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Accounting for Lean Manufacturing: Another Missed Opportunity?

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Many companies are implementing lean accounting techniques, yet the management accounting literature and curricula lag behind in their coverage of these topics. The management accounting field faces a severe challenge to catch up or risks leaving graduates unprepared for their careers.

EXECUTIVE SUMMARY While much has been written in the operations management and engineering fields about the benefits and processes involved in lean manufacturing, very little has been written by accountants about the specifics of adapting accounting systems to better serve lean operations. An evaluation of management and cost accounting texts revealed continued heavy emphasis on traditional absorption cost accounting with only spotty coverage of the accounting techniques needed for lean manufacturing. We propose some reasons for the lack of accounting contributions by practicing accountants and educators, concluding that the career of management accounting faces severe challenges and that university accounting programs do a poor job of preparing graduates for careers in management.

In recent years, many companies have significantly changed their production strategies. To meet increasing competitive pressures, these companies have moved from producing large batches of uniform product to creating individual products or small batches modified to the demands of individual customers. To be successful in this shift of emphasis, firms have adopted a set of processes called lean manufacturing, a term that seems to have arisen from the work of Eiji Toyado and Taiichi Ohno of Toyota Motor Company.[1] Over the past two decades, many companies have implemented lean manufacturing techniques, including concepts such as just in time, the Theory of Constraints, Six Sigma and other quality measures, value-stream management, activity-based management, and target costing.

Changing traditional mass-production thinking to lean thinking requires changes in the ways companies control, measure, and account for their processes. Some companies, when trying to shift to lean manufacturing, discover that their standard cost accounting systems create problems for their lean programs. They often find that the emphasis of traditional standard costing on labor efficiency and utilization promotes nonlean behavior such as manufacturing large batches, building high inventories, hiding waste, and focusing on financial rather than operational performance measures. The new lean environment, however, needs local performance measures that are timely, understandable to those on the shop floor, and, often, nonfinancial.

Historically, measures of accounting and control have fallen within the domain of management and cost

accountants. Yet a review of recent accounting literature finds little that addresses the mutual interests of management or cost accountants and those managing operations. While the nexus between lean manufacturing and cost accounting appears to be an area ripe with opportunities for accounting researchers, far more attention to the issue has been paid by those in engineering and information technology. In fact, what has been written in accounting journals often reports a lack of progress by accountants in the adoption of new techniques. Accountants seem to have left the field primarily to engineers and software providers.

In the following sections, we provide brief histories and descriptions of lean manufacturing and management accounting and describe the divide between traditional accounting and current operational practices. We also propose some possible reasons for the failure of both practicing accountants and accounting academics to rise to the challenge.

What Is Lean Manufacturing?

Lean manufacturing aims to reduce waste while providing increased customer value. It seeks to involve all the labor of a company in increasing output, productivity, and quality while reducing inventory, defects, dedicated floor space, cycle time, and the cost of scrap and rework. Lean manufacturing is a process of constant, unwavering attack on waste in all its forms.

Building on the success of processes used at Toyota, those who promote lean manufacturing advocate five fundamental principles:

1. Define value and identify the value stream for each product;
2. Eliminate all unnecessary steps in every value stream;
3. Make the value flow continuously;
4. Base flow on customer pull; and
5. Pursue perfection continuously.[2]

Lean production combines sophisticated technology and high capital investment with skilled laborers capable of varying task assignments. It allows organizations to introduce new products quickly at reasonable cost while simultaneously improving quality. A lean strategy can reduce inventory levels, saving space and handling costs. Work is often accomplished best by cells of workers producing a complete product rather than functional departments transferring work in process sequentially along an assembly line. Such reorganization saves time and space on the factory floor and improves product tracking and quality. Inventory at all levels is considered a negative factor to be controlled rather than an asset adding value to the company.

The value stream encompasses all those processes necessary to serve the customer and produce value. It usually must extend further than the factory floor and include even suppliers and distributors. Transparency and cooperation between units within the value stream is necessary if the full benefits of lean thinking are to be achieved.

Management Accounting

Full absorption and standard costing methodologies arose at the turn of the 20th Century when mass production had revolutionized the manufacturing process and made the United States an economic powerhouse. Production was organized into large, discrete batches with many standardized parts or products. Labor made up 50% or more of product cost, with low-skilled workers considered a totally variable cost. Setup times were high and production runs long. Success in such a system was gained by a stable environment, with each labor unit segmented into hard-and-fast categories of time and pay.

In this environment, an appropriate accounting system maximized work center efficiency by tying most costs to labor and encouraged foremen to keep their center running. Cost accounting faithfully mirrored the organization and economics of the time. Setting predetermined standards for material and labor efficiency was considered both motivational and corrective. The few indirect costs associated with production were assigned to unit product on the basis of the product's labor content. This methodology permitted management to know if each product was carrying its share of overhead and that all costs were being covered by price. The variances produced by such a system allowed management to evaluate and analyze functional and departmental performance. Productivity, efficiency, breakeven, and product costs and margins became the standard by which organizations established and evalu-

ated their internal performance.

In assuming that competitive advantage is gained by improving internal productivity, the system emphasized department-level decision impacts and concentrated on decisions internal to the firm. Departments acted as silos of specialization, and managers competed for bigger budgets, promotions, and bonuses.

In traditional accounting systems, increased volume lowers unit costs. Capital equipment, salaried employees, and equipment setups must be averaged over many units to appear cost effective. Therefore, strategic decisions are focused on volume. Such systems also place major importance on inventory and are geared to fine-tuning information about the many resources used in measuring and controlling it. Because increases in inventory and costs of ordering and holding don't show up as costs until products are sold, traditional systems might reward managers for overproducing. This problem is exacerbated when bonuses are tied to productivity.

Traditional reports address the efficiency of people, the utilization of machines, and such variances as labor rate and usage, materials price and usage, and overhead absorption. Time and effort are spent gathering data, organizing the report, and explaining the variances. For decades this effort has been considered central to management's understanding of production processes. When processes were stable, competition manageable, and product life cycles relatively long, these monthly or quarterly post-mortem reports served management well. Unfortunately, standard and absorption costing methodologies appropriate to manufacturing processes of the early 20th Century have inherent flaws in today's marketing and manufacturing environment.

Divergence of Management Accounting and Production Processes

Some companies that have considered adopting lean processes have determined that the change would not be cost effective, and others have abandoned the techniques after active resistance from employees and management who felt that the process led to division losses. Organizations may reject potentially profitable manufacturing options for a variety of reasons, including lack of upper management support, poor employee training and other human resource limitations, and resistance to change, particularly changes affecting performance evaluations and pay.[3] Some of these behaviors are common to most organizational change. There is strong and growing evidence in the case of lean manufacturing, however, that the failure of the accounting system to properly support the change has been a major factor in management's rejection of new processes.[4]

Reports from firms that have been successful in implementing lean processes indicate that a change from traditional standard cost accounting practices is crucial. Rather than categorizing costs by department, successful companies organize them by value stream.[5] It is necessary to consider, therefore, whether deficiencies in commonly used cost accounting systems have deterred or defeated attempts to adopt potentially profitable production methods.

Fifty years ago, Peter Drucker expressed concern that traditional full-absorption cost accounting negatively impacted strategic and operational decision making.[6] Since then, the same complaint has been uttered regularly by those involved in reorganizing business processes to meet the challenges of new production methods.[7]

Lean processes require information about activities associated with the value stream—procurement, order fulfillment, and month-end closing. Data is needed quickly to manage value streams, constantly identify waste, make each employee accountable for cost reductions at his or her own level of activity, and link all reporting to improvement cycles. Not only do traditional accounting systems not measure many of the needed metrics, but they also report too slowly to be of value in a lean environment.

The apparent failure of some firms to change their accounting systems leads to a chicken-and-egg type question: Do production processes lead to the design of management accounting systems, or do companies set strategy based on the system already in place? The indication of published research seems to indicate the latter.

The production method used by a firm will impact its cost structure and should affect what the company measures and reports, but the reverse may also be true: Embedded cost accounting systems might affect a choice of production system by making some methodologies seem more profitable than others. In this case,

instead of acting as a strategic support function, the accounting system could become a hindrance to successful implementation of a superior operational methodology. There is an unfortunate likelihood that upper management may view strategic and operational choices in terms of the information the accounting system is reporting, thereby causing a potentially profitable decision to appear unprofitable.

Successful implementation of lean manufacturing may not require a significant monetary investment up front, but it is likely to create the perception of costliness as inventory decreases lead to higher cost of goods sold. The benefits of smaller inventories, higher product quality, and improved customer satisfaction become obvious only over an extended period of time. A traditional absorption accounting system, with its short-term emphasis, can easily mislead decision makers. To successfully undertake a strategic approach to long-term success, the information system must be changed to reflect long-term performance, and organizational culture must reflect a longer view.

Recent surveys of management accountants report their belief that there has been a change in the role of management accountants from numbers crunchers to business partners.[8] Someone reading only these reports would surmise that the profession is alive with new vigor and on the leading edge of developing and implementing improved corporate strategies and processes. Much is made of the increased prominence that internal accountants have in the finance function. Unfortunately, those conducting field studies also comment on the dissatisfaction felt by production managers with the apparent failure of their management accounting departments to develop methods that will aid organizations in making sound business decisions.[9] Bernard Pierce and Tony O'Dea found a large preparer-user expectation gap.[10] When surveying accountants and production managers in the same companies, they found that the managers were more likely to report deficiencies in the accountants' work than the accountants did themselves. They also found indication that managers are turning to IT departments to create reports their accountants are unable to (or do not) provide.

Integrating production and accounting requires dialogue across functional boundaries. The technical and operating staffs who initiate lean manufacturing are often at odds culturally with those in finance who measure and evaluate the ultimate results. They tend to speak different languages, with each group understanding its specific jargon. Accountants who are willing to adjust to new production methodologies have to mingle with those on the production floor who need the information. Management accountants need to be adaptable and willing to account for rapid variations in activity and processes. Development of local performance measurements allows cell leaders, value-stream owners, and managers to understand and monitor production processes and their improvements.

Just as lean manufacturing attempts to simplify processes and reduce waste, a lean accounting environment should simplify accounting, control, and measurement systems. Measurements should be few and focused only on those variables that motivate lean behavior and bring about continuous improvement. Better ways to understand product and value-stream costs should lead to greater accuracy and improved strategy. Eliminating much of the data now collected can save money and free the time of finance staff to work on more interesting strategic issues.

The Slow Response of Accountants to Lean Production Techniques

There are several themes evident within the lean manufacturing literature that may account for the apparent failure of accounting to change as rapidly as production procedures:

1. **Lack of training or understanding of production processes.** To keep current with fast-changing operating processes, accountants must combine sound accounting skills, understanding of the business, and the ability to gain in-depth knowledge of the key processes and commercial issues. This comprehension is far broader than what is traditionally expected of accountants.
2. **Departmental silos and lack of physical proximity.** In many companies, the finance and accounting functions are located at great distance from production areas. Value streams cut across traditional functional departments, but companies have not always made it easy for accountants to interact with operations personnel.
3. **A financial statement frame of mind.** Those

involved in management accounting must eventually tie their numbers to the financial statements. "Bottom line" and historical cost mentality are not only part of their training, they are often that which ultimately determines their reputation and rewards within the organization.

4. Feelings of "professional superiority." In some cases, those trained as Certified Public Accountants (CPAs) or Certified Management Accountants (CMAs) may feel that their education and knowledge is superior to that of those in operations. Maintaining proprietary rights to information produced—particularly if the information is not readily understood—may serve to enhance self-esteem.

5. Enjoyment of complex number crunching and complete accuracy. Those attracted to accounting often thoroughly enjoy the complexities of variance analysis, numerous allocations, and multiple decimal points. They are not attracted naturally to the simplification and speed demanded by lean accounting methods.

6. Fear of failure. Developing new systems in a dynamic environment necessitates the acceptance of potential mistakes and continuous adjustment. Both the culture of the organization and personality of the accountant need to be attuned to such an environment.

7. Inequitable performance reward structures. Often, the performance of the accounting or finance function in traditional control systems is not tied to the performance of business units. An accountant whose benefits are tied to net income, which may temporarily decrease under lean operations, will not be motivated to support or encourage such new operational methods.

8. Fear of downsizing. The basic tenet of lean manufacturing is that anything that does not improve value should be eliminated. This might include much of the data, many of the transactions, and a large number of the reports now being generated by accountants. It is not surprising that some accountants may be hesitant to throw out the complex data collection and manipulation techniques they have developed as well as, possibly, some of their colleagues.

9. Not invented here. As we have noted, there is a lack of research and educational support for new accounting methodologies. Since those in operations management have been responsible for the development of new techniques in production, there seems less incentive for accountants to step in with processes to support the techniques. Consequently, the field is being left to those in other disciplines.

Are Universities at Fault?

The importance of accounting literacy to those who would succeed in business has long been recognized. Thus, accounting courses are a basic requirement in most university business programs, both undergraduate and graduate. The curricula generally begin with one or more courses in financial accounting followed by at least one course aimed at applying accounting concepts to the management function. For students who are not accounting majors, the norm is one quarter or one semester of management accounting concepts.

While the complexity of financial accounting has increased in recent years, the basic purpose and structure of financial statements has remained consistent over several decades. During the 1980s, through the auspices of the Accounting Education Change Commission, an attempt was made to alter the teaching of introductory financial accounting from a preparer's perspective to a user's. The majority of financial accounting texts have implemented this change to at least some extent. The consensus about what topics should be taught at both the introductory and intermediate financial accounting level seems to be fairly well established.

Currently, more than two-thirds of America's accounting graduates work for corporations.[11] At about the same time that publicized changes were being attempted in the teaching of financial accounting, the Institute of Management Accountants (IMA) polled a large number of corporate managers about the qualities needed by entry-level management accountants.[12] The results of this study did not seem to have the same dynamic effect on the management accounting curricula and texts as those that took place in the financial accounting arena.

Other than occasional calls from the IMA and a special issue of *Issues in Accounting Education* (May 2000), fewer publication outlets and academic conferences deal with managerial accounting than with financial accounting topics. A report by W. Steve Albrecht and

Robert J. Sack points out the rapid changes in the environment of business and gives evidence that accounting programs are not changing very rapidly.[13] George Foster and S. Mark Young, surveying managers about the accounting issues most important to them, found that many of the topics of most importance to managers were given little attention in management accounting research.[14] This limited attention to the needs of practicing managers seems to apply also to those who write textbooks and/or teach management accounting.

To determine how well management accounting texts have adapted their subject matter to the changes that have taken place in the companies to which such accounting applies, we surveyed the tables of contents from the management and cost accounting texts of leading academic publishers as well as a sample of syllabi from management and cost accounting classes. The findings are only suggestive but open an area for further research.

Our impression of management and cost texts and syllabi is that they are organized around a laundry list of interesting techniques, both old and new. A strong emphasis on full absorption and standard costing forms the backbone of the material. Most texts contain extensive information about overhead allocation and the use and calculations of variances. Although quality initiatives, the Theory of Constraints, value chains, and other contemporary management accounting methods are mentioned in passing, most texts discuss them in a few brief paragraphs or in catchall final chapters near the end of the book. Given the organization of the most popular texts, it was no surprise to discover that instructors were likely to delegate more recent methodologies to the end of the course. Those with teaching experience know that time often runs out before they reach these final chapters. If the concepts of lean manufacturing are thoroughly covered or integrated anywhere in the texts or courses, it is not evident from the sources we examined.

Most business majors will enter firms where at least some attempt is being made to modernize production processes, but it appears that they only learn about improved accounting information methodologies after they leave the university. They are being taught modern operations techniques like lean manufacturing in their operations management and systems courses, but they are not given any guidance in their accounting classes as to how information might be collected, organized, or applied to these techniques. Accounting majors, who study at least one additional semester of cost accounting, will not be much help because cost accounting texts also continue to emphasize the various methodologies of standard costing, variance analysis, and cost allocation in great detail but barely mention procedures that might fit lean manufacturing.

The Lag in Management Education

Additional study is necessary to determine why accounting educators have not responded in a timely manner to changes being made in manufacturing processes. Some possible reasons include:

1. **Time devoted to the subject.** While financial accounting is often allocated two-thirds of a school year under both the semester and quarter systems, management accounting generally is limited to one quarter. It may be felt that students are best served in the brief time allowed by the straightforward and quantifiable job and standard costing methods, with a little budgeting and breakeven thrown in. This deprives business majors of much understanding of the environment they will enter as graduates. This also fails to explain why so little attention is paid to lean manufacturing methodologies in the courses taught to accounting majors. Cost accounting is often taught in two quarters or semesters. Time spent on the intricacies of cost of production reports and equivalent units might better be spent enlightening future management accountants about more contemporary methods.

2. **Faculty training.** Few faculty have recent practical experience in production facilities. Faculty internships are infrequent and often not rewarded by university tenure and promotion criteria. Thus academics have no direct knowledge of improved information and production processes. The extensive field work that would be needed to learn about lean manufacturing is difficult for educators to obtain.

3. **Research prestige.** The exciting research topics accepted by top-tier accounting journals are more frequently in the financial area. Teaching and research in management and cost subjects may not carry the same

prestige nor attract the same academic leaders.

4. Importance of professional support associations. The American Accounting Association, the main support organization for accounting academics, has far more sections devoted to financial accounting than to management accounting. There seems to be a perception that the financial area receives more funding and has a higher stature, thus driving research and disseminating information toward improvement of financial rather than management education. The IMA works to increase faculty support, but fewer academics belong to this organization.

5. Silos within universities. The operations management faculty, whose curricula change rapidly, are well aware of the limitations of what is currently taught in accounting. But there is little interaction between those teaching management subjects and those in accounting schools and departments. This situation is exacerbated by the separate accreditation status of leading accounting departments and by promotion criteria that do not reward research in journals outside accounting.

6. Absence of market forces. It is unlikely that students choose to attend particular universities based on the specific content of accounting courses. It is only after they graduate that they might discover that their training is deficient. The global forces that drive other organizations toward change are not as pressing in academia.

7. Rapid changes in manufacturing methodologies. Although first described in the 1980s, lean manufacturing is still finding its way into production processes, with continual adaptations to software and nomenclature. Although texts in the operations management discipline seem able to capture at least some of these changes with each new edition, accounting texts traditionally are slower to adapt.

8. Lack of highly defined terms and processes. While standard costing and variance analysis tend to be well defined and understood both by producers and accountants, lean manufacturing by its very nature must be customized for each company's products and markets. Yet the same might be said for concepts such as breakeven and cost allocation—subjects that are regularly taught in management courses.

9. Lack of theory, complexity of methodology. The accounting systems needed by firms employing lean manufacturing are not as well structured and systematized as the traditional 100-year-old methodologies. Authors and instructors would require greater time and experience more variation in content were they to update their offerings at a faster pace. Pressured to perform many other teaching, research, and service duties, they may err on the side of doing what is easiest.

10. Lack of interest. As mentioned previously, even practicing management accountants seem disinclined to devote as much attention to the needs of the factory floor as operating management feels they should. It is not surprising then that academics tend to teach and write about those topics that they find most interesting rather than those that managers in industry find important.

11. The CPA examination. Until its recent content reorganization as part of computerization, cost and management topics formed a very small part of the exam. Although academics like to state that they do not consider the exam in their teaching, the exam undoubtedly affects curriculum content. The new section devoted to the business environment and concepts holds a promise to include more current topics in management strategy.

Increase the Effort to Adapt

During the second half of the 20th Century, improvements in engineering and communication led to extreme changes in the way businesses conduct their operations. Globalization and competitive pressures have altered the way products are produced and priced, and the product life cycle has been shortened considerably. It should not be surprising that accounting and control systems designed for mass production are ill-suited to this new environment. What does seem surprising, however, is how slow many management accountants have been in adapting to the new realities of lean thinking. Changes in the competitive marketplace drive changes in management philosophy, which *should* drive changes in management accounting. We contend that unless accountants increase their efforts to develop, implement, and teach accounting methods that better serve business organizations, the occupation of management accounting may soon be seen as irrelevant.

It is rather myopic for universities to deprive graduates of the knowledge base that might improve a firm's competitiveness. Many educational processes have

already been taken over by companies that feel they do a better job of preparing their employees than traditional educational institutions. Web searches of the terms "lean manufacturing" and "lean accounting" find a large number of proprietary consulting services and corporate seminars devoted to the topics. Better accounting systems will be created, and companies will adopt them. Management accountants and academics should be leaders in adding value in this area. Unless they increase their efforts, however, they are likely to be passed by as others take over the development of new and dynamic cost and management accounting methodologies. ■

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