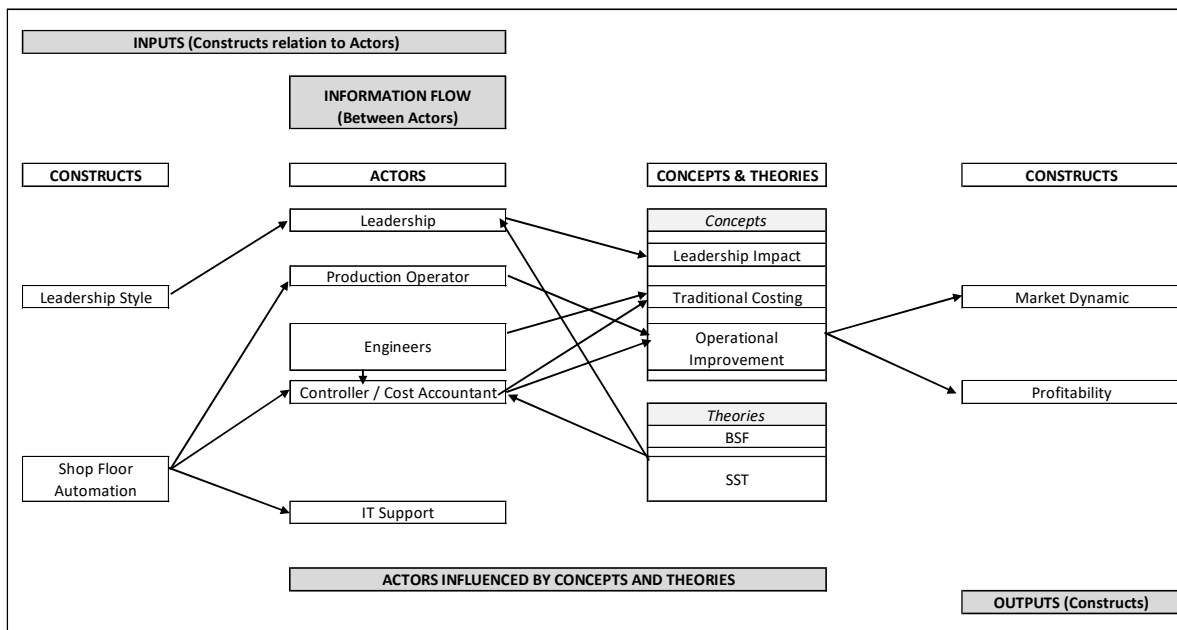


Figure 1. Conceptual framework diagram.

Summary of the Conceptual Framework

The conceptual framework is made up of four components: concepts, theories, actors, and constructs. This section listed each of these components, how they relate to each other, and the objective of the dissertation study. The concepts outlined were traditional or volume-based costing's impact on product pricing strategies, operational improvements that can be gained through more complex costing processes, and leadership's impact on the changes to the processes. The concepts were researched in conjunction with the use of the BSF and SST to assess how changes are made and how the organizational structures assist or impede the change process. By utilizing a multi-site case study process, the existing environment was accessed through interviews, observations, and detailed information from the actors noted above. The need for more complex costing information is driven by the constructs of the profitability and market dynamics of the participant companies. To sustain complex costing processes, it is crucial

to have accurate information readily available. An assessment of data collection procedures and the level of shop floor automation are key factors for the sustainability of any costing process. A researcher must focus up front on the level of leadership's support for any change initiative if the goal of having sufficient costing information for strategic business decisions is to be realized.

Definition of Terms

Activity-based costing (ABC): ABC is a product or service costing method that utilizes a distinct two-step process (Hoozee & Hansen, 2018). The first step is to gather costs from production and support functions and combine the costs into cost pools, which are assigned to activities (like issuing purchase orders or equipment maintenance). In the second step, the costs assigned to the activities are allocated to the cost objects (i.e., products or jobs) by the amount of activity each product or service consumes.

Time-driven activity-based costing (TDABC): TDABC is a simplified version of ABC, in which costs are allocated in a single step (Hoozee & Hansen, 2018). Costs are pooled together and then are directly allocated to the cost objects through a time equation, though it is possible to allocate different amounts of costs based on specific characteristics of the cost object.

Flexible manufacturing. Flexible manufacturing is the ability of manufacturers to either utilize the same pieces of manufacturing equipment to make different products or the ability to use multiple pieces of equipment to manufacture the same product (Bhosale & Pawar, 2019).

Small and medium-sized enterprises (SMEs): SMEs are organizations that have fewer than 250 employees, are constrained by human capital, and frequently have a minimal presence of accounting information that can be utilized in MA practices (Raucci & Lepore, 2020).

Assumptions, Limitations, and Delimitations

The flexible design allowed the researcher to understand the assumptions, limitations, and delimitations that exist in this study. According to Almasri and McDonald (2021), assumptions include general knowledge that helps develop an understanding of the nature of what is being researched and the researcher's beliefs that may influence the findings. Assumptions can add risk to the study and need to be mitigated.

This study could be limited by the potential inability to acquire the necessary documentation and to secure sufficient time to interview participant actors. The inability to collect sufficient data would have put the study at risk as the researcher would not have been able to reach a point of data saturation, and the findings would not be complete or supportable.

Delimitations are boundaries that are set to define the scope of the study. The boundaries must be clearly understood by the researcher and the participants before the initiation of any data collection. By nature, case studies are challenged by the need to properly identify the boundaries of the study (Cresswell & Poth, 2018). There is a clear overview of the assumptions, limitations, and delimitations in the current section.

Assumptions

Three assumptions are included in this study of costing processes at small flexible manufacturers. The first assumption is that participant firms of the study were truthful in the information they provided. Though the study utilized methodological triangulation to cross-check information, the researcher assumed that the information gathered was valid to the best knowledge of the participant. The second assumption is that in each participant site, one or more of the actors had at least a basic level of MA knowledge. At a minimum, this knowledge must be at the level of tracking costs and valuing inventory through some standardized process. Najera

Ruiz and Collazo (2020) noted that many small businesses use a minimal level of MA techniques. This minimal level may only be that the costs to manufacture a product are tracked in some manner. The third assumption is that the participants were open to changes to their current processes if the changes were cost-beneficial.

The researcher must understand each of the three base assumptions and that the assumptions carry a certain amount of risk. The risks in the assumptions need to be mitigated in the research process. Hu and Plonsky (2019) noted that failing to check assumptions adds a potential threat to the validity of the study itself. This failure to check assumptions prevents those reading the study to have faith in the findings. To mitigate the lack of truth or transparency in the information provided, multiple means of methodological triangulation were instituted. The researcher gathered details that supported product costing from the controller or president of the organization. This costing data was then compared to the input from engineering and actual observations on the shop floor. Having multiple participating firms also strengthened the data quality and identified any inputs that were outliers. To mitigate the risk of the lack of a functioning costing process, a review of how the participants identified and recorded costs was performed at each site. Vilakazi et al. (2020) highlighted that many small firms have limited accounting information available for instituting MA processes. For this study, the researcher assessed the level of this information's availability. Lastly, the assumption of openness to change (especially by the leadership) needed to be understood. Bassani et al. (2021) stressed that the organization's leadership support is key to the implementation of any changes in MA processes. This study required open discussions about the purpose of the study and gaining the support of the leadership. The study was presented by the researcher as providing alternative approaches to

product cost management that could benefit the organization. Without this support and cooperation from other actors, the success of the study would have been compromised.

Limitations

In case studies, researchers focus on collecting relevant information to the point of data saturation. Saunders et al. (2018) identified data saturation as identifying redundancy in the data collected to the point that further collection is not necessary. The ability to gather sufficient information from each participant in a multi-site case study is a limitation that must be understood and mitigated if the research is to be successful. Cresswell and Poth (2018) wrote that the measure of a good case study is that it presents a detailed understanding of the case. The level of detailed understanding is reached through the collection and integration of multiple sources of qualitative data from interviews, document reviews, and observations. The lack of access to the necessary information is a serious limitation often beyond the control of the researcher. If the actors in the study do not provide the researcher with sufficient documentation of the current processes or if the actors limited the time required for interviews, the data collected may not be sufficient.

To mitigate the risk of having insufficient data, detailed planning was done in advance of this study's data collection. Cresswell and Poth (2018) recommended the use of a data collection matrix to help coordinate data collection efforts. The matrix outlined the types and amounts of data and the sources of data at the participant organization. Additionally, an estimate of the time required for the various means of data collection was provided. The list of the personnel required was created and the estimated time per interview was shared with each participant.

Delimitations

In case studies, the delimitations or scope of the study can be a major challenge. Cresswell and Poth (2018) noted that researchers utilizing case studies must first ensure that the study is worthy of study and neither too broad nor too narrow. The authors noted that when using multiple cases, researchers must identify resource requirements, participants to select, and cross-case analysis plans. In this study, the researcher chose a multi-site case study method to cover differences in the demographics of the participants and to cross-check findings. Cross-checking ensures that factors such as the size of the organization or the products manufactured are not controlling constructs of the study's findings. Though results from the participants of this survey are similar, it does not mean that the same results can be expected from other organizations in this market (small flexible manufacturers). Researchers can use the results of the study as a basis for broader quantitative studies of the market segment. Though there may be a tendency to draw generalizations from the findings of a study (especially if all participant responses are aligned), it is not the purpose of qualitative research to provide this type of analysis (Cresswell & Poth, 2018). Instead, a case study summarizes the situation studied and identifies themes at the specific participant location(s), showing what is learned in the research. The findings can then be utilized for future studies. The choice of multi-site case studies required considerable time to research each location. The availability of information and the cooperation of the different actors at each site could have forced a reassessment of the number of sites selected. Fortunately, both sites fully cooperated in the gathering of the necessary information.

Significance of the Study

The significance of the study focused on reducing the gaps in the literature, implications for Biblical integration, the benefits to business practice, and the relationship of the study to the

accounting cognate or function (Liberty University, 2021). This study sought to reduce gaps in the literature, specifically regarding the use of complex costing processes at small flexible manufacturers. Additionally, this study focused on the sustainability of the costing process over time. There have been other studies on implementing ABC at small manufacturers, but these studies were not specifically for flexible manufacturers. Another gap in the literature is the focus on the ease of information accessibility, needed to maintain the complex processes over time. In this study, the researcher presented the Biblical integration of the theories and concepts of the research. These integration points are demonstrated through a review of Biblical writings on leadership, cross-functional work, and the essential nature of rules in everyday life. The improved knowledge of the behavior of costs gained through the study will benefit businesses in the development of their pricing and product mix strategies. The researcher intends for the study to add to MA practices, MA coursework, and accounting information systems (AIS) studies.

Reduction of Gaps in the Literature

The study aimed to reduce gaps in the literature regarding implementing complex costing processes at small flexible manufacturers and sustaining them over time. The research noted related studies on the implementation of ABC and TDABC at small manufacturers. Adiguzel and Flores (2019) outlined implementing TDABC at a small baked goods manufacturer, and Raucci and Lepore (2020) described the process of implementing ABC in a small transportation company. Flexible manufacturing, as outlined by Bhosale and Pawar (2019), is identified as firms utilizing equipment or manual processes to manufacture a variety of products either in small batches or by dedicating multiple pieces of equipment to process a specific product. This flexibility allows firms to be agile in meeting short-run and customized orders. Flexible manufacturing also demands the need to understand processing costs in detail to price products

appropriately or to decide not to accept an order. Significant literature has been published on the gaps in appropriate MA tools at small manufacturers, as noted by Nartey and van der Poll (2021). The specific needs of flexible manufacturers and the benefits that they can gain from the introduction of advanced MA tools at these types of firms require further research.

The other gap in the literature is the focus on accounting data to create and maintain complex accounting models. To maintain complex costing models over time, the accounting data needed to detail cost behaviors (i.e., cost pool values and activity-related cost identification) must be readily available. Najera Ruiz and Collazzo (2020) noted that many small businesses lack minimal accounting information to make informed business decisions. Though cost models can be developed to provide higher quality information, focusing on the means of capturing the required data on an ongoing basis needs to be added to the literature on small companies' usage of complex costing processes. Shop floor equipment can be a direct source of data that can be gathered, proofed, and utilized with minimal effort. This theme is supported by Aljabr (2020), who highlighted the need for quality data on the shop floor to successfully implement ABC. Designing a process to capture this information for use of ABC (or TDABC) on an ongoing basis should be detailed as part of the implementation plan.

Implications for Biblical Integration

The Biblical integration of the study is presented through the link between the research's conceptual framework and Scripture. The researcher focused on the integration of cross-functional work and leadership in implementing and sustaining activities of new costing processes proposed in this study.

Vetchagool et al. (2020) noted in their research that ABC is cross-functional. Managers and employees from multiple departments must cooperate to implement and maintain an ABC

system. Input from each department is necessary to understand the actions and the flow of data and the costs associated with these activities. Surveys of employee activities are performed in diverse areas such as purchasing, customer service, maintenance, and quality control. The feedback from each of these areas provides the organization's management with insight into where costs are incurred. Gaining knowledge of how costs are incurred leads management to take actions that will lead to process effectiveness and improved quality (Vetchagool et al., 2020). Brands (2019) noted that accounting departments frequently work within their siloed organizations when it comes to the maintenance of accounting software, such as ABC. This author encourages accountants to reach out to their IT departments and become involved with technology issues and enhancements not only in accounting but in other areas of business processes. The need for having different employee groups working together for the organization's overall performance has a parallel in Scripture. The Apostle Paul wrote in 1 Corinthians 12 that the diversity of gifts enhances the unity of the body of Christ (*Holy Bible, Evangelical Heritage Version*, 2019). Everyone brings different skills to the Church, and not all can be ministers of the Gospel. Talents such as administration, carpentry, and compassion for the sick can be utilized to strengthen the church body and share the good news of salvation. One talent is not more important than the next. "If the whole body were an eye, where would the sense of hearing be? If the whole body were an ear, where would the sense of smell be?" (*EVH*, 2019, 1 Corinthians 12:16). Only by working together is the team whole. "But as it is, there are many members, yet one body" (*EVH*, 2019, 1 Corinthians 12:20).

Leadership's impact on the implementation and maintenance of complex costing processes is one of the major constructs in the study. Bassani et al. (2021) wrote about leadership and how leaders' relationships with employees can impact changes in MA processes. The

leadership in an organization helps facilitate the entire change process. Changes in the costing process like ABC require resources allocated for implementation and a facilitator who can help overcome barriers to the change. The organization's leadership should fill this role. Bassani et al. wrote about how differences in leadership opinions on MA change can lead to five contested areas: the necessity of the change, resources that are required, the level of accuracy in the processes, who owns the process, and who is responsible for the processes (Bassani et al., 2021). Leadership is fully integrated with Scripture. Drov Dahl and Jones (2020) noted that Christian leadership is servant leadership. Leadership should lead by example and with humility. "Do nothing out of selfish ambition or empty conceit, but in humility consider one another better than yourselves. Let each of you look carefully not only to your interest but also to the interest of others" (EVH, 2019, Philippians 2:3-4). Leadership style will impact employees' acceptance of the change. As noted above in the constructs section, leaders can influence changes by the level of their commitment and support. This support comes in the form of participating in the change process and allocating sufficient resources to accomplish the necessary tasks to implement or sustain a new process (Alblooshi et al., 2021). Scripture also provides directions for a leadership style that will effectively communicate, correct, and train employees. "All Scripture is God-breathed and is useful for teaching, for rebuking, for correcting, and for training in righteousness, so that the man of God may be complete, well equipped for every good work" (EVH, 2019, 2 Timothy 3:16-17).

Benefit to Business Practice and Relationship to Cognate

As noted above, the focus of this study was to provide the selected firms in the small flexible manufacturing sector with an understanding of their existing cost structures and the potential benefits of the use of complex costing processes, such as ABC or TDABC. Vetchagool

et al. (2020) noted that firms can improve their operating performance by utilizing ABC, regardless of the size of the firm. The research can be extended specifically for those firms in flexible manufacturing that rely on being able to meet short-term demand and irregular production releases. Being able to recognize how costs occur, which activities generate higher levels of costs, and which products or services are more profitable, is basic information that the firms in this industry need for survival in the increasingly competitive market.

The study adds to the field of knowledge in both MA and AIS. Understanding cost behaviors at a manufacturing firm is a basic function of MA. Verifying the flow of costs on the shop floor is a necessary double-check to the engineering estimated process bill of materials and routings. Much has been discussed in academic literature as to the benefits of ABC but also the drawbacks to the efforts required to implement and maintain this process (Tarzibashi & Ozyapici, 2019). Global competition, however, has increased the need for enhanced MA practices, yet many SMEs have limited exposure to these tools (Nartey & van der Poll, 2021). Technical advancements can add higher requirements for manufacturers but also can provide solutions. Senova and Sebescakova (2020) wrote about the increasing availability of data from manufacturing automation. AIS needs to be designed not only to provide basic functions such as ensuring that inventory is valued correctly and transactions post to the general ledger, but also to harvest the massive amounts of data being generated by this shop floor automation. Basic cost information and production statistics are produced by programmable logic controllers (PLCs) on the shop floor continuously. The downtime of equipment, units produced, units scrapped, and process time per unit or batch are examples of data that can be captured automatically. This data can be utilized for transaction reporting and as the basis for cost activity allocations.

Summary of the Significance of the Study

The significance of this study is to eliminate gaps in the existing literature on the use of advanced costing processes in small businesses, the implications of Biblical integration inherent in the study, and the benefits the study provides to business practices and the accounting cognate. Although research has been done on the ability to implement ABC or TDABC at small firms, a specific focus on flexible manufacturers and the ability to have the necessary data readily available has not been detailed. Though small flexible manufacturers can benefit from enhanced knowledge of their costing structures, the use of traditional or advanced costing tools requires further research. The researcher integrated this study with the Bible by detailing the need for cross-functional support and the impact of leadership on the development and maintenance of MA processes. The study benefits business practice by advancing MA practices in an underserved market and is an enhancement to MA and AIS curricula and research.

A Review of Professional and Academic Literature

The following literature review shows how the existing body of knowledge relates to the research study. The review is composed of seven parts: business practices, the problem, concepts, theories, constructs, related studies, and anticipated and discovered themes. The review of business practices in the current environment helps identify the research problem and existing trends in the MA field that are covered in the proposed study. The increased need for cost control and management is highlighted by recent research on the impact of global competition and the increase in customer demand for more diverse products. The problem of the study is supported by various research on the increased complexity of business requirements, the insufficiency of traditional costing systems, and the challenges that small organizations face in implementing complex costing tools.

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The significance of the study is to eliminate gaps in the existing literature on the topic of the use of advanced costing processes in small businesses, the implications of Biblical integration inherent with the study, and the associated benefits the study gives to business practices and the relationship to the accounting cognate. The study outlines that though research has been done on the ability to implement ABC or TDABC at small firms, a specific focus on flexible manufacturers and the ability to have the necessary data readily available has not been detailed. Though small flexible manufacturers can benefit from an enhanced knowledge of their costing structures, their use of traditional or advanced costing tools requires further research. The researcher integrated the study with the Bible through its detailing the need for cross-functional support and the impact of leadership on the development and maintenance of MA processes. The study benefits business practice by advancing MA practices in an underserved market and is an enhancement to MA and AIS curriculums and research.

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The following literature review is presented to show how the existing body of knowledge relates to the research study. The review is composed of seven parts: business practices, the problem, concepts, theories, constructs, related studies, and anticipated and discovered themes. The review of business practices that exist in the current environment helps identify the research problem and the existing trends in the MA field that are covered in the proposed study. The increased need for cost control and management is highlighted by recent research on the impact of global competition and the increase in customer demand for more diverse products. The problem of the study is supported by a variety of research on the increased complexity of business requirements, the insufficiency of traditional costing systems, and the challenges that

small organizations have in implementing complex costing tools. The first concept that was the focus of the research was how traditional costing processes impact pricing strategies. This concept then led to the presentation of research on organizational improvements due to the implementation of complex costing processes and how leadership can impact costing process implementations and sustainability. The research utilized two theories to understand how participant organizations manage change in their MA processes. These theories are the BSF and SST. The literature given in this review provides examples of how these theories are applied to diverse types of process changes in the MA function. Next, the literature on the four constructs that are included in the study's conceptual framework is given. The review covers the impact that leadership style, market dynamics, profitability, and shop floor automation constructs have on the implementation of advanced costing processes. Related studies recently conducted on the use of complex costing processes, such as ABC and TDABC, show how these costing tools can be utilized in different industries. The related studies section outlines the use, benefits, and drawbacks of complex costing processes but does not directly cover the use of advanced costing tools at small flexible manufacturers. These related studies also did not further examine the need to focus the design of complex costing processes on the data. Therefore, these studies do not capture the sustainability that the proposed research provides. Lastly, the anticipated and discovered themes are noted. The themes included in this section are the lack of existing MA processes and insufficient base costing data at the research participants' locations.

Business Practices

Increased competition has led business managers to focus on choosing cost-management processes that integrate with their production systems to manage costs more effectively (Basti & Boyer, 2021). Organizations can utilize cost management processes that link with production

systems to provide the necessary information to both control costs and create strategic plans for product pricing and product-mix decisions. Management accountants look for costing methods that are suitable for their specific industries and production systems. Basti and Boyer (2021) noted that ABC is a commonly utilized option for this purpose. ABC processes are tools that help in cost control and management through the focus on activities within the operational and administrative functions of the organization. The cost of these activities is assigned to the specific cost objects (products) through a two-step process. The first step is to assign costs (or resources) to an activity. The second step is to allocate the assigned costs to the cost objects through the number of activities that each cost object consumes. The implementation of ABC processes gained popularity in the 1990s. Enterprises that moved from traditional standard-based costing to an ABC process benefited through better control of costs, which led to higher profitability (Basti & Boyer, 2021).

Though ABC does have some degree of utilization in large and small manufacturers, Basti and Boyer (2021) noted that this costing method has been criticized for not being accurate and being costly to implement and maintain. As these deficiencies of ABC were noted in the industry, organizations started to abandon the process or only implemented ABC at a limited level (i.e., for specific locations or operations). The authors noted that TDABC can be utilized to address the deficiencies in the ABC process. TDABC is simpler, well-suited for capacity control, and still has many of the features of a traditional ABC process. One of the noted simplifications that TDABC offers is the ease of integrating TDABC models (or software) with existing enterprise resource planning (ERP) and customer relationship management (CRM) software packages (Basti & Boyer, 2021).

Mirroring the deployment of ABC in the 1990s was the development and use of ERP systems. Organizations implemented ERP systems to improve productivity, better satisfy customer demand on a timely basis, and provide a competitive advantage (Yan et al., 2019). The concept behind ERP systems is to have a single software that integrates all business processes from the purchase of raw materials to the collection of payments on customer invoices. Yan et al. (2019) noted that ERP systems replace either manual processes or complex integrations between multiple software systems with a single system that assists in standardizing and automating cross-functional transactions. Though many firms have made substantial investments in these types of systems, debate continues about whether these investments were successful. Like ABC, the cost of implementing ERP systems is extensive and time-consuming. Yan et al. (2019) noted that in addition to these implementation costs, ERP systems have a high rate of launch failure and may lead to cybersecurity issues. Critics stress that even though the investment in a full ERP implementation may benefit organizations that are in a stable operational environment, it may be detrimental for those that face massive changes in the marketplace. The authors also noted that after ERP systems are implemented, a negative impact on business performance and productivity can result in the short term (Yan et al., 2019). A key factor to the successful implementation of ERP systems is the mapping of processes and obtaining alignment of the different participants in the overall project. This alignment should cover the business functions, associated integrations, and the information needs of the member groups of the organization (Yan et al., 2019). Within an ERP system, the financial and MA functionalities and their integration with other functions need to be clearly understood. How data flows between the different process modules must be mapped and verified in detail before utilizing the information for the development of ABC or TDABC models or to interface these process models directly into the existing ERP system.

Changes in customer demands are pushing manufacturers to build flexibility into their manufacturing systems. Lower volumes of more customized parts require routing and machine flexibility (Bhosale & Pawar, 2019). To address the requirements for changing customer demands, some manufacturers have developed flexible manufacturing systems (FMS). Bhosale and Pawar (2019) identified FMS as the integration of the central computer system (i.e., the firm's ERP system) to the computerized numerically controlled (CNC) machines. These CNC machines use a process to track the manufacturing of products and the movement of components until the goods have finished the production process and have moved into storage. This continuous feeding of information into the ERP system allows for real-time tracking of inventory levels and provides detailed information that accountants can utilize for the development of product cost drivers (i.e., the cycling of the production equipment that incurs costs such as utilities, maintenance, or operating supplies).

For an operation to be considered flexible, two important flexibilities need to exist: machine flexibility and routing flexibility. Machine flexibility is the ability to manufacture assorted products on the same piece of equipment. Routing flexibility refers to the ability to produce a specific product on multiple machines (Bhosale & Pawar, 2019). Having this flexibility allows manufacturers to produce a wider variety of products at either low or inconsistent volumes. Standard fixed manufacturing has dedicated equipment to produce products in large batches. Though developing an automated FMS may require a substantial investment in the short term, less capital equipment investment will be needed in the long term. There is a need for complex production management and costing processes to effectively manage flexible manufacturing. FMS requires a robust production scheduling process to detail how parts are selected for production on specific pieces of equipment. The allocation of available tools and

fixtures to meet production needs and the optimum schedule and mix will need to be determined (Bhosale & Pawar, 2019). As part of this production planning and scheduling, a detailed understanding of how costs are incurred in each step of the production process is required. Connecting ABC with FMS meets this need.

Industry 4.0 and lean manufacturing are additional current trends in the manufacturing environment. Nedjwa et al. (2022) describe how these processes have revolutionized manufacturing through the ability to increase the variety of products produced and the reduction in the time it takes to bring new products to market. Industry 4.0 was launched in Germany in 2011 as part of that country's initiative to strengthen its global leadership position in the manufacturing industry. Industry 4.0 is an approach to controlling production and enabling the synchronization of workflows for both dedicated and flexible manufacturing. Though the total concepts of Industry 4.0 include the establishment of automated robots, additive manufacturing, and the use of cloud technology, the focus of the Nedjwa et al. (2022) article was on the integration of information systems and the topic of big data analysis. Integrating systems (i.e., PLCs and ERP systems) allows for the capture of large volumes of data. The data being captured becomes a tool that can be utilized in lean management.

Lean management focuses on the elimination of waste. These waste categories include transportation, overproduction, defects, excess inventory, and unnecessary movements (Nedjwa et al., 2022). As part of the lean manufacturing analysis, accountants need to develop the costing of these waste categories. The ability to see the cost impact of the elimination of each waste category allows firms' management to determine which categories should be prioritized for reduction activities. Having this type of information available on a real-time basis allows for quicker reactions to operational and customer changes. By gaining better knowledge of each

production step, firms can improve their competitiveness through increased operational efficiencies and flexibility (Nedjwa et al., 2022).

The speed of change in technology and customer demand is especially felt in SMEs. Azudin and Mansor (2018) highlighted that the higher use of operational technology at SMEs has increased the need for more sophisticated costing processes. MAPs, like product costing, are considered value-added, as these practices assist leadership in the management of organizations. MAPs include tools and techniques that provide the information needed for budgeting, performance evaluation, and overall profitability analyses. Though the benefits of MAPs are known, the use of these tools in SMEs is lacking. Azudin and Mansur (2018) wrote that this lack of MAP usage by SMEs is due to insufficient staff training and the fact that MA (unlike financial accounting) is not a mandatory practice. The authors researched SMEs to determine the impact the organizational culture, business potential, and the existing operational technology have on the use of MAPs. The authors showed that only operational technology had a significant impact on MAP usage. Operational technology is defined as complex processing systems, advanced manufacturing technology (i.e., PLC integration), and strong quality measurement systems. The use of these higher-level operational technologies increases the need for sophisticated costing processes and other MAP tools (Azudin & Mansur, 2018). The authors noted in their research that of the participant SMEs most were utilizing traditional costing processes (such as volume-based standard costing). With the increases in operating technologies and the need for better scheduling for complex flexible operations, higher-level costing tools such as ABC and TDABC needed to be utilized to meet organizational objectives. SMEs need to be competitive in a global market. Using higher-level operating technologies and the associated higher-level MAPs is an increasing requirement for survival in the coming years (Azudin & Mansur, 2018).

Cost management researchers have focused on the proper allocation of production costs to cost objects and the appropriate way to analyze and allocate overhead costs (Afonso et al., 2021). Management accountants have developed tools to better understand product cost structures and the associated pricing strategies. Additionally, production cost estimates are integral components in budgeting and business plan designs. Choosing a method to cost products is therefore a crucial business decision. As global competition requires the development of diverse products, frequently in a more complex manner, there is a need for even more sophisticated costing processes. Accountants who have a proper costing system can provide detailed cost information on short- and long-term activities (Afonso et al., 2021). Costing processes need to detail not only the direct costs of the product or services (i.e., raw material and direct labor costs) but also indirect costs from non-production departments. Manufacturing companies today have complex operations. Diverse products are being manufactured on multiple assembly lines. The decisions in the manufacturing industry on having broad product lines with multiple processes require costing information that is complete, accurate, and timely. Afonso et al. (2021) noted that actual manufacturing systems are highly variable and have a degree of uncertainty. Although the manufacturing environment has become more complex, many companies still traditionally cost their products (through proportionally allocating costs to products by the number of units produced). In the past, when the range of products or services produced was narrow, the use of traditional costing may not have had a significant impact on operations. However, as operations have become more complex, these traditional costing systems are no longer sufficient. If traditional systems are used in a complex manufacturing environment, costs become distorted, and inappropriate business decisions could be made (Afonso et al., 2021).

The lack of use of MAPs by SMEs was also noted in the research by Najera Ruiz and Collazzo (2020). The authors outline how small businesses utilize minimal MA techniques beyond simple cash management. Many small businesses are challenged by the lack of accounting information. Information is generated for tax purposes, but utilizing the available information for decision-making is limited or nonexistent. Small companies, especially microenterprises (less than 50 employees), generally do not use MA tools. Frequently, the overall administration of the organization is based on the business skill set of the business owner or manager (Najera Ruiz & Collazzo, 2020). The lack of use of financial management tools is one of the most crucial factors for SMEs. Previous research on SMEs has found that the use of MA tools can lead to improved performance. Najera Ruiz and Collazzo noted that two basic MA tools were in use. First was the use of budgets. Most participants (80%) in the survey of SMEs noted the existence of a budgeting process, though less than half of these have the budget detailed in writing. The other area of MA that is generally in place in the surveyed SME participants is product costing. The surveys showed four different methods of product costing are being utilized by SMEs: product costs based on acquisition costs, acquisition costs plus a markup, product costs based on market pricing, and lastly, product costs using financial calculations. The first method, the use of acquisition costs as the basis for product valuation, was the most common (at 39%). Costs of material, direct labor, and indirect costs are considered at their acquisition value and applied to the value of the units produced. The next method simply takes the acquisition costs and applies a markup (used by 25% of participants). The market-based costing is to value products based on the cost of comparable products available in the market (used by 22% of participants). The least common method (used by 14%) is to cost materials based on a financial calculation. Examples of these calculations include break-even costs, a set

margin above fixed costs, or standards based on the level of production or planned sales (Najera Ruiz & Collazzo, 2020). The authors' research provides an overview of how SMEs approach product costing, which is useful in further research in this industry segment.

Msoni et al. (2020) further researched the lack of MAPs in SMEs. They noted that even though MAPs have been identified as key tools for positive organizational management, few SMEs are utilizing these tools as a part of their decision-making processes. The researchers found that frequently, the lack of education of the staff and the understanding of the business owner or manager are contributing factors to the poor utilization of MAPs. This lack of understanding and adoption of MAPs by small businesses may adversely impact their decision-making and may suppress operational performance. This deficiency extends to relationships with external stakeholders (Msoni et al., 2020). Investors and other stakeholders need to have confidence in budgets and strategic plans, as well as basic information such as inventory valuation, before investing in an organization. SMEs frequently compete with larger organizations that have a competitive advantage by having well-instituted MAPs. Msoni et al. focused their study on how SMEs can integrate MAPs into their management toolbox. Their findings, beyond the lack of staff and management understanding, included the enterprise age or years in operation. They noted that there is a misconception about the adoption of MAPs. Many SME owners and managers believe that MAPs are implemented only after the firm is fully established. MAPs can be set up and utilized at any phase of the enterprise life cycle, including in the development stage (Msoni et al., 2020). Surveys also found that the level of technology that is adopted in the operations will strongly influence the level of MAP adoption. Overall, this study found that SME owners and managers are aware of the impact and benefits that can be gained by adopting MAPs. Unfortunately, many of these leaders are fully engaged in the

challenges of daily business and cannot dedicate time and resources to adopt and utilize these valuable practices (Msomi et al., 2020).

Vilakazi et al. (2020) noted that the lack of accounting information is an additional challenge in the implementation of complex product costing and other MAPs. These authors researched the use of MAPs by SMEs on an international level. They noted that of SMEs that have implemented MAPs, most have implemented traditional MAPs such as budgeting and standard absorption costing rather than more recently developed MAPs. Of the few SMEs that were utilizing more recently developed MAPs, the most common tools used were ABC and target costing, followed by life-cycle costing (Vilakazi et al., 2020). The results of their surveys suggest that among SMEs in the manufacturing sector, there is an increasing awareness of the tools and benefits that can be provided by advanced MAPs. The MAP tools highlighted by this research include costing systems, budgeting systems, performance measurement systems, decision support systems, and strategic MA (Vilakazi et al., 2020). Costing systems are defined as a framework to measure the costs of the products produced for use in profitability analysis, inventory valuation, and cost control. Costing systems include traditional, variable, and ABC systems. Budgeting systems are an expression of the strategy for the planned inputs and outputs. Budgets allow management to track and control costs and are a way to communicate the organization's goals to employees. Organizations use performance measurement tools to track activities that are currently happening and provide a starting point for setting goals. Decision-support systems provide information to support specific business decisions, such as capital investments, acquisitions, or divestitures. Strategic MA provides information to analyze the firm's markets, competitors' cost structures, and the monitoring of the organization's overall strategies and those of competitors over time (Vilakazi et al., 2020).

To utilize these tools, it is crucial to have sufficient accounting information generated from the firm's ERP systems, PLCs on the shop floor, or manual tracking of performance factors. Vilakazi et al. (2020) noted that in general, SMEs do not keep extensive accounting data due to the lack of awareness of this information's uses. Internal and external factors cause this low level of awareness. Internally, the size and age of the firm along with the organizational strategies can lead companies to not adopt MAPs that could generate the accounting data needed for business decisions. External factors such as the level of competition, advancements in technology, and the existing network infrastructure may also hinder the adoption of these tools.

The Problem

Higher complexity in the business environment has increased demands on management accounting systems (MASs). Davila (2019) wrote that the two major forces that are increasing the demands on MASs are technology and globalization. Simple cost control and execution support services are not sufficient. For MA to remain relevant and create new sources of value, it must keep pace with these advances. Most of the existing MA theories noted in textbooks were developed in the late 19th century. However, in recent years, financial accounting has shifted toward focusing more on inventory and costs of sold valuations (Davila, 2019). This attention by financial accounting has increased the focus on MAPs to better capture these costs. As advanced technology has allowed for better information flows, performance measurements have moved from purely financial reporting to including non-financial metrics. The ability to capture these non-financial metrics (such as the number of purchase orders issued, or cycle wait times) has made the development of higher-level MA tools possible (Davila, 2019). One of the trends that have forced MA to change is the impact of big data, which is a product of machine learning. The objective of data from machine learning is not to test costing models; rather, it is used to predict

future behavior. A substantial number of variables are gathered and analyzed to determine the potential of predictability. Machine learning does not need to have models developed in advance. Instead, the variables are extracted and analyzed for their predictability value. Less attention is paid to the costing models and more to the data itself. The impact of machine learning on MA is to shift the focus from the development of the optimum costing model to the research on a larger set of potential cost drivers (Davila, 2019).

Hutahayan (2020) highlighted that globalization causes rapid and continuous new processes and product development needs in business. The development of these needs causes uncertainty within the business sector and increases the need for the creation of innovative strategies that help firms achieve a competitive advantage. Innovation is a key determinant of business success. New products and services need to be developed to meet changing customer requirements. These demands require MASs that are broad in scope, timely, can be easily consolidated, and are integrated with other functional systems. These systems need to be able to capture and analyze the required information on a timely basis. The system architecture must be broad in scope, able to consolidate and summarize data in usable formats, and can be integrated into other systems such as existing ERP or PLC systems. There is a strong link between a company's business strategy and its MAS. Hutahayan (2020) hypothesized that MASs are the link between a company's innovation strategy and its financial performance. The author noted that a higher level of internal process improvements (necessary for successful innovation in product development) helps firms to be more competitive which results in better financial performance. Though their research did not find a direct link between an enhanced MAS and improved financial performance, it was noted that these systems need to be reliable to assist in the development of the overall business processes. The fact that MASs requires competent

management in the internal process improvement activities, explains the reason the direct link between MASs and financial performance was not statistically supported (Hutahayan, 2020). Restated, managerial competency levels can override the impact of a well-designed MAS. Though this direct link to financial performance was not shown in this research, MASs have been shown to help firms face market competition. MASs are designed to focus on efficiencies and value-added processes, which can help in the development of competitive advantage. This advantage can be gained by having the necessary tools to analyze alternative courses of action and assist in overall planning and controlling activities (Hutahayan, 2020).

The growth in global competition and changes in technology have increased the demand for MAS. One area of focus is the need for higher quality costing (or valuation) of products and services. Many firms today still utilize traditional costing systems, such as standard or variable costing. Tarzibashi and Ozyapici (2019) highlighted that traditional costing is not capable of providing quality product valuations. Traditional costing systems frequently use direct labor hours to allocate costs to products. This costing concept has been in use for more than 70 years. Many firms still utilize this process for cost estimation and inventory valuation. Companies that produce a wide range of products and utilize a traditional single volume-based cost driver can have significant distortions in their product evaluations. The range of actual costs to produce various products will not be reflected in the valuations. With inappropriate valuations, the pricing of the products to customers and the decisions to invest capital to produce these products can be erroneous. Traditional costing systems also rarely produce non-financial metrics that help leaders manage their businesses. The non-financial data is useful in process improvement initiatives. Increased pressure from competition has forced many organizations to invest in

advanced costing systems to gain insights into their costing structures and monitor key non-financial metrics (Tarzibashi & Ozyapici, 2019).

Cescon et al. (2018) noted that traditional MAPs do not provide the level of data necessary to make strategic decisions. Advanced MAPs are needed to meet the challenges created by global competition by assisting firms in identifying potential strategies. To compare product costs against the competitors' costs, a detailed understanding of what drives costs within the organization needs to be developed. To do this analysis, detailed information to calculate product costs through methods such as target costing or life-cycle costing must be available (Cescon et al., 2018). Target costing is a process where the selling price of a product is computed as a sum of the production costs and the respective desired profit margin (Silva, 2022). Target costing forces leadership to focus on the characteristics of the product itself, especially in the design phase, to manage the production process to minimize costs, especially non-value-added costs. Target costing is used as a pricing method for firms that operate in extremely competitive markets, as it helps to better detail the costs that are a result of the specific production process characteristics of each product. This costing method is key in the overall management strategy of the company as they target markets, customers, and specific products to focus investments and operating resources on (Silva, 2022). Life-cycle costing provides a unique perspective as it looks at the costs of products beyond the manufacturing stage (Knauer & Möslang, 2018). Accountants use traditional cost accounting to analyze the costs that are incurred to produce a product only in the manufacturing phase of the product's life. Life-cycle costing includes costs that are generated before the start of production (i.e., R&D, prototyping, pre-production equipment run-offs) and costs that exist after the sale of the product (i.e., warranty and legal liability costs). MASs need to be developed so that the overall costs can be accurately tracked and assigned to the activities

that produce them. Knowing the full life-cycle costing can help firms improve the quality of their decisions which can impact their actual financial performance (Knauer & Möslang, 2018).

Though the need for advanced costing processes has been identified, small organizations have struggled in the implementation and maintenance of these tools. Msomi et al. (2020) wrote that the use of advanced MAPs has been shown to have positive impacts on administrative and strategic management for large organizations. The authors noted that MAPs' benefits for SMEs are limited, and this limitation may negatively impact SMEs' ability to remain competitive in markets where they must frequently compete with larger firms. MAPs help guide business decisions and can be useful tools to help small business owners and managers maintain their competitiveness. Changes in competition and technologies require SMEs to move toward advanced MAP tools such as ABC. Unfortunately, most SMEs have minimal comprehension of how the adoption of these tools can assist in the management of their operations (Msomi et al., 2020). The development of innovative ideas and the use of advanced methodologies at SMEs is frequently limited due to the limited availability of appropriate resources. These resources include skilled personnel who understand MAPs and fully comprehend the existing manufacturing processes and the lack of financial resources needed to acquire the necessary technology. Another limiting factor is the leadership's understanding of and commitment to developing and maintaining a robust MAS. The research by Msomi et al. (2020) showed that though many SME owners and managers may be aware of how MAPs can benefit their organizations, the daily challenges faced by their operations and the associated lack of resource availability prevent these tools from either being implemented or fully utilized.

Nartey and van der Poll (2021) echoed the fact that SMEs (specifically those in the manufacturing sector) operate in a complex environment, and the owners and managers of these

firms need detailed operational information to fully comprehend the impact of their decisions. The need for MA tools has increased over the past years due to technological advancements and the desire for both large firms and SMEs to be the most innovative in the products and services that they offer. This change has made MA more relevant, as there is an increased need to measure, evaluate, and assist in the management decision-making process. Though MAPs are key tools for capturing the information needed to develop competitive strategies, many SMEs have limited use of or exposure to advanced MAPs. Narthey and van der Poll's analysis looked at seven different innovative MAPs that could positively impact SMEs. These processes included ABC, life-cycle costing, total quality management, environmental costing, target costing, kaizen costing, and value analysis. Their research recommended that SMEs implement these tools into their business strategies to achieve long-term business sustainability. Traditional MAPs have not provided the necessary information to properly analyze cost structures or make strategic business decisions. Traditional MAPs are designed to focus on historical costing information and can be misleading. To accurately assess the environmental and sustainability impacts of operations, firms need to implement advanced MA tools such as ABC, life-cycle costing, reporting on waste control, and detailed performance evaluations. The Narthey and van der Poll research noted that business strategies need to have integrated advanced MAPs to process the necessary information to meet the changes in competition and technology, especially in SMEs.

Concepts

Tarzibashi and Ozyapici (2019) noted in their research that traditional costing systems (such as absorption, variable, or standard costing) are not capable of providing quality product valuations. Traditional costing processes are designed to utilize a single cost driver (i.e., direct labor hours) to allocate overhead costs to products. Using a single application rate based on

production volumes may cause inappropriate results in the cost of products. This is pronounced when the organization produces a wide variety of products that utilize different production processes. Technological innovations have led companies to invest in diverse types of manufacturing technologies. These investments lead to higher levels of transactions and higher overhead costs (Tarzibashi & Ozyapici, 2019). The increase in transactions and overhead costs will then create a wider difference in costing results between a traditional costing process that utilizes a simple volume-based cost driver and costing processes that use multiple cost drivers that are attributed to the product or service characteristics. Higher overhead costs can increase the level of difficulty in developing a proper way to allocate costs to the products produced. Care must be taken to note the nature of the costs. Additionally, the authors noted that traditional costing processes also do not produce non-financial metrics that can be used to control costs or support efforts to improve process efficiencies. This is especially true for SMEs. This inadequate level of information has forced many organizations to seek advanced costing systems to achieve or maintain a competitive advantage (Tarzibashi & Ozyapici, 2019).

Cost systems frequently are simple and use heuristics to allocate costs. When costs are allocated based on these simple processes, poor business decisions may be made. Research by Homburg et al. (2018) noted that complex costing systems that have a higher number of cost pools have a substantially lower level of costing errors than traditional systems. This lower level of errors can impact pricing and product portfolio strategies. In their research, price, and product mix decisions were made by simulating calculations in over 100 different cost models with different market environments (Homburg et al., 2018). The first test looked to determine whether a more complex costing system produced a materially lower level of profit errors. The authors next looked at the impact of production quantity and product portfolio on the level of costing

errors. Lastly, they surveyed whether the over- or under-production of specific products had a larger impact on the level of errors. The findings of the research showed that complex cost systems had lower error rates for all error types. The researchers next saw that an error in production quantity had a larger impact on overall profitability than errors in the product portfolio (product mix). Lastly, the study showed that the overproduction of unprofitable products had a larger negative impact on profitability than the erroneous discontinuation of the production of profitable products. This last finding suggests that the costing systems tested by the researchers tended to underestimate the actual costs (Homburg et al., 2018). Survey results of complex costing systems, such as ABC, showed that one of the most important applications for complex costing systems is for pricing decisions. Pricing decisions are the most important business decision that firms make because these decisions can impact their overall performance (Homburg et al., 2018). The authors noted that pricing decisions assume that firms have some pricing power in the markets they serve. For those firms that have pricing power, it is assumed that the firms can use discretion in changing the prices that are charged, due to the lack of product pricing transparency. The authors noted that their research can be utilized to support investments in more complex costing systems or for use in assessing an existing process and determining whether the process needs to be modified. The enhancement of an existing system may be useful for firms that are in financial distress and could benefit by utilizing more robust tools to determine proper pricing for their products. Lastly, Homburg et al. (2018) highlighted that a costing system that uses more advanced tools will also improve the organization's overall transparency.

Vetchagool et al. (2020) researched the impact that ABC has on organizational performance. The researchers also looked at any effects that the type and size of the businesses

had on the successful use of ABC as measured by improvement in organizational performance. The authors theorized that ABC could improve organizational performance because the information produced by ABC could help firms better manage resources and costs, provide detail on the need and impact of process improvements, and help in identifying non-value-added activities. The research included the use of three different models to compare data and determine whether results from manufacturing and non-manufacturing firms differed. They also surveyed whether there was a difference in the impact on operating results between large firms and SMEs (Vetchagool et al., 2020). The study was designed to determine the extent of ABC usage and its impact directly on financial performance. The literature review section of their research detailed the background of ABC as an alternative to traditional costing systems. The authors highlighted that the major advantage of ABC is that it captures the economics of operational processes more thoroughly and efficiently than traditional systems. This is in part due to ABC identifying cost drivers that better identify the rationale for the existence of overhead costs. This new understanding allows for management to identify the activities causing non-value-added costs and initiate actions to eliminate or minimize their impact and develop strategies to address long-term efficiencies. The authors' research findings were that ABC directly improves the operational performance of a company and indirectly improves its financial performance. The authors noted that results were similar for large and small firms and for firms that are engaged in manufacturing and those that are in non-manufacturing (Vetchagool et al., 2020).

Ganokar et al. (2019) also wrote that ABC has helped many organizations in the manufacturing and service sectors. These organizations have improved their competitiveness by enabling better strategic decision-making through the enhanced understanding of the cost behavior of their processes and products. The ABC process of assigning indirect costs to

activities and then assigning the activities to the products or services was outlined. ABC provides a more accurate product costing than traditional costing (Ganokar et al., 2019). The authors then highlighted that the implementation of ABC can have issues. The time and costs required to implement and sustain an ABC process can be extensive. To alleviate these concerns, a newer version of ABC has been developed that only requires two parameters and a single step to allocate costs. This newer process developed by Kaplan and Anderson (2004) is known as TDABC. The two factors that need to be identified are the unit cost of supplying capacity and the time required to perform an activity. TDABC avoids one of the major time-consuming tasks required in ABC, conducting employee surveys, by relying on managerial estimates for time spent by activity. Also, the TDABC models can be much more flexible. The base concern regarding the use of ABC is not the concept; it is the way the models are created. Though it is possible to survey employees of a small company or a single department to see how much of their time is spent performing each activity, for large organizations, this is not practical. The TDABC process utilizes the basic activity-based theory but simplifies it to be used for larger implementations and to allow for more flexibility (Kaplan & Anderson, 2004). Ganokar et al. (2019) used TDABC in their research, in conjunction with a tool known as Maynard Operational Sequence Technique (MOST). MOST is a set motion time that is used in manufacturing to determine the standard time it should take a worker to complete a task. The authors utilized a case study to show that by utilizing the MOST technique with a TDABC process, the implementation of an activity-based process was simplified, and process concerns were identified for productivity improvement initiatives (Ganokar et al., 2019).

The third concept is leadership's impact on the implementation and sustainability of an organization's costing processes. Bassani et al. (2021) wrote that leadership is a key factor in

MAP changes. These changes could be the implementation of a new MAP or simply the role that accountants play within an organization. Leadership's role in the change process includes being the facilitator for the process, aiding in overcoming obstacles that may arise, and helping develop team spirit for the implementation and the potential outcomes from the change. Leadership normally is assumed based on the role and hierarchy that exists in an organization. Bassani et al. noted that leadership can help create momentum for change and remove barriers across functions, as it is the relationships between the actors in the organization that drive how the change process is rolled out. The researchers focused on an organization that had a dispute between members of the leadership team regarding a new accounting system. The core concern was that the new accounting system produced refined costing data that made the true impact of the operations transparent. The old system utilized direct costing with arbitrary allocations of overhead. This was sufficient for business use since the products that were produced were relatively consistent. When the business changed, the new product mix required an improved accounting system. The new costing system affected how different businesses were valued through a refined allocation method for overheads. The users of the old system and their managers resisted changes to the existing process. In addition, through the implementation of the new processes, errors in the old processes were discovered. This then resulted in a blame game and put the accountants in a defensive mode. The existing accounting manager resisted the implementation of the new process and gained support from his staff. Regardless of the intentions of the senior leadership, without the support of the middle management and the staff performing the work, the proposed changes to the MAPs will suffer and may fail (Bassani et al., 2021). While the research did show that leadership should lead process changes, the relationship between the members of the leadership team and how they influence the staff needs to be

understood and addressed so changes (such as the implementation of an advanced accounting process) can be successful. The authors noted that it is the responsibility of top management to have an inclusive tone in the executive staff so that the leadership teams' disputes are not seen in process change projects and ongoing operations. Leaders can encourage their employees to embrace changes in the MAPs, and care must be taken not to put self-interest above the collective good of the organization (Bassani et al., 2021).

Allain and Laurin (2018) noted that one of the reasons given for difficulties in the implementation of ABC processes is leadership and employee resistance to change. The authors focused their study on leadership's rationale for implementing an ABC system. The system can be designed to focus on controlling costs or on enabling firms to develop strategies. The leadership of an organization may resist the implementation of new costing processes if they view that the new process restricts their authority or is purely subjective. The authors noted in their research that a system that can both control and enable is not possible. Leaders who assume the system was implemented to improve operational decision-making may be resistant to a costing system that is designed purely to control costs. If the ABC process is not designed to meet the leaders' expectations upfront, the costs to address the concerns during or after implementation can be significant with no guarantee that expectations can be met (Allain & Laurin, 2018). A focus on controlling costs is required for financial reporting. Inventory needs to be valued correctly, and the root causes for incurring costs need to be understood, as well as the accurate measurement of performance against a set budget or target. The enabling feature of ABC is to focus on managerial decision-making processes such as product design, pricing, optimum mix decisions, and continuous operational improvements. For an ABC process to be used in an enabling way, four important principles need to be present. The first principle is the

ability of employees to improve the process on an ongoing basis. This includes modifying calculations and the use of new cost drivers. The second principle is internal transparency, where employees within the department can understand how costs are modeled and used within their department. Third, the ABC process must have global transparency. Global transparency is defined as allowing employees to have a broader view of the cost system design utilized throughout the organization. The fourth principle is that the ABC system must be flexible. The system must be flexible enough to allow for new work requirements that may arise. Allain and Laurin (2018) highlighted that traditional costing systems were designed to be used for controlling purposes and ABC and other newer costing approaches have been developed for enabling purposes (i.e., to support decisions). This difference needs to be understood by the organization's leadership. If the firm is seeking purely to develop better means of controlling costs, ABC systems can be structured to meet this expectation. If the desire is for decision-support activities, this can be covered in the system design. Leadership needs to make this decision upfront.

Theories

The BSF theory was developed for analyzing MA changes according to how rules and routines impact the organization's accounting structure and the associated actions (ter Bogt & Scapens, 2019). The framework shows the link between institutions that exist in companies. It also shows the rules and routines that organizations develop, as well as the actions that are a result of the establishment of the rules and routines. The difference between rules and routines was defined. While rules are formal statements normally set or approved by senior management, routines are ways that individuals put the rules into practice. Routines can be established by individuals regardless of the hierarchy established within the organization. Routines come from

the application of the rules but can also inform the modification of the rules if circumstances change and the use of the rules is no longer practical or does not meet the stated objective. The authors noted that the term “institutions” refers to the assumptions that are taken for granted in an organization and identifies the actors, the activities they participate in, and how the actors related to each other. The framework diagram (Burns & Scapens, 2000) notes that the institutional realm (or rules-of-thumb) is encoded with routines and rules. The routines and rules are enacted over time. The actions are then reproduced. Eventually, the routines and rules are institutionalized as a new base assumption. The research by ter Bogt and Scapens (2019) noted that though actors may repeatedly take actions based on the set rules and routines, the rules and routines can be changed frequently. The institutions that are embedded into the organization’s culture take a much longer time to adapt to these types of changes. Knowledge of this concept is key to the development of an understanding of how changes (especially in MA) are managed in an organization. When initiating case study research, understanding the organization’s rules on product costing is a good initial step. However, by interviewing the actors who perform the cost calculation processes, it may be determined that the routines used in the process deviate from the stated rules. The BSF process can further be utilized in developing an understanding of how the participant organization puts the rules and routines into action over time. This can best be assessed by watching the actors perform the costing activities. To further refine the BSF process, ter Bogt and Scapens (2019) suggested extending the framework to include the impact of institutions that are outside the organization that may influence the internal institutions and the establishment of internal rules. The authors provided an example of performance measurement. Their extended framework noted that outside of the organization, generalized practices are developed that become base assumptions that will then influence the inside organizational

institutions. As an example, outside institutions may develop rules about performance measurements that may require formalized internal rules for performance measurements to change.

Muhammad et al. (2019) noted in their research that the BSF is designed to identify three types of dichotomies that help researchers understand the change process. These three dichotomies are evolutionary versus revolutionary change, regressive versus progressive change, and formal versus informal change. Evolutionary change is an incremental change that happens over time. In the BSF, evolutionary change is noted through the adaptation of existing routines. Revolutionary change is a radical departure that poses a threat to the existing institutions (or rules-of-thumb). These types of changes are generally initiated by senior management with little input from employees on how the changes are implemented or applied (Muhammad et al., 2019). Regressive change refers to the accounting rules that are institutionalized to keep the existing routines intact. These regressive changes are done when there is mistrust or resistance to new rules or routines. Progressive changes purposely seek out changes to the existing rules and routines. Formal change is generally due to the introduction of new rules. These rules are implemented top-down and do not take input from employees in their design or plans for implementation. In contrast, informal change focuses on routines instead of specific rules, with an ability to adapt the routines to changes in the environment over time (Muhammad et al., 2019). Understanding these three sets of dichotomies that exist when utilizing the BSF to assess MA changes is key when mapping out how a participant organization will address changes to processes such as product costing. The BSF highlights how institutions lead to the establishment of rules and routines. Does the organization change rules and routines incrementally, or are major changes dictated from the top down (evolutionary versus revolutionary)? Are rules

instituted regularly to enforce the existing practice on how products are costed or are the rules instituted to purposely change the way processes are currently done (regressive versus progressive)? Lastly, does an organization make changes in the way MAPs are established formally by issuing new rules from senior management, or do they have employees develop new routines to adapt the existing process to the new requirements? The Muhammad et al. (2019) research was a case study of an agricultural company that was investigating the implementation of a new accounting information system to improve reporting efficiencies. Their interviews with this participant showed that the change was revolutionary (i.e., it was a major transformation), progressive (i.e., they sought changes in the existing process), and formal (as the change was implemented through a top-down approach). The authors also compared their study with survey results from other previous quantitative research to show how other firms in different countries and industries handled changes in MAPs.

The second theory reviewed is Stones' Strong Structuration Theory (SST). SST is a theory used to analyze the existence of organizational structures (formal and informal) and their impact on changes in MAPs. Daff and Jack (2018) wrote about the development of SST through the general structuration theory, which looks at the relationship between human actions and social structures. The authors noted that the routines that people follow and how they interact with each other become institutionalized over time (as noted in the BSF). These institutions then develop into organizational structures. These informal structures empower agents, or actors, in their daily activities. The agents' behavior either confirms or potentially alters the structures over time. Since these structures both support and are a result of social interaction, there is a duality within these structures. Stones (2005) developed the concept of strong structuration by breaking down the duality that exists in structures into four components. These components are external

structures, internal structures, agent practices, and outcomes of the associated actions. External structures are independent of the agents, and the agents are not able to influence them. Internal structures are the general patterns of thought, habits, and culture within a specific context such as a position or role within a firm. Agent practices are ways that agents routinely interact with their internal structures. The outcome of the actions taken by agents may affect both internal and external structures, which may result in the structures being affirmed or changed (Stones, 2005). Daff and Jack (2018) utilized SST in their research to show the importance that accountants place on communication and the development of networks within their organizations. Through interviews, the researcher sought out four objectives for this study. The first was an examination of the importance accountants placed on having networks. The second was to determine who the accountants' primary network partners are. The third objective looked at the strategies that accountants used to influence the establishment and maintenance of their networks. Lastly, the fourth objective asked how accountants used their networks to influence their organizations. Their research findings showed that the accountants seek to establish and expand their networks and these networks help the accountants develop relationships with their peers and those at higher levels in their organizations. The understanding of how the existing organization and perceptions of their roles helped accountants develop a strategic approach which led to the altering of their organizations' internal structures.

Kholief and Jack (2019) extended the application of SST further into MA by looking at how the interactions between internal and external structures impact budgeting practices. The authors' case study was designed to review how the budgeting process changed at a governmental tax department. The findings of this research highlighted the need to understand the interactions between the internal and external structures to fully comprehend the role that

middle management played in the proposed change to the budgetary process. The external structures highlighted were higher levels of government departments and the existing budgetary laws. These external structures constrained the middle managers' ability to utilize their internal structures to assist in the process changes needed. Other external structures, such as consultants and former senior government officials, helped the change process by providing an internal structure to assist with the implementation of portions of the new performance-based budgeting process (Kholief & Jack, 2019). Understanding this interplay between internal and external structures was essential to understanding the management accountants' ability to successfully achieve the targeted process change goal.

Feeney and Pierce (2018) provided another study on the use of SST in MA through the study of structures and their impact on the role of accounting in the new product development (NPD) process. Their research was designed to explore the complex social interactions that take place during an NPD process by using SST. It was noted that accounting information is utilized as a part of the formal requirement for NPD initiatives. This formal accounting information supports the technical requirement structures of the organization. There is also informal accounting information that NPD teams use to help guide initiatives in the preliminary stages of development (before the formal approval process). Informal accounting information does not necessarily come in a consistent format and is developed on an as-needed basis. This informal information is understood to be a common language between the accounting and NPD teams and helps create a specific internal structure. The use of both formal and informal accounting information provides the organization with a balance between process control and flexibility, a key to the success of any NPD process (Feeney & Pierce, 2018). The use of SST in this case study helped the researchers make sense of social actions that occurred within the organization

during the NPD process. By utilizing a case study, the researchers were able to get a detailed description of the NPD process and a clear understanding of how accounting information is communicated, used, and interpreted by various levels of users participating in this activity. The authors' view supports the belief that accounting information can support innovation and not just record past activities and meet reporting requirements. Feeny and Pierce (2018) wrote that accounting information is being pushed further back into the product development process, which includes market information along with historical internal information. While formal accounting provides the needed information on the impact of decisions, informal information needs to be shared with the NPD team in advance of any commitments by the organization. Understanding how information is used differently by internal and external structures within an organization is a key tool in understanding how organizations can be successful in NPD and other strategic change initiatives.

Constructs

The leadership style of an organization's management can impact innovation and process changes. Alblooshi et al. (2021) noted in their research how the change process is driven by leadership and is evidenced by their commitment and support for the change. The authors stated that due to increased risk in the global economy, firms need to continuously change their processes and find new opportunities for profitable growth. Leadership's ability to drive change is done through supporting their teams with open communications and the allocation of the needed resources. Employees enable and implement the changes. Employees must have a perception that the leadership supports and participates in the change initiatives (Alblooshi et al., 2021). This perception comes from the leader's ability to establish a solid change strategy and communicate the reasoning for the strategy to the employees. Leadership defines plans that seek

to develop innovative ideas, or adapt existing ones, to improve operational performance.

Organizational innovation is gained through the creation of new products, restructuring the organization, or changing the culture. The Alblooshi et al. (2021) research study was designed to help organizations select the optimal leadership style to enhance their innovation strategies and lead to a competitive advantage in their current or future markets. The authors listed the various leadership styles that can impact how innovations are initiated, implemented, and embedded in a firm. The leadership styles were defined and classified as either directly impacting organizational innovation, only indirectly impacting organizational innovation, or both directly and indirectly impacting organizational innovation. Two of the groups that both directly and indirectly impacted innovation were highlighted. The two groups used transformational and transactional leadership styles (Alblooshi et al., 2021). The transformational leadership style is evidenced by emphasizing the achievement of a common goal by stimulating the team's morale, motivation, and self-confidence. This leadership style is based on encouraging employees to work for a common goal and valuing and recognizing their contributions. Transactional leadership focuses on the benefits the change will have on the leader and the team. The targeted benefits are achieved through the establishment of objectives, the continuous monitoring of project processes, and the avoidance of errors. There are also numerous other leadership styles such as paternalistic, developmental, and political leadership. The choice of leadership style can directly impact organizational innovation. The leadership styles that indirectly influence an organization include charismatic, humorous, servant, and self-leadership styles. Alblooshi et al. (2021) noted that leaders can adjust their leadership styles depending on political, economic, or technological conditions. They noted if changes are needed quickly, a leadership style that has a direct impact

is required. If the leader is looking to enhance organizational innovation and is seeking to share knowledge or enhance learning, they should adopt a style that impacts these goals.

A manager's leadership style can impact the level of employees' engagement in process changes. Meskelis and Whittington (2020) noted that the personality of the employee's direct supervisor is one of the main engagement factors, as this relationship and the actual work tasks performed are the two main points of contact that the employee has with the organization. The researchers found that though an employee's personality traits impact their level of engagement in the change process, there are external factors that can be a strong influence. These external factors include the values of the organization, peer relationships, and the relationship the individual has with their leader. This is highlighted by surveys that showed that a team's engagement is largely determined by its manager (Meskelis & Whittington, 2020). The behavior of leaders can impact the attitudes of employees, which can be evidenced by changes in the employees' performance. Leadership that is negative or uncivil will lead to employees being less engaged in their work. Positive leadership will lead to a higher commitment and engagement to the tasks at hand. Positive leadership is shown by leaders who utilize a transformational leadership style, as defined above by Alblooshi et al. (2021). The transformational leadership style is evidenced by inspirational motivation, intellectual stimulation, and concern for individuals. This leadership style leads employees to develop a sense of meaningfulness in their assigned job, a key factor in engagement. Meskelis and Whittington (2020) focused their research on authentic leadership and its impact on engagement. Authentic leadership is a transformational leadership style that has a specific focus on ethical leadership behaviors. These behaviors are a set of self-regulations that guide the leader into doing what is right with the objective of minimizing the difference between what is said and what is done. This ethical

leadership style is best evidenced by leaders who lead by example. The authors patterned their research as a field study of 100 participants and looked at how authentic leadership style along with honesty and humility impact employee engagement. The quantitative studies noted that employees' personality traits of honesty and humility are strong indicators of employee engagement and that the authentic leadership style can function as a substitute for these traits.

Market dynamics are another construct that impacts the use of enhanced costing processes. The level of competitiveness in the participant's specific market will influence the need to produce accurate product costing. Aljabr (2020) noted that in highly competitive markets, complex costing tools such as ABC are needed to allocate indirect costs to products more precisely. The use of ABC is a more refined costing process than traditional costing systems (Aljabr, 2020). When utilized, ABC reduces the opportunity for a firm's competitors to benefit from poor decisions based on erroneous product costing (i.e., poor product pricing or product mix strategies). This is especially true in industries that have an elevated level of automation and an associated higher level of indirect costs. Aljabr's research study examined three different questions: the level of competition that is expected to have a positive influence on the adoption of ABC, the level of indirect costs that will have a positive impact on the adoption of ABC, and the production complexity that will have a positive impact on the adoption of ABC. The researcher utilized regression analyses from this quantitative study to determine the validity of these hypotheses. Their research showed there was not a significant correlation between market competitiveness and the adoption of ABC, though it was noted this might have been due to the lack of refinement in the definition of the reasons for the competition (i.e., quality and variety). The ability of firms to modify their pricing may also be a limiting factor. The other two hypotheses also showed an insignificant correlation between the level of indirect costs or the

presence of production complexity and the adoption rates of ABC (Aljabr, 2020). The author noted in the research findings that the impact of resistance to change and other factors were not measured and might have influenced the correlation findings. He also highlighted that it was clear that the reasons that firms seek to implement ABC are complex, with multiple variables, and specific to a set of existing circumstances. Though the study was inconclusive on the impacts of the market dynamics on the use of ABC, the author noted that additional studies should be done to further develop themes regarding factors that impact the utilization of complex costing models such as ABC.

Nguyen and Harrison (2019) studied the impact of the level of market stability on the way that changes to MA are implemented. As global competition increases, customer requirements change rapidly, which shortens product life cycles. These changes have pressured firms to develop higher-quality information to enhance their operations, support innovation, and promote their competitiveness. One way for management accountants to meet these challenges is to increase their knowledge through input from their customers about their needs. Customer input will help organizations develop new products or services. The process of gaining this knowledge is known as customer leverage. Having customer leverage gives firms the ability to respond to changes in technology or swings in market demand (Nguyen & Harrison, 2019). In their research, the authors proposed that customer leverage directly impacts both cost efficiency and the associated financial performance in a manufacturing environment. They also theorized that process innovation strategies positively impact cost levels and financial performance. The researchers noted in their study findings that market dynamics had a moderating impact on process changes. The researchers found that firms that participate in stable markets will deploy changes incrementally. Firms that exist in unstable markets are more likely to initiate more

innovative changes so they can meet their customers' requirements. In markets that have an aggressive environment for technological changes and requirements, organizations are motivated to utilize external knowledge from the entire supply chain, including the use of customer leverage. Nguyen and Harrison outlined the need for manufacturers to focus more on customer leverage and understand their customers' requirements. Additionally, market turbulence increases the demand for process innovations. These process innovations should include a better understanding of the firm's existing processes. Process innovations help in the absorption of customer leverage and its use to improve cost and financial measuring processes (Nguyen & Harrison, 2019). Customer leverage, along with advanced manufacturing, information technologies, and advanced business processes (such as ABC), will help firms develop their dynamic capability to survive in the marketplace.

Profitability goals and external pressures to achieve are important constructs to any proposed change in business processes. To assist in improving organizations' efficiencies, tools such as ABC have been developed to help gain an understanding of the existing cost structures and to support efforts in operational improvements. Vetchagool et al. (2020) wrote about how different ABC models can directly impact operational performance and indirectly impact financial performance. The authors noted in their introduction that ABC provides information that is necessary for managing costs, improving direct processes, and enabling strategic decision-making. The investment in a more complex costing process needs to be cost-beneficial. This research sought to add to the knowledge of the benefits of utilizing ABC. Vetchagool et al. went beyond simply determining whether the benefits of using ABC exceeded the costs of implementation; they also sought to determine whether the operational performance was impacted differently by using three different ABC models. The researchers utilized different

models to look at three distinct aspects. The first was the positive extent to which ABC can directly impact financial performance and, indirectly, operational performance. The second was the extent the use of ABC positively impacts financial performance indirectly through improvements in operational performance. The third aspect was the extent ABC positively impacts operational performance (Vetchagool et al., 2020). Previous research showed that the use of ABC in a manufacturing setting resulted in improvements in quality, cost reductions, improved processing cycle times, and delivery reliability. This research surveyed how the participants viewed the impact of ABC on operational performance. The research results did not support the hypothesis that ABC can be linked to improvements in financial performance, but they did indicate that ABC can impact financial performance indirectly through improvements in operational performance (Vetchagool et al., 2020). The results of this research can be utilized in practice by industry. The firm's profitability focus must be considered. Whether the organizational leadership is focusing on short-term profit boosts or longer-term process improvements will influence the viability of investing in a complex costing system such as ABC.

Research by Pavlatos and Kostakis (2018) highlighted how a firm's historical financial performance impacts the use of strategic MA (SMA) and its associated tools, such as ABC. In their study, the researchers reviewed questionnaires and financial statements from nearly 100 different enterprises to see how these firms' top management leadership characteristics and past financial performance impacted their implementation and usage of various SMA tools. Though numerous studies have examined how top management influences the use of MA tools, how past financial performance impacts SMA usage has had a minimal review. SMA is designed to focus on the external environment of an organization, while conventional MA focuses on the internal environment. Information used in SMA comes from external and internal sources that provide

non-financial information. By linking SMA with marketing, organizations can develop robust product and customer strategic plans (Pavlatos & Kostakis, 2018). Previous research on the impact of historical financial performance on the use of SMA has shown that it may be an influencing factor. Companies that do not meet their goals generally focus on better use of contemporary management tools and seek incremental improvements. Those firms that experience significant reductions in profitability seek more innovative approaches using various SMA tools. This study showed that companies with poor financial performance have a higher level of adoption of MA tools. SMA tools, such as ABC, provide higher-quality information from both internal and external environments and provide a way for organizations to focus on cost controls, operational improvements, and strategic market initiatives. Pavlatos and Kostakis's quantitative study on financial statements and survey results supported the hypothesis that organizations that historically lag in financial performance are more likely to adopt SMA techniques. The tools being adopted helped provide the organizations with the higher-quality information necessary to improve their operating performance in the future (Pavlatos & Kostakis, 2018).

The level of shop floor automation is the final construct important to this study. Aljabr (2020) stated in his research that firms that implement ABC are reliant on readily available high-quality inputs from their IT systems. IT systems that can gather substantial amounts of quality information reduce the costs required for the development of costing models within a complex costing system (Aljabr, 2020). The automated methods used to gather information on resources and production processes assist firms in developing activities and cost drivers with minimal effort, as they are a byproduct of the ERP and PLC systems. If information is gathered manually, the cost to maintain complex costing processes may be excessive. If the quality of the IT

information is poor, the costs to accurately measure the costs will increase and may exceed the benefits derived from the implementation of the SMA tools (Aljabr, 2020). The author did note, in a situation where the IT quality is low, organizations still may consider implementing ABC, since utilizing traditional costing methods may create costing errors that can be detrimental to the business. The IT technologies that the researcher focused on were various advanced manufacturing technologies, including product design, flexible manufacturing, logistics planning, and production scheduling systems. The use of these types of systems provides manufacturers with information on production processes and resource consumption. These systems also help increase IT quality levels while decreasing the costs to capture the data for measurement. In conjunction with these manufacturing technologies, Aljabr (2020) surveyed the research participants on their intentions of utilizing ABC. Half of the participants noted they never considered using ABC, and only 9.5% were currently using it. However, the survey did highlight that 31.5% of the participants stated that they are intending to use or currently investigating the use of ABC. The results of the research showed that production complexity and the availability of information from advanced manufacturing systems do influence the decision to utilize ABC.

Senova and Sebescakova (2020) noted in their research that investments in manufacturing automation have led to a massive increase in capturing production-related data. This available data will lead manufacturers to develop tools that facilitate risk assessment and planning. The new manufacturing infrastructure and associated manufacturing applications are available but can only deliver positive results if they are used appropriately. One of the trends in manufacturing is for machines to identify manufacturing process steps, gather associated shop floor automation data, and produce job-related information that can be utilized for equipment

maintenance, cost control, or planning purposes. These tasks have been manually performed by personnel who now can concentrate on communications, critical thinking, and management skills (Senova & Sebescakova, 2020). One of the key points the authors made was that with the advances in technology, there is a concern that labor markets do not have the skill levels to properly utilize these tools. The world is becoming more data-driven each day. In the manufacturing sector, equipment is being installed that creates and utilizes big data gathered from shop floor automation data that is captured. This big data can be used to better understand processes and can be utilized for future strategic planning (Senova & Sebescakova, 2020). The data captured by manufacturing equipment can be integrated into the company's ERP system to automatically record production counts, scrap transactions, process variations, and cycle times. This equipment-generated data can also be utilized directly to predict maintenance needs, which leads to lower maintenance costs (Senova & Sebescakova, 2020). The use of this shop floor automation data will help companies control operational processes, control costs, and assist in future product developments, all of which will help companies remain competitive in the coming years.

Related Studies

This literature review outlines four related studies to the proposed research. The first of these studies involve the use of a simplified ABC process at a small transportation company. Raucci and Lepore (2020) provided research on the implementation of an earlier-developed simplified ABC model at the participant firm. The researchers noted that the study was successful in part because they took advantage of the informal conditions and the positive collaborative culture at this participant site. Transportation firms frequently have their logistics costs recorded in overhead, making it difficult to analyze or control these costs. The authors

noted that the use of ABC would be beneficial for this participant as it could help identify the real costs of the operation.

Though previous studies have shown that the adoption of ABC is cost-beneficial, many SMEs fail to implement ABC due to the complexity of the process. The authors' goal was to make the ABC process simpler yet retain most of the benefits of the process. Raucci and Lepore (2020) proposed a simplified ABC approach at the transportation company to gradually introduce the organization to the advanced costing system. This gradual process allowed the authors to make the participant aware of the benefits that an ABC system could provide to the firm.

While this gradual implementation process was being initiated, the researchers took advantage of the informal conditions of the participant to develop a collaborative culture for the research study. This collaborative culture made the study much smoother and was viewed as a positive experience by both the researchers and the participants. As the various parts of the costing processes were implemented, the participant organization gained a better understanding of their firm's cost behaviors. This knowledge assisted in making better business decisions immediately. Raucci and Lepore (2020) developed a collaborative approach by simply interviewing employees while they were performing their daily tasks. This informal, hands-on approach helped minimize the employees' reluctance to change. Through interviews with management, administrative staff, and truck drivers, the researchers were able to develop a matrix of activity drivers for each of the four routes that the participant provided. The cost drivers selected included orders received, hours spent loading the trucks, transportation distances, customer complaints, and invoices paid. The costs associated with each activity were

then allocated to the respective route according to the amount of each activity the routes consumed.

In the conclusion of the study, Raucci and Lepore (2020) highlighted the benefits of gradually implementing ABC. This gradual implementation was designed to demonstrate the benefits of the new process to the participant organization as the new processes were being implemented. The authors also highlighted the need to better educate the business owners and managers of SMEs on the benefits that an ABC process can bring. This education process will lead to a higher level of adoption (Raucci & Lepore, 2020). The authors provided insights on the use of ABC at an SME. The case study does not cover the specific requirements of a flexible manufacturer. Also, the study did not focus on how the firm will consistently gather quality data to keep the costing process functioning over time. Data collection must be cost-effective to gather and analyze, or the long-term survival of the process is suspect.

Another approach to implementing a simplified version of ABC is to utilize TDABC. The following two studies look at how TDABC was utilized at two diverse small manufacturers. In the first study, Basti and Boyar (2021) applied TDABC methods at a small mold shop to see the process's impact on an order-based firm. Specifically, the researchers sought to determine how TDABC enhanced its product costing processes and the participant's production capacity utilization. The authors noted that ABC had been criticized in the past for the high installation and update costs, which may be overly burdensome for SMEs. They recommended the use of TDABC to address these criticisms. TDABC is simpler to use than ABC, yet it preserves the basic features (and benefits) of ABC. Simplicity is especially beneficial for use in capacity control (Basti & Boyar, 2021). The main goal of the research was to show the advantages and

disadvantages of using TDABC and traditional costing processes in order- or project-based production environments.

Basti and Boyar (2021) selected a company that produces molds for the plastics industry for their case study. The researchers focused on how the organization's use of TDABC could improve its ability to effectively manage production costs and better utilize its existing manufacturing capacity. The study included a six-stage procedure to calculate the cost and capacity utilization data using TDABC models. First, resource groups were determined. Then, the costs for each resource group were identified, and a practical capacity for each resource group was captured. A capacity cost rate (resource group costs divided by practical capacity by resource group) was calculated. The costs assigned to each resource group were determined, and the total cost assigned to each resource group was calculated. Rates were developed and compared with the existing costing rates from the participant's traditional costing process. The TDABC costing process helped the firm identify departments (or resource groups) that had idle capacity. This knowledge helped the firm focus on improving efficiencies and production scheduling in these areas. The traditional costing process did not identify these issues. In addition, the existing traditional volume-based costing system calculated the cost of orders as either too high or too low by not including the cost of idle capacity. This could lead to poor business decisions. The study showed that TDABC could be applied not only to repetitive production but also to order-based production. Though mold shops can utilize the same equipment for multiple purposes, it is not in the same market as flexible manufacturers who produce small batches of various products on a repetitive basis. In addition, this study did not focus on how to design the processes to ensure that the data required to sustain the TDABC process is readily available.

The other example of the use of TDABC at a small manufacturer was written by Adiguzel and Flores (2019). This case study showed how capacity utilization and cost rates could be developed for a small manufacturer that produces baked goods. The authors' study started by noting the problems with implementing ABC. Issues included the time requirements for surveying employees, inflexibility in the modeling, and the resistance of managers and employees. This is especially true for SME companies, which are less likely to have developed IT processes that can readily provide the necessary information. The TDABC process is established by having the costs identified for each department (or resource group) instead of having costs identified by many different activities. The design of a TDABC system is modified for each company to match its unique cost flows. Adiguzel and Flores (2019) held that TDABC is more suitable for SMEs as their processes are often more labor-intensive and there is less of a need to spend time interviewing employees. Besides having costs on a departmental basis, TDABC also utilizes capacity cost rates to determine the impact of idle capacity, which ABC does not specifically address. The firm in the study had gradually moved from a traditional volume-based costing process to a TDABC methodology. This process change provided the firm with higher-quality costing data, which led to quality improvements in the various profitability analyses (such as profitability by product and per client). In the authors' cost modeling, they calculated a capacity cost rate for each employee. The time employees spent producing the assorted products or servicing specific customers was tracked, and the costs were allocated by multiplying the time utilized by the capacity cost rate. Indirect supporting costs are allocated by the management accountant to the specific departments (resource groups) based on the actual time spent supporting them. Corporate-level costs were directly expensed to the profit and loss

statement and not allocated back to each of the production departments, as these costs are not related to the level or type of business being conducted.

Adiguzel and Flores's (2019) research provided a detailed overview of how the use of TDABC at a baking firm provided the participants with key information needed to manage their operations. The use of TDABC provided superior-quality data compared to the traditional costing processes, which frequently only utilized simple spreadsheets. Though this study does show how TDABC is a simpler tool that can be utilized by small manufacturers, it does not cover the unique requirements faced by flexible manufacturers. This study also does not have a detailed discussion on data accessibility. The information required to calculate the costs must be simple to capture. It was noted that TDABC is simpler than ABC, but additional research is needed to ensure a robust means of gathering the information is in place for use with either of these tools.

Grasso et al. (2022) wrote about how ABC can be utilized in conjunction with value-stream costing. Value-stream costing is a method of lean accounting that organizes products into groups that generally follow the same flow of production. Each of these groups is considered a separate value stream. Variations in resource usage generally occur between different value streams and not within them. The value streams are significant enough to have dedicated indirect support resources (such as material handling, maintenance, and supervision); therefore, cost allocations for the indirect support costs are not required. The value stream then becomes the target of cost control and performance improvement activities. Grasso et al. provided a case study of how an electronic component manufacturer uses value-stream costing for direct production costs but utilizes ABC to allocate the costs of shared strategic and support functions that serve multiple value streams. In this manufacturer's product mix, some customers bought

products from multiple value streams. The costs of marketing, sales, and delivery are allocated to the value stream based on the level of activity that each area incurs. ABC can also be utilized to calculate the total cost of ownership by the supplier. The total supplier cost information is used in contract negotiations and as a metric to determine which suppliers to select for contracts. The authors did note that ABC can be extended for use within a value stream if individual product costs vary significantly within that grouping. From past surveys, it was noted that this research participant was not unique in utilizing both ABC and value-stream costing. Surveys reported that over 18% of those that have implemented lean production have also instituted ABC (Grasso et al., 2020). Though the use of these two valuable tools in combination may benefit some manufacturers, it would not be applicable for use in the study of flexible manufacturers. Flexible manufacturing has equipment that can be utilized for several distinct products, so organizing the production flow into a unique grouping of by-products would not be possible. The use of both ABC and value-stream costing would be complex. Additional research would be needed to discuss how a steady, accessible flow of information is possible to manage this dual costing process.

Anticipated and Discovered Themes

As part of Section 1, the researcher outlined anticipated themes in advance of the actual research fieldwork. Two anticipated themes the researcher highlighted were the lack of MA processes at the participant firms and the insufficient base cost data available to develop and sustain the advanced costing models. These two themes were outlined with references to prior research that highlighted these concerns.

Najera Ruiz and Collazzo (2020) researched the use of MA processes at SMEs. The authors noted that small companies frequently found minimal benefits in using MA processes for

either the controlling of costs or for use in their decision-making processes. One of the few areas in which SMEs did utilize MA tools was cash management. Analyses such as perpetual cash balances in bank accounts, cash conversion timing, or simple cash flow reporting for operations were noted by the researchers as some of the cash management tools that SMEs did utilize. The lack of resources, the lack of administrative skills leadership, poor planning, and a perception among SME leadership that MA tools will negatively impact their firm's ability to remain flexible have all been identified as barriers to SMEs' adoption of MA tools (Najera Ruiz & Collazzo, 2020). In addition, newer SMEs utilize the fewest MA tools, as their focus is on business survival factors such as overall cash flow analysis. Prior research has shown that the use of MA tools can benefit SMEs, but the adoption of MA processes has been minimal. Najera Ruiz and Collazzo (2020) noted that a vast majority of the SMEs that they surveyed did utilize some type of product costing process. Many of the firms surveyed (nearly 40%) stated that they cost their products based on the acquisition costs of the major components (raw materials, direct labor, and other input costs). The next most common costing process (25%) was acquisition costs plus a markup. Another 22% of SMEs determined the cost of their products based on a market-based valuation. Only 13% of the firms cost their products based on a financial calculation that included margins over the fixed costs, costs per a break-even point, and costs based on a planned sales level (Najera Ruiz & Collazzo, 2020).

Acintya (2020) also researched the need for the use of MA techniques in SMEs. In her research, she utilized the International Federation of Accountants' evolution of the MA model (IFAC, 1998) to structure the study. This model notes that organizations go through four stages in the development of MA practices. The first stage focuses on determining cost structures and financial control. This process is designed to first collect and summarize costs and assign these

costs to products based on a single driver. Frequently, this driver is direct labor hours (Acintya, 2020). The second stage has the organizations' accountants focusing on management planning and control. Action plans are created to address deviations from plans and forecasts. The use of technology in this stage is limited, as most information is gathered manually. In the third stage, the management accountants begin focusing on the reduction of waste. Real-time information becomes available, and the MA staff focuses their analyses not only on cost reductions but also on waste in operations. The fourth and final stage is when management accountants play an essential role in the creation of value in their organization by providing the required information and analyses on how resources can be utilized most effectively. Acintya (2020) highlighted that many small firms have not yet reached the first plateau in MA, which is the determination of cost structures and cost control. SMEs lack the development of MA practices despite research showing the positive impact of tools such as ABC on these types of organizations (i.e., Vetchagool et al., 2020).

The second anticipated theme in the study was the potential of having insufficient base cost data available to develop and sustain working costing models. Najera Ruiz and Collazo (2020) highlighted this theme in their research on the use of MA in SMEs. The authors noted that one of the most important shortfalls in small companies is the lack of accounting and financial information. This lack of information prevents the leadership and accountants at SMEs from analyzing financial statements, carefully planning activities, and making informed decisions. The generation of financial information at SMEs is frequently only done to meet the requirements set by tax authorities or lending institutions. The lack of detailed and relevant financial information may harm SMEs, as cost controls and operational and strategic planning are only possible with the proper inputs. Not having the relevant information available to support the use of MA tools

puts SMEs at a distinct disadvantage when competing with other firms (regardless of their size) in a global market (Najera Ruiz & Collazo, 2020).

Tian et al. (2019) further researched the impact of the availability of information on the efficiency and optimization of manufacturing operations. The authors noted that product information management is crucial to the survival of manufacturers. Unfortunately, many firms (especially in the SME segment) lack the real-time collection of this information, which negatively impacts shop floor management and strategic decision-making. The need for real-time production process information is essential for production scheduling (Tian et al., 2019). Real-time reporting allows management to monitor the production flow and modify schedules if there are equipment maintenance issues or if the customer changes requirements (i.e., volume or delivery timing requirements). The authors noted that information systems have been developed to manage business processes, such as product lifecycle management systems and customer relationship management systems. These systems have added to the success of the organizations that have used them (Tian et al., 2019). Recently, there has been more of a focus by manufacturing leadership on capturing production information directly off the shop floor on a real-time basis. Capturing data directly from shop floor equipment has allowed for the development of scheduling processes for situations where there are low volumes and high levels of production variations (flexible job shop scheduling). These scheduling processes are set up to adjust when confronted by abnormal events such as equipment breakdowns or the arrival of an urgent order for a priority customer (Tian et al., 2019). Having this type of shop floor reporting process available provides leadership, production management, and management accountants with crucial information needed to optimize performance. Being able to optimize performance

with real-time production information gives firms a valuable tool for developing or maintaining a competitive advantage on a global basis.

The findings of this study confirmed the anticipated themes of the lack of MA skills and insufficient MA information. First, through interviews of the participants at both locations, it was clear that the MA skill levels were minimal, especially beyond those individuals directly responsible for maintaining the existing costing processes. At the first participant, most of the individuals were unaware of how costs were tracked and what the existing budgeting process was. The second participant used paper forms to track labor hours and the necessary manufacturing processing steps. Costs were only tracked on an organizational level, and there was no attempt to track costs by department or production process. The second participant had only recently initiated budgeting, and this was done by senior leadership on a facility-wide basis. This lack of understanding of how costs are incurred makes process improvement initiatives like the elimination of non-value-added processes more difficult.

The second anticipated theme of insufficient base cost data was also confirmed. The first participant had various methods of collecting information from manual tally sheets entered in their ERP system to barcode scanning. This participant also was in the process of linking the production equipment directly with the ERP system to track production counts, equipment cycling, and downtime. There was no attempt to measure support activities like the number of purchase orders issued, the required quality tests, or the number of customer service calls. All activities require the consumption of resources. As noted earlier, the second participant used a manual paper process to track labor hours per process and a production tracking sheet to note the material used, the processes completed, and the net units produced. This information was then keyed into a database. There was no attempt to track costs per production process or the costs of

any support functions created by product- or customer-specific requirements. The lack of this base cost data would make the implementation of an advanced costing process at either location quite difficult.

Summary of the Literature Review

The researcher has provided a literature review that was the foundation for the proposed study on the sustainable use of ABC in a small flexible manufacturing environment. The business practices section was written to provide background information on the current trends and the general business environment as it relates to the study topic. Global competition has increased the need for better cost controls through increased pressure on pricing and the need for manufacturers to provide a more diverse product offering. The other business practices topic is the minimal use of MAPs in small businesses. This limited use has been attributed to staff skill levels and the inability of small firms to provide sufficient accounting data. Having this understanding of the current business practices provided insights for the researcher as to the need for an advanced costing process and the impact of the level of understanding and demand for these tools. In the section on the problem, the major areas outlined were the increased complexity of business requirements, the insufficiency of traditional costing systems, and the inability of small businesses to implement and utilize complex costing tools. The literature in this section provided insights into the potential benefits and drawbacks of ABC, especially for small businesses. This understanding helped the researcher prepare the research questions and interview plans by understanding past studies on the components of the defined problem. The literature on the concepts of the study covers the impact that traditional costing processes have on pricing strategies, organizational improvements due to implementing complex costing processes, and leadership's impact on implementing and sustaining costing processes. This

literature assisted the researcher in developing guidelines to focus research and interview questions on the problem defined in the study.

The BSF and SST are two theories that are used in monitoring and managing the change processes in MA. Literature on these theories provided the researcher with potential approaches for their use in understanding and managing the change process at the different participant sites of the study. Literature on the four constructs of leadership style, market dynamics, profitability, and shop floor automation showed how each construct can impact the participant organizations' openness and commitment to change. Recent related studies and research were provided on the topic of the use of advanced costing processes. Though none of these related studies were specifically written for small flexible manufacturers, nor were they focused on the sustainability of costing processes through efficient data capture, the researcher gained insights into processes and methods that provided successful results in these other studies. Recent research on the anticipated themes of the lack of existing MAPs at SMEs and the potential that sufficient base cost data may not be available to develop the necessary costing models was provided. These themes helped direct the researcher in the development of the research plan and the need to mitigate potential deficiencies. The findings of the research supported both anticipated themes. Each section of the literature review provided insights to the researcher on the support for the problem statement and what previous researchers have found in their studies on the need for more complex costing processes in businesses, especially SMEs.

Section 2: The Project

In Section 2, the researcher outlines the proposed project plan for the study of the sustainable use of ABC in a small flexible manufacturing environment. Initially, the rationale for the research is presented by restating the purpose statement from Section 1. The role of the

researcher is discussed and includes the actions the researcher took to conduct the proposed study. Additionally, the use of bracketing was utilized to avoid having the researcher's personal biases impact the integrity of the study. The research methodology of a flexible design and a multiple-site case study process were appropriate choices for use in the research. The use of triangulation benefited the quality of the study. The participants included in the proposed study were chosen from an eligible population set. The researcher provided the chosen sampling method, the sample frame, and the desired sample size for the research study. In the data collection section, the processes of interviews, observations, and the gathering of participant documentation are discussed. The interview guide and archived data were the two instruments the researcher used in this study. Though the researcher was the primary data collection instrument for this study, an interview guide was used to ensure there was consistency when asking questions (as each participant was asked the same questions). Archived data was utilized to develop an understanding of existing and past MAP practices. An organizational plan for the collected data was included. The data organization method was crucial to ensure the data analysis processes were conducted efficiently. In the analysis part of this section, the topics of emergent ideas, coding themes, interpretations, and the representation of the information are provided. The researcher outlined triangulation, bracketing, and data saturation to enhance the reliability and validity levels of the proposed research study, which provided the reader with a degree of confidence as to the quality of the study being presented.

Purpose Statement

The purpose of this flexible design multiple-site case study was to expand the understanding of the practicality of the use of complex costing processes in the small flexible manufacturing environment and the potential impact the use of the processes has on firms'

profitability. The researcher explored how manufacturers develop and utilize product and process costing in their operations and the benefits that can be achieved by using more complex costing processes. The research was conducted with a flexible design utilizing the qualitative research tools of in-depth interviews, detailed documentation reviews, and observations of the costing and manufacturing processes. The use of qualitative research tools helped develop an understanding of the existing manufacturing and costing methods and assisted in assessing the impact of the use of more complex costing processes. The potential problem with the sustainable use of ABC was explored using a multiple case study with the targeted population of small flexible manufacturers supporting the transportation industry located in southeast Michigan and southern Ontario, Canada.

Role of the Researcher

Horlings et al. (2020) noted the role of the researcher entails the process of collecting, analyzing, and interpreting research data. The researcher is the primary instrument to gather information to support the purpose of the study. Researchers must understand their position within the research process and how they relate to the participants. Researchers also need to identify the changes needed to address the research problem and recognize how their position may impact their subjectivity (Horlings et al., 2020). Rashid et al. (2019) further defined the role of the researcher, specifically when utilizing the case study, the chosen methodology for the proposed study. The authors noted in the pre-field phase of the study, the researcher must not only select the research design and method, but should prepare research questions, seek participant permission, consider potential ethical concerns, and outline the interpretation and assessment processes. In the field phase of the research, participant contact was initiated. This role included the collection of background information possibly useful for future analyses. The

other role the researcher performed in the field phase was that of interviewer and observer. The researcher ensured the interview questions were open-ended so participants could answer the questions fully. In the reporting phase, the researcher analyzed the data collected, developed themes, and reported the research findings (Rashid et al, 2019).

In the study, the researcher identified potential areas of bias from the experiences gained over years in the industry. The researcher has past experiences in the development and use of MAPs in a manufacturing setting. These experiences include the development and auditing of product costing processes. This knowledge assisted in contacting potential participants and helped in the development of an understanding of the existing processes. However, the researcher ensured personal perspectives did not influence or override the input from the participants. One of the tasks the researcher utilized was bracketing in the study to mitigate the risk of bias and viewing the situation at the participant location only through a personal lens (without obtaining the insights of the individuals directly involved). Dörfler and Stierand (2021) stated bracketing a researcher is to hold back the assumptions and previous experiences on the research topic to attain an understanding of the input received from the participants. The researcher can then develop themes directly from the participants' input. The authors stressed that even though personal biases need to be separated by the researcher, they do not need to be completely removed from the study. Rather, the researcher can utilize their personal biases after the participant data is gathered or when analyzing the inputs and developing themes for the study (Dörfler & Stierand, 2021).

It was the researcher's role to make certain bracketing was carried out in the proposed study. The researcher initially noted his industry expertise in the research documentation, but these insights were kept hidden until after the participant interviews and observations were

completed. Sharing the researcher's input with the participants in the data collection phase of the study may have prevented the participants from fully sharing their opinions and experiences, as they may have wanted to match the opinions of the researcher (Dörfler & Stierand, 2021).

Having the researcher's input on potential cost modeling or approaches to process design was valuable but only after the input from the participants was gathered and summarized. Dörfler and Stierand (2021) also noted the use of bracketing is not having the researcher set aside their experiences or expertise, but ensuring the researcher is aware of the development in the research study regardless of whether the researcher agrees with the participants' approaches or not (i.e., keep an open mind). In this study, the researcher focused on mitigating biases by noting experiences upfront and refraining from providing opinions or insights to the participants during the data collection. The researcher utilized past experiences during data analysis and the development of potential cost models. Care was taken to ensure the participants' input was used throughout the research study.

The researcher also made certain ethical procedures were observed in conducting the research and in the presentation of the associated findings. Cresswell and Poth (2018) stated ethical issues can arise throughout the research process. Before conducting the study, the researcher should obtain permission from the participants for the use of any materials. The researcher disclosed the purpose of the study was for academic reasons and not for process improvement findings for the individual participant locations. The researcher sought to minimize interruptions at each location and avoid deceiving the participants. Also in the findings, the researcher divulged both positive and negative results (Cresswell & Poth, 2018). In the proposed study, the researcher provided the participants with assurances that any sensitive materials would be safeguarded and returned. The researcher also made clear the purpose of the study was for an

academic understanding of the sustainable use of ABC at a small flexible manufacturer, and not for the direct identification of specific areas of excess costs in the operations. Lastly, the researcher ensured participant anonymity was respected, and the findings were shared in advance of any publication of the results. The researcher shared results by having participants review the data collected for accuracy, otherwise known as member checking, and by reviewing the findings of the data analysis and interpretations.

The role of the researcher is outlined as the principal point of research, to gather and analyze data, and report on the findings. This activity included engaging in events in advance of the fieldwork, such as preparing research questions and seeking permission from the participant organizations. In the fieldwork phase of the study, the researcher's role was to conduct interviews and observations. In the reporting phase, data were analyzed, and themes were outlined and presented in written form. The researcher utilized a bracketing process to ensure personal biases did not affect the research findings. Though the researcher's expertise may have been used in the creation of cost models, the analysis of data, and the development of findings and recommendations, care was taken not to use this expertise to direct the participants' responses in the interviews. The participants' thought patterns on the appropriate method of product costing were captured, as well as the way the participant organizations utilized the existing or enhanced processes. The opinions of the researcher were held back during the data-gathering processes to ensure the study was not biased.

Research Methodology

As noted in Section 1, the proposed research study was conducted using a flexible design. The reasons why a flexible design was appropriate for the study on the sustainable use of ABC in a small flexible manufacturing environment are given in this section. The researcher has chosen

the multiple case study method among all the flexible design methodologies available. The researcher investigated the practicality of the use of ABC at two diverse, small flexible manufacturers. Methodological triangulation was utilized to strengthen the study's verifiability and validity. Lastly, a summary of the overall research methodology is provided.

Discussion on Flexible Design Appropriateness

Flexible design research studies require the researcher to develop a data collection plan, but the specific details on how the data is gathered or evaluated are not fixed (Sovacool et al., 2018). The researcher may need to modify interview questions, planned observations, and other research processes, based on the specific situation presented or the responses provided by the participants. The authors noted the differences between quantitative and qualitative research.

While quantitative study researchers use surveys and statistics to assess hypotheses or quantify relationships (i.e., correlations), qualitative researchers involve interviews, observations, and case studies to conduct exploratory research, or to access in-depth information regarding the research problem (Sovacool et al., 2018). Sawatsky et al. (2019) further defined qualitative research as gathering insights from observations, interviews, and documentation in a real-world situation. Qualitative researchers then seek to develop an understanding of the information gathered from the participants (Sawatsky et al., 2019).

The research topic for the study was the potential for small flexible manufacturers to sustainably utilize ABC. The research was best carried out by engaging in flexible research at the participant sites. The study investigated the existing costing processes utilized at the participant firm and determined whether there was a potential benefit in utilizing an ABC approach. Any proposed changes to the costing processes were developed based on the ability to easily maintain the process designed. The purpose of the research was not to evaluate a hypothesis based on the

benefits of process changes nor to verify whether there was a correlation between the different demographics (i.e., size or products produced) of the participant organizations and the use of advanced costing processes such as ABC. The purpose of the research was to examine real-world examples to evaluate the sustainability of ABC and to analyze the benefit to a participant, a small flexible manufacturer. This research was best carried out using a flexible design study. Using a flexible design, the researcher engaged in open-ended interviews with the members of the participant team and conducted detailed reviews of the existing costing information (for example, bill of materials, routings, and overhead rate calculations). Finally, the researcher made observations of the costing and production process. It is understood the results of the research were specific only to the participants involved in the study. Generalizations could not be drawn from this research design and further quantitative studies must be done to extend research findings over a defined population.

Discussion on Multiple Case Study Appropriateness

Clare (2020) noted researchers who utilize case studies look at a specific real-world situation with the circumstances occurring at the time the research is carried out. A case study methodology was chosen by the researcher to review the specific situation presented in the problem statement. In this study, the researcher highlighted the potential problem small flexible manufacturers face in utilizing ABC on a sustainable basis. To understand the reasons preventing manufacturers from utilizing this advanced costing tool, the researcher selected a case study, specifically a multiple-site case study. Cresswell and Poth (2018) defined case studies as a study of single or multiple bounded systems over time. The authors noted, as with other flexible design methodologies, researchers undertaking case studies gather information through open-ended interviews, observations, and documentation review. The use of a multiple-site case study

allowed the researcher to gain insights into the existing business environment at each location and highlighted potential benefits the participants could have gotten by upgrading costing processes. The selection of multiple sites with different demographics strengthens the research findings by noting the effect participants' sizes or products had on the results at the individual sites. It should be noted that even if the various locations had comparable results, generalizations still were not made. Further quantitative research on a statistically significant sample size must be done by other researchers to evaluate any generalization hypotheses. However, a statistically significant sample size was not the focus of the study.

Discussion on Triangulation Method Appropriateness

Farquhar et al. (2020) defined triangulation as the process of providing a wider picture of a given situation using multiple research techniques from multiple sources of information. Yin (2018) highlighted case studies should contain multiple sources of evidence to provide quality findings. The author noted there are four types of triangulation. The types of triangulation are various sources of data, different evaluators, different perspectives on the same data, and the use of different data collection methods. Researchers can use qualitative methods to crosscheck the collected data. Various sources of data include open-ended interviews, observations, and a detailed review of the participants' documents. The researcher compared the data from the various sources to note common themes or discrepancies. Having multiple sites with multiple sources of information can provide the researcher with additional insights into common themes or the potential of an outlier response.

The proposed study utilized methodological triangulation to strengthen the study's reliability and validity. Dzwigol (2020) highlighted methodological triangulation consists of the use of multiple methods of data collection, and a comparison of the data within a method and

then among the different methods. The researcher gathered detailed costing data from each participant site to develop an understanding of the existing documented product-costing processes and results. The researcher then compared the information gathered with the results of the detailed interviews involving the different actors directly involved in the product-costing process (controller, cost accountant, and engineer). The third source of information was direct observations. Direct observations of the product costing process were conducted. Additionally, direct observation of the production flow used to crosscheck the costing master data (i.e., bill of material or routing) with the documentation gathered earlier was carried out. Interviews with other actors such as leadership, production operators, and IT personnel helped validate the intent of the costing processes and how operators and technology captured the information necessary to develop the costing models and support the costing process on an ongoing basis.

Summary of Research Methodology

The research methodology of the study highlights the adequacy of the use of a flexible design in conducting the study. The need to develop a detailed understanding of the participants' existing processes and the potential benefits to be gained using advanced costing techniques is best done using qualitative research tools. A multiple case study method was chosen as the appropriate tool for this flexible research. This method allowed the development of a deeper understanding of the existing environment and the possible advantages of using advanced costing processes. Having multiple sites aided in strengthening findings by reviewing the impacts of the different demographics of size and products produced. Lastly, the researcher's use of methodological triangulation through multiple sources of information (documentation, interviews, and observations) from multiple participants, at two different sites, increased the reliability and validity of the findings of the research.

Participants

To determine participant selection, an initial overview of the existing staff levels and the functions they provide at each site was carried out. After the researcher developed an understanding of which individual was responsible for the respective functions, the individuals directly or indirectly involved in the costing function were selected for interviews. The proposed study targeted the practicality of the sustainable use of complex costing processes. To gain an understanding of how the overall process could be implemented, used, and sustained, it was necessary to interview a wide variety of participants. As the population at the participant sites were selected from small firms (less than 250 employees) the staffing of each of these functions varied.

Individuals eligible to participate in this research beyond the accounting functions included functions providing input in the process, utilizing the process, or providing support in maintaining the process. The intention was to select the participants equitably, to ensure a full view of the costing process at the subject organizations was obtained. Cresswell and Poth (2018) noted successful interviews include identifying the individuals that can best answer questions (i.e., experience levels, and job function). The researcher included the controllers, cost accountants, engineers, leadership (general managers or owners), sales personnel, IT staff members, and production supervisors, to participate in the study. This broad range of actors either directly or indirectly contributed to the establishment or maintenance of the product costing process. The first four participant functions (controllers, cost accountants, leadership, and engineers) helped produce the costing models and the product costing structures in the form of bills of materials, routings, and overhead costing factors. The other participant functions (sales personnel, IT staff, and production supervisors) influenced the prioritization of product costing

tools and how information was gathered to maintain existing or proposed costing processes, and how product costing was used in the establishment of selling prices.

To gain access to the participants, the researcher contacted the prospective firms via email or telephone. The initial communication included details on safeguards to protect the participants and the purpose of the study. Yin (2018) outlined these protections as, first gaining informed consent from the leadership and the other persons to be interviewed, observed, or contacted to provide documentation. Before conducting interviews with the participants, the researcher introduced himself to the participants and provided the purpose of the research individually, to each participant, and then reviewed the documentation and contribution each participant made to the current costing process. No hidden details which could potentially harm the participants were included (Yin, 2018). An example would be to use shop floor observations to provide recommendations to leadership on the existence of excess staffing. A sense of trust was earned by the researcher before the interviews and observations, to gain a true picture.

To assist in minimizing the impact and the stress of the interviewing process, a strategy for the researcher to develop a working relationship with the participants was needed. Before interviewing the participants, the researcher spent time with each participant to review the existing documentation and to give the participants time to fully understand the purpose of the research. Respect for the individuals' inputs and time schedules was maintained. The researcher carefully scheduled interview times in advance. Yin (2018) noted in case studies researchers can schedule a prolonged case study of interviews (of 2 or more hours) or a series of shorter interviews. This can be structured around the individuals' preferences or scheduled work times. To assist in minimizing time and ensuring focus, the researcher utilized an interview guide and found a distraction-free location to conduct the interviews. Finally, privacy and confidentiality

were maintained by the researcher throughout the study (Yin, 2018). The participants' costs to produce a product were strictly confidential. This costing information included the equipment being utilized, the staffing of the operation, proprietary technology, and associated efficiency assumptions. These factors were crucial pieces of information not to be shared outside those participants who have the authority to review this type of information. How confidential information was stored by the researcher and returned to the participant, as well as how the participant was provided with anonymity, was discussed before any data collection.

The proposed study was conducted using a multiple-site case study. In a case study, an extensive gathering of information by the researcher is required to reach saturation. Yin (2018) noted a feature of a case study is the reliance on multiple sources of evidence converged in a triangulating process. The researcher gathered documentation from the controllers, cost accountants, leadership, and engineers to use as a baseline to compare with the information they provided through open-ended questions. These two sources of information were then compared with observations based on the creation of product costs and the production flows on the shop floor. An example would be to compare the staffing and throughput rates observed by the researcher with the previously acquired documentation from the participants. Interviews with production personnel and IT staff informed the researcher how data was collected from the shop floor and the existence of potential gaps in processes. Interviews with leadership and sales personnel allowed the researcher to gain insight into the knowledge of the use of cost information and the support for ongoing or potentially enhanced processes.

Population and Sampling

The chosen population for the study was small, flexible manufacturing firms in southeastern Michigan, United States of America (USA), and southern Ontario, Canada. Flexible

manufacturers are noted in the “Definition of Terms” section as those manufacturers that either can produce various products over the same piece of equipment or can produce the same product over multiple pieces of equipment (Bhosale & Pawar, 2019). Although this flexibility allows for minimizing capital investments, it requires careful production scheduling to ensure proper capacity utilization and the ability to meet changing customer demands. The definition of an SME population was also defined earlier as firms with less than 250 employees. Firms selected for participation must meet both definitions. Yin (2018) noted case studies must be carefully carried out to ensure they are sufficiently rigorous. Procedures to select appropriate participants and gather sufficient information are a constant focus of the researcher to provide a quality research study. The researcher contacted the participants to share process documentation and to participate in open-ended interviews and observations. The sampling of participants and the gathering of information continued until data saturation was achieved and no additional information or perspectives could be collected (Ningrum et al., 2019). The regions selected are appropriate for keeping the sampling and fieldwork process efficient, as these regions are local to the researcher.

Discussion of Population

The eligible population from which the research participants were drawn met the definition of a small flexible manufacturer, was diversely sized, and produced a different line of products. The researcher targeted firms at the end of the size scale of the definition of an SME (i.e., firms that have less than fifty employees and those that have more than 100 employees). This selection of a range of sizes was to prove if the number of personnel would influence the ability to gather data and utilize complex costing information. Choosing firms that produce various products gave insights into the impacts of data capturing from different manufacturing

processes. Many products require more direct labor and the base cost data is collected manually. Others have a higher level of automation which may be with associated manufacturing technologies. The use of these manufacturing technologies has increased the need for advanced costing processes and may provide a readily available source of data needed to create and maintain the costing process. The targeted eligible population size for this proposed multiple-site case study was a total of 15—30 participants. It is noted that at smaller locations some of the functions may be combined in a single individual (i.e., the controller and the cost accountant may be the same employee). The researcher requested access to a participant pool of seven distinct functions at each location that directly or indirectly impacted the creation, use, and support of a costing process. The individuals selected to participate were determined after an initial review of the selected organization's staffing charts. The study focused on the sustainable use of complex costing processes, therefore input from participants beyond the accounting function was required.

Discussion of Sampling

Sampling requires a method, a sample frame, and the selection of the sample size which are the focus of the data collection efforts. The following discussion provides insight into the sampling method used in the research and the adequacy of this method for the study. A discussion on the sample frame will describe how the samples were selected from the defined population and why a careful selection of the frames was carried out. Finally, the chosen method and desired sample and sample size for this study on the sustainable use of ABC by small flexible manufacturers were presented.

The researcher selected the maximum variation strategy method as the sampling method for the study. Cresswell and Poth (2018) highlighted for case studies researchers should seek a

maximum variation strategy as a sampling method. The authors defined this methodology as seeking diverse variations in the sites or individuals, based on specific characteristics, to participate in the research. Graham et al. (2021) emphasized consideration in the sampling process involved the need to include variability, a diversity of opinions, and ensure data collection continued until saturation was achieved (i.e., there was consistency in responses or no further insights were gained). Other considerations in the selection of a sampling method were the time and resources available to obtain a broad range of perspectives (Graham et al., 2021). To meet these requirements, the researcher selected the use of a maximum variation strategy. The researcher selected firms with a diverse range of sizes and products produced to gather input on perspectives from sites with different demographics. The individuals at each site were selected from the functions directly or indirectly impacting the costing process development or maintenance. Interviewing and observing different individuals provided diverse perspectives and helped in the validation of the themes which emerged in the data collection process. The use of multiple sources of input from different actors at multiple sites was the basis for the triangulation strategy for the research.

The sample frame is a list of the population from which the researcher will draw the study sample (Lo et al., 2020). The authors noted the importance of the list or dataset from which samples were taken. Sample frames not representing the overall target population could be a signal of potential bias issues (Lo et al., 2020). The sample frame for the proposed research study was defined as a listing of manufacturers with two characteristics: size and type of production process. The study topic was the sustainable use of ABC at small flexible manufacturers. The sample frame consisted of firms categorized as SMEs (less than 250 employees) which met the criteria of being flexible manufacturers as defined by Bhosale and Pawar (2019). Additionally, to

meet time requirements the sample frame was limited to firms local to the researcher in southeastern Michigan, USA, or southern Ontario, Canada. A listing of potential participants was obtained by contacting regional chambers of commerce, internet searches of firms based on manufacturing type and size within the selected regions, professional associations, and personal contacts. From this list, the desired sample was chosen to utilize the maximum variation strategy method.

The desired sample size for a case study is defined by Creswell and Poth (2018) as a few sites or individuals involving extensive data collection from each site or individual. As noted above, a maximum variation strategy was employed by the researcher to obtain an adequate sample. A diverse set of firms was selected from the sample frame. The demographics in the sample selection included variations in the firms' sizes and products. To ensure data was collected to the point of saturation, the number of firms the researcher selected was limited to two. Consistently gathering information from both sites assisted the researcher in developing an understanding of how each firm approached product costing and the potential impact of the use of complex costing processes. Within each firm participants were selected to provide documentation, participate in interviews, or be observed. Individuals in each function directly or indirectly impacting the costing process were included. As noted in the population discussion, the targeted number of participants was 15—30 in total for the study. However, the need for data saturation may have required an adjustment to this target. Saturation is achieved when the researcher no longer finds new information to add to the researcher's understanding (Cresswell & Poth, 2018). In the study, when the feedback received was repetitive and no new perspectives were gained, further sampling was no longer required.

Gaining access to research participant firms was not clear. Striepe and Cunningham (2022) wrote that gaining access to research participants can be obstructed by various members of the participants' organizations. These members may view the research as lacking in value or that their firm's information is too sensitive to share. The authors recommended the researcher build a relationship with the organization and understand their culture before attempting to gain access, to overcome issues with participants' attitudes toward the research (Striepe & Cunningham, 2022). The researcher made initial contact with the sample firms by contacting the local chambers of commerce to acquire a list of small manufacturers in the region, and by connecting with professional contacts in the manufacturing sector for potential participant candidates. Using the chamber of commerce roster or recommended contacts provided, the potential participant firms were contacted for participation via telephone or email. The communication emphasized the study was for academic purposes only. Product costing information was confidential. Guidelines on the safeguarding of documentation and the confidentiality of responses and the anonymity of the firms and actors were communicated by the researcher. Additionally, in the initial contact with the prospective participants, the researcher outlined the time investment and noted the findings were to be shared with them before any publication. The researcher maintained the list of eligible participants throughout the research process. There was a possibility that selected participant sites would not meet the criteria for the study or they could withdraw from the research resulting in additional firms needed for participation. Fortunately, no additional firms were needed.

Summary of Population and Sampling

The population and sampling portion of Section 2 covered details on the participants, population, and sampling plans for the proposed research on the sustainable use of ABC by small

flexible manufacturers. The participants included the controllers, cost accountants, leadership, and engineers who were directly involved in the product costing process, along with others (leadership, sales personnel, IT staff, and production supervisors) who indirectly influenced the use of the costing process or were responsible for the inputs necessary to maintain the costing models. The aim was to interview and observe multiple individuals to crosscheck the information and gain different perspectives. The population of the research was drawn from small flexible manufacturers in southeastern Michigan, USA, and southern Ontario, Canada. These regions were local to the researcher.

The researcher utilized a maximum variation sampling method to seek diverse small flexible manufacturers to participate in this multiple-location case study. The two key demographics used to select from the sample frame were the number of employees and the products produced. The sample was limited to two different sites. These sites were of varied sizes (based on the number of employees) and produced assorted products through different manufacturing processes. Within each of these sites, there were seven functions (targeted participants of 15-30) identified in the participant section who were contacted to be interviewed, observed, and asked to provide existing detailed information. A set of guidelines were given on how sample firms were contacted to participate in the study. The importance of anonymity and confidentiality was highlighted, as well as the need to contact additional firms in the event the firms selected did not meet the requirements to be included in the study.

Data Collection and Organization

The researcher's data collection plan was presented to outline the required source data and the collection process. The research was planned as a flexible study, using a multiple-site case study methodology. A data collection plan goes beyond the gathering of information

through interviews, observations, and the review of participant documents. Cresswell and Poth (2018) noted topics such as anticipating ethical issues, gaining permission to gather documents, interviewing participants, developing a sampling strategy, and securing data collected, need to be included as part of a researcher's data collection plan.

Ethical considerations are an important part of the research plan, including before conducting the data collection phase of the study. The researcher ensured the participants were fully aware of the research study's objectives and methods. According to Cresswell and Poth (2018), the use of deception regarding the nature of the study is not acceptable. The researcher informed the participants the study was solely for academic purposes. Though the findings were shared, there was no guaranteed direct benefit to the participant organizations' operational or financial performance. The researcher forwarded the plan to the university's Institutional Review Board (IRB) for approval before any data collection efforts were initiated at the participants' sites. Cresswell and Poth (2018) highlighted the IRB reviews the research design to ensure the study plans will follow the guidelines for ethically conducting research.

After the researcher received permission to contact the participants and collect data at their sites, the initial focus was on developing an understanding of the current product costing process. First, existing product costing information was requested from the leadership, controllers, or cost accountants. This costing documentation included the bill of materials, routings, and details on how overhead costs were calculated and allocated to products. The costing documentation could either be electronic (Excel) or hardcopy. If the costing information was in a hardcopy form, the information was promptly scanned and returned to the participant. In addition, the cost accountants, engineers, or production operators were asked to provide the researcher with a chance to view the shop floors to show the physical production process being

costed. The researcher did not request videotapes of the observations, as this was seen as not being acceptable in this industry. The researcher used a copy of the product costing sheet as a guide to walk through the manufacturing process and noted any discrepancies or missing information. The researcher scheduled and conducted interviews with the actors of this study, focusing on minimizing the disruption in the operations. The researcher requested permission to record the interviews via a Microsoft Teams meeting or through phone recording when interviews were conducted in person. If permission was received, the recorded files were loaded into a qualitative research software package (NVivo) to produce a written transcript subsequently reviewed by the researcher and the participants. The actors who directly created or modified the product costing (leadership, controllers, cost accountants, and engineers) were interviewed first. Next, the actors who indirectly impacted product costing through the input of base activity data or support of the costing process were scheduled for interviews. Having multiple data collection methods (documents, observations, and interviews) with multiple participants helped cross-check the information that was provided and increased the level of reliability and validity of the study. The use of multiple data collection methods was the basis for the study's triangulation plan.

Member Checking

Member checking is the process of soliciting feedback from the study's participants regarding the data collected and the interpretations of the data by the researcher (Motulsky, 2021). The author wrote that peer reviewers, IRBs, and research supervisors assume a study's validity is at risk unless the researcher includes members checking in on the study. For this study on the sustainable use of ABC at small flexible manufacturers, member checking was utilized at numerous points in the data collection and interpretation phases. The researcher reviewed the existing product costing information and discussed the understanding of the information with

those participants responsible for the process creation or maintenance. Additionally, the researcher verified product costing structures through observations of the production process. Any discrepancies were reviewed with the participants before drawing any conclusions. After the researcher completed the participant interviews, a copy of the transcripts was returned to the participants to ensure accuracy in the transcript and allowed the participant to make corrections in responses or further expound on the answers given. The researcher also requested feedback from the participants while interpreting the findings of the study. Member checking is a technique used to minimize biased behaviors by researchers via participants' verification of their wording and perspectives against the researcher's ideas.

Follow-up Interviews

Participant responses to interview questions may have led the researcher to request follow-up interviews with some, or all, of the participants. The study was designed to use a semi-structured interview guide described in the "Instruments" section below (a copy of this guide is included in the Appendix). The initial interview questions were designed to address the research questions listed in Section 1 of this study. There was a possibility of follow-up interviews to further clarify the responses given or to pursue concepts not considered in the original interview guide or the research questions. The researcher focused on addressing the objectives of the study while allowing the participants to provide insights into the existing product costing processes or the development of enhanced processes. In this study, follow-up interviews were not required.

Instruments

The researcher was the primary data collection instrument in this study. The researcher's role was to plan, conduct, analyze, and report on the data gathered through documentation collected, interviews, and observations. To assist in the interviews and documentation reviews,

the researcher utilized an interview guide and archived data. An interview guide is a tool to help researchers maintain focus during the interview process (Roberts, 2020). The proposed research utilized an interview guide as a structure to interview each participant at each site. Though questions were intended to be open-ended, there was a need for a guide to ensure the interviewing process met the study's need for input, based on consistent questioning to respect the participants' time schedules. Though the guide assisted the researcher in the interview process, there was a possibility the participants' responses may not have directly answered the questions, leading to follow-up interviews. Follow-up interviews were not necessary for this study. The use of archive data focused on organizational records. Existing and previous years' budgets and product costing support information were used to develop an understanding of the background of the current product costing processes. This information also provided the researcher with insights into changes in costing processes or overall business changes (i.e., different product line introductions or changes in production volumes), and the extent of control procedures at the participant organization.

Interview Guides

Interview guides are tools or scripts researchers use to maintain focus during the interview process and to help to ensure critical topics are covered. Interview guides are frequently required by IRBs to ensure researchers follow a standard protocol when conducting participant interviews (Roberts, 2020). The author noted although interview guides may be required, there were alternative approaches to the structure of these guides. The guides could be a simple list of interview questions related to the study's research questions. Another alternative for the guide was a simple outline covering the overall research themes or including follow-up questions not originally part of previous interviews (Roberts, 2020). The research on the

sustainable use of ABC by small flexible manufacturers utilized an interview guide supporting the research questions provided in Section 1. The research guide is presented in Appendix and lists twelve questions addressing the three main research question topics of traditional costing methods and alternatives, the use of complex costing models, and leadership's impact on the costing process utilization.

The first research question (RQ1) explores the potential issues arising from the use of traditional costing for product pricing and the alternatives that have been developed. To address the research questions, the researcher developed five questions numbered 1-5 in the interview guide (Appendix). The first four questions were designed to determine how each location in the research study progressed in the development of MA processes (MAPs). These questions assisted the researcher in understanding the participants' current product costing processes and the potential issues arising from the use of these processes. Najera Ruiz and Collazzo (2020) noted SMEs rarely use MAPs beyond simple cash management reporting. To assess the level of progress of participant organization in the development of MAPs, the initial questions sought the participants' input on basic controlling questions. First, an understanding was needed of how the firm tracked costs. Were costs simply recorded on a facility basis or were they recorded by the department or cost center? The use of ABC and other advanced MAP tools utilizes cost allocations to departments or cost centers which are the source of the activity or cost. If costs are only tracked on a facility-wide basis, breaking costs down further would be the initial focus. The second question was regarding the current budgeting process. Did the organization track real costs against a budget? The extent of planning was crucial in forecasting the development of standard costs and other MAPs. The third question was presented by the researcher to see the process the participants used to value their production inventory. The researcher compared the

inventory valuation process against the existing costing documentation and the flow of production on the shop floor. The researcher asked the fourth question to understand how the participants priced their products. Tarzibashi and Ozyapici (2019) highlighted that the use of traditional costing as a basis for product pricing could distort customer pricing, which could in turn have a direct impact on the firm's profitability. Having the participants provide details on how products were priced would also highlight to the researcher the role the participants played in accuracy levels in product costing. The fifth and final question in this first section of questions in the interview guide asked the participants about any enhancements to the product costing process the participants made close to the time the study was carried out, or whether any enhancements were being considered. The researcher sought the participants' input to determine their awareness of the need for change, whether changes had been recently made, or whether changes had been considered to enhance their costing processes.

The next topic covered in the interview guide was how SMEs could derive a favorable cost-benefit using complex costing models (research question RQ2). Nartey and van der Poll (2021) wrote that SMEs needed detailed costing information that could be gained using advanced costing processes like ABC. These tools help firms properly analyze their cost structures and assist in making strategic decisions. Though the benefits of the use of advanced MAPs may be known, the use of these tools has been limited for SMEs. Msomi et al. (2020) highlighted though owners and managers may be aware of the benefits of MAPs, daily operational demands and the lack of resource availability may prevent these tools from being implemented or fully utilized. The researcher proposed questions six to nine (in the interview guide) to address these topics. The researcher asked the first question to allow the participants to discuss concerns surrounding the implementation of a more complex process. Questions seven to

nine were asked by the researcher to determine how the participant gathered the information needed for the development of advanced costing models. The sustainability of any costing process (including a traditional standard costing process) is contingent on the availability of data collected and analyzed with minimal effort.

The researcher proposed the final three questions 10 to 12 in the interview guide to address leadership's impact on costing process utilization (research question RQ3). The focus of question 10 was the organizations' understanding of how a business's profitability could be impacted by accurate product costing. This question was asked of both the leadership and the whole team of participants. Accurate costing knowledge allows leadership to focus on areas of operational improvement and assists in the setting of prices and product-mix strategies. The researcher developed the last two questions in the interview guide to explore the level of leadership support for implementing and supporting the maintenance of a new complex costing system. These questions mirror research sub-questions RQ3a and RQ3b. Allain and Laurin (2018) highlighted leadership's support in the implementation of advanced costing processes. Furthermore, the authors noted leadership may resist the implementation of new processes as it may restrict their authority and may be subjective. The responses to these last two questions from both the leadership and all the participants provided the researcher with insights into the leadership's perspective on change and the remaining participants' views on their leadership's support for any changes to existing MAPs.

Archive Data

Yin (2018) defined archival data as one of the six sources of evidence in case study research. The author stressed that the classification of archival records includes organizational records such as budgetary or human resource files. In the research study, the participants were

asked to provide documentation of past product costing results. The documentation collected was used as a basis to compare the data received from interviews and direct observations. To further detail the costing processes at the participant sites, copies of past year budgets, staffing plans, and costing sheets were requested. This compilation was used to compare the archived data to the current costing information to note changes in budgeting or costing processes and to highlight any changes in the business environment. One aspect of the research was to understand whether the participant firm had acquired or discontinued a new product line, or whether volumes changed dramatically, close to the time the research was carried out. The review of past staffing charts provided the researcher with information on the turnover of personnel or changes in staffing levels. The use of this information helped the researcher develop a deeper understanding of the cost-controlling processes at the participant site. This understanding was necessary to determine the benefit of the use of advanced processes. There was also a possibility this type of detailed information on the costing processes did not exist at each site being researched. Msomi et al. (2020) emphasized, the adoption of MAP processes like budgeting or ABC was lacking in many SMEs, as the leadership of the organization was fully engaged in daily business challenges.

Data Organization Plan

It was necessary for the management of the data collected to be carried out early in the research process. Cresswell and Poth (2018) stated researchers should create a file naming system as data is saved into digital files. How the files are named and organized will assist the researcher as they prepare to analyze the information collected and develop themes. One of the first steps in the development of file folder structures is the identification of the firms and the participants interviewed, observed, or those sources of current and archived documents. The

proposed research was on the product costing processes of two participant firms. Anonymity was required to protect the results of the existing costing processes or the potential results of the use of ABC. Yin (2018) noted in case studies the decision to disguise either the participants or the entire case is a requirement. The proposed research was a multiple-site case study with two different participant organizations. The researcher coded the firms as FM1 and FM2 (flexible manufacturers 1 and 2). Since the participant firms were smaller, the number of individuals involved in the costing process was limited. The participants were identified using a code with the firm number (i.e., FM1) and the order in which they were interviewed (i.e., FM1.1). There was the potential that at some firms (especially the exceedingly small ones) the positions may be combined.

Yin (2018) highlighted through qualitative software packages may assist a researcher, they would not provide the final analysis. Software packages could assist the researcher and provide tools to help organize and analyze the gathered data. The researcher would be able to enter information, code it, and then run statistical analyses or highlight the occurrences of themes (Yin 2018). The researcher utilized NVivo to gather the different source documents. The folder structures were established before data collection, to ensure an organized structure for each participant firm. Both participant firms' structures were kept in the same format to allow for a comparison of the individual components of the collected data. The data was backed up on Microsoft OneDrive.

With the information stored in a logical file structure, the input was reviewed, and notes were created to identify possible themes existing in the data. The researcher assessed the input received from the interviews and noted similarities between the data and the documentation provided earlier in the fieldwork. After reading and jotting down themes in the data collected, the

next step was to code or categorize the information (Cresswell & Poth, 2018). Data categories were established for the information collected based on cost components (i.e., material, direct labor, and machine costs) as well as categories of activities and cost drivers utilized in the development of cost models. NVivo can load multiple types of data and audio files into the folder structure. In addition, there is a structured coding section to establish the code master hierarchy which can then be attached to the individual files collected. The codes were used to assist researchers in categorizing the data for further analysis.

Summary of Data Collection and Organization

The data collection and organization plan for the proposed research are detailed in this section. Since the research is a flexible study, data was collected through the interviews of the participants, observations of the costing and manufacturing processes, and the review of current and past product costing documentation. Ethical considerations on anonymity and safeguarding the information collected by the researcher are highlighted. The initial focus was on the development of an understanding of the existing costing processes and assessing which benefits could be gained by moving to a more advanced MAP. One aspect of the data collection process in the study was to conduct member checking. Participants were asked to review the themes developed from the researcher's understanding of the information collected, to ensure the themes were accurate. Any discrepancies between the various sources of information were reviewed with the participants to clarify the reasons for the differences. Interview transcripts were sent back to the participants for review to ensure accuracy in the transcripts. Participants that chose not to receive a copy of the transcript for reviewed signed a form noting that they did not want a copy of the transcript forwarded. The need to establish follow-up interviews to clarify responses or pursue additional concepts not considered in the original interviews was discussed. Follow-up

interviews were not required. The instruments used in the data collection were identified as the interview guide (see Appendix) and archival data. The interview guide provided participant questions that addressed the concepts posed in the research questions. How each interview question was tied to a research question was detailed in this section. Archival data was noted as previous period organizational budget and cost data used to understand the current processes and business environment changes. The researcher highlighted the need to develop a folder and a coding structure to aid in organizing the data and in the development of themes before the research data analysis. The development of the data folders led to the consideration of anonymity concerns for both the firms and individual participants. The researcher utilized Nvivo to store, code, and organize the various data and audio files. The backup of data to Microsoft OneDrive was outlined by the researcher. With the data stored and organized, the researcher was able to review the data, create memos, and develop themes from the information collected.

Data Analysis

The data analysis section starts with a review of the information collected and ends with the triangulation analysis of cross-checking data sources to increase the research study's validity. Cresswell and Poth (2018) define emergent ideas as the process of memoing concepts the researcher identifies while collecting or reviewing the data. The coding process involves categorizing the data to prepare for detailed analyses. Interpretation of the data consists of making sense of the information collected on the part of the researcher (Cresswell & Poth, 2018). Data representation includes reviewing the interpretations and developing a generalization that other researchers can evaluate through further studies. Lastly, a detailed discussion of how the researcher conducted a triangulation analysis to develop a sense of validity and reliability for the findings from the case study is provided.

Emergent Ideas

When gathering and organizing data collection before analysis, the researcher read and noted any themes or emergent ideas that appear in the data set. Cresswell and Poth (2018) recommended while researchers are reviewing interview transcripts and other documents, they should write notes or memos in the margins on emerging themes. This can be completed on a manual document and scanned into a digital file or can be carried out directly in the qualitative research software package. Cresswell and Poth (2018) highlighted memos are intended to be short phrases on the concepts identified by the researcher when reviewing the documents. To initiate the development of emergent idea memos, the authors recommended researchers ask for a definition of the data, the detail as to who and why produced it, and why it was produced when they review the information gathered. The authors also noted memoing should be carried out throughout the research analysis process. A system of organizing the memos must be established beforehand. The organization of the memo structure is key in the development of coding and is used to sort and retrieve necessary information when analyzing and producing findings for the research study (Cresswell & Poth, 2018). The researcher utilized memos to highlight emergent ideas throughout the data analysis process of the proposed study. Memos were captured in the qualitative software package and were included in the development of the data coding structure.

Coding Themes

Locke et al. (2020) defined coding as the review and organization of observations and data collected into data segments. These segments are allotted names (or numbers) which allows for the linking of the different data segments and ideas. Cresswell and Poth (2018) mentioned coding as a key feature of qualitative research, necessary to make sense of the massive amounts of data collected. The coding process can be a first-order or top-down approach where codes are

derived from the research question. On the other hand, a second-order form of coding can be developed from the participants' experiences (Locke et al., 2020). In this research, coding was designed to match the three research questions and the associated sub-questions. Creswell and Poth (2018) noted the need for a codebook to identify the boundaries of each code and to demonstrate how these codes relate to each other. The author's name of the code, as well as a description of what the code entails, could be jotted down in the margins of documents. The researcher used the coding functionality of the research software package to obtain the codebook features. These features include a listing of the code names and hierarchies, along with the relationships between the different data files or data codes.

Interpretations

Creswell and Poth (2018) defined data interpretation as the process in which the researcher makes sense of the data which has been collected. According to Creswell and Poth (2018), the interpretation process involves three steps. The first step is to develop codes from the data collected (as described above). The second step is to develop themes from a review of the coded data. The third step is to organize the various themes into larger views of the data themes, to develop an interpretation of the study (or make sense of the data collected). Yin (2018) listed five different techniques to be possibly employed in the analysis of case study data. The first is to match patterns of predicted values with the collected values. The next technique is to build an explanation by asking the questions of "how" or "why" a circumstance or situation exists. Researchers can also utilize a time-series analysis to look at trends in data collection results over time. Another tool that can be utilized is a logic model, which is developed to explain cause-effect patterns for complex activities such as implementing a major project. Lastly, the researcher can use a cross-case synthesis technique to analyze and interpret results over multiple

case studies (Yin 2018). In the proposed research, the researcher utilized two interpretation techniques: pattern match (predicted versus actual results) and cross-case synthesis.

Msomi et al. (2020) and Najera Ruiz and Collazzo (2020), highlighted many SMEs do not have developed MAPs such as ABC or advanced budgeting. SMEs who do not implement a minimal level of MAPs frequently utilize cash management, simple budgets, and traditional volume-based product costing processes. These previous studies have led the researcher to the assumption that the participant firms use simple traditional product costing processes to value their inventories. This predicted value of the participant having a simple traditional costing process was then compared to the data collected to determine whether the pattern of participant responses matched the predicted values. The second technique is cross-case synthesis. The proposed research was designed as a multiple-site case study. The cross-case analysis was carried out between the different sites to note common themes or discrepancies. The researcher ensured the data collected, and the interviews' wording were consistent between the two subject locations so the responses from each site could be adequately compared.

Data Representation

Cresswell and Poth (2018) posited, to appropriately represent and visualize the data collected for analysis, two objectives need to be met. These objectives are aimed at documenting support for the researcher's point of view and displaying and reporting on the information collected. Supporting the researcher's point of view required the development of data models and matrices. The reporting on the data requires a written report on the findings (Cresswell and Poth, 2018). It was necessary for both the documentation and the report to be presented in an organized fashion. The researcher illustrated the background and findings of the case by presenting the research study in a linear-analytical structure. Yin (2018) defined this research

composition strategy as the standard approach to research reporting for case studies. The research reporting flows from the research problem to a review of the relevant literature. Next, the process flow outlines the methods used, the data collected, and the associated findings. The findings then lead to a conclusion and a discussion of the implications for the problem being studied. As a part of the study report, the data was represented in multiple forms. Information flowcharts on how traditional costing and ABC were developed and presented to demonstrate the differences between the two processes. In addition, summarized sample part costing data from both the traditional and ABC models at each research site were provided to show the difference in the costing results and the potential impacts on product margins. The flowcharts and costing models served as tools to help the reader understand the background of the research problem and to support the researcher's interpretations or findings.

Analysis for Triangulation

Data triangulation was implemented to fully understand the situation by using multiple research techniques and by collecting data from multiple diverse sources (Farquhar et al., 2020). Yin (2018) noted case studies specifically need multiple sources of evidence to ensure a high-quality study is presented. The researcher utilized multiple sources of information, along with cross-checking between the different participant sites to aid in the triangulation of the data sources. The researcher gathered archived documents on budgets and product costing support for the existing processes. In addition, using participant interviews and observations, the researcher was able to cross-check the described processes against the documentation provided to determine whether the data coincided (Yin, 2018). The research consisted of a multiple-site case study. The findings from each location were compared to explore evidence of non-convergence (Yin, 2018).

The results of the triangulation analysis were documented and presented to ensure data reliability and the validity of the research process and findings.

Summary of Data Analysis

In the data analysis portion of Section 2, the process began with the identification of emergent ideas. The researcher reviewed and jotted down emergent ideas or themes as the study progressed. These emergent ideas were highlighted and coded in NVivo throughout the research process. The coding of the emergent ideas aided the researcher in classifying the information to develop the overall themes for research and analysis purposes. Coding was organized from a top-down approach to match the responses from the interviews and observations to the research questions. After the emergent themes were coded and organized, the researcher compiled the themes into an overall interpretation of the data gathered. The data representation plans noted the organization of the study as having a linear-analytical structure. In this structure, the researcher described the research problem, then the literature review provided an outline of the methods used, described the data collected, and presented the associated findings. A key tool utilized in the analysis process was the use of triangulation. The researcher utilized various methods to gather information from different participants to note consistencies in the responses. Additionally, the feedback from the two participant firms was compared for theme consistency.

Reliability and Validity

The need for reliability and validity in research is outlined below, along with the ways the researcher addressed these concerns. Reliability of the information refers to the credibility, transferability, dependability, and confirmability of the data collected, along with the associated interpretations. The methods used to ensure data reliability are outlined in this section. The validity of the research data and findings was supported through bracketing, triangulation, and

collecting data to the point of saturation. The researcher provides details on how validity tools were utilized in the study.

Reliability

Yin (2018) outlined reliability in research by stating the findings of the research are dependent on the findings of the study if another researcher carries out the same study with the same procedures. Reliability in research is a focus on the minimization of errors through poor source selection, improper interpretations, or the researcher's own biases. Lincoln and Guba (1985) posited to help researchers establish trustworthiness in their studies. The reliability of data is established when researchers can prove the information's credibility, transferability, dependability, and confirmability. Cresswell and Poth (2018) summarized this concept of gaining reliability in research data and findings. Credibility is obtained by using data triangulation. As noted in the previous section, the researcher utilized triangulation by seeking multiple sources of input (interviews, documentation, and observations) from multiple participants. Additionally, as the research consisted of a multiple-site case study, the findings between the two locations were compared. The information and concepts had to be transferred from the participants to the researcher. To ensure transferability in the research data, it was necessary to have detailed descriptions of the concepts and process steps. In the proposed research study, the researcher had to obtain a full understanding of the product costing process at each site. For example, gathering cost component data as simply "overhead" was not sufficient. It was necessary to provide details describing what the participant included in overhead costs. The results of the research also had to include dependability. Dependability assumes other researchers who carry out the same case with the same parameters will have the same results. If the researcher changes parameters, then different results will occur. As this study entailed a

flexible designed research, the findings are specific only to the cases being researched. Generalizations should not be made. Lastly, confirmability in a qualitative research study is obtained by auditing the research process. The proposed research study was presented as an academic exercise and was reviewed by the researcher's dissertation chair, administrative and committee reviewers, and the university's IRB. After the review of the study, the study was defended by the researcher. This research process review was necessary to gain confirmability of the data and findings and will provide the reader with a sense of the study's reliability.

Validity

Yin (2018) mentioned that the criteria for judging a research's quality are dependent on the types of reliability and three types of validity. The three types of validity are construct validity, internal validity, and external validity. Construct validity denotes whether the concepts being studied are utilizing the correct operational measures. Internal validity is obtained by establishing a causal relationship between different conditions. Finally, external validity seeks to prove whether the study can be generalized by additional research (Yin 2018). To provide the reader with a sense of validity in the findings, three techniques were utilized: bracketing, triangulation, and data saturation.

Bracketing is used by researchers to ensure their personal biases do not distort or manipulate the study's findings. The researcher sets aside their individual experiences before data collection, so participants do not emit a pre-conceived response (Dörfler & Stierand, 2021). The researcher's approach to bracketing is outlined in the following section. Farquhar et al. (2020) established the use of triangulation has become the accepted means of providing research studies with an acceptable degree of validity. Triangulation was utilized in the research study by collecting data from multiple sources (documents, interviews, and observations) and multiple

participants. The research collected input from six distinct functions at each of the two sites. The results of the interviews were compared to the documentation previously collected, as well as to observations of the costing process and the production flow on the shop floor. Data saturation was achieved when no additional information or perspectives could be collected (Ningrum et al., 2019).

Bracketing

As noted above, bracketing is the practice of the researcher to place their previous experiences or biases aside when gathering input from the research participants. Cresswell and Poth (2018) stated, if the researcher shares individual experiences, bracketing is minimized and may reduce the level of information the participants share. Dörfler and Stierand (2021) wrote researchers need to retain their assumptions, but not discard them. The researcher can utilize past experiences when reviewing the data collected, to develop themes and assist further in the analysis process. In the proposed study, the researcher bracketed previous experiences beforehand by noting these experiences and associated information in a separate section in NVivo. Care was taken to use the interview guide for conducting the participant interviews. The researcher refrained from providing insights on alternative approaches to product costing while engaging in the data collection process. The focus of the research study was to receive input from the participants in the study, and not to detail the experiences of the researcher. While previous experiences can be used during the analysis phase, special attention must be taken to refrain from these conversations while the participants outline existing processes and share experiences within their respective firms.

Summary of Reliability and Validity

Establishing the reliability of the research findings is key for researchers. Reliability is obtained by minimizing errors through poor source selections, improper interpretations, or the biases of the researcher. A study's reliability in data and findings is achieved when the information is shown to be credible, transferable, dependable, and able to be confirmed. Data triangulation needs to be implemented to show credibility. Full detailed information must be transferred from the participant to the researcher. This can be achieved by ensuring detailed definitions of the processes in the study. Dependability is defined as gaining results consistent with the parameters provided. Confirmability was achieved through the review of the research process by the university's staff and the IRB.

The validity of the research is a measure of the quality of the study. The sense of validity can be strengthened using three different techniques: bracketing, triangulation, and data saturation. Researcher bracketing entails having the researcher refrain from sharing their experiences or opinions so the participant could provide full unbiased answers to the interview questions. Triangulation was achieved by gathering input from multiple sources (documentation, interviews, and observations) from a full set of participants directly or indirectly impacting the product costing process. Data saturation is defined as gathering input from the participants until no new perspectives can be gained. The reliability and validity section concluded with additional insights on the bracketing technique the researcher used in the study.

Summary of Section 2

In this section of the study, the research project plan was outlined. First, the researcher explained the purpose of the study, the role of the researcher, and the research methodology. The purpose of the research was to expand the practicality of the use of complex costing processes in

the small, flexible manufacturing environment and the potential impact the use of these processes has on a firm's profitability. The role of the researcher is to gather information from interviews and observations. The researcher sought participant permission, considered potential ethical concerns, and outlined and conducted the interpretation and assessment of the processes used for the data collected. The researcher utilized a flexible design to conduct the research. The data required to address the study's problem statement was obtained through the collection of participant documents, conducting of open-ended interviews, and observations of the costing process and the flow of production on the shop floor. These flexible tools were utilized in a multiple-site case study research process. Two different firms with diverse demographics were selected to receive a broad range of feedback for the analysis of the potential use of complex costing processes.

Section 2 included details on the participants, population, and sampling methods used in this research. The participants included individuals who directly impacted the costing processes (controllers, cost accountants, and engineers), others who indirectly impacted the support of the use of the costing processes (sales personnel and leadership), or others who assisted in gathering the information to maintain the processes (production operators and IT personnel). The firms selected to participate were chosen from small, flexible manufacturing firms in southeastern Michigan, USA, or southern Ontario, Canada. These two regions were local to the researcher and made the research fieldwork more efficient. To select the sample firms, a maximum variation strategy was utilized. This strategy was accomplished by selecting firms with varied sizes and products and by interviewing and observing a full range of individuals who impacted the product costing process.

Section 2 also included a discussion on the collection and organization of data, as well as a description of the data analysis. Member checking was employed by the researcher to ensure the information gathered was accurate. Interview transcripts identified themes, and interpretations were shared with the participants to receive their feedback as to the accuracy and completeness of the responses. There was also a possibility that follow-up interviews would need to be scheduled if the information received needed further clarification. These follow-up interviews were not required. The data collection plan included the use of an interview guide to assist the researcher in maintaining focus during participant interviews, as well as the use of archived data to help develop an understanding of the history of the participant's MAP processes. The interview guide is included in Appendix and is linked to the research questions listed in Section 1. The researcher utilized NVivo to input and organize the data collected. In the data organization plan, the information was reviewed, and themes or emergent ideas were noted from the data gathered from the participants. These themes were coded to allow the information to be summarized and analyzed. The themes captured were then collected into an overall interpretation of the participant inputs. The researcher matched patterns from the predicted values taken from the levels of SME MAP usage noted in the literature review, with the data collected at the participant sites. Secondly, a cross-case analysis involving the two participant firms was carried out to note the differences between the two firms' responses, as well as to determine if any common themes existed. The information was presented in a linear-analytical structure with supporting process flow charts and sample costing results from the existing and proposed costing processes. Lastly, the use of bracketing, collecting data to the point of saturation, along with triangulation, assisted the researcher in demonstrating the reliability of the study's data and the validity of the research findings.

Transition and Summary

In Section 2, the researcher outlines the project plans utilized in the research study. This section started with a restatement of the purpose statement from Section 1. The role of the researcher in the study was detailed in this section. The researcher's role was the main instrument for data collection, analysis, and interpretation of the study. While collecting data, the researcher bracketed previous experiences in MAP by segmenting these insights into a separate folder to be used after the participants' input was collected. The researcher utilized a flexible design for this study. The researcher gathered data through qualitative research tools, specifically open-ended interviews. Among all the flexible methodologies available, the researcher has selected a multiple-case study method. Two small flexible manufacturing firms were selected to develop an understanding of their current costing processes and their potential for the sustainable use of ABC. The researcher employed methodological triangulation using different methods of data gathering (i.e., interviews, observations, and documentation collection). These data sources were then cross-checked to improve the level of reliability and validity. The participants in the study belonged to various functions directly or indirectly impacting the product costing process at the two participant firms. The researcher targeted a total of 15-30 individuals to participate in the study. The samples were drawn from the population, based on the size of the firm and the ability to meet the definition of a flexible manufacturer. The researcher has chosen a maximum variation strategy as a sample selection process to ensure a broad range of demographics in the study. The participants were selected with distinct variations in the size of the firm (number of employees) and the products produced. In the data collection and organization portion of this section, the details of the researcher's communication with contacted the participants, as well as the information gathered, were outlined. All collected data were uploaded into NVivo, which

was used to code, organize, and assist in analyzing the information for common themes. Member checking was used to ensure the data was collected accurately and that it reflected the participants' intent. To assist the researcher in maintaining focus, an interview guide has been prepared (Appendix) to ensure consistency in conducting interviews. The data analysis discussion focused on the memoing and coding of the concepts the researcher uncovered during the data collection and analysis phase of the study. The researcher interpreted the data by seeking common themes from the coded data. The researcher presented the research findings in a linear-analytical structure. Lastly, the researcher concluded Section 2 with a discussion on supporting the study's reliability and validity using triangulation and bracketing.

In Section 3 the researcher details the findings of the study. These findings include the themes the researcher discovered and interpreted. The representation and visualization of the data from the study are presented by the researcher in the form of process flows and sample data modeling. The researcher details discussions on how the findings relate to the approved research proposal by providing a connection to the research questions and the conceptual framework. The themes from the findings were compared with the predicted themes noted in the proposal, and any differences are noted. Additionally, how the findings relate to the literature and the research problem is discussed. After the findings are presented, the supporting material for the study is given. Section 3 includes details on how the study applies to professional practice. A discussion on how the study results can improve general business practices and can assist in potential application strategies is also outlined. The researcher also provides recommendations for further research to build on the findings of the study. Also included in Section 3 of the research are the researcher's reflections on how the study impacted personal and professional growth, as well as a

Biblical perspective on how the business functions researched are integrated into a Christian worldview.

Section 3: Application to Professional Practice

In the final section of this study, the researcher presents how the study was conducted, the findings of the study, and the lessons learned. In the overview of the study, the researcher prepares a detailed summary of how the study was approved by the university, how participants were recruited, and how the study was conducted. In the presentation of the findings, the results of the review of documentation, interviews, and observations at each of the participant sites are given. Next, the researcher identified applications to improve business practices and suggests potential application strategies based on the knowledge gained from the findings of this study. In addition to these improvements to business practices, the researcher has provided recommendations for further studies. Finally, in the reflections section of this study, the researcher demonstrates how the study integrates with a Christian worldview and the personal and professional insights gained.

Overview of the Study

This qualitative research study was designed to develop an understanding of the potential for the sustainable use of activity-based costing (ABC) in a small, flexible manufacturing environment. Small manufacturers were identified as firms with less than 250 employees. To be considered a flexible manufacturer, the firm should produce a product over alternative equipment, or produce the same product simultaneously on multiple pieces of equipment (Bhosale & Pawar, 2019). Small flexible manufacturers are sensitive to the pricing of their products, as improper pricing and selling of products at a negative margin can be disastrous to a firm with a limited customer base and market influence. The study was designed to include two

small flexible manufacturers with diverse sizes and product offerings. The study limited the number of participant firms to minimize the scope of the research, and to develop a better understanding of the existing costing processes, as well as the potential to sustain the use of a more complex costing process.

Before gathering information from either participant firm, the researcher received research approval from Liberty University's Institutional Review Board (IRB). One aspect of the research approval process entailed identifying the background of the study and how the study should be conducted. The researcher outlined the process of utilizing multiple sources of information at both locations to establish a triangulation process of data validation. The study included gathering documentation on the current costing process, a series of interview questions to be given to multiple participants, and observations on the shop floor. The researcher also described how the participants' confidentiality would be maintained. The firms permitting the study would be identified as FM1 and FM2 (Flexible Manufacturers 1 and 2). The interviewed participants were assigned codes (i.e., FM1.1) to note the firm they worked for and the sequence in which they were interviewed.

To recruit participants in the study, multiple methods of recruiting potential candidates were implemented. The researcher posted a social media message to request participation in the study. No responses were received. The researcher then contacted two alumni associations, a manufacturing association, and an economic development agency. Only one response from one of the alumni associations was received. The response petitioned the message to be forwarded. Permission was granted, but no further communication was received. The researcher then directly contacted ten different local small flexible manufacturers to request participation in the study. Of these ten potential sites, six sites did not respond to multiple inquiries, one site did

respond and declined participation, and three other sites agreed to participate. Of these three sites, two were chosen. The researcher chose to minimize the scope of the multiple-site case study by choosing to study only two firms in this market segment. The researcher utilized a maximum variation strategy when selecting the participating firms. Cresswell and Poth (2018) defined a maximum variation strategy as selecting sites based on specific diverse characteristics. To ensure the study was not biased to a specific set of demographics, the two firms were chosen from opposite ends of the size scale (i.e., the first firm [FM1] was comprised of 115 employees, and the second firm [FM2] had 23 employees). In addition, the two firms have different manufacturing processes. FM1 works with laser cutting, welding, and grinding for agricultural and industrial products and FM2 utilizes chemical etching to produce products for the healthcare and defense industries.

As shown in the Representation and Visualization of the Data section of this study, the documentation collected from the participant firms was used by the researcher to develop process mappings and sample product costing models for each site. Additional documentation was provided to support the methods currently used to calculate overheads and to determine the extent of the participant firms' budgeting processes. Member checking of the researcher's data representations was achieved by sending the process flow charts and the sample product costing tables developed by the researcher to the participants responsible for the development of product costing. FM1, the participant who provided the costing documentation noted one error in the process flow and the need to further clarify one of the other elements. These changes were made and sent back to the participant, who approved the revised process flow and the associated costing model. At FM2, the participant noted a missed step in the process not discussed during the site visit. This additional step was added. To manage the participant interviews, an Interview

Guide was produced containing a total of twelve questions. This guide was approved by the IRB and was used for face-to-face or Microsoft Teams interviews. The interview questions were designed to develop an understanding of three major areas: the extent of the participant's knowledge of the existing management accounting (MA) processes at the firm, how the base production-related activity was tracked and reported, and how the participants viewed openness toward upgrading the costing processes at their firm. The participants included employees at each location in the following functions: leadership, accounting, sales, engineering, production, and information technology (IT). Each of these individuals signed a consent form before the interview. At FM1, ten of the 11 participants allowed the researcher to audio-record the interviews. At FM2, all six of the participants were allowed audio recordings of the interviews. After the interviews were completed, the recordings were uploaded into an NVivo database to produce a transcript. At FM1, all transcripts were returned to the participants to review as a means of ensuring accuracy. At FM2, only two participants requested to receive a copy of the transcripts, the others signed a form that they did not want a copy for review. At FM1 one individual did not wish to be audio recorded. Therefore, the researcher took notes and created a transcript manually. This manual transcript was returned to the participant for review, and after editing for the received feedback, the approved transcript was uploaded into the NVivo database.

After obtaining the documentation, the researcher analyzed the participant input for common themes. The themes were developed for each participant location, and the themes from each site were then compared to note any commonalities. The two common themes at both locations were the lack of MA knowledge and the need for more readily available detailed costing information, necessary for the potential development of a more complex costing process. Both themes were listed as anticipated themes in advance of the fieldwork. The fieldwork

uncovered each participant had different methods of collecting costs and valuing their inventories. FM1 utilizes a standard full-absorption costing process allocating costs based on machine hours. FM2 costs their products by batch, based on a historical market cost per hour for processing and setup activities multiplied by the estimated time to complete the job. Neither participant firm was attempting to capture information based on the specific activities consuming the firms' resources.

The area where the two participants differed was in the willingness to change to a more advanced costing process. FM1 possessed a common theme of openness to change if proven to be cost-beneficial. FM2, especially the senior leadership, commented, a more enhanced costing process would not be beneficial. The researcher's interpretation of the reasoning behind this difference is based on the market and profitability constructs under which the two participants operate. FM1 works in market competitive and price sensitive. The need to understand their cost structure is essential to improve their profitability. FM2 operates in a niche market due to its unique manufacturing process, allowing for a quick turnaround on small and mid-sized customer orders with a minimal investment in tooling and capital. At FM2, the profitability levels are acceptable to the corporate owners and the objective is to manage capacity. The other difference between the two participants is the size of the organization. FM2 contains a fraction of the number of employees compared to FM1 (23 at FM2 versus 115 at FM1), which highlights the resource-requirement concerns FM2 noted, regarding moving away from a simple costing process. To determine whether these results are common for other firms in this market, or whether there is an optimum size (number of employees) required to implement and maintain a complex costing process, an additional study is required.

Presentation of the Findings

In this section of the research, the findings of the fieldwork for the study on the sustainable use of activity-based costing (ABC) in a small, flexible manufacturing environment are presented. The themes discovered in the field work completed at each location separately will be presented first, followed by the common themes to both locations and finally the interpretation of these themes. The representation and visualization of the data captured are given in the form of flow charts of the participants' current costing processes, as well as a suggested approach for the use of an ABC costing process (as shown in Figures 2,4, and 6). In addition, samples of product costing using the existing costing processes at each location are provided, as well as an example of ABC for a product with a customer-based cost driver (Figures 3, 5, and 7). The researcher describes the relationship of the findings to the research questions, the conceptual framework, the existing literature, and the problem statement. The themes developed by the researcher are compared to the anticipated themes outlined in Section 1. Finally, the researcher provides a summary outlining the manner in which the findings address the problem statement and the overall purpose of the research.

Themes Discovered

The researcher contacted and met with the two firms who agreed to participate in this study. The first firm identified as "FM1" produces agricultural and industrial products through the manufacturing processes of laser cutting, bending, welding, grinding, and painting. The number of employees fluctuates with business levels but was at 115 employees at the time of this study (33 salaried employees). FM1 provided an organization chart which was used by the researcher to identify individuals to participate in interviews. The number of participants identified at this first location was eleven. All these individuals agreed to participate and signed

consent letters. The second firm, identified as “FM2” produced health care, defense, and aerospace products using a chemical etching process. This firm had 23 employees (nine salaried positions). At FM2 the researcher identified the potential of six individuals to participate in the study. These six individuals agreed to participate and signed consent letters. The interviews with the participants were conducted using scheduled Microsoft Teams meetings and face-to-face interviews during the in-person site visits. The three topic groups covered by the interviews were the use of management accounting (MA) processes, the method of collecting and reporting production-related information, and the openness of the participant organization to potentially change their costing processes. The themes from the participant interviews were summarized separately and then common themes between the two sites were noted.

Themes Discovered at First Participant (FM1). The themes discovered by the researcher at FM1 were developed from the information gathered through data collected on the existing costing process, interviews with the participants, observations of the costing process development and use, and the flow of production on the shop floor. The individuals the researcher selected to participate included employees in the accounting function who were responsible for the development and maintenance of the current costing process and individuals who indirectly influenced the costing processes (i.e., production management and information technology). Though the participants who only indirectly influenced the costing processes were able to answer a portion of the interview questions, their perspectives provided the researcher with a detailed understanding of the participant’s contribution to the overall process, their understanding of how the information was collected, and their understanding of the organization’s openness to change.

The first common theme obtained was the limited knowledge of management accounting (MA) processes, especially beyond the controller function. How an organization tracks costs is a basic MA function necessary to develop product costs, measure performance, and create metrics for use as a guideline for continuous improvement. A significant number of the participants responded they were unaware of how costs were tracked, or they responded tracking costs were the responsibility of finance (or specifically the controller). The majority of the participants had a similar response regarding the existing budgeting process employed at this site. The question regarding the process for valuing inventory was answered by only three participants. One of those participants answered the valuation was in the ERP system and was maintained by the finance function.

The second theme was the different methodologies for collecting production-related statistics. The responses from the participants were not consistent but demonstrated an organization in transition. There were numerous comments about the production and scrap counts being captured in the ERP system. Several individuals noted scrap tracking sheets were maintained manually and then keyed into the ERP system. Two individuals answered the question of how the organization captured production statistics in a more detailed manner. These individuals noted products were labeled and then scanned to create production and scrap values in the ERP system. One individual noted the firm was in the process of implementing new automated lines (with robotic welding) to capture the values for production, scrap, and downtime automatically and then transfer the results into the ERP system. The common theme was the participant utilized various methods to capture production-related statistics, intending to further automate the reporting process.

The third theme was the openness of the organization to potential changes in costing processes to a more complex or advanced process. Responses varied. Concerns were raised with personnel being available to pilot, implement, and maintain a new process in product costing. Multiple participants noted if a benefit could be demonstrated, the management and the overall organization would support the change. The key to a successful launch of an enhanced process is contingent upon proper piloting of the process and sufficient staff training. Implementing any enhancement would require consulting and considering feedback from individuals involved in the data collection process or cost modeling. One participant highlighted the need to include engineering in designing improved process flows. There were no comments noting leadership would resist changes. The common theme was if a benefit could be proven, the change would be accepted.

Themes Discovered at Second Participant (FM2). The themes from FM2 were gathered by the researcher from interviews with participants, a review of costing process data, and observations on the shop floor. The individuals who participated in the study belonged to senior leadership, engineering (cost estimating, design, and quality), and production. At the FM2 firm, the president was the individual responsible for the costing process. The other participants provided insights on how they indirectly influenced the costing process at this small, flexible manufacturing firm, as well as their opinions on the organization's openness to change. As in FM1, the interviews were given based on the study's interview guide, which was written to provide the researcher with a standard format and prevent the researcher from providing leading questions or expressing personal opinions based on previous experiences.

The first common theme at FM2 was the limited MA knowledge. MA skills were limited to the president and the cost-estimating engineer. The method used by the organization to track

costs was clear, as the process had been established for many years, and was manual. Costs were tracked specifically to the customer job order based on the number of panels, or sheets of metal, being processed. It was noted the only inventory valuation recorded on the balance sheet was the value of the raw material (i.e., stainless steel, copper, and brass) purchased. This material was valued at the purchase price. There was no work in process or finished goods' inventories recorded. Labor costs were tracked in total and were not specific to the process. All other costs were captured on a total facility basis. The focus of leadership was on earnings before interest and taxes (EBITDA), not specifically on the profit per product or customer. The overall returns were high due to the unique processing which allowed for flexibility, quick development, and the ability to produce profitably at low volume levels. The senior leadership noted this year the new parent company asked the firm to budget on a detailed level, to better understand the operation and the firm's potential for further expansion. It was clear that MA process knowledge was limited beyond senior leadership.

The second common theme regarding how the firm collected production-related statistics was understood consistently by all interviewed participants. Costs were tracked using two manual forms. The first form was a labor ticket filled out by hand and turned in daily by all operators. This manual form listed the job number, the employee's name, date, time started and stopped, and the production process completed, from the preparation of the metal panels to the packaging and shipping of the final product (there were a total of fifteen processes). It was noted the labor sheets were not used for payroll purposes, as this was accomplished by clocking into a payroll system. The other form was a job processing sheet called a "traveler". This form was designed by the organization to outline the details of the job being produced, the setup requirements, processing times, and quality measurements of the product. As part of the normal

process, a copy of the last traveler completed for the same product is attached as a guideline. The information from the time tracking sheets and processing sheets was entered into a customized database to record the material used and processing times required to complete a job. This information was then used for future quoting purposes.

On the topic of openness to changing costing processes, there was no common theme between the two firms. The senior leadership stated there is no interest in changing the costing process, as the current process is simple, and the organization's overall profitability is strong. This individual believed any investment in refining the costing processes would not provide offsetting benefits. This lack of openness to change was understood by other participants. The remaining four participants believed if there was a clear benefit to changing the process, the organization would be open to change.

Common Themes for Both Participants. The common theme for both participating firms was the lack of MA knowledge. At both participant locations, knowledge of the organizations' budgets was restricted to a single individual. At FM1, there was not a common understanding of how costs were tracked in the organization, while at FM2, the understanding of manual processes was understood by all participants (i.e., the labor ticket and the traveler). The two participant firms were of different sizes and in different markets. FM1 was evolving from the manual tracking of production reporting to barcoding and was developing a direct link between the production equipment reporting of the statistics directly into the ERP system at the time of the study. FM2 had a well-established manual process and had no plans to seek alternatives. The openness to changing the product costing process was a strong common theme at FM1. However, at FM2, it was clear senior leadership was not open to changes in the process, as it was not believed to be cost-beneficial.

Interpretation of the Themes

The researcher focused the interpretation of the themes on the results of the research at each participant firm and noted any commonality between the two participants. At FM1, the knowledge of product costing and general MA processes was limited to the few individuals who were directly involved or were in senior management positions. Though the individuals directly involved would be more versed in MA processes, the other participants were unaware of how costing data was collected or budgeted. FM1 conducted minimal cost control reporting at the department or function level. This lack of cost center reporting (or responsibility accounting) and the lack of basic knowledge of cost controls, discouraged ownership of results by individuals below the senior leadership level. Modeling was collected from FM1, showing the firm had begun the process of allocating indirect labor to the manufacturing processes on an estimated percentage of effort basis. This simple process was a step in the direction of identifying activities responsible for the generation of costs. FM1 had multiple methods of collecting data which ranged from manual tallies summarized on a spreadsheet and then manually entered in the ERP system, to barcoding scanning of labels into the ERP. At the time of the study, they were in the process of installing manufacturing execution systems (MES) on some of the newer production equipment. FM1 recognized the need for more timely acquisition of production-related statistics such as production counts, machine cycle times, units scrapped, and equipment downtime for setup or maintenance. This understanding of the need for data will assist FM1 in developing plans to capture the necessary cost driver information to sustain a more advanced costing system. FM2 had developed two simple manual sheets to track activity, at the time the study took place. All participants knew how to use the forms. Unfortunately, the amount of data captured would not lead to the identification of costs by activity. Any advanced cost modeling would be difficult

without first developing more detailed data collection processes. The third general theme was the openness of the organization, especially the leadership, to change. Through interviews, the common themes of openness to change and the desirability of having more accurate product costing information became evident at FM1. This firm's participants stated if a clear benefit could be shown, changes in the product costing process would be accepted. Though most participants were unaware of the manner in which the organization prepared product costing information, they agreed to have more accurate information regarding the costs needed to produce and sell a product was essential for the long-term profitability of the organization. FM1 possessed many elements which could influence the further development of a sustainable ABC process: the openness to change, understanding of the need to automate production reporting, and the belief that more accurate costing data would benefit the organization.

At FM2, the organization was not subject to the same constructs of market dynamics and profitability as FM1. While FM1 produced products requiring substantial capital investment and was in a competitive market, FM2 participated in a niche market with low levels of capital required. FM2 was able to produce products with minimal investment, as their process were relatively unique, and they had few direct competitors. FM2 was able to accept small and mid-size orders and quickly produce the products, as tooling and setup costs were low. The firm measured its success at a high level based on the overall earnings of the organization. With low levels of pressure from the market or demand for higher profitability, there is little motivation to invest in advanced processes to understand the cost structure of the organization. The low level of interest in the understanding of the activities consuming resources was reinforced by the fact that the investment in equipment was minimal and most processes were done manually. The impact of the constructs of the market dynamics, profitability, leadership style, and the lack of

shop floor automation made any effort to institute an ABC process at FM2 impractical. In the future, with increased market pressure, it may be necessary for FM2 to move toward the development of an understanding of the different process activities involved in the creation of costs.

Based on the research of the two diverse sites in this case study, there is no single answer for the desire to implement ABC in a small, flexible manufacturing environment. Before introducing a cost model development, an understanding of the organization and its environment is needed. The market and profitability pressures existing at the manufacturer could strongly influence the leadership on their openness to change. The concept of changes as cost-beneficial was clearly understood, but the motivation to invest in developing a new product costing process (or any process change) had to exist in advance. The other two factors were the availability of resources to develop and maintain costing processes and the ability to easily gather information. An organization with fewer employees struggles with the allocation of time to do the necessary analysis. This issue is pitted against the daily production resource requirements. The lack of automation at FM2 would make capturing statistics on a more detailed level a much more difficult process than at FM1. Though cost modeling can be developed by an outside consultant, the ability to maintain these models at FM2 could be quite onerous. At FM1, though the processes did not capture the costs of the activities utilizing the resources, there are tools identified available to assist in this effort. Of the two sites studied in this research, FM1 would be better suitable for further refining costing processes into an ABC-type process, compared to FM2.

Representation and Visualization of the Data

This section consists of graphical presentations of the current costing processes at each participant location, followed by an example of a product costing result, utilizing the methodology used at the time of the study. The costs of example products for each participant presented in these models have been masked to ensure the confidentiality of the costing structures. A process mapping utilizing ABC will then be provided to give an overview of this advanced costing process. The ABC process is used to provide an example of two products with similar production processes but different levels of customer-related activities impacting their overhead structure. The ABC costing example is an effective manner to represent the costs created by the activity specific to the design, manufacturing, packaging, and account servicing of the individual product. This more detailed costing knowledge can be utilized in the development of customer pricing models, and for capacity planning decisions by either of the participant firms.

Figure 2 represents an overview of the costing process for FM1. The direct materials and direct labor costs were assigned to the final product costs through a specific bill of material (BOM). The overhead was then allocated to the individual product through an annual budgeting process. Costs deriving from sales and administrative functions (not manufacturing or manufacturing support) were not allocated to the product cost or the inventory value as they were recorded as a period expense. The overheads at FM1 were based on annual manufacturing costs not including direct material and direct labor. These costs could be variable, such as indirect labor, repairs and maintenance, consumables, sorting costs, and equipment utilities (i.e., electricity, natural gas, water, or welding gas) or fixed costs such as fixed labor, equipment depreciation, facility depreciation or rent, and taxes. FM1 allocated overheads in a two-step

method. FM1 first allocated non-labor overhead costs to the various production cost centers (i.e., laser cutting, welding, grinding, and bending) based on the active floor space (square footage) each of these processes occupied. Production processes occupying a larger footprint on the shopfloor were charged a higher rate of non-labor overhead costs. The indirect labor was allocated to each production process by a management estimate of the percentage of effort for the support level to be received. For example, if the welding process required 30% of the effort of quality inspection labor, then 30% of the indirect labor from the quality cost center was allocated to the welding process. All overhead costs, both indirect labor and other overhead were summarized as a total for allocation by the process. These total costs were divided by the budgeted machine hours to create an overall overhead cost per machine hour. Though the costs were noted as variable or fixed, when the costs were applied to the product it was entered as a single overhead rate multiplied by the fractional machine hour per unit. There was no attempt to allocate sales and administrative costs to the product cost, as the product cost was used for inventory valuation. Notably, these expenses were recorded as a period cost (instead of capitalized in the valuation of inventory). The figure below and the associated part costing example table were created after engaging in discussions with the controller and validated by comparisons of the data collected as well as the observations on the shop floor (i.e., triangulation). When these figures were developed, the researcher sent the diagram and costing model to the controller for validation (i.e., member checking).

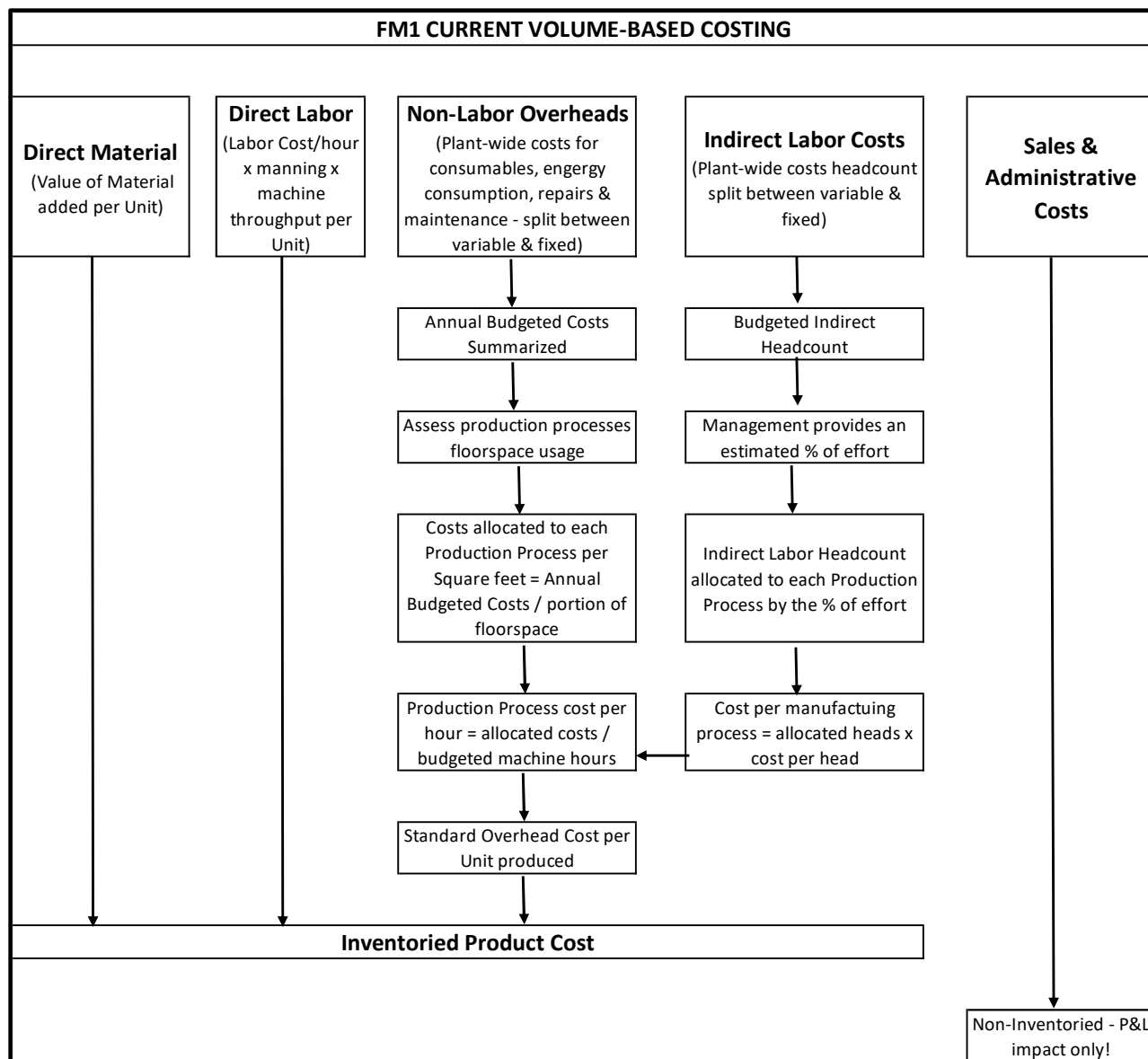


Figure 2. FM1 current process.

In Figure 3, an example of a cost product from FM1 is provided. This figure represents a product with rates and structures masked to provide the participant with cost structure confidentiality. As noted in the process outlined in Figure 2 above, labor and overhead rates were developed as a part of the annual budget. These standard labor and overhead rates were entered into their ERP system. The product structure (bill of material) and the manufacturing process

(routing) utilized the direct labor and overhead costs, along with the associated direct materials to calculate the cost per product. This process has the possibility of multiple levels. The researcher shows this in the example below. Component 1 and Component 2 both required different quantities of specific raw materials. These two components had two similar production processes: laser cutting and welding. The throughput rates for laser cutting for each of these components were different. Component 1 had a throughput rate of 403 parts per hour, while Component 2 had a throughput rate of 560. Since fewer Component 1 part could be run through the laser cutting process per hour, the processing cost per part was higher. Note Component 1 had direct labor costs of \$0.05449 per part and overhead costs of \$0.16814 per part. Component 2 had direct labor costs of \$0.03921 and overhead costs of \$.12100 per part. Besides needing additional materials per unit, if the production process speed were to be increased the costs incurred would decrease on a per-unit basis.

		Direct Labor	Overhead			
Grinding		\$ 21.58	\$ 38.30			
Welding		\$ 23.11	\$ 52.19			
Bending		\$ 21.56	\$ 44.71			
Laser Cutting		\$ 21.96	\$ 67.76			
	Throughput	Material	Direct Labor	Overhead	Other	Total
Component 1		45.94059	0.70791	1.52310	0.00000	48.17160
Laser Cutting	403	45.94059	0.05449	0.16814		46.16322
Bending	33	0.00000	0.65342	1.35496		2.00838
Component 2		38.52300	0.69263	1.47596	0.00000	40.69159
Laser Cutting	560	38.52300	0.03921	0.12100		38.68322
Bending	33	0.00000	0.65342	1.35496		2.00838
Welding	5	0.00000	4.62157	10.43781	0.00000	15.05939
Grinding	14	0.00000	1.54143	2.73573	1.00000	5.27716
Painting	Outsourced	0.00000	0.00000	0.00000	15.00000	15.00000
Total Product Cost		\$ 84.46359	\$ 7.56354	\$ 16.17261	\$ 16.00000	\$ 124.19974
% of Total		68.01%	6.09%	13.02%	12.88%	100.00%

Direct Labor and OH Costs per unit = 1/Throughput Rate x Labor or OH Rate
(i.e., For Grinding: Direct Labor = 1/14 x \$21.58 = \$1.54143 each & Overhead = 1/14 x \$38.30 = \$2.7357 each)

Figure 3. FM1 Volume-Based Costing Example

For FM2, the current costing process is given in Figure 4. This participant captured costs on a batch basis. The only inventory value on FM2's balance sheet was for raw materials. This raw material value was the number of materials purchased minus the amount utilized in customer batches. The quantity of remaining material was valued at the purchase price (a standard material value was not used). FM2 developed a historical processing cost per hour which captured the cost of direct labor, chemicals, consumables, administrative, and facility costs. This single processing cost per hour was tested against the market for alternative processes for the fabrication of low to mid-size quantities of small metal components in the medical, defense, and industrial business sectors. The cost per batch was based on the customer's order for the number of units. FM2 calculated the number of sheets of metal (or panels) needed to produce the number

of parts required. The estimating engineering then calculated the number of hours to set up and process the order, based on previous jobs for the same or similar component if available. If tooling was required to be fabricated these costs would also be estimated. The labor time for set up and the time for processing were then multiplied by the standard overall costing rate per hour. This resulted in the cost per job batch quoted. This cost then had a flat fee added for final inspection and packaging. The total cost was then marked up to develop the pricing to be submitted to the customer. If the customer did not order a full sheet of products, additional parts were stored (at the raw material value) for future orders. The results of the processing times were then compared to the quoted times of future customer orders for this product. As with FM1, the process diagram and the example product costing model were developed through interviews, data collected, and shop floor observations. The process flow and the associated costing model were sent to the participant for validation.

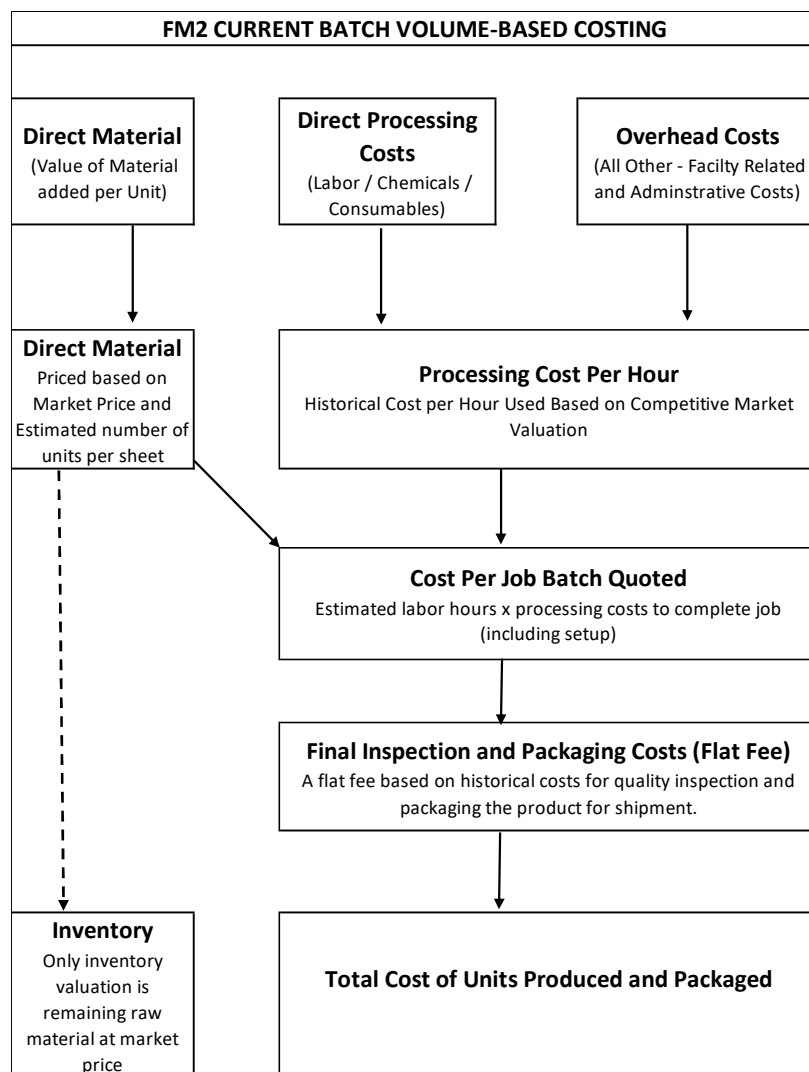


Figure 4. FM2 current batch volume-based costing process.

In Figure 5, an example of a product from FM2 is displayed. Similar to the product from FM1, the structure and cost rates have been masked for confidentiality purposes. As noted in the costing process above (Figure 4), the inputs for the costing of products were limited to the raw material used, a single historical rate for processing and set up, and the time required to set up and process the job. In the example given below, an order was received for 50 units of a certain product. These 50 units could be produced on a single sheet of stainless steel valued at \$10.00 each. This production run was estimated to take 1 hour of processing time and 0.5 hours to set up

the job. The total cost of material was \$10, the set-up costs were \$50 ($\$100/\text{hour} \times 0.5 \text{ hours}$), and the processing costs amounted to \$100 ($\$100/\text{hour} \times 1 \text{ hour}$). The total cost was \$160 to produce the batch. Taking the total batch cost and dividing it by the units produced the cost per unit amounted to \$3.20 ($\$160 / 50 \text{ units}$). FM2 then added a flat fee of \$50 per order for final inspection and packaging. The cost per unit was \$1 for the inspection and packaging processes ($\$50 \text{ per process} / 50 \text{ units}$). The total cost of \$4.20 per unit (cost to produce of \$3.20 + \$1.00 for inspection) was then given a markup of 10% to come to the customer pricing of \$4.62 per unit ($\4.20×1.1).

FM2 BATCH VOLUME- BASED COSTING EXAMPLE			
Material (Stainless Steel) cost per panel			\$10.00
Processing or Setup Cost per Hour			\$100.00
Hours for Processing			1.0
Hour for Setup			0.5
Final Inspection and Packaging Costs per Order			\$50.00
Estimated Cost for Production of 50 parts per panel:			
		<u>Units Produced</u>	Cost per Unit
Material Cost	\$10.00	50	\$0.20
Setup Cost (Hours for Setup x Setup Cost per Hour)	\$50.00	50	\$1.00
Processing Cost (Hours for Processing x Processing Cost per Hour)	\$100.00	50	<u>\$2.00</u>
Estimated Costs for units produced			\$3.20
Final Inspection and Packaging Costs per Order	\$50.00		\$1.00
Mark Up	10%		<u>\$0.42</u>
Quoted Cost per Unit			<u>\$4.62</u>

Figure 5. FM2 Batch Volume-Based Costing Example

The next data representation and visualizations presented are an example of an ABC costing process and an associated product costing example. In the ABC costing process, both the direct material and the direct labor costs were similarly allocated to the product, as with

traditional volume-based costing. The overheads were allocated through the identification of the activities consumed by the individual products. Sales and administrative costs could also be attributed to the costs of the product for analysis and decision-making modeling through a similar manner, but not for inventory valuation (as accounting principles require these costs to be recorded as a period expense).

The first step in the development of ABC was to capture the costs and the associated activities (Bloucher et al., 2016). In Figure 6 below, the annual budgeted overhead was classified by subtask or function. An example would be to have overhead costs for the purchasing function identified. The next step was the identification of an activity associated with the costs incurred in the function (i.e., the activity cost driver). Continuing with the example of the purchasing function, the number of purchase orders issued would be a factor used in the calculation of a cost driver. The next step was to identify the number of activity cost driver units for the budgeted period required. Figure 6 shows the number of purchase orders issued for the following year. This could be determined by looking at the first and last purchase orders issued for the current year. The number of purchase orders issued was then estimated by determining whether future period volumes would require a higher or lower level of activity due to changes in customer requirements and the specifics of the products to be produced. The ability to capture cost driver activity could require input from the organization's operating system if the number of activities was not easy to estimate based on sequential numbering.

With these two factors captured, the second step in the ABC process could be accomplished. This second step was assigning the costs to the activity by taking the subtask costs budgeted and dividing these costs by the number of estimated activity cost drivers for the budgeted period (Bloucher et al., 2016). The net result in this example would be the cost per

purchase order issued. Bloucher et al. (2016) wrote the third step was to assign the activity costs to the cost objects, in this case, the production units. If each product required the same number of activities to produce and support, then having costing per activity was not necessary. A single rate to capture the costs of the overhead activity would be sufficient. If, however, the products required a different level of purchasing, quality, or sales support activities the impact on the cost of the individual products could be significant.

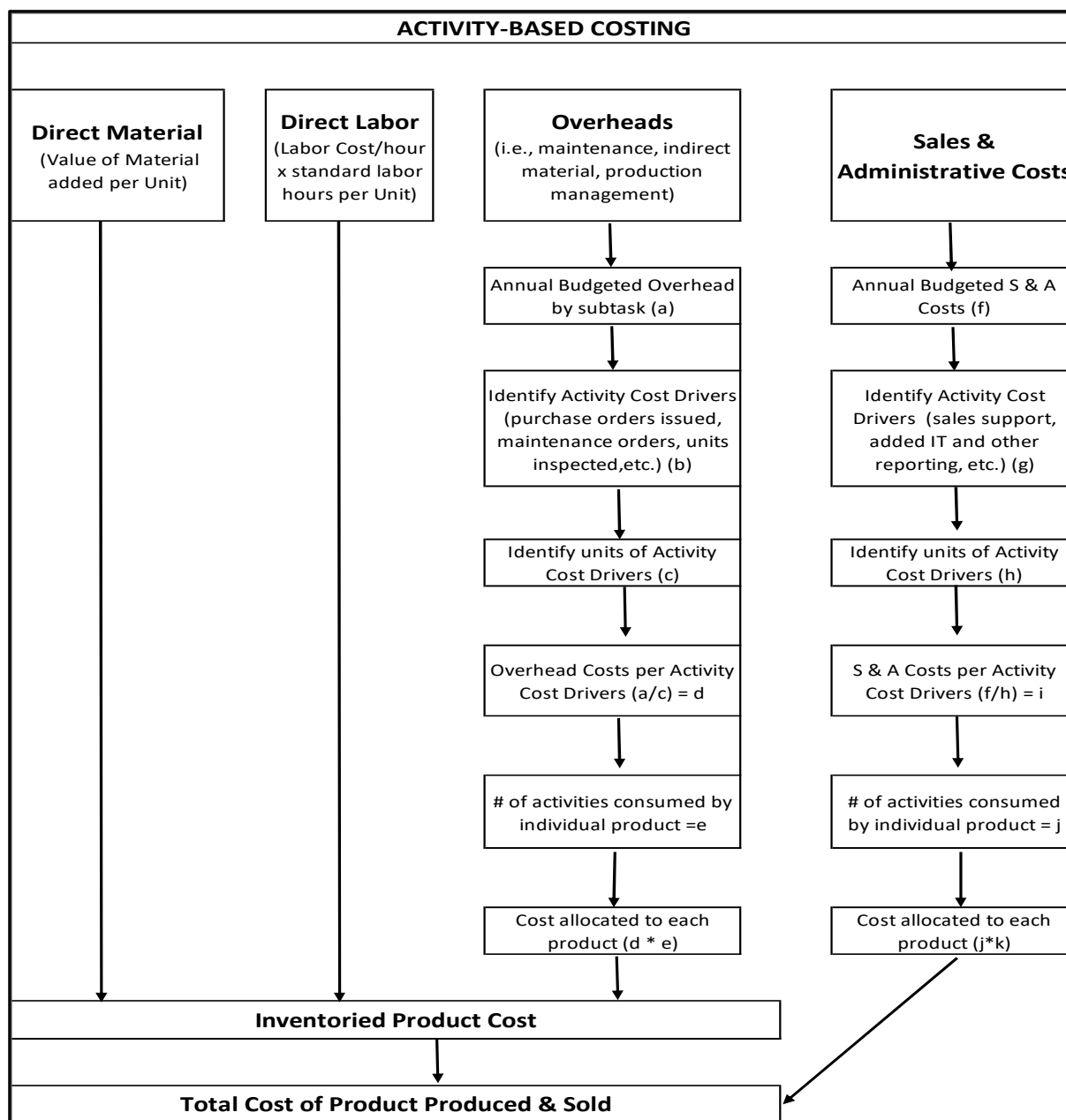


Figure 6. Proposed ABC process flow.

At the time of the study, both FM1 and FM2 noted specific customers required added support in the areas of quality testing and customer service, though these costs were either included in a standard overhead applied to all products equally (based on machine or labor hours) or were considered sales and administrative costs and are expensed as a period cost. As certain customers required a higher level of support, these customers' products should have

involved a higher level of cost. Provided in Figure 7 is an ABC overhead allocation model for two products with similar production processes, yet significantly different overhead costs, due to differences in customer-related activity. The model format has been patterned on the three-step allocation process outlined by Bloucher et al. (2016). The three steps are identifying costs and the associated activities, assigning the costs to each activity, and allocating the costs to the product. In Figure 7, the first two sections identify the costs and the associated activities. In this particular example, the products entailed different levels of engineering, packing, quality testing, customer support, and additional setups due to the specific customer demand. The model developed in Figure 7 provides an example of the impact of using an ABC process to allocate overhead costs and could be used as a pattern by the study participants to develop their cost models.

The part costing results provided in Figure 7 showed the process of how the ABC concepts would be carried out and are not a true model for either participant site. The scope of the fieldwork was limited to developing an understanding of the current costing processes, the activities associated with these processes, and the openness of the participants to the potential of changing to a more complex or advanced costing process. An analysis of each of the participant's operations to develop detailed ABC modeling would be a recommendation for future studies. The first two sections of Figure 7 provided the basis for the allocation of overhead costs. Budgeted costs were established for each of the five functions identified as overhead areas not directly allocated to a specific product. Each function then identified the activity consumption cost driver associated with the function's consumption of resources. An example of this is the customer support function budgeted at \$100,000 per year. Costs were generated by the number of customer support calls. Care should be taken when selecting the cost drivers to ensure

they are easily identifiable and measurable, for the costing model to be sustainable. To utilize customer service calls as an activity driver, the organization needed to track the number of calls made per customer or had to ask the customer service function to provide a percentage of effort estimate which could be tested.

With the costs budgeted and the activity drivers identified, the next step was to estimate the activities per customer for the budgeted period. In the example given, the organization had two major customers, which were A and B, and a grouping of minor customers (others). Each activity was estimated for each of these five functional areas. The utilization of these overhead functions did not necessarily follow a specific volume-related pattern. Though packing activity was volume-related, engineering hours and the number of customer support calls may not have been. In the example provided, Customer A had 20 orders to pack, and Customer B had 50 hours to pack. However, Customer A had a significantly higher level of quality testing (75 versus 10) and customer service calls (123 versus 45) than Customer B. With the budgeted costs per function and the estimated activity drivers established, the costs per activity could be calculated by dividing these two factors. Continuing with the example of customer service costs, the budget of \$100,000 was divided by the number of estimated customer service call totals of 378 to equate to \$264.55 per customer service call.

The final step in the ABC process was to allocate the overhead costs to the cost object (Bloucher et al., 2016). In the example below it is noted Customer A was budgeted to require 8,000 units, while Customer B required 25,000 units. Note the allocation of overhead charges was not based on the volumes of the products produced, but rather on the consumption of the activities generating the costs. As Customer A required higher engineering, setup, quality testing, and customer service support. The overhead cost allocation per unit was nearly double (\$29.68

for Customer A's product versus \$15.00 for Customer B's product). The per unit cost differential was calculated by taking the activity rate per product and multiplying it by the budgeted consumption per product. These results were then divided by the budgeted units to be produced. In the example for Customer A's product, the total overhead of \$237,431 was divided by the units to be sold of 8,000, and the result was an overhead cost per unit of \$29.68. The calculation below shows a total of \$357,397 of the \$500,000 being allocated to Customer A and Customer B's products. The remaining \$142,603 of the \$500,000 would be allocated to all other customers and their associated products. In a traditional volume-based overhead allocation process the total overhead costs of \$500,000 would be divided either by the units to be produced or the machine hours needed to produce the units. This would distort the true costs taken to produce and support the sales of the products. The knowledge of which products and customers consume a higher percentage of costs is essential when developing a pricing strategy or when determining which customer orders should be accepted in the case of capacity constraints. When there are capacity constraints, all customer orders cannot be accepted.

EXAMPLE OF ABC COSTING WITH CUSTOMER DIFFERENCE ACTIVITY DRIVER				
Activity	Budgeted Cost	Activity Consumption Cost Driver		
Engineering	\$ 100,000	Engineering Hours		
Setups	\$ 100,000	Number of Setups		
Packing	\$ 100,000	Number of orders to pack		
Quality testing	\$ 100,000	Number of required tests		
Customer Support	\$ 100,000	Number of customer support calls		
	<u>\$ 500,000</u>			
Estimated activities per customer products				
	Customer A	Customer B	Other	Total
Engineering Hours	200	100	20	320
Number of Setups	50	20	10	80
Number of orders to pack	20	50	45	115
Number of required tests	75	10	35	120
Number of customer support calls	123	45	210	378
Cost to be used for allocations				
	Budgeted Cost	Budgeted Acty Consumption	Activity Rate	Unit of Measure
Engineering Hours	\$ 100,000	320	\$ 312.50	Per Hour
Number of Setups	\$ 100,000	80	\$ 1,250.00	Per Setup
Number of orders to pack	\$ 100,000	115	\$ 869.57	Per Order
Number of required tests	\$ 100,000	120	\$ 833.33	Per Test
Number of customer support calls	\$ 100,000	378	\$ 264.55	Per Call
Allocation to Individual Products (Cust A) - 8,000 units				
	Activity Rate	Budget Product Consumption	Total Overhead	Overhead Per Unit
Engineering Hours	\$ 312.50	200	\$ 62,500	\$ 7.81
Number of Setups	\$ 1,250.00	50	\$ 62,500	\$ 7.81
Number of orders to pack	\$ 869.57	20	\$ 17,391	\$ 2.17
Number of required tests	\$ 833.33	75	\$ 62,500	\$ 7.81
Number of customer support calls	\$ 264.55	123	\$ 32,540	\$ 4.07
			<u>\$ 237,431</u>	<u>\$ 29.68</u>
Allocation to Individual Products (Cust B) - 25,000 units				
	Activity Rate	Budget Product Consumption	Total Overhead	Overhead Per Unit
Engineering Hours	\$ 312.50	100	\$ 31,250	\$ 3.91
Number of Setups	\$ 1,250.00	20	\$ 25,000	\$ 3.13
Number of orders to pack	\$ 869.57	50	\$ 43,478	\$ 5.43
Number of required tests	\$ 833.33	10	\$ 8,333	\$ 1.04
Number of customer support calls	\$ 264.55	45	\$ 11,905	\$ 1.49
			<u>\$ 119,966</u>	<u>\$ 15.00</u>

Figure 7. Example of Customer-Focused ABC Costing

Relationship of the Findings

The relationship of the findings of the study is outlined by the researcher through an analysis of the findings using as a foundation the research questions, conceptual framework, anticipated themes, existing literature on the subject, and its relationship to the study's problem outlined in the proposal section. The researcher created the research questions to develop an understanding of the use of the current costing processes, the possible benefits that could arise from the use of complex costing methods, and the impact leadership has on the utilization of

costing processes. The conceptual framework of this study was provided to outline the impact of the constructs, actors, concepts, and theories existing and impacting the processes and the motivation and support levels at the time of the study, to move to more complex costing processes. Two anticipated themes were outlined in the study proposal. These two themes were compared with the themes discovered in the interviews, documents gathered, and observations at the two participant firms. The findings were then compared with the literature review provided in the proposal, and finally, the findings were related to the problem targeted for the study.

As Related to the Research Questions. The researcher provided three research questions with five sub-questions. In the proposal, the first research question (RQ1) was meant to explore the issues arising from the use of traditional volume-based costing for product mix and pricing strategies. The researcher noted in the findings both participants utilized a similar standardized process, whereby volume-based metrics (machine or labor hours) were used to allocate overhead costs. At participant FM1, the standards were adjusted at a minimum every quarter. These adjustments were made to account for raw material price increases and changes in the bill of material or routings. The methodology of allocating the overhead remained part of the annual budgeting process. The second participant (FM2) allocated overhead costs more simply. There was a single rate per hour, based on a historical market rate to cover the cost of all direct and indirect processing costs, except for raw materials, final inspections, and packaging (which is covered by separate line items). These processing and overhead costs were allocated to the production batch through the estimated labor hours to set up and process the job. With allocating overheads simply based on overall production volume, any product requiring additional resources due to extra quality testing, added customer support or additional administrative costs was undervalued. The undervaluing of these products can lead to underpricing of the products to

the customer or can result in the acceptance of a less profitable business when confronted with capacity constraints. The researcher then asked in question RQ1a about the alternatives to traditional costing that had been developed. At FM1, a detailed model to allocate costing was developed. This detailed model had a preliminary step of allocating indirect labor by a percentage of effort to the production cost centers, although it did not involve specifically moving the allocation of costs by activities (i.e., laser cutting, bending, welding, and grinding). FM2 responded the process has been instituted since the founding of the organization and there were no initiatives to modify or upgrade this process, at the time of the study.

The intention of the second research question (RQ2) was to look for ways in which flexible manufacturers could derive a cost-benefit from using complex costing models. The findings from the interviews of the participants noted a general understanding that accurate product costing was important to the business to properly measure profitability and price products strategically. The researcher then outlined two sub-questions to seek input from the participants about their concerns on the implementation and sustainable maintenance of a new complex costing system. This set of questions was key due to the size of the participant organizations. The interview questions asked by the researcher regarding concerns about the implementation and use of a complex costing system highlighted the need for training and potentially additional resources. Though previous research by Vetchagool et al. (2020) noted the ability of SMEs to implement ABC, for small firms like FM2, with less than 25 employees, dedicating resources for the maintenance of a complex costing process could be a difficult task. Though FM1 utilized an ERP system, the company did not measure activities regularly (such as the number of purchase orders issued) to create a base for allocating overhead costs (i.e., costs from the purchasing function). Additionally, it was noted during the shopfloor observation at

FM1 that the firm was in process of implementing new production equipment that would have PLCs to capture activity automatically. The interviews at FM1 noted production and scrap activities were being tracked through a manual entry or by scanning a label into their ERP system. At FM2, the entire production tracking and labor reporting processes were done manually. Costs were tracked on an estimated basis for a specific job. No attempt was made to identify the activities consuming resources. At the time of the study, no tools existed at FM2, to provide information surrounding the activities consuming resources.

The third set of questions (RQ3, RQ3a, and RQ3b) were drafted to develop an understanding of how the firms' leadership impacts the implementation and use of costing processes in their organizations. The researcher asked interview questions regarding the level of support the organization would have for implementing a new complex costing system. This particular question was aimed at exploring the level of openness the organization had to change and defining the concerns participants had about the implementation and use of a new process. The responses from FM1 were consistent. If a cost-effective benefit could be shown, the leadership and the organization, in general, would be open to this change. Concerns were voiced on resource availability and sufficient levels of training. FM1 highlighted that employee turnover was high and that having documented training processes was essential if complex processes were to be used. Overall, the leadership at FM1 noted their openness to change and understood the benefit of having more accurate costing data. FM1 was in the process of expanding its business and needed to develop a deeper understanding of the costing of its products. At FM2, it was noted that a change in ownership was initiated close to the time of the study and the requirement of a detailed budgeting process at the beginning of the calendar year was implemented. The leadership of the firm did not note any interest in modifying the costing processes at that time, as

the firm was run on a macro-EBITDA basis. The firm operated in a niche market with minimal competition and pricing pressures from its customer base. Any investment in an advanced costing process was viewed as requiring more effort than the potential benefits to be received.

As Related to the Conceptual Framework. The researcher outlined the conceptual framework in the proposal section of the study. This framework included four components: concepts, theories, actors, and constructs. The three concepts detailed in the conceptual framework are the traditional costing impacts on the organization's pricing strategy, the operational improvements that can be gained using a complex costing process, and leadership's impact on the implementation and use of advanced costing. The findings showed the use of traditional costing processes at both participant locations. FM1 used a standard costing system where indirect costs were allocated based on machine hours. At FM2, all processing costs and administrative costs were assigned to production batches based on a historical market rate, times the number of labor hours to set up and process the product batch. The lack of information on how specific customer or product-related activities use resources could lead to discrepancies in terms of the costs to produce a product beyond the direct material and labor involved in the production process. The benefit to operational performance went beyond just the detailed costing results. Having the participants develop an understanding of how costs were generated through the activities being performed, could greatly increase the sensitivity and knowledge base for any operational and administrative process improvement initiatives (i.e., lean manufacturing, standardization, and analysis of potential outsourcing or elimination of non-value-added activities). Leadership has a clear impact on the implementation of any process change, including a change in the costing process. During the interviews at FM1, the participants remarked leadership was open to changes in the costing process if benefits could be shown. Recent

additions to the finance team staff highlighted the willingness to add resources to allow for analysis and model development. The individuals directly involved in the development of costing processes had ample knowledge of the process and were open to changes. At FM2, one participant from the leadership team did not think enhancements to the product costing processes would be cost-beneficial. Others believed the firm would be open to process changes if the changes were cost-beneficial.

The two theories comprising the conceptual framework of this study are the Burns and Scapens Framework (BSF) and Stones' Strong Structuration Theory (SST). These theories are used in management accounting studies to understand the change management process at the participant firms. The BSF explored how rules and routines impacted the accounting structure and the actions taken (ter Bogt & Scapens, 2019). FM1 has rules on the valuation of inventory, on a full absorption basis. There are informal rules on how the standard costing rates are developed. Spreadsheets are developed by members of the accounting team who in the past, helped direct the creation of overhead rates per manufacturing process. These spreadsheets were accepted by the staff and have been incorporated into the annual budgeting process. This routine does not contradict the rules established for inventory valuation, but rather, is used as a supporting tool that has not been established as an official rule. FM2, before the start of the study, was a family-owned business. Information continues to be captured on manual forms and entered by office staff into a customized database. Though formal rules were not evident, the use of these manual forms was universal. Participants understood the need to use the forms as the basis of the capturing of costs at this location. The SST theory focuses on the existence of social structures and their impact on the management accounting process. This theory was developed to identify how formal and informal structures within the organization could influence processes

such as budgeting and product costing. Input from outside the accounting function on how the product costing process was utilized, was not observed. As noted in the discussion above on the BSF, the participant firms had a basic set of formal rules on inventory valuation, and the accountants and controllers developed informal tools which were accepted as routine. The structures within the organization followed this pattern. There was a formal structure of how costing was used for inventory valuation. These processes were subject to auditing by internal and external bodies (i.e., government agencies and external financial auditors). At FM1, individuals with a deeper knowledge of costing (and spreadsheet skills) initiated the development of costing models that were instituted as a routine. These models have been subsequently reviewed and accepted by various internal and external parties, though not formally instituted as a rule. At FM2, the senior leadership was responsible for establishing the costing processes. Due to the size of both organizations, especially FM2, the ability to carry out a detailed analysis of the change process within the MA function was minimized.

The third component of the conceptual framework was the actors or participants. The study included interviews with individuals in leadership, accounting, production, engineering, and information technology (IT) functions. In addition, time was spent directly with the accounting personnel to review the costing processes which existed at the company at the time of the study. Observations were also carried out with production personnel to note the production process on the shop floor. A total of 17 participants were interviewed. Fifteen were interviewed in person during the site visit (the other two were interviewed using Microsoft Teams meetings). At FM1, the larger of the two firms, 11 people were interviewed. At FM2, a total of six people were interviewed. A similar mix of personnel of those directly involved in the costing process and those indirectly influencing the process was made at both locations. Though most of the

individuals at both firms were not directly involved in the costing process and were not able to answer the specific interview questions regarding the budgeting and inventory valuation processes, they provided valuable insights as to how information was captured on the shop floor. This shop floor information was the basis for the development of the production-related statistics utilized in cost analysis. Also, input from those only indirectly influencing the costing process provided insights into their opinions on the benefits of having accurate costing data and the organizations' openness to changes.

Four constructs form part of the conceptual framework, as outlined in the study proposal. The four constructs are leadership style, market dynamics, profitability, and shopfloor automation. At FM1, the leadership style showed an understanding of the value of accurate product costing and the openness to changes to a more advanced costing process, if a clear benefit was shown to exist. At FM2, the leadership style was focused on keeping processes simple and minimizing complexity in reporting. An openness to change was not evident. Market dynamics strongly influence the development and use of product costing processes. FM1 participants operate in a competitive market that is price sensitive. To ensure pricing decisions are competitive, the participant organizations need to first understand existing cost structures. Decisions can then be made as to the pricing levels to be used for placement in the market as the low-cost supplier, or as a premium-cost supplier of a unique product. FM2 participated in a niche market where its unique processes and flexibility minimize competitive pressures. The researcher designed one of the interview questions to ask the participants' opinions on the impact of their organizations' profitability by having more accurate product costing information. At FM1, a common understanding or theme existed in which accurate costing data is crucial, not only for pricing decisions, but also for general business strategies, such as areas of cost improvement

focus, or the possible discontinuation of specific products or processes. At FM2, detailed costing was not viewed as a necessary goal. Overall firm profitability was sufficient and producing an additional level of costing detail would not be cost-beneficial. The level of shopfloor automation was a key factor in the sustainability of complex costing models. Though costing models could be created to provide detailed information on which activities consume an organization's resources, the ability to maintain these models on a practical basis is crucial. Interviews with FM1 participants noted a variety of ways to capture data. Production-related data was captured on manual tally sheets, then summarized into a spreadsheet and entered in the ERP system, or production and scrap barcode labels were scanned into the ERP system. Another attempt by the organization was to capture production-related data directly from the PLCs. At FM2, data was captured manually on a paper labor ticket, or by a production batch traveler form attached to the products as they move from one process to the next. The details from these forms were then summarized into a customized database to detail the costs incurred. This captured data was then utilized for future quoting activity. The lack of data capture automation should be considered when costing models are developed. If models become too cumbersome to maintain, the practicality of their use and any derived benefits were susceptible to change.

As Related to the Anticipated Themes. In the previous section, two anticipated themes were outlined. These themes were the lack of MA processes at the participant firms and insufficient base costing data available to sustain the development and use of advanced costing models. In their research, Najera Ruiz and Collazzo (2020) highlighted small companies frequently found minimal benefits in using MA processes to control cost or in decision-making processes. At FM1, this was not found to be accurate. The participant firm budgeted sales and operating costs and develop standards for product costing which were used as a base for the

pricing of their products. Via participant interviews, it was noted there was a need for accurate product costing information and there was a general opinion that accurate costing could impact the profitability of the organization. Since the interviews covered a broad range of functions, there was a clear difference in the MA knowledge levels between the leadership team and the senior accounting associate, and the other functions within the organization. When asked how costs were tracked or for a description of the budgeting process, a common response from individuals in engineering, production, and IT was, the finance department was responsible for the activity, and the results resided in the firm's ERP system. At FM2, the understanding of MA processes was also minimal, as seen in the anticipated theme and the associated literature. At the time of the study, the firm had recently initiated an overall annual budget. However, the costs were not tracked by the department or cost center. The leadership was doubtful that further enhancements in product costing would be cost-beneficial.

The second anticipated theme in the study was the potential the participating firms may have insufficient base data available to sustain an advanced costing system. Najera Ruiz and Collazo (2020) highlighted the lack of accounting and financial information as one of the most important shortfalls in small companies. FM1 possessed accounting information in their ERP system, but activity was frequently captured manually, and generally only focused on the impact on the general ledger. Activities such as the number of purchase orders submitted, the times spent on quality testing, and additional administrative tasks required by certain customers were not captured. Some activities such as the number of purchase orders issued could be derived from the differences in the sequential numbers over a period. The researcher showed in the study how basic data such as the number of units produced, machine cycle times, downtimes for setups, or the number of units scrapped were captured using a variety of methods. The method

used for collecting the base data depended on the manufacturing process and varied from manual tracking sheets summarized into spreadsheets which were keyed into the ERP system, to barcode scanning of product labels directly into the ERP system. At the time in which the study was conducted, FM1 was in the process of acquiring new robotic production equipment in which PLCs directly updated activity in the ERP system. FM1 had not yet developed a process to identify the activities causing the consumption of resources beyond the costs directly associated with the processing of production units (direct labor and direct material). There was an outlined process that started to identify the indirect labor time spent (percentage of effort) per production process. At FM2, information was passed from one production step to another by manually recording the activity on a manual ticket (traveler). Costs were only tracked for the overall process. Detailed information on the cost by individual production process was not tracked, as the rate used in customer quotations was a historical market-driven rate assigned to all processing combined.

As Related to the Literature. The aim of this study was to reduce the gaps in the literature regarding the implementation of complex costing processes at small flexible manufacturers, and the sustainability of these processes over time. As noted in the literature review in Section 1, research has been carried out on implementing ABC and time-driven ABC (TDABC) at small companies. The researcher focused this study on the potential use of an ABC process at a small flexible manufacturer, where the need to understand which products created the highest return was crucial. Bhosale and Pawar (2019) identified flexible manufacturing as having the ability to produce multiple products on the same equipment. Though this flexibility provides the manufacturer with opportunities to capture new business while minimizing investment costs, it also creates a deeper need for understanding which businesses should be

pursued and a need to understand the pricing levels. The case study of both locations that the participants met the definition of a flexible manufacturer and had a clear need to define which products should be produced to optimize the use of their production capacities. Tarzibashi and Ozyapici (2019) stressed simplified costing approaches, such as traditional volume-based costing, did not meet organizational requirements. Using these simplified tools, accountants could produce reports to seriously distort costing information. This potential was shown through the ABC example given above (see Figure 7) on the differences between the overhead cost allocation for two products. Though both products had similar manufacturing processes, the overhead resources consumed for engineering, quality testing, and customer service support could be heavily understated if a traditional volume-based costing process were to be utilized. At the time of the study, FM1 was in a transition between different products and customers. On the other hand, at FM2 the participant was at a capacity limit. In both situations, having a detailed understanding of how costs were generated in the operation was crucial information. The importance of acquiring this detailed costing knowledge was highlighted by Vetchagool et al. (2020). Additionally, Homberg et al. (2018) supported the need for detailed costing data as they highlighted the importance of using complex costing processes to improve the quality of product costing and profit planning.

Several authors argued whether ABC or TDABC should be used in general, especially in small organizations. Hoozee and Hansen (2018) noted the accuracy of ABC and TDBAC. Additionally, they mentioned when costs were highly traceable to an activity but less to the product, TDABC would be more accurate. ABC is more accurate when the activities are more traceable to the product. Through reviews with both participants, it was highlighted specific products and their associated customers were the generators of added resource-consuming

activities. Therefore, ABC modeling would be a more applicable tool for both FM1 and FM2, compared to using TDABC. Any modeling development must first consider the concerns noted in the interviews. FM1 noted if there could be a visible benefit, the organization would support a change to an enhanced costing process. Though open to change, FM1 voiced concerns about resource availability and the current situation with high job turnover levels. A common theme was noted, which was due to employee turnover, there existed a general need for MA and other business process training and documentation. At FM2, a lack of support for further enhancing the product costing process by the leadership was emphasized. Implementation of an ABC process without the support of the organization's leadership would not be successful.

The literature review of the study observed the deployment of ABC being mirrored with the use of ERP systems. FM1 utilized an ERP system that captured all basic business functions such as sales, inventory management, and production statistics, as well as financial functions such as product costing and general ledger accounting. This ERP system was instituted by FM1's parent company and has been structured for repetitive manufacturing. The previous ERP system utilized by FM1 was based on the use of job-order costing (archived information was received). At the time the study was carried out, the ERP system tracked costs based on a traditional standard costing basis, while the previous system tracked materials and direct labor costs per job or batch. Overheads were applied based on a volume-based standard rate. Tian et al. (2019) observed the use of ERP systems either replaced manual processes or complex integrations between multiple software packages. At FM1, the organization utilized only one software package. However, some activities were handled manually. At FM2, the participant used a simple customized Microsoft Access database which allowed for the tracking of orders being quoted, as well as the information on labor hours needed to complete the orders received. There

was no attempt to link other systems to this database. Labor and job batch tracking were handwritten and handed to the administrative staff for data entry.

Najera Ruiz and Collazzo (2020) surveyed small manufacturers to determine the product costing method used. The surveys showed four types of costing were utilized: costing based on acquisition, acquisition costs plus markup, a market-based costing approach, or costing materials based on a financial calculation, such as a breakeven cost or a set margin above fixed cost. At FM1, costs were recorded as acquisition costs (which per the Najera Ruiz and Collazzo (2020) survey is the most common). These acquisition costs were updated monthly, or at a minimum, every quarter to ensure any major changes in raw materials or purchased services were noted in the inventory valuation. At FM2, the only inventory valuation tracked on the balance sheet was the value of the raw material, which was valued at the purchased price.

Literature has been published highlighting the increase in complexity in the business environment, causing demands on management accounting systems. FM1 has been faced with potential competition from domestic and foreign manufacturers. Having accurate costing will be crucial in establishing prices to provide quotations for new business. As mentioned earlier, FM1 has been in the process of installing new equipment with the capacity to capture data from the equipment PLCs. The benefits of linking the equipment to the ERP system lie in the timeliness of reporting and the decrease in time to capture, record, and post activity. Hutahayan (2020) emphasized the importance of internal process improvements (i.e., automatic capture of production-related data) and their effect in increasing a firm's ability to compete. FM1 has been seeking to institute automation to free production operators and production management from manual gathering and reporting of data. Time not spent on data gathering can be used to improve product quality and process efficiencies. At the time of the study, the level of competition at

FM2 was minimal due to the unique nature of their production process. There was no attempt toward automation on the shopfloor to capture information from the equipment. At FM2, investments in information derived from the equipment were not viewed as cost beneficial.

As Related to the Problem. The specific problem for this study was designed by the researcher to address the potential inability of small flexible manufacturers to implement and sustain a complex costing process. This problem could result in poor product pricing strategies, which could impact an organization's long-term profitability. In this multiple-site case study, two diverse, small flexible manufacturers were chosen to study the product costing processes during the year of 2022 and analyze the benefits these organizations could obtain from the use of more complex costing processes. Any cost modeling change should consider the ability of the participant firms to maintain the process over a lengthy period. Therefore, a focus on minimizing the time requirements needed to support the new process should also be considered.

Davila (2019) highlighted MA has changed over the years and that simple cost control and execution support are no longer sufficient. His study noted the need for MA to create new values to remain relevant in the market. Though the benefits of advanced MA processes such as ABC may be known, small manufacturing firms struggle with dedicating time to developing and maintaining enhanced processes. Msomi et al. (2020) observed, though many SME owners and managers may understand the benefits of the development of advanced costing processes, the daily challenges from operations may prevent small manufacturing organizations from utilizing these tools. Azudin and Mansur (2018) also mentioned the lack of the use of MA processes at SMEs. These authors noted the veracity of the lack of the use of MA as evidenced by a lack of staff training. Furthermore, another piece of evidence showing the absence of MA processes was that management accounting (unlike financial accounting) is not a mandatory practice.

Azudin and Mansur's (2018) findings were supported by the interview responses in this study. The knowledge of MA was limited to the individual responsible for developing the cost process, as well as a few other employees who gained this knowledge from their previous experiences. The focus of the accounting activities was financial reporting, and not on MA processes. Due to the firm size differential, FM1 had more individuals in the accounting function than FM2. The additional resources were dedicated primarily to finance processes such as accounts receivable, accounts payable, and fixed asset accounting. The participants in the study lacked MA skill levels which mirrored the literature from previous studies. Although the individual directly responsible for creating the product costing at FM1 had initiated the review of some activity-based type cost analysis (i.e., the percentage of effort of indirect labor), the understanding of MA processes by the overall staff was limited.

The second part of the problem being studied was the sustainability of any enhanced costing process. The key to sustainability was the generation and use of production-related and other activity data on a timely basis. Having manual processes to capture basic data could negatively impact the development and maintenance of complex costing models. As noted by the participants FM1, a clear benefit must be shown before implementing any costing enhancement. Having to add resources to capture this basic data will make any initiative in cost modeling a more difficult proposition. FM2 captured all production-related information manually. Any enhancements to the costing processes at this location should first focus on the development of a process to efficiently capture the data. Any attempt to implement advanced costing models at FM2 would be cumbersome and would be highly unlikely to be sustained over time.

Summary of the Findings

The researcher presented the findings of the multiple-site case study on the sustainable use of ABC in a small, flexible manufacturing environment. These findings addressed the problem being studied, the purpose of the research, and the associated research questions. Findings from the study also included conclusions drawn from the study for each participant site, noting the commonalities between the two sites. The findings supported the two anticipated themes: the lack of MA knowledge at small manufacturers and the lack of efficiently captured costing data. At the first participant site, FM1, the knowledge of MA and product costing processes was limited to the individual directly responsible for the task and senior leadership, who gained knowledge through previous experience. At FM2, this knowledge was limited to a single individual in senior leadership. Both participant organizations would benefit from MA skill development through the different functions at their facilities, as these skills could help each function measure the effectiveness of any process improvement activities. The second issue was the capture of data. At FM1, there was a variety of methods involving data capture, from manual tracking to fully automated links with the production equipment. At FM2, the process was solely manual. The ability to capture basic data at both locations was a concern. To develop a sustainable advanced costing process, there was a need to first address a lack of data availability.

As outlined in Section 1, the purpose of the study was to expand the understanding of the practicality of the use of complex costing processes in a small, flexible manufacturing environment, and the impact the use of these processes had on the firm's profitability. In the findings, the researcher first reviewed the existing costing processes at each participant site. The limitation in the costing processes did not accurately match the costs assigned to products with the activities creating the costs. Both participants noted specific customers had different levels of

support requirements (i.e., quality testing and engineering support) which were not reflected in the manner in which support costs were allocated to the individual products.

The researcher addressed each of the research questions outlined in the study. The first question was posed by the researcher to understand the issues arising from the use of traditional volume-based costing for product mix and pricing strategies. The researcher received cost product details from sample parts. The methodology used by the participants for product costing was noted in the process flow diagrams and costing examples from each location were provided. Though the participants recognized specific customers and their products required different levels of support, only direct labor and direct materials were assigned to the products based on actual usage. All other costs (overheads) were allocated based on the volume of production involved in each production function, (i.e., cutting, welding, and grinding), or in combination as a single rate with direct labor. An example was provided showing the impact of using an ABC process to allocate the support costs of a product. The next set of research questions covered the cost-benefits of using a complex costing model such as ABC. At FM1, the participant interviews highlighted common themes which were understanding the importance of accurate product costing, and the openness to change the existing process if shown the benefits exceed the required resources to develop and maintain the new process. FM2 showed a lack of interest in advanced costing enhancements due to their existing market structure (i.e., a unique process in a niche market). The final set of questions sought to understand the leadership's impact on the implementation and use of costing processes in their organizations. At FM1, it was noted the leadership supported enhancements in product costing accuracy. Furthermore, with the addition of more resources in the finance function, there existed the potential additional time could be spent on understanding activity cost drivers and their impact on the operations. At FM2, the

leadership did not believe that more detailed product costing information would be cost-beneficial, as the firm measured activity only on an overall firm basis.

In the findings, the researcher showed the challenges small manufacturers had in the development of accurate costing information and the capture of the necessary inputs to generate and maintain meaningful cost modeling. Having detailed accurate costing information was essential for both participants, as FM1 sought to add new types of equipment and customers. On the other hand, FM2 was at a capacity limit and the company needed to understand which customers' business requests should be prioritized. The two participant locations were selected to represent a broad range of demographics within the parameters set for being a small flexible manufacturer. The smaller participant (FM2) had a bigger challenge of assigning personnel for costing model development than the larger participant (FM1). Quantitative research should be carried out to determine whether these findings are common to the entire industry segment or whether there is a minimum size limit (number of employees) needed to develop or support a costing process beyond traditional volume-based costing.

Application to Professional Practice

The application of the study on the sustainable use of ABC in a small, flexible manufacturing environment is outlined in two distinct parts: improving business practices and potential application strategies. First, the researcher showed how the completed study can be applied to improving general business practices. One of the common themes in the research was the lack of MA skills at both participant locations. The need for MA skill development in small flexible manufacturers should be extended beyond the accounting function and cover all functions in the operations. The other general business application was to have organizations focus on minimizing the efforts to collect basic costing data. Optimizing data collecting in terms

of cost allowed further initiatives in process improvement and market effectiveness. The second part of the application to professional practice was to propose potential application strategies to be utilized by organizations in the small flexible manufacturing market. These strategies included the assessment of the organizations' constructs before investigating the enhancement of MA processes and recommending an iterative step process of developing MA tools at these types of organizations.

Improving General Business Practice

Abundant research has been conducted on the benefits of ABC. Vetchagool et al. (2020) posited how firms, regardless of their size, can improve their operating performances by utilizing ABC. This desire to enhance costing processes needs to be balanced with the MA skill levels of the organizations and their ability to generate MA data on an efficient basis. Nartey and van der Poll (2021) claimed there is a greater need for enhanced MA practices, yet many small firms have limited exposure to these tools. This finding was supported by the study at both participant sites. The MA knowledge was confined to the controller or senior management. To obtain benefits from the implementation of processes like ABC, the staff in all functions should have at minimum a base level of MA understanding. This can be accomplished by holding internal training courses on the fundamentals of cost tracking, and by sharing the organization's budgeting process. From the interview responses at both participant locations, it was evident the firm's budget was produced solely by the controller (FM1) or the president (FM2). The other employees in the organization should be informed of how the business creates and utilizes the budgeting process and should be included in the process of estimating costs, discussing the need for new equipment or additional maintenance, or personnel-related items like the need for additional training. By participating in the budgeting process, the businesses can encourage

ownership of the budget and eventually the operation in total. This process of interfacing the organization's structures and strategies with MA is known as responsibility accounting (Lennon, 2019). Responsibility accounting is a process in which costs are assigned to decentralized business units or cost centers responsible for the planning and controlling of these costs. Having the various functions aware of how costs are incurred is an initial step in the elimination of non-value-added costs and other process improvement initiatives. Small firms, such as the two participants in the study, need this skill set beyond the controller and senior leadership.

The second topic in the application of this study to professional practice is the recognition by firms, especially small firms, of the need for easily accessible MA data. To develop the MA tools which assist in cost controlling and business strategy development, an efficient flow of information is necessary. Tarzibashi and Ozyapici (2019) mentioned although ABC can bring benefits to the organization, there are drawbacks to the implementation and maintenance of this process. The major drawback is the need for resources to first build the models and ensure there is personnel available to gather the information, maintain the processes, and analyze the results. This is especially true at smaller organizations like the two participant sites in the study. Msomi et al. (2020) noted frequently small firms do not have the resources available for advanced MA processes, as these resources' time is consumed by the day-to-day requirements for the production and shipment of products to the customer. In the study conducted, a lack of time was an issue. At FM2, the smaller of the two participants, the senior management was directly involved in the daily operations of the plant. The FM2 costing process was simple in design and the operations were profitable. Additionally, further enhancements were not viewed as being cost beneficial. Though it may not be cost-beneficial to introduce additional resources or allocate resources away from other functions to manage MA processes, some activities can be used to

initiate the gathering of more refined statistics with minimal effort. Suggestions are outlined in the potential application strategies below. The development of methods to capture base costing data should be a focus for small organizations before any initiatives to implement more advanced processes. Without having the needed inputs readily available, any process developed to better monitor performance or assist in strategy development is difficult to sustain over time. In this study, it was noted in the completed study the two organizations had vastly different means of capturing production statistics and other cost-tracking information. At FM1, the participant used an ERP system and had multiple ways of gathering information (from manual entry to barcode scanning). This participant would need to focus on better identifying the activities consuming resources and determine an optimum way to gather the necessary data to measure these activity cost drivers. At FM2, with only minimum data captured manually, a better understanding of the nature of processes is needed through the mapping of cost centers and the assignment of budgets at this level. This assigning of responsibility to the operators and management in the individual processes (production and administrative) is a necessary first step in identifying the information to be captured. By assigning individuals to gather the information and track costs, a sense of ownership can be gained, which will assist in developing methods for future initiatives, to capture the information efficiently.

Potential Application Strategies

There are two potential application strategies identified by the researcher from the completed case study on the sustainable use of ABC in a small, flexible manufacturing environment. The first is the need to develop a solid understanding of the organization's constructs before any process change discussion occurs. The second is the need to develop an iterative strategy for the enhancement of costing processes. For the first strategy, organizations

must possess a firm understanding of the constructs noted in the conceptual framework before initiating any product costing or any other MA process enhancement. Understanding the organization's leadership style, their positions in their respective markets, and the profitability pressures, are key factors that must be understood before suggesting any changes to MA processes. With any process change, the need to assess the leadership style is a requirement. In this case study, FM2 leadership was not open to enhancing their product costing structure since there were not any foreseeable benefits. It was also noted the first participant, FM1, was in a competitive market with a high level of price sensitivity, while the second participant, FM2, was in a niche market due to their unique production process. FM2 was less sensitive to pricing. The research by Pavlatos and Kostakis (2018) highlighted firms under performance pressure are much more likely to implement strategic MA tools like ABC than those firms which are in stable markets and are meeting performance objectives (i.e., budgeted profitability levels). The further away a company is in terms of performance targets, the more likely the firm will look to make radical changes in the MA processes (Pavlatos & Kostakis, 2018). The case study findings support this research. FM1 was more open to changing their product costing processes if they were cost-beneficial, while FM2's leadership was not open to product costing changes, as profitability targets were being met and the competitors were few. The case study results, along with support from previous research, lead practitioners to an initial first step in attempting to enhance product costing processes. First, there must be an assessment of the market and profitability of the targeted company. Firms with pricing pressure and unstable markets are more likely to be open to process changes than ones that are in a more stable environment. Secondly, there must be an open discussion with senior management to explore their understanding of the need for enhanced processes. Without this support, any process change would be difficult.

The second potential strategy is to develop a small, iterative product-costing enhancement strategy at firms that have minimal MA data available. Going from a costing process that only captures only labor hours per job, to a process where activity cost drivers are identified, and activity consumption is used as a basis for allocating overhead costs, will require a multi-step approach. The goal should not be to implement an ABC process, rather, it should be to enhance product costing processes to better assist the organization in its pricing and product-mix strategies. Though FM2's leadership was not open to changing their costing process, they were confronted by the situation where capacity was limited and decisions surrounding the choice of customer orders, needed to be made. At the time of the study, all products were priced at the same rate per hour. The only difference in the cost was the estimated time to set up and process the order. Other costs such as additional customer support, added quality testing, and additional documentation (i.e., for the defense industry) were not separated from the costs of the production processes. This put the organization at a disadvantage. The first step in initiating this step strategy would be to interview the quality, sales, and administrative staff, to develop a simple percentage of effort matrix by customer. Though initially, this would be subjective, the identification of additional time requirements by customers would provide information on which products require additional effort (and therefore consume more resources). The next step would be to segregate overhead costs from production costs. This could be done by simply classifying the payroll costs for the non-production personnel into a separate general ledger account. Taking these administrative costs and allocating them to the specific customers' products using the percentage of effort matrix, allows the organization to develop an estimated surcharge rate for specific customer orders. If the organization decides to pass the surcharges onto the customer through an increased processing rate or will simply use it for order acceptance purposes, the

organization will benefit. This recommendation would be a preliminary step necessary for the organization to develop a basic understanding of MA methods and the benefits that could be obtained from their usage. With this level of detail, the next step would be to subdivide the administrative costs into separate functions or departments (i.e., quality, sales, and accounting). Over time, more decisions will need to be made to analyze whether there would be a benefit in moving from the subjective percentage of the effort allocation process to one where activity statistics (like the number of quality tests required or sales calls answered) are used to allocate the associated overhead labor costs.

Summary

In this section, the application to professional practice was provided. This was done by analyzing how the completed study could be applied to improve general business practices and how the study could be used to develop potential application strategies. The application to general business practice highlighted the need for the development of MA skills outside the accounting function. The findings suggested, at the level of MA knowledge was minimal at both participants' sites. The recommendation was to introduce non-accounting personnel to MA processes and to initiate responsibility accounting throughout the firm, to develop a sense of ownership for the consumption of resources. This sense of ownership is crucial for process improvement initiatives, such as the elimination of non-value-added activities. The other impact on general business practices is the recognition of the need to develop readily accessible MA data. Small organizations need to focus on simple tools to capture cost activities. One strategy is to initiate the assigning of responsibility for capturing statistics to the operators and management in each production and administrative function. A sense of ownership in capturing the data and a basic understanding of MA will assist the organization in achieving better cost controls.

Two potential application strategies were given by the researcher. The first was to understand the constructs in the organization's environment before initiating any enhancements to product costing processes. It was noted in the case study that the difference between the openness to changing MA processes at the two locations was driven by the firm's leadership. This openness was shown to go beyond the leadership style and was strongly influenced by the market in which the firm was founded, and the associated profitability pressures. One participant was in a competitive market and was eager to develop a deeper understanding of their cost structure. The change would be welcome if the change costs were less than the benefits received. The second participant was not open to change, as they were in a niche market with minimal competition. The second potential application strategy was to develop a small-step MA enhancement strategy at small organizations with minimal MA processes. This strategy was outlined as first splitting overhead costs from processing costs and developing a percentage of effort matrix to allocate costs separately as a surcharge, based on customer process requirements. Further steps could be taken over time with a clear demonstration of benefits to be received by any further efforts.

Recommendations for Further Study

The scope of the completed multiple-site case study was to select two diverse, small flexible manufacturers and review their existing costing processes, and understand the potential benefits they could achieve by using an advanced costing process like ABC. In addition, participants were interviewed to determine the openness to changing costing processes at their organizations. There are two areas recommended for further study. The first one is to develop a methodology for small manufacturers to identify the activities which most consume resources when minimal MA data exists. Another recommendation is to initiate a quantitative study to

determine whether there is a minimum size a manufacturer should possess to establish an ABC process. The study at FM2 showed a small manufacturer who only tracked labor hours and used these hours times a single rate for all manufacturing and administrative activities. Though at the time of the study, the organization did not believe that enhancing its costing process would be beneficial, increased competition could change the need to enhance this process. Bloucher et al. (2016) noted firms that do not accurately determine the costs of their products, run the risk of incorrectly identifying the profitability of the different product types. This could result in higher sales, but lower profits, and a lack of understanding as to the reasons why (Bloucher et al., 2016). FM2's production process was similar for most of their products, but the support levels for each customer differed. At the time the study was concluded, FM2's sales increased, hitting capacity limits. Understanding the differences in support levels can impact their choice in selecting customer orders. Further research on developing a simple road map to identify the activities consuming resources would be a good initial step for small manufacturers like FM2. With activity cost driver identification, the participant could decide to add surcharges to the orders for those customers requiring additional support levels. If unable to pass these additional costs on to the customer, the participant will be able to identify the products which cost more to produce and service when making decisions on which orders to accept.

The second recommended a quantitative study as a further study on the potential existence of a minimum size requirement for the use of ABC-type costing processes. As noted above, Vetchagool et al. (2020) mentioned implementing ABC can improve operational performance regardless of the size of the organization. Though small firms may be able to benefit from the implementation of ABC, the fact is many small firms have minimal MA skills and the data necessary to implement and maintain this advanced costing process. This case study

supported these findings. Msomi et al. (2020) not only noted the lack of MA skills in small firms, but they also highlighted the issue of resource availability to manage an ABC process. The Msomi et al. (2020) study mentioned many small firms are consumed by day-to-day operations and are not able to devote time to analyzing costing structures. This study, along with previous research, rose the question of whether there exists a minimum size necessary before implementing an ABC. This unknown element can be formulated as a research question in further research. The recommendation is to develop a simple survey to be sent to small manufacturers (less than 250 employees) to first determine if ABC or an ABC-like process has been implemented for product costing. For those firms where ABC has been utilized, the researcher would ask about the current number of employees using a survey. Finally, the survey would ask the participants whether they would continue to use ABC and whether they believe the investment in ABC was cost-beneficial. This survey information can be used to either note the successful use of ABC at small manufacturers or signal the need for another process that could assist this market segment.

Reflections

In this final part of the supporting material section of this study, the researcher provides insights on how conducting the research added to personal and professional growth, and how the business functions explored in this study relate to a Christian worldview. Areas of personal and professional growth include learning the systematic research process of problem identification, design, fieldwork, and summarization of the study. The interviewing process was highlighted as a great skill that can be used in both personal and professional settings. The study also improved the understanding of the use of the software tools necessary to produce a comprehensive research project. Throughout the research project, the researcher refined skills in patience, as the

university staff was reviewing each section. Also, an increased sense of humility was gained, as the researcher learned to accept feedback from others. Lastly, the integration of a Christian worldview into the business functions as a new perspective gained while developing this study, as well as throughout the enrollment in the Doctors of Business Administration – Accounting cognate program. The summation below highlights how the business world and God’s work can be integrated.

Personal and Professional Growth

The conducting of this research project has helped the researcher grow both personally and professionally. The research process of identifying a problem, designing a process to investigate the issue, scheduling and carrying out the fieldwork, and summarizing the findings is useful on an individual and professional basis. The study required many months to develop the steps needed to accomplish the goal of understanding the potential use of ABC by small flexible manufacturers. Maintaining focus and making steady progress were crucial skills that were polished. One of the skills in the fieldwork the researcher found was unique was the structured interviewing process. Developing a script in advance (an interview guide) and selecting a broad range of participants was time-consuming. The concept of bracketing and interviewing without interrupting or suggesting answers was an excellent experience and can be used in future professional assignments.

An additional set of skills learned during the conducting of the study is the use of various software tools. Becoming familiar with the use of the university library was essential. To support each step of the study, continuous interaction with the reference library was carried out. Numerous sources from up-to-date scholarly publications were searched, reviewed, and used in the development of the study. Furthermore, basic editing skills were learned during the

development of the study. The initial submissions of the study came back with a substantial number of editing comments. The better use of Microsoft Word and the use of an additional grammar software tool has improved the quality of the submissions. A third software used was the qualitative software package, NVivo. This tool was an excellent repository and helped efficiently create transcripts from the interviews conducted.

Finally, the research project helped the researcher further refine the skills of patience and humility. Patience skills were tested while waiting for responses on submissions, and while waiting for research process approval from the IRB. During these times, the researcher learned to review and prepare future activities while waiting for feedback. Receiving feedback during this process helped the researcher develop a greater sense of humility. During the early phases of the research process, extensive feedback was received on content deficiencies and grammatical errors. The first reaction was to be defensive. Learning was achieved by the researcher through the methodical review of the feedback on the submissions and the creation of detailed change matrixes. This process first helped guide a systematic approach to corrective actions. Secondly, creating the matrix helped reinforce an understanding of the deficiencies and assisted the researcher in not repeating the same errors.

Biblical Perspective

Linking a Biblical perspective with business functions was another area of personal growth strengthened by conducting the research. Each course in the Doctor of Business Administration (DBA) program is linked to a Christian worldview. This research project is a comprehensive example of this concept. In the study proposal, a subsection of the Significance of the Study noted implications for Biblical integrations. In this subsection, two distinct topics were developed. The first was the integration of cross-functional teams and the second was the

impact leadership had on the implementation and maintenance of new costing processes.

Conducting the fieldwork supported the importance of both topics.

In the study, a broad range of participants was selected for interviews to receive input, not only from those personally responsible for the creation of the product costing but also from those who indirectly influenced the process. Individuals were selected to be interviewed from senior leadership, sales, engineering, production, and information technology (IT), as well as accounting. Gathering insights from the distinct functions provided a fuller picture, compared to only gathering input from one function or individual. The understanding that a dedicated team is made up of many functions working together is highlighted by the Apostle Paul in his letter to the Romans. “For we have many members in one body, and not all the members have the same function. In the same way, though we are many, we are one body in Christ, and individually members of one another” (Holy Bible, Evangelical Heritage Version, 2019, Romans 12:4-5). Teaching MA skills to each of the functions will assist in process improvements, not only in the production process but also in administrative tasks. Understanding how to identify and eliminate non-value activities is key to gaining overall efficiencies and improving operational performance. Having each function participate in MA processes such as the tracking of costs, budgeting, and variance analysis, will strengthen the team overall in their level of sensitivity to effectively manage the organization’s resources. The proper stewarding of an organization’s resources has a strong link to a Christian worldview. In the parable of the ten minas, Christ provided an example of proper and improper stewardship of an employer’s resources. The faithful servants who were entrusted with funds utilized the funds to produce more wealth. The unfaithful servant did not utilize the funds adequately and was punished (*EVH*, 2019, Luke

19:11-27). The learning of MA skills and the interaction between the various functions of an organization will provide long-term benefits.

The second topic with a Biblical perspective outlined in the study was the impact leadership has on the implementation and maintenance of complex costing processes. The interviews in the study involving two participant locations highlighted different results as to the openness to change. In the first participant firm, there was a common theme noting whether the leadership and the overall organization could determine a change in the costing process was cost-beneficial, then the change would be made. This view was shared by senior management and the other functions at the firm. At the second participant location, the senior leadership was not open to changing the costing process since it was not viewed as beneficial. Other participants at this firm did not share this view. The alignment of leadership and their employees are crucial. Luke Chapter 19 is a strong example of the need for alignment (*EVH, 2019*). Leaders' opinions influence the actions of their employees. If the leader does not support a new change initiative, it would be difficult to initiate or sustain any enhancement, especially one that may require additional investments of time or financial resources. Leaders should be open to input on the need for change. Others within the organization may have insights that should be considered. When leaders are open to input from others, opportunities for improvement increase. This advice is noted in Proverbs 11:14, "Without guidance, people fall, but in many advisors, there is safety" (*EVH, 2019*). Leaders should seek advice, especially from those individuals directly involved in the process. An example of this would be to solicit input from operators in the production or administrative processes on resource-consuming activity identification, a necessary first step in developing an understanding of the nature of an organization's cost structure. Leadership's commitment to change is essential for the success of any process improvement. This

commitment to change would include participating in the design and implementation discussions of the process improvement, as well as allowing their employees sufficient time to participate in the activities. Leaders place a special trust, not only in their employers, but also in their employees and God. “Always keep watch over yourself and over the whole flock in which the Holy Spirit has placed you as overseers, to shepherd the church of God, which he purchased with his own blood” (EVH, 2019, Acts 20:28).

Summary

The researcher reviewed how the research project provided for personal and professional growth in the reflections section. There was also a discussion of the links between the business functions studied in this research and a Christian worldview. Personal and professional growth was achieved through learning the research process of identifying the problem, designing a process to investigate the issue, then scheduling and carrying out the necessary fieldwork, and finally summarizing the findings. This process can be utilized in business when major development or launch projects are initiated and need detailed systematic milestones to ensure progress is made. The study also helped the researcher develop the software skills necessary for the publication of a detailed topic. In addition, patience and humility skills were reinforced through the process of approving submissions and research plans.

A Biblical perspective of the study focused on two topics: the need for cross-functional team efforts, and the impact leadership has on the implementation of changes in MA processes. The study focused on the current product costing processes being utilized at the two participant locations at the time of the study, and the potential benefits that could be achieved by implementing complex costing processes. When conducting this study, the researcher selected a wide range of functions to be interviewed at both locations. A Scriptural linkage to the Apostle

Paul's letter to the Romans was provided to show how Scripture notes the importance of having multiple functions working together in the Lord's mission. A key finding from the research was the need for MA skills to be acquired by employees outside the accounting function, to better steward the resources of the company. The story of the three servants and the ten minas (Luke 19:11-27) was given to support this integration between business functions and a Christian worldview. Finally, it was noted leaders should be open to input from various members of their teams from all production and administrative functions. This need to be open for advice from others is highlighted in the book of Proverbs.

Summary of Section 3

In this final section of the study, the researcher provided a detailed overview of how the study was conducted, the results of the research at the two participant sites, the lessons learned, and the potential for further studies. In addition, the researcher shared personal insights gained while conducting this research and how this study was integrated into a Christian World View. In the overview of the study, the researcher noted the steps required to gain approval for conducting the research and the efforts to recruit participants. Since an organization's costing information is confidential, it was difficult to convince firms to participate in the study. Once access was given to two diverse small manufacturers, data was collected by gathering documentation, interviewing participants, and observing the manufacturing and costing processes on the shop floor. The common themes of the minimal knowledge of manufacturing accounting in both firms supported the findings of previous research. The leadership's support for the possible upgrading of the costing process was different between the two participants. This was driven by the senior management's opinion and the market dynamics of each of these participant firms.

The researcher provided insights that could be utilized for professional practice. First, the general business can be improved by increasing the basic MA skill levels of their overall staff, and by developing processes to ensure MA data can be gathered on an efficient basis. To gain benefit from the development of advanced costing processes, the organization must understand the MA concept. Furthermore, the data needed to provide the insights must not be onerous to capture. The study also identified two potential application strategies. The first was to gain an understanding of an organization's constructs before initiating enhancement of the costing processes. At FM2, it was clear the firm was not subject to pricing pressure as they provided a unique process to the market. The benefits of having a more refined costing process were not as evident as it was to the other participant (FM1). The second professional practice insight gained was the need to develop a small iterative product costing enhancement strategy at firms with minimal MA data available. An approach that provides an organization with incremental benefits will help support further resource investment in the next process improvement step.

Two areas of further study were recommended for conducting this research. These areas of study were the need for a methodology for small manufacturers to identify cost-driving activities, and to determine whether there is a minimum size a manufacturer should have to establish an ABC process. The conducting of the study provided the researcher with insights useful for professional growth by utilizing the detailed research process for major problem-solving opportunities in the workplace. On a personal development basis, the researcher learned to refine the skills of patience and humility throughout the entire dissertation journey. Finally, a Biblical perspective was gained through the linking of the integration of cross-functional teams and the impact of leadership on process improvement with scriptural passages from the Apostles Paul and Luke, as well as insights gained from the book of Proverbs.

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Appendix: Interview Guide

1. How does the organization track the costs that are incurred in operations?
2. Describe the budgeting process that currently exists.
3. How does the organization cost products for inventory valuation?
4. How are customer pricing levels set?
5. Discuss any enhancements to the product costing process that has been made or are in consideration.
6. What concerns do you have about the implementation and use of a more complex costing process that could provide more accurate product costing information?
7. How does the organization gather input for units produced, units scrapped, and production downtime?
8. What production-related statistics are currently reported?
9. How are these production-related statistics collected?
10. Describe your understanding of the impact on your business's profitability of having more accurate product costing.
11. What level of support within the organization would there be for implementing a new complex costing system?
12. What is your opinion on the support levels necessary for maintaining a complex costing system?