Reengineering: Internal Controls Are More Important Than Ever Before

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Abstract

Companies are reengineering their fundamental business processes to improve quality, service, and efficiency. When vital business processes are reengineered, new ways of managing and controlling the processes are required. A reengineered accounts payable system and the controls that should be included in the system are described. Through training and support of those who will perform the new processes and the appropriate use of internal controls, companies will maximize their benefits from business reengineering.

Introduction

In response to global competition, U.S. companies embraced the concept of reengineering their fundamental business processes to improve quality, service, and efficiency. Aetna Life and Casualty (Hammer and Champy, 1993), Bell Atlantic Corporation (Currid, 1994), Cummins Engine Company (Klimas, 1997), Eastman Kodak (Hammer and Champy, 1993), Ford Motor Company (Hammer and Champy, 1993), Hewlett-Packard (Currid, 1994), Taco Bell (Hammer and Champy, 1993), and Tenneco Gas (Currid, 1994), among others, have realized impressive gains from reengineering. Small and mid-size companies have also benefited from reengineering; Richard L. Florida of Carnegie Mellon University found that 60 percent of the 2,000 companies he surveyed in the Great Lakes states showed improved returns from restructuring work (Gleckman, 1993). Accounting and finance departments (Hildebrand, 1994; Klimas,

1997; Schmidt, 1994), production and supply logistics (Kallock, 1994), human resources departments (Smith, 1994), and government agencies, such as, the U.S. Department of Commerce Patent and Trademark Office (Taylor, 1994), and the Metropolitan Transportation Authority in Los Angeles (Sanders, 1997) have undergone business process reengineering.

Reengineering or process innovation, the term preferred by some (Davenport, 1993), leads to new ways of doing work in which the typical division of responsibilities between individuals and departments may be obscured or eliminated. In contrast to the separation of duties among individuals and departments within traditional business organizations proponents of reengineering stress efficiency gains from consolidating responsibility and authority for complete business processes in the hands of individual company personnel (Davenport, 1993; Hammer and Stanton, 1995; Hammer, 1990). Although efficiency gains from reengineering may outweigh some of

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the control advantages inherent in the separation of duties relating to authorization of expenditures, custody of firm assets, and record keeping, the importance of adequate internal controls in reengineered business processes should not be overlooked. The Barings Bank incident, in which a single trader was able to initiate and falsify the records of a series of trades that led to the demise of a long-lived, world-wide organization, illustrates the need for internal controls in business processes (Gibson, 1997). In fact, reengineering has joined the ranks of many change initiatives, from total quality management (TQM), mergers and acquisitions, to restructuring, that have failed to achieve expected results (Champy and Nohria, 1996; Hammer and Stanton, 1995; Markus and Benajamin, 1997).

To avoid failures, proponents of management change emphasize the importance of business processes that clearly state management's performance expectations for the enterprise and provide feedback that compares results with these performance expectations so that the members of an organization may exercise self-control (Drucker, 1996). Although feedback mechanisms that enable self-control by those who carry out vital business processes are valuable to business efficiency and success, when those who initiate processes, also record, implement, and report on those processes, added business risks should not be overlooked (COSO, Vol. 2, 1992). By identifying the control points and suggesting controls that might be imbedded in the information systems procedures and applications software programs of the reengineered accounts payable system that was described in Michael Hammer's seminal article in the *Harvard Business Review* (Hammer, 1990), the role of internal controls in assuring that organizations realize the benefits of reengineering is demonstrated.¹

Reengineering Objectives and Principles

Consultant Michael Hammer brought reengineering to the attention of managers looking for solutions to a range of problems that information technology investments failed to solve (Gleckman, 1993; Hammer, 1990). Even when

processes are automated, they often reflect a way of doing business that evolved during the industrial age. Processes are divided into a series of discrete tasks that are performed by people working in separate departments. One part of the process is completed, and the work is transferred to another department or individual, where the next task is performed. Tasks are completed sequentially, in an assembly-line fashion. Coordination of work that might lead to better customer service, fewer delays, and lower costs seldom occurs.

Reengineering involves recognizing and breaking away from the outdated rules and fundamental assumptions that underlie many business operations. Reengineering results in processes that cut across departmental divisions and even across traditional organizational boundaries between the company and its customers and suppliers. The essence of process reengineering is redesigning and reworking business processes to maximize the attainment of business goals. The goals may range from improving customer service or product quality to achieving operating efficiency and cost reduction in order to gain competitive advantage. Unessential steps, activities, and subprocesses are eliminated and delays are minimized. In many cases, employees' duties are expanded from responsibility for discrete tasks that must be managed by others to coordination of their own work with that of others through the use of information technology. Information technology is used to record, process, store, and retrieve data. Frequently, networked personal computers and electronic mail link workers to each other and to those with whom the company does business. This technology makes reengineering possible, but it is only one of the elements of successful business reengineering. Table 1 summarizes seven principles identified by Hammer for reengineering processes to change the way work is organized and conducted (Hammer, 1990).

Reengineering and Management

The traditional hierarchical corporate structure, represented by a pyramid, does not

Table 1
Seven Principles of Business Reengineering

1. The organization should be restructured around outcomes, not tasks.

When possible, a single person performs all steps in a process. Design that person's job around an objective or outcome, instead of a single task.

2. Those who use the output of a process should perform the process.

Rather than dividing work into separate tasks which must be performed by others, enable those within the company and the company's suppliers and customers to do as much as they can for themselves.

3. Information processing should be subsumed into the real work that produces the information.

Those who act upon and generate information also process it. Information technology reduces the time required for recording information and automates data processing. Computer-based technology monitors the process.

4. Geographically dispersed resources should be treated as though they are centralized.

Databases, telecommunications networks, and standardized processing systems enable workers who are physically remote to achieve economies of scale, as well as, maintain flexibility and service.

5. Parallel activities should be linked and managed as they are performed, rather than treated as sequential tasks.

Information technology enables independent groups to work simultaneously, keep others informed of their progress, and coordinate their efforts.

6. The people who do the work should be allowed to make decisions.

Information technology captures and processes data. Expert systems provide information and guidance. Workers make decisions and become self-managing, reducing the need for hierarchical decision making.

7. Information should be captured at its source.

By integrating and connecting computer systems, the company eliminates redundant data entry along with the inevitable errors that arise.

* Excerpted from Hammer (1990).

promote the relationships required when business processes are reengineered (Brite, 1994; Champy and Nohria, 1996). In the hierarchical firm, the base of the pyramid depicts the large number of workers who are supervised by a smaller group of middle managers. The middle managers comprise the next level of the pyramid. Middle managers, in turn, report to their superiors, who are represented as the top of the pyramid. Information is transmitted from the lower levels of the firm to higher levels, and decisions made by managers are transmitted to the lower levels for implementation. Coordination to accomplish business objectives is a top-down process (Drucker, 1996).

When business processes are reengineered, workers and managers must adjust to a new environment of shared responsibility and ambiguous boundaries (Table 1). With reengineering the emphasis is on customer service instead of the completion of discrete tasks. Customers may be other departments, other divisions of the firm, or outside parties. To coordinate their activities, workers communicate with each other rather than with supervisors. Decision making and supervision are delegated to team-based work arrangements. These arrangements lead to less specialization of duties and greater autonomy for those who perform the work. However, in the U.S. many organizations fail to provide sufficient training and rewards to motivate their employees to act in the best interests of their organizations (Markus and Benajamin, 1997).

Reengineered processes have many characteristics that are associated with the way Japanese companies operate (Brown, 1987). For example, Japanese manufacturers work closely with their vendors to assure that materials are available when needed, quality standards are met, and inventory holding costs minimized. In Japanese organizations, the duties for which an individual is responsible are relatively limited, while the area of mutual responsibility is broad. Division of labor in this broad area of interdependence is flexible, changing as circumstances require. In large Japanese corporations, employees remain

with the company on a long-term basis, and significant amounts of time and money are devoted to employee education and training programs. Frequently, workers are rotated and trained in several departments within the company. As a result, the Japanese concept of job is flexible, and employees are prepared to perform a variety of roles within their companies.

Employees who are unaccustomed to shared responsibilities may perceive reengineering as a threat to their jobs (Klimas, 1997; Springsteel, 1997). In too many companies, reengineering is equated with down-sizing, doing less with less (Goldsmith, 1994). Although reengineering may result in reductions in payroll, the primary objective is to increase productivity (Hammer and Stanton, 1995). As early as possible, those who will perform the new jobs should be enlisted as active participants in the process. If their current duties are part of the process that is being reengineered, they may describe existing practices and may contribute to identifying essential elements to include in new systems (Klimas, 1997). Most important, though, if reengineering is to succeed, those who do the work will need training in order to effectively assume new responsibilities (Markus and Benajamin, 1997).

Internal Controls

The need for reengineering and the gains that may be achieved from it are persuasively presented by Hammer and others (Davenport, 1993; Hammer and Champy, 1993; Morris and Brandon, 1993). Missing from published accounts, though, is explicit discussion of the internal controls that can and should be included in reengineered processes to assure that the processes are operating in accordance with management's objectives. Internal control is a process designed to provide reasonable assurance regarding the achievement of objectives in three categories: effectiveness and efficiency of operations, reliability of financial reporting, and compliance with applicable laws and regulations (COSO, Vol. 1992, p. 1). From the initiation of a reengineering project through its implementa-

tion, internal controls that are cost effective and promote the achievement of business objectives should be instituted. Based on Hammer's 1990 article, the key elements of the reengineered accounts payable process at Ford Motor Company are described. Next, using Ford's accounts payable system as an example of a reengineered process, the internal controls that might be utilized in a reengineered accounts payable process are described. Consistent with the guidelines provided by *Internal Control--and Integrated Framework* (COSO, Vol. 2, 1992; COSO, Vol. 4, 1992), the assessment of risks, controls over system development and maintenance, authorization, data entry and processing, and the transmission of data are emphasized. If organizations are to achieve the most from process reengineering, internal controls must not overlooked.

In many companies accounts payable is a prime candidate for reengineering (Davenport, 1993; Klimas, 1997). Traditionally, the division of responsibilities among departments was used as a control device in which one employee's work was passed on to several other individuals for further processing before a transaction could be completed. Even when systems were automated, tasks within the accounts payable cycle continued to be assigned to separate individuals or departments. The purchasing department often developed procedures without considering how they increased costs and processing time in accounts payable. In turn, the accounts payable department was unconcerned with how its procedures affected the treasury department (Hammer, 1990).

In a reengineered accounts payable process, the procedures of acquiring and paying for goods and services are viewed as a single process involving both the company and its suppliers (Hammer, 1990). An integrated database system may be used to record, store, and process data required in the acquisition, receipt, and payment for goods and services. At Ford Motor Company, "invoiceless processing" is accomplished through the computer network that connects Ford's purchasing department to its vendors. When materials are needed, a Ford employee

places an order by entering the supplier code, part number, and quantity at a desktop computer from which the order is electronically transmitted to the vendor. The vendor fills and ships the order. When the goods are received, the receiving clerk checks the database to see if the items correspond to an outstanding purchase order. If they do, the goods are accepted and the clerk records the transaction in the database (if not, the goods are returned to the vendor). When a receipt is recorded, the computer automatically checks the purchase order number, supplier code, item descriptions, and quantities entered by the receiving clerk. If the items match an outstanding order, a payment, based on pre-approved prices, is generated.

The reengineered process makes Ford's vendors a part of the team that enables Ford to acquire goods in a timely, cost effective manner (Table 1, item 2). Through the electronic network that connects Ford to its suppliers, any problems with purchase orders, such as unavailable items, are brought to the immediate attention of Ford. Without the need for re-keying the items on the purchase order, picking orders are automatically generated, and orders are filled and shipped more quickly (Table 1, items 3 and 8). Vendors no longer prepare invoices. The comparisons between invoices, purchase orders, and receiving reports that were formerly performed by the accounts payable department are not required. At Ford, the purchasing department works with production and the company's suppliers to assure that materials are delivered when needed (Table 1, item 5). Receiving department personnel determine whether delivered goods conform to purchase orders and record the quantities received. The difference between the reengineered process and past practice is that receiving department personnel, when they accept delivery, now initiate the process that ends with payments to vendors (Table 1, item 1). By reengineering this process, Ford Motor Company achieved a 75 percent reduction in accounts payable personnel. In addition, the electronic connection between Ford and its vendors results in better inventory management, and vendors receive prompt payment when they deliver the

goods.

Risk Assessment

As the Ford Motor Company experience shows, reengineering may result in impressive gains in efficiency, but it also represents a departure from established practices. Before reengineering the accounts payable process (or any other process), an assessment and documentation of risks should be performed. Risk assessment is the identification and analysis of relevant risks to the achievement of objectives; it forms a basis for determining how the risks should be managed (COSO, Vol. 2, 1992, p. 2). A list of threats foreseen by management and other employees involved in the acquisition and payment for goods should be developed (COSO, Vol. 4, 1992, Reference Manual: Inbound, Receiving, pp. 57-62; and Procurement, pp. 78-82). Estimates of the levels of risk and descriptions of controls to address foreseeable threats should be included in system development documentation (COSO, Vol. 4, 1992, Reference Manual: Technology Development, pp. 83-84, Manage Information Technology, and Manage Risks (of accidents or other insurable loss), pp. 93-100). Examples of risks might include loss of processing ability because of power failure, destruction of files through error or sabotage, unauthorized purchases, data entry and processing errors, delays to correct errors, and many others. Estimates of the degree of risk are essential to determine hardware and software requirements and the duties that will be assigned those who perform the work.

Systems Development and Maintenance

In the new accounts payable process, segregation of duties between computer programmers and those who are responsible for initiating orders and approving cash disbursements is highly recommended (COSO, Vol. 2, 1992, Segregation of Duties, p. 47). If the company has a comprehensive mainframe computer system, the systems and programming responsibilities have probably been segregated from the authorization and information processing respon-

sibilities. This segregation should be carried forward to the personal computer network, as well (COSO, Vol. 2, 1992, p. 58). Analysts and programmers should not process data, and system users should not be able to modify or gain access to computer programming codes (COSO, Vol. 2, 1992, Application System Development and Maintenance Controls, p. 49). Furthermore, procedures for developing, maintaining, documenting, testing, and approving systems and changes should be formalized in procedure manuals (COSO, Vol. 4, 1992, Reference Manual: Manage Information Technology, pp. 93-98). Extensive testing should be performed for each application to ensure that programs function correctly (Ibid.). Finally, any changes to programs should require approval by information systems management (Ibid.).

Authorization

One of the most important components of a reengineered accounts payable system is an integrated database that receives the disbursements data from various systems throughout the company. Thus, procedures should be formulated to prevent or detect unauthorized access to, or changes in, data files (COSO, Vol. 2, 1992, Access Security Controls, p. 49). A system of user codes and passwords should be sufficiently layered to provide protection for operating programs, data files, and data items within files. Certain programs and data items may require multiple passwords to access. Physical controls, such as, when not in use, keeping desktop computer keyboards locked are also important to consider. These procedures can reduce the risk that unauthorized parties may gain access to the system.

In a reengineered accounts payable process, transactions that once required the movement of paper documents from one department to another may be handled through the computer. In the reengineered process, separation of duties between those authorizing purchases and the receiving department could be maintained through the use of logon identification and passwords that limit access to only those parts of the system that

are needed to do ones job (COSO, Vol. 2, 1992, Access Security Controls, p. 49). At the time orders are placed and when the receipt of the goods is recorded, a computer program may be used to check purchase orders and receiving reports for conformity with predetermined criteria. Placing an order would require proper authorization, use of an approved vendor, verification of the product description and price, and other necessary information. Receiving reports would be checked for such items as these: receiving department authorization, purchase order number, delivery date and address, vendor name, product description and quantity. Items on the receiving reports that match the criteria would automatically be approved for payment (COSO, Vol. 4, 1992, Process Accounts Payable, pp. 105-106). Exceptions would be printed to a report of orders that require special attention (Ibid.). Employees with authority to approve the payment of unusual disbursements, such as those over a specified dollar amount, could review and approve such disbursement requests on-line. Electronic authorization codes, known only to designated employees, would be required to approve transactions. Computer generated logs to track the receipt, status, and disposition of all orders would be maintained (COSO, Vol. 2, 1992, System Software Controls, p. 49).

Data Entry, Processing, and Storage

Another important aspect of reengineering the accounts payable system is to have appropriate controls over data entry and processing. These are referred to as application controls that may be built into the information technology. In an on-line system, pre-formatted data entry screens, on-line editing, completeness checks, and validation of items such as account codes may be used to ensure the accuracy of data input (COSO, Vol. 2, 1992, Application Controls, p. 50). General controls over data center operations, software maintenance, access security, back-up, and recovery procedures apply to data entry and processing, too. If general controls are inadequate, it may not be possible to depend on application controls, which assume the system itself will function properly (COSO, Vol.

2, 1992, Relation between General and Application Controls, p. 50). At all times, access logs that record the identity of the operator, the time and date, and the files utilized should be maintained. In addition, operating procedures should be adopted to protect files and programs from possible loss, destruction, or unauthorized use. A thorough data back-up plan for the applications and data on the mainframe is, of course, required. In reengineered processes, employees will often store essential data on their personal computers. Back-up procedures need to be implemented for these files, too.

Data Transmission

Finally, the use of a communication network requires attention to control issues (COSO, Vol. 4, 1992, Management Information Technology, pp. 93-98). For example, payables may be routed to the company's pre-determined disbursement bank from which checks may be issued automatically or transfers made electronically. Electronic data transmission may expose assets and data to serious threats of loss, unauthorized access, and errors. Thus, particular attention should be given to the security of communication media. For instance, encrypting messages that contain confidential data or using special cables or high-speed transmissions can help prevent data from being intercepted by unauthorized persons. System software that performs parity checks, echo checks, and other verification checks provides assurance that codes are not altered and that data are correctly transmitted.

Conclusion

Broadly defined, internal control is a process, or series of actions, that provide reasonable assurance, but no guaranty, that management objectives for efficiency and effectiveness of operations, reliability of financial reporting, and compliance with laws and regulations may be achieved (COSO, Vol. 1, 1992). Reengineering of accounts payable and other business processes requires careful attention to internal controls. The assignment of specific tasks to dif-

ferent individuals, through which so many controls objectives were once achieved in U.S. companies, is inconsistent with the principles of reengineering. Nevertheless, by building computer-based general and application controls into reengineered processes, access to the system may be limited, the ability to authorize expenditures restricted, and the accuracy of data entry and processing enhanced. From the beginning stages of the reengineering process, risks should be specified and controls evaluated in terms of their cost and effectiveness. When determining how processes should be changed, those employees, vendors, and customers who perform the tasks or use products that will be affected by the reengineering project should be consulted. Successful reengineering requires the training and support of those who will perform the new processes. They may assist in identifying problems with the existing processes and may suggest improvements. Through enlisting the commitment of those who do the work and incorporating appropriate internal controls into reengineered processes, companies will maximize their benefits from reengineering.

Suggestions for Future Research

Many organizations have undergone reengineering of vital business processes. Frequently, the gains from reengineering have not been as great as management anticipated. Surveys of organizations that have reengineered their business processes might be conducted to gather information relative to the incorporation of the above internal controls, and others, in those processes. The surveys might include queries regarding the degree of satisfaction, cost savings, revenue gains, etc., attributed to the reengineered processes. In this way, the importance of internal controls to successful reengineering of business processes might be empirically tested.

Footnotes

1. Published reports of the reengineered accounts payable process at Ford Motor Company have not included explicit dis-

cussion of the internal controls in the system (Hammer and Champy, 1993; Hammer and Stanton, 1995; Hammer, 1990). This does not imply that adequate controls were not included in the reengineering of the process. In this article, internal controls are emphasized for the purpose of illustrating how these controls may assure the maximum benefits from the reengineering of an accounts payable process.

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