

## AUDITING

### AUDITING MANUFACTURING CLIENTS IN TODAY'S LEAN ENVIRONMENT

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**A**uditing a manufacturing company in today's lean production environment is substantially different from auditing one in a traditional setting. The just-in-time (JIT) and total quality management (TQM) concepts have significantly changed the financial performance and operating structure of manufacturing companies. This article provides a comprehensive perspective on auditing the modern manufacturer and helpful insights on performing analytical review procedures of the financial statements of these companies.

#### Today's Lean Environment

The traditional manufacturing environment assured adequate supplies of raw materials, purchased parts, works in process, and finished goods. Inventories allowed manufacturing operations to proceed smoothly without being disrupted by problems with deliveries, inventory handling, or warehousing. Finished goods provided a buffer to ensure uninterrupted shipments to customers. Inventory buffers, however, are not only costly to maintain but increase cycle time and inhibit the detection of defective parts.

JIT simplifies product design, manufacturing processes, and other operations. The manufacturer acquires parts and materials just in time to begin production, constructs subassemblies just in time to forward to the subsequent process, and completes final assembly just in time for shipment to customers.

The strength of JIT is that it eliminates non-value-added activities. In traditional manufacturing companies, waiting time is the major component of production cycle time. Units sit idle between processes. For most industries, the actual processing time for fabrication and assembly constitutes less than 10% of the entire cycle time in

traditional plants. High-level inventories create operational problems and slow down the entire process.

#### What Has Changed?

A JIT company adds value with every activity. Where JIT has been introduced, there have been dramatic increases in the proportion of the actual value-adding time to the total cycle time, often more than 70%. Since non-JIT companies usually report about 15%, JIT improves operating efficiency significantly.

Eliminating non-value-added costs, such as defective materials, in-process inventories, and delays, JIT simplifies the entire manufacturing system and improves long-term productivity. Cost accountants' role in JIT is to reduce operating costs by identifying the cost drivers of non-value-added operations and eliminating them.

Consequently, cost accounting systems in JIT companies function in support of JIT management objectives and requirements rather than stand-alone product costing functions. Although companies use different tactics to deal with specific problems, they all simplify the cost system to—

- monitor a small number of key cost drivers
- reduce the number of cost classifications
- produce a small number of easily applied performance measures
- reduce the number of transactions, including accounts payable processing.

In a traditional manufacturing environment, work orders serve as the primary documentary device for driving production schedules and tracking costs. Costs attach at various workstations and processes as products move through the factory. Work orders are not needed in a JIT setting because production takes place in a department or workstation only if the units produced are required by the next workstation. Small lot sizes make it impractical to attach work orders to individual lots.

In the JIT environment, the focus changes from products to process, in which manufacturing workers bundle parts and prepare them by process cells rather than by products. Production costs are charged to the process cells for the daily production rather than to jobs or lots. Work-in-process inventory (WIP) counts are not as accurate; however, in a JIT system

the amount of WIP should be insignificant, whereas for traditional manufacturers it could be the largest current asset.

There is no single, authoritative cost accounting method required for JIT. Different manufacturers have implemented various cost accounting systems, including back-flush costing, to make cost accounting compatible with JIT manufacturing. Under back-flush costing, costs flow from the Raw and In-Process Inventory accounts and the Conversion Cost account to the Finished Goods Inventory account when the products are completed. Back-flush accounting does not pass costs from one department to another, as in process costing, nor does it require the departmental documentation of traditional costing methods.

TQM refers to organizational programs that motivate workers and managers to solve problems scientifically in order to achieve continuous improvement. It is customer satisfaction-oriented and is often combined with JIT implementation.

#### Reevaluation by Auditors

Conversion to JIT/TQM generally follows changes in a company's culture and its manufacturing systems. The auditor must reevaluate attitudes toward internal control and operating policies and determine management's commitment to maintain or improve internal control in the new manufacturing environment. The tone at the top will determine the effectiveness of internal control; employees will not follow control procedures in the absence of managerial commitment.

A common cultural change in JIT/TQM conversions is the transition from a management system that emphasizes the distinctions between positions in the management and labor hierarchies to one that deliberately strives for greater congruence of goals and functions across hierarchies. Both during and after the transition, the cultural changes create new motivations and opportunities for breakdowns in internal control. Rarely will the paper trail from the old internal control system provide adequate evidence about the effectiveness of controls in the new environment.

Nevertheless, internal control may be strengthened by the new culture and the overall commitment of employees dedicated to improving the quality of their work. A JIT/TQM organization strives to develop "competent personnel with clear

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ly assigned responsibilities," which must be recognized as part of the internal control system. Otherwise, the auditor may overcompensate by performing more extensive substantive testing at an unnecessarily high cost.

### Alternatives to Substantive Testing

Auditors should carefully consider today's manufacturing reality. Since the cycle time is often minutes instead of hours or days and the quality standard is very high, any defect or deviation is immediately apparent in a JIT/TQM environment. There is cost-effective method of compensating for the lack of paperwork control: More extensive analytical reviews on the relationships between production throughput, total cycle time, sales volume, and manufacturing costs will provide evidence regarding the appropriateness of the transactions and account balances.

Throughput represents the production output that a manufacturing unit processes in a specified period. Cycle time is the time needed for raw materials and parts to be processed into finished products. A cycle time of three minutes translates into a throughput of 20 units an

hour. By calculating the relationships among throughput, cycle time, sales volume, and manufacturing costs, auditors can detect any significant deviations.

Increasing the extent of substantive testing for the weakened paper audit trail fails the test of relevance in the audit of a JIT/TQM manufacturer because a reduction in documentation does not necessarily mean weakened internal control. If there is adequate control over the JIT production process, a review of performance measures such as throughput and cycle time could more than compensate for the reduced paper audit trail. Despite the reduced paper audit trail, the audit time and cost could be reduced in a JIT/TQM environment. A proper understanding of a JIT/TQM control environment is essential for audits of manufacturing clients that use such techniques.

**More reliance on analytical reviews.** Auditors can rely on analytical reviews and efficiency measures used by the system when production documentation is not complete. Back-flush costing used by JIT/TQM organizations has eliminated conventional production reports. But the streamlining of production processes, wherein close attention

is paid to cycle time measurement, and the tight production and quality control under JIT/TQM can compensate for the internal control changes.

JIT/TQM leads to lower inventory values for materials and parts, works in process, and finished goods. Accordingly, the percentage of inventory to total assets is much smaller than the traditional ratio of 20%. The significance of inventory in the entire audit process is decreased, which lowers the overhead cost involved in handling and tracking inventory.

### Impact on the Analytical Review

The authors surveyed the impact of JIT/TQM on the auditor's analytical review by testing for significant differences in various financial ratios of 103 JIT/TQM companies for the periods before and after the adoption. Out of a comprehensive list of ratios that auditors typically use in analytical reviews, only four ratios showed a statistically significant change after JIT/TQM adoption: inventory turnover, working capital turnover, current ratio, and acid test (quick) ratio.

The sample comprised 103 industrial companies that adopted JIT/TQM during



the period between 1980 and 1994, had financial data available on COMPUSTAT, and had material inventory figures. The time period was chosen to ensure sufficient number of post-adoption observations. The companies were concentrated in the electronics (32%), industrial machinery (29%), and motor vehicles and accessories (14%) sectors.

### Results

The test results indicated that the mean difference between inventory turnover ratios for the pre- and post-adoption periods was statistically significant when the three- and four-year-average ratios were compared. This means that, given sufficient time, inventory turnover improves significantly for JIT/TQM companies.

The mean difference of current ratios and acid test (quick) ratios for the pre- and post-adoption periods was statistically significant when the three-, four-, and five-year-average ratios were examined. The decline in

current ratios after the adoption of JIT/TQM was expected because the numerator (current assets) includes inventory that should decrease because of JIT. This is consistent with the improvement in inventory turnover ratios for the post-adoption periods because, in computing the ratios, inventories become denominators.

An explanation for the decreases in quick ratios for the post-adoption periods is that, when management becomes lean under JIT/TQM, even short-term liquidity can be managed with lower levels of quick assets because less working capital is needed to finance inventories.

The three-year-average working capital turnover ratios show a difference after JIT/TQM adoption. When net sales are divided by working capital and working capital decreases after the JIT/TQM adoption, the working capital turnover improves. This result is also consistent with the other changes in the ratios, indicating a significant change in a company's operations.

### Implications for the Audit of Manufacturing Clients

Empirical tests offer clear evidence that JIT/TQM significantly changes the activity (inventory turnover and working capital turnover) ratios and liquidity (current and quick) ratios of a manufacturer. CPAs performing analytical reviews in the audit of a manufacturing client should adjust their expectations of ratio variation to compensate for the effects of a JIT/TQM adoption. Since the ratios used here represent the averages of more than 100 firms in different industries, they provide sufficient evidence that those ratios change generally; however, a larger-scale survey is needed to provide a reference guide for use in industry-specific cases. □

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