ima®

The Association of Accountants and Financial Professionals in Business

Forensic Analytics and Management Accountants

Statement on Management Accounting

About IMA®

IMA, the association of accountants and financial professionals in business, is one of the largest and most respected associations focused exclusively on advancing the management accounting profession.

Globally, IMA supports the profession through research, the CMA® (Certified Management Accountant) program, continuing education, networking, and advocacy of the highest ethical business practices. IMA has a global network of more than 75,000 members in 120 countries and 300 professional and student chapters. Headquartered in Montvale, N.J., IMA provides localized services through its four global regions: The Americas, Asia/Pacific, Europe and Middle East/Africa. For more information about IMA, please visit **www.imanet.org**.

About the Author

Saurav Dutta, CMA, Ph.D.
Dutta is an associate professor and was the chairman of the Department of Accounting and Business Law at the State University of New York at Albany. He holds a bachelor of technology degree in Aerospace Engineering from the Indian Institute of Technology, Bombay, India, and a Ph.D. in Accounting from the University of Kansas. He is a CMA® (Certified Management Accountant) and received the Robert Beyer Silver Medal in 1989 for securing the second-highest total score on the CMA exam in June 1989.

Institute of Management Accountants
10 Paragon Drive, Suite 1
Montvale, NJ, 07645
www.imanet.org/thought_leadership

Research Area

Statement on Management Accounting

SMAs present IMA's position on best practices in management accounting. These authoritative monographs cover the broad range of issues encountered in practice.

Topical Area

Risk Management and Internal Controls

This research area focuses on frameworks, methodologies, and approaches used by organizations to understand the risks they are exposed to, put controls in place to counter threats, and effectively pursue their objectives.

Executive Summary

Management accountants possess unique skill sets that include a knack for data analysis as well as a broader business perspective than financial accountants. Management accountants are not limited to internal financial data, but rather synthesize the entire organizational performance from financial, operational, efficiency, and effectiveness measures and blend those with macroeconomic data. Management accountants typically interact with the entire business world, not only other internal business units. A typical management accountant has knowledge of financial rules and information as well as awareness of political, economic, and social influences on their industry or business. Thus, management accountants are well positioned to make contributions to forensic accounting by proactively directing attention to anomalies and apparent inconsistencies in company/segment/individual performance compared to broader business and economic trends. This Statement on Management Accounting (SMA) summarizes recent fraud cases perpetrated by management and employees and suggests the use of management accounting tools and techniques that may aid in early detection of these schemes.

Keywords: Fraud triangle, risk maps, cluster analysis, association analysis, outlier analysis, Beneish model, variance analysis, budgeting, contribution margin

Introduction

The 2014 Report to the Nations on Occupational Fraud and Abuse from the Association of Certified Fraud Examiners (ACFE) notes:

> "Fraud is ubiquitous; it does not discriminate in its occurrence. And while anti-fraud controls can effectively reduce the likelihood and potential impact of fraud, the truth is that no entity is immune to this threat."[1]

The report estimated that around 5% of a typical organization's revenues are lost to fraud every year.[2] This amounts to a projected $3.7 trillion loss globally due to fraud. With only 14% of the organizations making a full recovery from fraud, and an average 58% of organizations not recovering any losses, prevention and early detection of fraud is the responsibility of every financial professional in an organization. Types of fraud plaguing companies can be classified into one of three categories of occupational fraud: financial statement fraud, asset misappropriations, and corruption. The median loss caused by fraud in 2014 was $145,000, and 22% of the cases involved losses of at least $1 million.[3] This Statement on Management Accounting (SMA) focuses on the first two, financial statement fraud and asset misappropriation.

This is the first SMA to address the risk of fraud and how management accounting techniques can be adapted to direct attention to anomalies caused by fraud. It begins by briefly describing Enterprise Risk Management (ERM) systems, the fraud triangle, risk maps, and the updated 2013 *Internal Control—Integrated Framework* from the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Next it discusses how fraud detection is a shared responsibility of various parties including management, auditors, and employees of an organization. Then it briefly describes a few well-known cases of corporate fraud and employee fraud and presents how traditional management accounting tools can be employed as forensic analytic tools. Finally, the SMA introduces new techniques that are better suited for the Big Data environment and technological advancements that permit continuous monitoring of organizational data.

---

[1] Association of Certified Fraud Examiners (ACFE), "Report to the Nations on Occupational Fraud and Abuse: 2014 Global Fraud Study," 2014, p. 6, www.acfe.com/rttn.aspx.

[2] Association of Certified Fraud Examiners (ACFE), "Report to the Nations on Occupational Fraud and Abuse: 2014 Global Fraud Study," 2014, p. 4, www.acfe.com/rttn.aspx.

[3] Association of Certified Fraud Examiners (ACFE), "Report to the Nations on Occupational Fraud and Abuse: 2014 Global Fraud Study," 2014, www.acfe.com/rttn.aspx.

Risk Frameworks and Management Accountants

Every organization takes some amount of risk to engage in business and generate profits. Risk management is of growing importance to the management of the company. As finance professionals, management accountants are being required to assume greater responsibilities in managing and assessing these risks. This section describes Enterprise Risk Management (ERM), risk maps, the 2013 updates to COSO's *Internal Control—Integrated Framework*, and the basics of the fraud triangle—the factors that enable a fraud to be committed.

Enterprise Risk Management

ERM takes an integrated and holistic perspective of risk facing an organization instead of managing risks through many individual silos. In *Enterprise Risk Management—Integrated Framework*, COSO defined ERM as:

- "An ongoing process flowing through an entity;
- Effected by people at every level of an organization;
- Applied in strategy setting;
- Applied across the enterprise, at every level and unit, and includes taking an entity-level portfolio view of risk;
- Designed to identify potential events that, if they occur, will affect the entity and to manage risk within its risk appetite;
- Able to provide reasonable assurance to an entity's management and board of directors; and
- Geared to achievement of objectives in one or more separate but overlapping categories."[4]

That definition clearly identifies ERM as part of everyone's job. With the growing importance of ERM to business organizations, these responsibilities are increasingly being assigned to management accountants. Larry White (former Chair of IMA's Global Board of Directors) underscored the importance of ERM to management accounting: "All management accountants need to understand [enterprise risk management] work as they can help their companies analyze and manage financial and operational risk."[5] Management accountants are increasingly being asked to transition from the role of "counter of wealth to assist in the creation of wealth" and are being relied on to serve on and lead cross-functional teams that implement enterprise-wide initiatives.[6] In their SMA *Enterprise Risk Management*, William Shenkir and Paul Walker outline many ways in which management accountants can add value to the organization's goal of managing enterprise-wide risks.

Organizations face significant challenges when moving ERM frameworks from assessing risks to managing risks. Multiple responses are possible to mitigate or avoid risks, and the costs vary across possible responses. Management accountants are expected to contribute to this process by enabling the

[4] Committee of Sponsoring Organizations of the Treadway Commission (COSO), *Enterprise Risk Management—Integrated Framework: Application Techniques*, American Institute of Certified Public Accountants (AICPA), New York, N.Y., 2004.
[5] Larry White, "Management Accountants and Enterprise Risk Management," *Strategic Finance*, November 2004, pp. 6-7.
[6] William G. Shenkir and Paul L. Walker, *Enterprise Risk Management: Frameworks, Elements, and Integration*, Statement on Management Accounting, IMA (Institute of Management Accountants), Montvale, N.J., 2014.

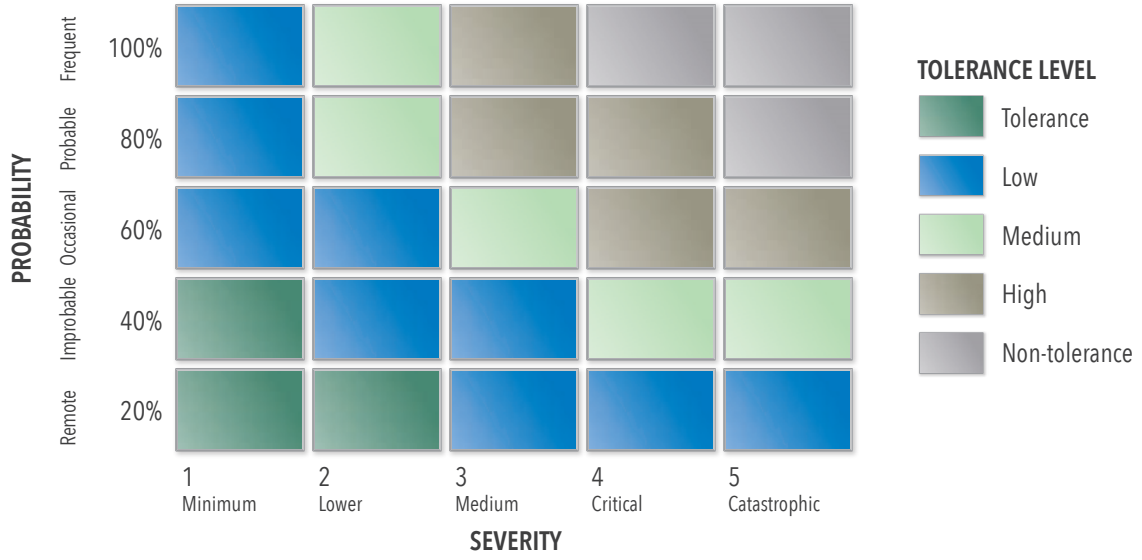
quantification of costs of various risk-reduction strategies and help select the optimal choice from among alternative course of action. Quantifying costs is a necessary step in identifying the response with the greatest positive net benefit and harmonizing an organization's risk response and residual risks with its risk appetite.[7] These costs include, but are not limited to:

- Control implementation costs,
- Premiums for insurance,
- Transaction costs,
- Opportunity costs, and
- Forfeited returns associated with forming strategic alliances.

Risk Map and Strategies

A common way to assess risk and its impact is through the use of a two-dimensional metric: likelihood assessment and expected costs. This metric can be represented diagrammatically in the form of a risk map.[8] Figure 1 shows the risk map and results of risk management strategies. The x-axis measures the level of impact or significance in economic terms. The y-axis measures the probability of a risk materializing. The impact and likelihood can be estimated for each risk, with the risk placed on one of the five boxes.

FIGURE 1: ORGANIZATIONAL RISK MAP



7 Brian Ballou, Dan L. Heitger, and Thomas D. Schultz, "Measuring the Costs of Responding to Business Risks," *Management Accounting Quarterly*, Winter 2009; and William G. Shenkir and Paul L. Walker, *Enterprise Risk Management: Frameworks, Elements, and Integration*, Statement on Management Accounting, IMA® (Institute of Management Accountants), Montvale, N.J., 2014.

8 Brian Ballou and Dan L. Heitger, "A Building-Block Approach for Implementing COSO's *Enterprise Risk Management—Integrated Framework*," *Management Accounting Quarterly*, Winter 2005; and William G. Shenkir and Paul L. Walker, *Enterprise Risk Management: Frameworks, Elements, and Integration*, Statement on Management Accounting, IMA® (Institute of Management Accountants), Montvale, N.J., 2014.

Various mitigating actions can be suggested for each of the boxes to manage the risk. Management accountants can help quantify these costs for the organization and create a template of the risk map unique to the organization based on its risk appetite, resources, and available options. Developing a risk map can help inform management of the cost-benefits of various risk-mitigating strategies available to the organization.

No organization can eliminate all the risks it faces. The risk map provides a structured framework to assess the options and reduce the risk to an acceptable level. The level of acceptable risk is denoted by the solid diagonal line, which denotes a constant expected loss. The distance of the line from the origin is determined by an organization's risk appetite, depending on where a particular risk lies on the risk map and the relative costs of various risk strategies. Some illustrative risk responses available to organizations are: accept the risk, eliminate the risk, reduce the risk, insure the risk, or invest in early warning systems.

The limitation of risk management is captured in the aphorism: "There are known knowns, known unknowns, and unknown unknowns." In the ERM process, known risks will be identified, and some previously unknown risks will become known. Fraud is a component of unknown unknowns, and so systems and processes have to be geared toward uncovering the incidences of these risks.

Updated COSO Framework

In response to many well-publicized business failures during the financial crisis, COSO published a research study in May 2010 titled *Fraudulent Financial Reporting 1998-2007*. The economic impact of fraud was highly significant, and the average cumulative misstatement amount was about $400 million. The most common motivations for committing fraud were:

- Meeting market earning expectations,
- Meeting internal earning expectations,
- Concealing the company's declining financial condition,
- Increasing the company's stock price,
- Increasing management compensation through achievement of earnings per share (EPS) or other achievement measures, and
- Misappropriation of assets for personal gain.

COSO updated the integrated framework on internal control in 2013, motivated by the drive to continuously improve and compounded by several changes to the business environment. Changes in technology, increased adoption of outsourcing, and increasingly complex laws, regulations, and standards had considerably changed the business environment since the issuance of the first report. Another, more urgent reason for the changes was the increasing number of internal control and corporate governance failures since the original framework was published.

COSO released its revised framework in May 2013. One of the most notable changes to the overall framework was the codification of 17 principles of effective internal controls. The framework outlines these principles under the five original components of internal controls. The risk assessment principles are of utmost importance and include one of the paramount objectives of internal controls: fraud prevention.

COSO's new framework explicitly recognizes the importance of assessing fraud risk. The principle is expanded into four points of focus similar to Statement on Auditing Standards (SAS) No. 99, *Consideration of Fraud in a Financial Statement Audit*. Both COSO and SAS No. 99 incorporate academic research into fraud prevention and detection, resulting in the formulation of fraud triangle.

Fraud Triangle

Much research has been done regarding the environment in which people are most likely to commit fraud. Current studies suggest that individuals who commit fraud are middle-aged white men who have no substantial criminal history and are often first-time offenders. Psychologists, sociologists, behavioral scientists, and academics of many fields have sought to bring light to this atypical profile of a criminal. Donald R. Cressey studied the circumstances that lead employees to commit crimes against organizations they work for and developed what is widely known and referenced today as the fraud triangle.[9] Cressey argued that three attributes must be present for a first-time fraudster to violate trust: pressure, opportunity, and rationalization.

According to this theory, there must be reasons, or pressures, for a person to engage in illegal activities. These pressures can be either personal or business-related. According to the ACFE, one of the most common personal pressures is living beyond one's means. Other typical personal pressures include large amounts of debt, poor credit, and high medical bills. On the other hand, business pressures often include meeting earnings expectations, qualifying for bonuses, and retaining investors.

Pressure or incentive to commit fraud by itself is insufficient—an opportunity to commit fraud must also exist. The accounting industry continuously discusses how to better improve corporate governance and the internal control structure in order to minimize an individual's opportunities to commit fraud within an organization. Measures such as proper segregation of duties, employee antifraud policies, a structured code of ethics, a positive tone at the top, anonymous hotlines, and an ethical corporate culture are some of the means by which an organization can invoke strong ethical sentiments among its employees and increase the perception of detection. Yet, when an individual is influenced by significant internal and/or external pressures, they quickly look for breakdowns in the internal control structure. Furthermore, even when sufficient controls exist, management override and employee collusion can circumvent these measures.

Yet it is not enough that a fraud perpetrator has the motive and opportunity to commit fraud. The individual must also rationalize and justify his or her actions so they do not contradict his or her ethics. It is this attribute that moves the fraud from an idea to a reality. Rationalization can also become part of an individual thinking as the person commits fraud on a more regular basis, causing the fraudster to be desensitized to the actual damage being caused. This attribute depersonalizes the behavior and often incorporates altruism. For example, a fraudster may tell himself or herself that no one is physically being hurt, that investors will lose money if action is not taken, that friends and family will suffer monetary losses if bonuses are not obtained, or that people will lose their jobs if the organization went out of business. In some cases, the rationalization attribute can be so strong and persuasive that fraud perpetrators will continue to believe that they were acting with best intentions even after they have been caught.

[9] Donald R. Cressey, *Other People's Money: A Study in the Social Psychology of Embezzlement*, The Free Press, New York, N.Y., 1953.

While not every single fraud case can perfectly fit into Cressey's fraud triangle, the three attributes hold true in some form or another. Because of their importance in understanding the driving forces behind fraud, the American Institute of Certified Public Accountants (AICPA) has developed an overview of key aspects under each of Cressey's attributes that should be examined to determine if financial statement fraud risk is high within an organization. In general, the ACFE and others rely on the fraud triangle when examining fraud cases. This concept also has been extended to a *fraud diamond* by adding one more dimension. The primary contribution of the fraud diamond is that the capabilities to commit fraud are explicitly and separately considered in the assessment of fraud risk.[10]

Though the fraud triangle (or diamond) is useful as a theoretical concept, it is not applicable to all situations. Do perpetrators of fraud actually think it through? Sometimes massive fraud is a result of a corrupt environment or failing social norms or "traps."[11] For instance, a single-minded focus or tunnel-vision may lead to massive fraud with the perpetrators not even fully realizing that they are engaged in it. Rationalization may not even come into play in such scenarios. One example often cited is that of Enron—employees were so focused on the goal of bringing in sales that they were not consciously considering the ethical boundaries they were crossing.[12] In other notable cases, such as at HealthSouth, the perpetrator was a charismatic sociopath who coerced his underlings to commit fraud on his behalf.[13] Sociopaths tend to view their life as a game with a need to win at any cost and are devoid of feelings of guilt and remorse.[14] In such cases of "good people gone bad," it appears that the perpetrator succumbed to a small error just to test his or her own capability and ended up committing a million-dollar fraud, much like Raskolnikov in Fyodor Dostoevsky's *Crime and Punishment*. He did not believe he was capable of committing and getting away with murder and is curious enough to follow through.[15]

[10] David T. Wolfe and Dana R. Hermanson, "The Fraud Diamond: Considering the Four Elements of Fraud," *CPA Journal*, December 2004, pp. 38-42.

[11] Muel Kaptein, "The Diamond of Managerial Integrity," *European Management Journal*, February 2003, pp. 99-108.

[12] Niki A. den Nieuwenboer and Muel Kaptein, "Spiraling Down into Corruption: A Dynamic Analysis of the Social Identity Processes that Cause Corruption in Organizations to Grow," *Journal of Business Ethics*, December 2008, pp. 133-146.

[13] Weston L. Smith, "Lessons of the HealthSouth Fraud: An Insider's View," *Issues in Accounting Education*, November 2013, pp. 901-912.

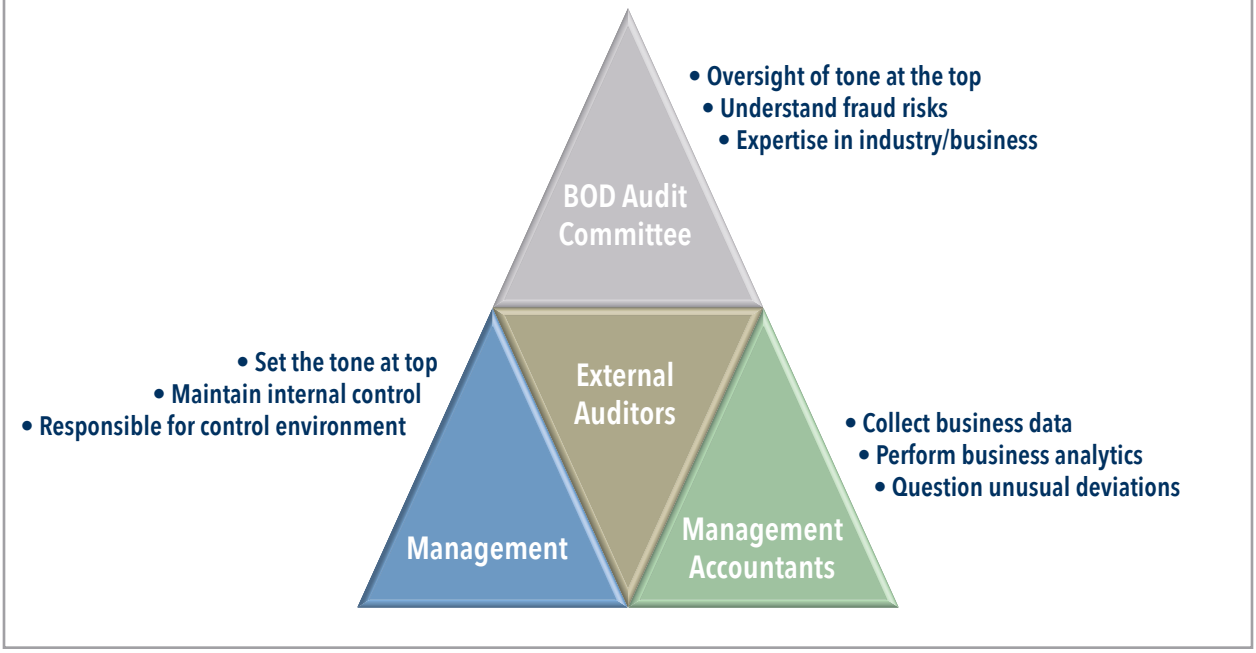
[14] Martha Stout, *The Sociopath Next Door: The Ruthless Versus the Rest of Us*, Broadway Books, New York, N.Y., 2005.

[15] See Fyodor Dostoevsky, *Crime and Punishment,* Snowball Classics Publishing, 1867.

Fraud Detection: Shared Responsibility

All parties involved throughout an organization's financial reporting supply chain bear responsibility in preventing and detecting fraud.[16] The various parties, including the management, board of directors, audit committee, management accountants, internal auditor, and external auditors, have complementary and overlapping responsibilities to ensure the integrity of the financial reporting process and to safeguard the organization's assets from misappropriation. Individually and collectively, these people are responsible for deterring and detecting financial statement fraud and employee fraud. Figure 2 illustrates the relationships between these parties and a summary of their roles.

FIGURE 2: FINANCIAL REPORTING PROCESS: A COLLECTIVE EFFORT



In addition to fiduciary responsibility, management bears the primary responsibility for the quality, integrity, and reliability of the financial reporting process. All regulators and standards worldwide unequivocally place this responsibility on management. As management's operative arm with regard to the organization's financial and accounting aspects, management accountants are naturally responsible for these functions.

From a corporate governance perspective, management accountants are in a good position to prevent and detect asset misappropriations and other fraudulent activities. Unlike others in the financial reporting supply chain—board of directors, external auditors, audit committee—management accountants are internal to the organization and are present throughout the year. Thus, they can

[16] Saurav K. Dutta, *Statistical Techniques for Forensic Accounting: Understanding the Theory and Application of Data Analysis*, Financial Times Press, Upper Saddle River, N.J., 2013.

continuously monitor financial performance and asset utilization and assess deviations on a timely basis. Being employees of the organization, management accountants usually have a longer tenure at the organization than the auditors, which means greater familiarity with personnel, industry practices, policies, and procedures. Furthermore, other employees within the organization may be more comfortable discussing sensitive and ambiguous situations with management accountants rather than with the external auditors, especially when there are far-reaching implications. Thus, management accountants have to play a proactive role to detect and deter fraud within the organization. This is particularly important in smaller organizations with no or negligible internal audit function.

Management accountants are best able to detect asset misappropriation fraud committed by lower- and mid-level employees. Asset misappropriations committed by employees usually are small and affect only one segment, region, or product line, not the entire organization. The amounts are likely to be immaterial in magnitude to affect the fairness of the financial statements, so external auditors are unlikely to focus on them. Management accountants, on the other hand, being part of the organization, have the responsibility to safeguard the organization's assets. Moreover, management accountants are involved in analyzing costs and profits across segments, regions, and product lines, making them more suited to identify significant anomalies in a sector or region that is material to the region without necessarily being material when aggregated across the organization.

Management accountants could help prevent fraud through three steps:

1. Using management accounting tools and techniques to identify significant and unusual deviations, i.e., "red flags" that signal the possibility of fraud.
2. Conducting thorough investigation of identified "red flags" and determining whether or not there are legitimate business or economic reasons for the unusual and significant deviations.
3. Reporting of the findings to the audit committee or to other appropriate levels of management. In extreme situations, it may require that management accountants communicate directly with external auditors regarding the observed and unexplained anomalies.

The concept of shared responsibility in detecting and deterring fraud is underscored by the findings of an academic study that fraud detection in the United States "relies on a village of whistle-blowers."[17] The study gathered a comprehensive sample of 216 alleged corporate frauds in large U.S. companies between 1997 and 2004. For each instance, the researchers identified the party that first revealed the fraud, i.e., the whistleblower. Internal governance uncovered 34% of the cases, and employees of the organization uncovered an additional 12% (see Table 1). Thus, approximately half of the alleged frauds in the U.S. were detected internally. One can hypothesize that this percentage would be even higher if employee frauds and smaller organizations were included in the sample.

The ACFE also finds that management fraud is more likely to be detected by employee tips than by other methods. Anonymous hotlines are an effective mechanism to allow employees to voice their suspicion without the threat of reprisal. In the 2014 Report to the Nations on Occupational

[17] Alexander Dyck, Adair Morse, and Luigi Zingales, "Who Blows the Whistle on Corporate Fraud?" *Journal of Finance*, December 2010, pp. 2,213-2,253.

TABLE 1: THE WHISTLEBLOWERS ON U.S. CORPORATE FRAUD (1996-2004)

First to Suspect Fraud	Number	Percentage
Internal Governance	74	34.3%
Employee	26	12.0%
Analyst	24	11.1%
Media	22	10.2%
Industry Regulator	20	9.3%
External Auditor	16	7.4%
SEC	10	4.6%
Other	24	11.1%
Total	**216**	**100%**

Source: Alexander Dyck, Adair Morse, and Luigi Zingales, "Who Blows the Whistle on Corporate Fraud?" *Journal of Finance*, December 2010.

Fraud and Abuse, the ACFE reported that approximately half of fraud tips came through a hotline when that mechanism was available, and 63% of the hotline reports involved fraud by a manager or executive.

In summary, though the public perception of the responsibility of preventing and detecting fraud is limited to external auditors, management accountants within a company—especially those in smaller organizations—can take a proactive role in fraud detection and deterrence. They have the tools, techniques, and data available to them through which significant anomalies can be identified and the reasons investigated. Asset misappropriations due to fraud and their ensuing cover-ups leave a financial trail that leads to inconsistent management accounting data. A careful management accountant can spot those anomalies through traditional and common management accounting techniques, such as contribution margin analysis and variance analysis, and more sophisticated techniques, such as association analysis, cluster analysis, and outlier analysis.

Brief Descriptions of Management Fraud

This section briefly describes five well-known and relatively recent corporate fraud cases:

1. The corporate fraud at Diamond Foods was perpetrated by the CEO and CFO to meet analysts' earnings expectations and thereby maintain a high stock price. Faced with rising commodity prices, they engaged in deferral of expenses from one accounting period to the next.[18]
2. Japanese camera manufacturer Olympus was accused of a multiyear collusive fraud perpetrated by its senior-most management in order to hide unrealized losses on investments.[19]
3. Lehman's bankruptcy was arguably the trigger of the 2007 financial crisis, and it used Repo 105 to understate its leverage ratios in the quarters leading up to the failure.[20]
4. Groupon, a new-age company engaged in innovative business practices, was unable to properly estimate allowances for sales returns as it explored and entered new markets.[21]
5. The 2006 backdating of employee stock options has been cited as one of the most widespread corporate frauds in the U.S.

[18] Mahendra R. Gujarathi, "Diamond Foods, Inc.: Anatomy and Motivations of Earnings Manipulation," *Issues in Accounting Education,* February 2015, pp. 47-69.

[19] Saurav K. Dutta, Dennis H. Caplan, and David J. Marcinko, "Blurred Vision, Perilous Future: Management Fraud at Olympus," *Issues in Accounting Education*, August 2014, pp. 459-480.

[20] Dennis H. Caplan, Saurav K. Dutta, and David J. Marcinko, "Lehman on the Brink of Bankruptcy: A Case about Aggressive Application of Accounting Standards," *Issues in Accounting Education*, May 2012, pp. 441-459.

[21] Saurav K. Dutta, Dennis H. Caplan, and David J. Marcinko, "Growing Pains at Groupon," *Issues in Accounting Education*, February 2014, pp. 229-245.

Deferral of Costs at Diamond Foods

Diamond Foods, Inc. is a premium snack food and culinary nut company that sells under brands such as Emerald snack nuts, Pop Secret popcorn, and Kettle Brand Chips. It is the largest walnut processor and distributor in the U.S. The company had started as a cooperative of walnut growers in California to package and market walnuts globally. It was later incorporated and expanded into other businesses primarily through acquisitions.

Walnut growers deliver their crop during the fall harvest season, and Diamond Foods pays for the crop in three installments. The price for the walnuts is not known at the time of delivery, rather it is determined later by the U.S. Department of Agriculture (USDA). The price of walnuts has been rapidly increasing since 2009. The price per pound for the 2008 harvest was 64 cents, increasing to 85.5 cents for the 2009 crop, to 101.9 cents for the 2010 crop, and reaching a record price of 143.5 cents per pound for the 2011 crop. Thus, the price per pound of walnuts more than doubled in the four-year period.

Diamond Foods made an unusual payment of $20 million to the growers on August 13, 2010. The letter accompanying the payment stated that the amount represented "both the final payment for 2009 and a 'continuity payment' reflecting the value of the multi-year supply arrangement." In fall 2010, a similar payment was made to the growers for $60 million, and the phrase "momentum payment" was replaced by "continuity payment." Views differed on whether the "continuity" and "momentum" payments were for the crop of the preceding or current fiscal year. The company treated these as payment for the crop of the current year, but several growers maintained that the payment was for the crop from the previous year since some growers who had terminated their relationship with Diamond were still receiving these payments.[22]

Following an SEC investigation and resignation of both the CEO and CFO, Diamond Foods disclosed in its 8-K filing on February 8, 2012, that its audit committee "concluded that the 'continuity' payments made to growers in August 2010 of approximately $20 million and a 'momentum' payment made to growers in September 2011 of approximately $60 million were not accounted for in the correct periods."[23] Consequently, the share prices of Diamond Foods lost about two-thirds of its value, falling from $90 per share in September 2011 to less than $28 per share by December 2011.

A management accountant's industry expertise and knowledge of macroeconomic variables, coupled with management accounting techniques, might have discovered some anomalies. Introduction of unusual and unfamiliar terms such as "continuity payments" and "momentum payments" should be viewed with skepticism. While nonaccountants may not have the financial expertise to challenge these concepts, management accountants are in a position to evaluate these newly introduced terms and question their purpose.

Furthermore, calculating a routine direct material variance would have raised a red flag if properly analyzed. As the commodity cost of walnuts more than doubled in a span of four years, one would expect

[22] Mahendra R. Gujarathi, "Diamond Foods, Inc.: Anatomy and Motivations of Earnings Manipulation," *Issues in Accounting Education*, February 2015, pp. 47-69.

[23] See the full press release at www.sec.gov/Archives/edgar/data/1320947/000119312512046902/d297426dex991.htm.

a large unfavorable material price variance. With the inappropriate deferral of the higher purchase costs of walnuts, the expected unfavorable material price variances were not identified in the proper period and the following year's standard material cost increased—thereby the unfavorable variance was not recorded in the applicable period. Benefiting from this knowledge, management accountants in similar situations could detect a similar problem in a more timely fashion. Waiting for an SEC investigation to spur action from the audit committee is too late to prevent material misstatement of results.

Exorbitant Consulting Fees at Olympus

The fraud at Olympus, a revered Japanese company, was publicly revealed by its former President and CEO, Michael Woodford. The fraud was perpetrated through collusion among senior managers and involved channeling funds to shell companies primarily by overpaying on acquisitions or acquisition-related costs. In one instance, a consulting firm was paid a fee of $632 million to facilitate a $2 billion purchase of a British firm named Gyrus. The consultation fee of $632 million, or 31% of acquisition price, was well above the industry norm of such advisory fees, which were about 1% to 2% of purchase price.[24]

The transfer of funds to the shell companies was part of a convoluted scheme to hide unrealized losses on investments purchased in the late 1980s at the peak of the asset bubble in Japan. The ensuing Investigation Report found numerous flaws in the corporate governance structure at Olympus, including those in internal controls and the internal audit function.[25]

There were numerous risk factors that, if pursued internally, would have indicated something was amiss. SAS No. 122 (AU-C §240.A75) identifies the following four risk factors that are relevant to Olympus and, particularly, to the shell companies that Olympus created:

- "Significant related party transactions not in the ordinary course of business or with related entities not audited or audited by another firm."
- "Significant, unusual, or highly complex transactions."
- "Significant operations located or conducted across jurisdictional borders where differing business environments and regulations exist."
- "Use of business intermediaries for which there appears to be no clear business justification."[26]

In this case, it is unclear if management accountants' warnings or red flags would have been heeded since senior management, including the head of the Internal Audit Division who also held the position of vice president of finance and served on the audit committee, were the primary architects of the scheme. In fact, whistleblower Michael Woodford, an employee of the company for more than 30 years who had been recently promoted to the posts of president and CEO of the company, was unceremoniously fired

[24] Saurav K. Dutta, Dennis H. Caplan, and David J. Marcinko, "Blurred Vision, Perilous Future: Management Fraud at Olympus," *Issues in Accounting Education*, August 2014, pp. 459-480.

[25] Olympus Corporation and Third Party Committee, "Investigation Report," December 6, 2011, www.olympus-global.com/en/common/pdf/if111206corpe_2.pdf.

[26] AICPA (American Institution of Certified Public Accountants), Statement on Auditing Standard (SAS) No. 122 (AU-C §240.A75), *Consideration of Fraud in a Financial Statement Audit*, 2011.

after raising the concerns with the board of directors.[27] Regardless, management accountants should be cognizant of the risk factors and bring such instances to the attention of senior management and the internal audit division of their organization. *The IMA Statement of Ethical Professional Practice* provides guidance on steps to be taken and resources available to management accountants.[28]

Lowering of Leverage at Lehman

In September 2008, Lehman became the largest company in U.S. history to file for bankruptcy, and in the process it eradicated more than $30 billion of investor wealth. It was subsequently discovered that Lehman had routinely engaged in short-term borrowing transactions known as Repo 105, which artificially lowered its leverage ratios making it appear to be in better financial health. Repo transactions are quite common in the financial industry and involve borrowing funds by transferring assets to the lender as collateral. The collateral stays on the borrower's financial statements, however, and the ownership is returned to the borrower when the loan is paid off.

Lehman, like other U.S. banks, engaged in Repo transactions where it would borrow large sums of money and put up its investments as collateral. But unlike other banks, Lehman treated those short-term collateralized borrowings as sales with the right to repurchase. They structured the transaction as Repo 105, taking advantage of a loophole in Statement of Financial Accounting (SFAS) No. 140, "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Consequently, the assets were removed from Lehman's balance sheet at the time when the loan was collateralized and would reappear when the loan was paid and collateral was returned. But during the term of Repo 105, i.e, when the assets were off Lehman's books, Lehman continued to receive the stream of income through coupon payments on these investments even though the investments were no longer on its balance sheet.[29]

Lehman's usage of Repo 105 was timed around the end of reporting periods. The usage of Repo 105 transactions at quarter-ends and intra-quarter is shown in Figure 3. As can be concluded from the data, the usage of Repo 105 spiked at quarter-ends and fell off on an intra-quarter basis. The structuring of Repo transactions as Repo 105 enabled Lehman to remove assets and corresponding debt from its balance sheet, yielding a marked improvement to its leverage ratio. The ratings agencies and lenders were concerned about Lehman's high leverage ratio, so it was beneficial for Lehman to be able to show lower leverage. It is unclear as to whether or not the use of Repo 105 led to Lehman's demise, but it is evident that the company employed a questionable accounting treatment that had no business purpose or economic significance other than to understate its leverage ratio.[30]

---

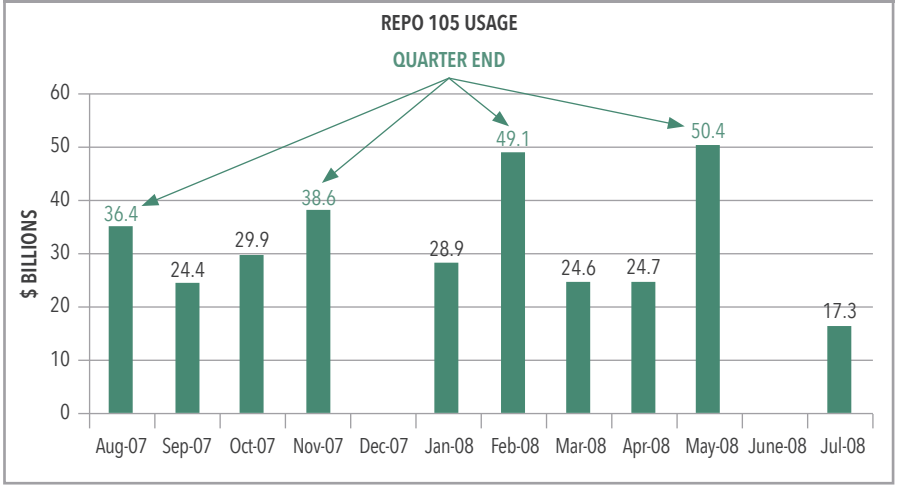
[27] Michael Woodford, *Exposure: Inside the Olympus Scandal: How I Went from CEO to Whistleblower*, Penguin Group, New York, N.Y., 2012.

[28] IMA® (Institute of Management Accountants), *IMA Statement of Ethical Professional Practice*, Montvale, N.J., 2004, www.imanet.org/docs/default-source/press_releases/ethics_prof_prac.pdf?sfvrsn=2.

[29] Dennis H. Caplan, Saurav K. Dutta, and David J. Marcinko, "Lehman on the Brink of Bankruptcy: A Case about Aggressive Application of Accounting Standards," *Issues in Accounting Education*, May 2012, pp. 441-459.

[30] Saurav K. Dutta, *Statistical Techniques for Forensic Accounting: Understanding the Theory and Application of Data Analysis*, Financial Times Press, Upper Saddle River, N.J., 2013.

FIGURE 3: EXTENT OF REPO 105 TRANSACTIONS AT LEHMAN



Using outlier analysis, a management accountant would have been able to identify the usage of Repo 105 transactions around quarter-ends. Any type of transactions that occur only around the end of a fiscal period may not be a routine transaction serving a legitimate business purpose. Instead, such unusual transactions are arguably undertaken to window-dress the financial statements. Management accountants armed with their knowledge of accounting and advanced analytic tools should be able to identify such transactions. While it may not be within the authority of a management accountant to terminate such transactions, bringing the existence to light may act as a deterrent within the organization.

The events at Lehman and its use of Repo 105 transactions provide two important lessons that apply to all organizations. First, all parties with meaningful roles in the financial reporting process should not apply accounting rules with the intent to obfuscate the economic substance of transactions. Second, professional standards established for each party, including the standards that IMA promulgates, set the bar for fair reporting higher than technical adherence to the letter of the law. The standards are aspirational in nature and go beyond the technical compliance of a particular standard.[31]

Estimation of Returns at Groupon

On November 4, 2011, Groupon Inc. went public with an initial market capitalization of $13 billion. Soon after going public but prior to the announcement of its first quarter results, the company's auditors required Groupon to disclose a material weakness in its internal controls over financial reporting. The weakness impacted its disclosures on revenue and its estimation of sales returns.

A merchandiser satisfies its obligations when it provides the product to the customer and consequently can recognize revenue for the amount of sale. When the possibility exists that the customer could return the merchandise for full or partial refund, the company is required to create a reserve

[31] Saurav K. Dutta, Dennis H. Caplan, and Raef Lawson, "Lehman's $hell Game: Poor Risk Management," *Strategic Finance*, August 2010, pp. 23-29.

for such occurrences. The amount to be reserved is based on past experience with sales returns and management estimates of future trends. If historical data does not exist and estimation of future return is not possible, then recognition of revenue must be deferred until the right of return has expired.[32] Until then, any cash received should be accounted for as unearned revenue, a liability.

Groupon was rapidly growing and expanding to other markets. As a result, its product diversity increased from small-ticket items such as restaurant meals and salon services to high-ticket items such as international vacations and expensive medical services. Entering new markets with little or no historical experience, it became increasingly difficult for Groupon to estimate customer returns. It was soon observed that the refund requests from customers had soared. The spike in refund activity was significantly correlated with high price-point deals that the company had only begun offering in 2011. One example was a large number of refund requests for a deal involving Lasik eye surgery. Interestingly, many consumers who purchased the Groupon for eye surgery did not realize that they had to be in good physical condition to undergo surgical procedures. For these reasons, when these subscribers were deemed unfit to undergo the surgical procedure, they returned their purchase to Groupon and asked for a refund. Yet Groupon had already recorded the sale and reported the revenue in the previous quarter without having made an adequate provision for sales returns.[33]

Backdating of Employee Stock Options

The stock option backdating scandal of 2006 was one of the broadest to sweep across corporate America. According to Lynn Turner, the former chief accountant of the U.S. Securities & Exchange Commission (SEC), "This scandal has now touched perhaps more companies than any other single scandal."[34] As of April 2007, more than 264 public companies have been the subject of internal reviews, inquiries by the SEC, or subpoenas by the Department of Justice in regard to option backdating.[35]

Backdating was first identified by financial economists in academic research. Erik Lie showed that companies granting options had decreases in stock price (negative abnormal returns) just before unscheduled option grants in addition to increases in stock prices (positive abnormal returns) afterward, and he posited that "the awards might be timed ex post facto, whereby the grant date is set to be a particular date in the past on which the stock price was particularly low."[36]

The story received significant public and regulatory attention after *The Wall Street Journal* published a front-page report on option backdating on March 18, 2006.[37] There were more than 600 derivative lawsuits filed by shareholders against companies accused of backdating.

---

[32] Accounting Standards Codification (ASC) Section 605-15-25.

[33] Saurav K. Dutta, Dennis H. Caplan, and David J. Marcinko, "Growing Pains at Groupon," *Issues in Accounting Education*, February 2014, pp. 229-245.

[34] Robert A.G. Monks and Nell Minow, *Corporate Governance*, 4th edition, John Wiley & Sons, Hoboken, N.J., 2008, p. 322.

[35] Zabihollah Rezaee, Craig Langstraat, and John Malloy, "Option Backdating Scandals: How Management Accountants Can Help," *Management Accounting Quarterly*, Winter 2008.

[36] Erik Lie, "On the Timing of CEO Stock Option Awards," *Management Science*, May 2005, pp. 802-812.

[37] Charles Forelle and James Bandler, "The Perfect Payday," *The Wall Street Journal*, March 18, 2006, p. A1.

Employee stock options give the recipients the right to buy shares at a predetermined exercise price, usually the market price on the grant date. Once the options are granted, alteration of the terms or dates are not permitted. Unfortunately, some of the well-known companies did just that.

Manipulating employee stock options involved managing the timing of the grant date to increase the potential value of the stock option. Grant dates of options were retroactively managed to maximize the benefit to executives, directors, or other grantors of the option. Manipulation of the timing was achieved in three ways:

- Backdating: a practice in which the grant date was intentionally or unintentionally set as the day when the underlying stock price was low.
- Spring-loading: a practice in which the grant date was set shortly before announcing good news or withholding the announcement of good news until after stock options were granted.
- Bullet-dodging: a practice that involved setting the grant date shortly after bad news was announced.

Backdating employee stock options had detrimental effects on the companies and was indicative of corporate governance failure. This raised concerns about management integrity and was reflected in significant decline in stock prices.

Zabihollah Rezaee, Craig Langstraat, and John Malloy urge management accountants to act as "gatekeepers and effectively discharge their responsibility by complying with regulatory requirements, accounting standards and tax rules."[38] They enumerate means by which management accountants can help alleviate the problem by getting more involved in the determination, execution, and reporting of executive compensation.

Employee Fraud: A Growing Menace

According to the ACFE, there are three general categories of fraud: asset misappropriations, fraudulent financial statements, and corruption. This section focuses on the employee fraud that usually involves asset misappropriation.

One of the more disturbing and ironic facts about employee fraud is that an employee must first be in a position of trust before he or she is able to commit a fraud. The perpetrators of such schemes are usually trusted employees who have been with the organization for a long time and are considered diligent and devoted to their jobs, taking very few vacation and sick days. This section describes some of these instances and how the use of data analytics and management accounting techniques might have led to early detection of these schemes and could have possibly reduced the loss.

[38] Zabihollah Rezaee, Craig Langstraat, and John Malloy, "Option Backdating Scandals: How Management Accountants Can Help," *Management Accounting Quarterly*, Winter 2008.

Embezzlement at Koss Corporation

Koss is a headphone manufacturer with market capitalization of about $40 million in 2012. In August 2010, the SEC charged two senior accounting professionals at Koss with accounting fraud and embezzlement of more than $30 million from the company over a period of five years. Embezzlement of funds occurred through various means and over many years. The accounting officer embezzled millions of dollars, and the fraud was concealed by falsifying accounting books and records.

The fraud was uncovered when American Express noticed that the accounting officer's personal credit card balances were paid through large wire transfers originating from a company bank account. If it were not for the vigilance of American Express, the fraud may have continued for many more years as no one inside the company suspected any fraudulent activity despite the theft of half of the company's pre-tax earnings over a period of five years.

The SEC's August 30, 2010, complaint provides details of the means used to circumvent internal controls and embezzle millions of dollars.[39] The perpetrators stole from petty cash, issued fraudulent cashier's checks and wire transfers, and misused American Express traveler's checks purchased by the company for employees traveling on business. The cover-up involved making false journal entries to overstate assets, understate liabilities, understate revenues, and overstate expenses. One of the more egregious schemes used was to understate sales and siphon off the cash generated by those sales. They used fraudulent accounting to cover up the company's sales over the Internet and at its retail outlet, totaling $1.8 million.

Management accounting techniques such as contribution margin analysis or variance analysis may have alerted internal management of the possibility of fraud. Since the fraudulent journal entries were reducing sales and increasing cost of sales, the contribution margin was negatively affected. Analysis of the drop in contribution margin per unit would have alerted management to investigate whether the Marketing department was giving deep discounts to customers. Awareness and investigation of the reasons of drop in contribution margin might have led to the unraveling of the fraud.

Similarly, reporting and analyzing a reduction of sales volume would yield an unfavorable sales volume variance for which the marketing and sales departments would be held responsible. Internal investigations by those departments as to the reasons leading to the unfavorable sales variance might have revealed that the sales numbers were erroneous. Unfortunately, in this case, the personnel expected to conduct the analysis were the ones perpetrating the fraud.

Kickback Schemes and Shell Corporations

Senior employees with authority over disbursement or purchasing may create shell companies or enter into kickback agreements with vendors. The perpetrator usually is in a position to approve charges. The shell companies, controlled by the perpetrator, may bill for items not shipped or sell items at an inflated price.[40] Since the perpetrator is in the position to approve those charges, the inflated bills get approved.

---

[39] Read the full complaint at www.sec.gov/litigation/complaints/2010/comp-pr2010-160.pdf.

[40] Saurav K. Dutta, *Statistical Techniques for Forensic Accounting: Understanding the Theory and Application of Data Analysis*, Financial Times Press, Upper Saddle River, N.J., 2013.

In "Rooting Out Fraud in Your Organization," Bonita K. Peterson Kramer discusses in great detail one such instance of a kickback scheme and identifies the following red flags indicating a kickback scheme or other compromises to the integrity of the purchasing function:

- Purchasing agent performs incompatible functions;
- Purchasing agent rarely, if ever, takes vacations or sick days;
- Purchases totals exceed the budget;
- Increasing number of purchases from a particular vendor;
- Prices from the vendor are unreasonably higher than prices charged by comparable vendors;
- Invoices contain anomalies;
- Tips or complaints from honest vendors;
- Substandard products received; and
- Purchase totals are just below the agent's approval limit.[41]

Management accountants are in a position to review purchase orders and accounts payables. Familiarity with the operations of the business makes it easier to identify questionable purchases involving goods or services that are not received; substandard goods, inventory, shipping and receiving records, pricing anomalies, and complaints from internal and external customers—all of which lead to actionable reporting and the ability to detect instances of fraud or misappropriations. Review of purchasing activity is part of the role of management accountants' role.

Fraud in Municipalities

Although many well-publicized instances of fraud involve public companies, governmental entities are not immune from fraud. Municipalities and state governments are especially vulnerable to fraud since they operate with small budgets—this creates challenges in establishing adequate internal controls or hiring competent and trustworthy employees. According to the ACFE's 2014 Report to the Nations on Occupational Fraud and Abuse, government and public administration had the second-highest reported fraud cases out of 22 industries.[42] In recent years, a number of large fraud cases have shaken local governments. Here are two noteworthy cases, along with a summary of the internal control failures that allowed these frauds to perpetrate undetected for decades.

The City of Dixon in Illinois was the victim of one of the biggest and longest-running municipal fraud ever committed. Located southwest of Chicago, Dixon is a small city of less than 16,000 residents. Dixon had an annual budget of approximately $9 million, but its comptroller, Rita Crundwell, stole nearly $54 million over a period of 20 years through a relatively simple embezzlement scheme.[43]

---

[41] Bonita K. Peterson Kramer, "Rooting Out Fraud in Your Organization," *Management Accounting Quarterly*, Summer 2009.

[42] Association of Certified Fraud Examiners (ACFE), "Report to the Nations on Occupational Fraud and Abuse: 2014 Global Fraud Study," 2014, www.acfe.com/rttn.aspx.

[43] Kelly Richmond Pope, "The $54 Million Fraud," *CPA Biz*, American Institute of Certified Public Accountants (AICPA), July 31, 2013.

Crundwell began working for the City of Dixon as an accounting clerk in the 1970s. By 1983, she had worked her way up to the position of treasurer and comptroller of the city's finances. The embezzlement scheme started in the 1990s when Crundwell opened a fictitious bank account under the name RCSDA (Reserve Sewer Capital Development Account) for the municipality but designated herself as the only authorized user. Crundwell wrote checks from the city's municipal bank accounts made out to the "treasurer," which were then deposited into the RCSDA.

The RSCDA was used as her personal bank account and was never used for legitimate expenses related to the City of Dixon. In order to legitimize the fraud, Crundwell created an audit trail of fake invoices to support the checks made to the RSCDA. She was the only person who knew about the fraud, so she had to keep tight control over all of the city's financial transactions, including its mail. Interestingly, she would have her relative pick up the city's mail when she was traveling or on vacation.

The fraud quickly unraveled when Crundwell loosened control over the city's mail in 2011. During Crundwell's extended vacation, another employee requested records from the bank for the city's account and discovered the RCSDA. Investigation ensued, and the scheme that was operational for a period of 20 years unraveled. Shortly thereafter, Crundwell pled guilty and was sentenced to 19.5 years in prison and was ordered to pay $53,740,394 to the City of Dixon.

Another sizable fraud scheme was carried out by Harriette Walters while working in the District of Columbia's Real Property Division of the Department of Finance and Revenue. The scheme began in 1989 and involved creating fake tax refund checks made out to her friends and family. The fraud quickly grew to what would ultimately become a $48.1 million scandal.[44]

From 1989 to 2007, Walters created upwards of 230 fake refund checks to nonexistent corporations. In 2005, the manual check-writing system was automated, and the property-tax module had built-in controls that created audit trails. Yet Walters would routinely bypass the automated system and had the authority to issue manual checks. The fraud eventually unraveled when one of the banks where a fake check was deposited required employee identification from the person making the withdrawal. The bank got suspicious and contacted the FBI. Following the inquiry into the shell company, the investigation uncovered the largest embezzlement scheme to hit Washington, D.C.[45]

Misplaced trust and lack of proper controls were key flaws that led to such extensive fraud, which went unnoticed for decades. Rita Crundwell was a trusted employee of the City of Dixon, having started at an entry-level job right out of high school. She was promoted to a key position and entrusted with handling all of the city's bank accounts. When she opened the RCSDA at a local bank, the bank trusted that it was within her authority to do so and never questioned her intentions. Harriette Walters found herself in a similar situation of trust, having started at an entry-level job and proven herself as a devoted employee. She was allowed to manually process refund checks even after the installation of the automated system with built-in controls.

---

[44] Del Quentin Wilber, "Tax Scam Leader Gets More Than 17 Years," *The Washington Post*, July 1, 2009.

[45] Philip F. Jacoby, Sebastian Lorigo, and Brent T. McCallum, "Fraudulent Tax Refunds: The Notorious Career of Harriette Walters," *Current Issues in Auditing*, June 2011, pp. A23-A38.

Internal control systems were lax in both situations. In Dixon, there was inadequate segregation of duties, and Crundwell was allowed to perform multiple incompatible tasks, such as being responsible for incoming mail, the overseer of bank accounts, and having authority to write checks. In Washington, D.C., even though a new system with built-in control was instituted, it was routinely bypassed and Walters had the authority to write checks manually.

For an internal control mechanism to be effective, it cannot be bypassed. In both of these situations, the fraud could have been detected much earlier and the damages curtailed through simple data analytic techniques.

Adaptation of Traditional Management Accounting Tools to Detect Fraud

Though management accounting techniques and tools were not intended to be used in forensic accounting tasks, using some of these techniques can direct management's attention to suspicious transactions or events. Three common management accounting techniques—contribution margin analysis, budgeting, and variance analysis—can be used to prevent or detect employee frauds.

Contribution Margin Analysis

There are two important concepts relating to profit margins—gross profit and contribution margin. Gross profit is a financial accounting concept and is reported in the financial statements as the difference between the revenue and cost of goods sold. Contribution margin, on the other hand, is a management accounting concept and is the difference between revenue and variable costs.

While the gross profit is always available and reported to external users, only management accountants have access to information needed to compute contribution margin. Contribution is used to evaluate profitability across product lines, geographical regions, etc. It also allows for computing break-even points as well as budgeting for sales level to achieve desired profits. Contribution margin analysis is helpful in making critical management decisions, such as dropping a segment, dropping a product line, accepting a special order, or giving discounts to some customers. Additionally, a review of contribution margin also enables the detection of common employee frauds such as skimming of sales or theft of inventory.

Gross margin and contribution margin are related but provide different insights into the organization's profitability. Most important, they differentiate between fixed costs and variable costs. Since fixed costs usually include depreciation expense, rent expense, insurance expense, etc., it is more difficult for an employee to manipulate them to yield personal financial gain. As a result, employee frauds are usually concealed in variable costs.

Examining and analyzing variable costs separately may lead to unraveling of fraud. To illustrate this through an example, consider the two income statements presented in Figure 4. On the left is a contribution income statement, and on the right is the financial accounting income statement. The income statement on the left differentiates between fixed and variable costs, while the statement on the right distinguishes between product and period costs.

FIGURE 4: INCOME STATEMENTS

Contribution Income Statement		Financial Accounting Income Statement	
Revenues	5,000	Revenues	5,000
Variable Manufacturing Costs	1,000	Variable Manufacturing Costs	1,000
Variable Nonmanufacturing Costs	800	Fixed Manufacturing Costs	1,500
Contribution Margin	3,200	Gross Margin	2,500
Fixed Manufacturing Costs	1,500	Variable Nonmanufacturing Costs	800
Fixed Nonmanufacturing Costs	700	Fixed Nonmanufacturing Costs	700
Operating Income	800	Operating Income	800

The only difference between the two income statements is that the variable nonmanufacturing costs switch place with fixed manufacturing costs. In the financial accounting income statement, fixed manufacturing costs are deducted from revenue to obtain gross margin. In the contribution income statement, the variable nonmanufacturing costs are deducted instead to compute contribution margin. Thus the difference between contribution margin and gross margin can be explained by the difference between variable nonmanufacturing costs and fixed manufacturing costs. In Figure 4, variable nonmanufacturing costs are $700 less than fixed manufacturing costs (1,500 – 800). Consequently, the contribution margin is $700 greater than gross margin.

Displaying the income statement in the contribution format enables the use of simple analytics to discover anomalies. Since the variable costs are related to sales volume, contribution margin as a percentage of revenues is expected to be more or less constant. Further, as fixed costs are not related to sales volume, these costs are expected to be largely constant from one period to the next. A management accountant can thus analyze whether contribution margin as a percentage of revenue is changing dramatically from one period to the next or across geographical segments.

Such analysis is not meaningful in the financial accounting income statement, which reports gross margin. Gross margin as a percentage of sales varies depending on the sales volume because of the fixed cost component embedded into the cost of goods sold. Gross margin as a percentage of sales is expected to be higher in periods of high sales and lower in periods of low sales. Similarly, nonmanufacturing costs are not expected to be constant from one period to the next as the variable portion varies with the amount of sales revenue.

At Koss Corporation, the employee fraud was concealed by understating revenues earned by the company. But the perpetrators were not understating expenses. While this would lead to a drop of gross margin percentage, it is not entirely evident that the decrease is caused by fraud, as some decline in gross margin percentage is expected as revenues decline. In a contribution margin income statement, however, this would result in a significantly lower contribution margin because the variable costs pertain to all of the sales while the revenue reported is only for the fraudulently lowered sales. The resultant decrease in contribution margin ratio would be evident and should raise a red flag for further investigation. A further drill down on margin by product might have highlighted a material usage variance between units produced and sold.

Budgeting

A budget serves as a blueprint for an organization to follow in a future period. It helps quantify the consensus opinions, forecasts, and estimates of various managers. Development of a budget, a prudent management practice, may deter employee fraud. Budgets in well-managed companies are an integral part of the planning process, and managers at all levels contribute their expertise to form the budget. The budgeting process accounts for the company's past performance as well as market feedback and anticipated future changes in the economy.

The core of the budgeting process is the master budget. It expresses management's operating and financial plans and is the initial plan of what the organization intends to accomplish and how it plans to operate. Changes from budgets are permitted but are subject to scrutiny.

In the absence of a budget, management accountants are hampered in their ability to investigate unusual transactions because there is no mechanism to direct their attention to any abnormalities. Basically, to identify something unusual, one needs to define what is usual or normal. Budgets are the means of defining normal, expected, or usual events that would occur in the forthcoming period.

Since the process of budgeting requires communication and coordination across various units of the organization, it is more difficult for a perpetrator to commit fraud. In each of the situations described in "Kickback Schemes and Shell Corporations" and "Fraud in Municipalities," the perpetrator took advantage of a lack of direct communication between different parts of the organization. The fraud was unraveled as soon as direct communication links were established, such as when the perpetrator took a vacation.

The coordination required for budgeting forces various parts of the organization to think about the impact of their division with others and encourages the sharing of information across departments. Effective sharing of information may help to detect the fictitious journal entries needed to coverup fraud.

Furthermore, budgeting enables management accountants to compare actual performance relative to budgeted performance and to evaluate variances. Variance analysis related to usage, spoilage, and pricing can help identify potential fraud.

Variance Analysis

Management accountants traditionally use variance analysis to manage business by efficiently directing attention to areas that appear unusual. Such methodologies can make fraud detection more efficient.

While causal and deterministic relationships between parameters, e.g., unit sales and revenue, lead to an expectation of one variable given the value of the other, often such relationships are probabilistic in the real world. It requires the development of statistically based techniques to model known relationships as well as identify previously unknown patterns. Management accountants can help in forensic accounting by harnessing their knowledge of business processes and relationships to construct predictive models that help identify deviations from the norm.

Variance analysis is part of a control function that facilitates management by exception. Management by exception is a practice whereby managers focus more closely on areas that are not operating as expected. Purchasing inventory at higher prices as part of a kickback scheme or the use of a shell company

would result in unfavorable purchase price variances of inventory. Purchasing materials of lower quality, or purchasing fewer units than paid for, may show up as excessive waste or losses in inventory. Management accountants need to investigate these further and question if the changes in the economic conditions justify a large unfavorable variance.

Without economic or market-based justification, a large variance becomes a red flag that should be brought to the attention of the internal audit team or forensic accountants. Kickback schemes involving the purchasing function can be unraveled through investigation of unfavorable purchase price variances as well as material usage variances. Similarly, in the Diamond Foods case, not having an unfavorable variance in situations where the economic conditions justify a large unfavorable purchase price variance (due to sudden increase in commodity prices) is a cause for concern and may be indicative of management fraud.

Sales volume variance is the difference in the actual and planned results attributable to the changes in sales volume. In other words, it is the difference between the flexible budget and the static budget. At Koss Corporation, an investigation of sales volume variance would have led to the questioning of entries. Since the sales revenue was skimmed by the perpetrators, they covered up the fraud by understating revenue.

If the organization had developed a static budget and engaged in variance analysis, it would have noticed a large sales volume variance in revenue. This could be attributable to unit variance or a price variance—i.e., was Koss selling less units, or was it selling at a lower price? If these questions were posed to the marketing/sales professional in the organization, the inquiry might have discovered the fraud earlier. (Note that the company did not internally discover the fraud but was alerted to it by American Express, which became suspicious that personal credit card bills were being paid through large wire transfers from a public company. Absent the vigilance of American Express, the fraud might have continued for many more years.)

Similarly, large and unfavorable material usage variances may indicate theft or shrinkage of raw materials inventory. This may also be caused by nonreceipt of merchandise or short-shipment, i.e. shipment of fewer goods than ordered and billed for. The presence of a large unfavorable variance by itself does not prove fraudulent activity, rather it is merely consistent with fraudulent activity. These variances have to be further investigated. Absent any economic justification, they might be a result of fraud.

Not all investigations of large unfavorable variances will result in the unraveling of fraud. There may be instances of false positives (Type II errors). Given the economic costs to an organization as a result of fraud, however, expending effort to investigate these anomalies is justified.

Data Analytics Tools

The availability of large amounts of data has created a new role for management accountants, for which they need to hone their skills in visualizing data by using patterns, algorithms, analysis skills, and business knowledge. They can aid in the field of forensic accounting by formulating and investigating hypotheses as new data and information becomes available. Management accounting provides many tools, technologies, and techniques to convert data to meaningful information. Management accountants need to understand and harness the current developments in data mining technology.

The skill to look at accounting data from a wider business perspective is invaluable for management accountants in identifying conceptual inconsistencies between the organization's financial data and other operational/industry/macroeconomic data. Management accountants need to possess the necessary skill set and competency to identify trends, patterns, and relationships between these varied data elements. Identification of such relationships is fundamental and imperative to forensic analytics.

Data mining is a collection of techniques and algorithms for unraveling patterns concealed in large data sets. The abundance of data in accounting, coupled with the need for powerful data analysis, is often described as a "data rich but information poor" situation.[46] The manual interpretation of data or assessing information from massive amounts of data has become more challenging in the current Big Data environment, thus the advent of data mining tools.

There are two types of data mining tasks: descriptive and predictive. Descriptive tasks describe the general characteristics of data with the aid of charts, graphs, and other visual aids. Predictive tasks help draw inference from data to identify patterns and trends. Management accountants may not have *a priori* knowledge of interesting patterns in the data, but they instead may discover it through repeated data searches and analysis.

The data mining system identifies patterns in the data—some informative, some spurious. Management accountants can use their business knowledge and analytic techniques to interpret the patterns and determine which of these patterns are interesting or informative. The various data mining tools in vogue today could be harnessed to detect fraud schemes.

Continuous Monitoring and the Big Data Environment

Continuous monitoring enables a constant review of business processes for adherence to and deviation from the intended levels of performance and effectiveness. Deviations from intended levels of performance form the basis for further investigation, supporting audit/forensic activities. This enables organizations to quickly and more effectively adapt to changes in enterprise risks and perceived compromises to the organization's control environment. Continuous monitoring of organizational performance fosters an integrated approach to control of both operational and financial information.

[46] Saurav K. Dutta, *Statistical Techniques for Forensic Accounting: Understanding the Theory and Application of Data Analysis*, Financial Times Press, Upper Saddle River, N.J., 2013.

As the volume of data increases, models help management accountants identify what is important, organize it, hypothesize about it, and discover connections between disparate data. Through such approaches, management accountants can help the organization transform into a risk-intelligent enterprise that proactively manages risks and reduces its exposure to fraud rather than retroactively acknowledging the compromises of controls and occurrence of fraud. Rather than focus on a single risk or event, management accountants can effectively manage risk across organizational silos and consider interactions of multiple risks and breaches.

Management accountants thrive on the collection, analysis, and dissemination of data. As the amount of organizational data grows exponentially, so do the opportunities for management accountants. In the Big Data environment, management accountants are expected to make significant contributions. Data in varying formats and from various sources are processed, fused, and superimposed to enable a more contextual interpretation and analysis.

Disparate sources of information generate significant amounts of data that often lack relevance, clarity, and accuracy. Meaningful aggregation of data of various types—structured-unstructured, numeric-textual, objective-subjective—is an arduous task and can be effectively performed only by professionals with experience in data handling and who have a broad business perspective. In many cases, a number of complex data sets need to be correlated and mathematical models or computer algorithms need to be employed to identify anomalies as predictors of fraud. For example, in some fraud investigations, information from social networking websites and textual data from e-mails are analyzed for the sentiments that might express motivation or rationalization for committing fraud.

Association Analysis

In order to make timely and effective decisions, management accountants must link data attributes together and develop associations within information sets. This can be accomplished using association analysis. Historically, association rules have been largely utilized in marketing to understand customer purchasing behavior, answering questions about what products to put adjacent to each other on grocery store shelves or how to reduce the cost of print advertising by sending the customer only what they are interested in.

What makes this tool extremely powerful is its use of Boolean vectors, where variables can only be assigned either a 1 (occurrence) or 0 (nonoccurence). For example, if a department store wished to know the presence of a relationship between nail purchases and hammer purchases, it would analyze customer purchase logs and search for a 1 assigned to both a hammer and nails. If many customers display this same behavior, a relationship can be inferred, and the organization has a better understanding of its inventory movement, sales drivers, and customers.

Association analysis has a wide variety of uses in an organization, and fraud detection is increasingly becoming one of those uses. Boolean vectors can alert management accountants to unexpected connections within the organization. If the variables are inventory theft and the presence of each warehouse supervisor, association analysis can help determine if there is a relationship between who is on duty at the warehouse and the occurrence of inventory theft. In a normal system with a sufficient amount of data, an even distribution would be expected between when inventory theft occurs and which warehouse supervisor

is on duty. In other words, one would expect to find each warehouse manager assigned a proportional amount of 1s (working) or 0s (not working) when inventory theft has taken place. If, however, one supervisor displays a large amount of 1s while the other supervisors are mostly assigned 0s, an association can be made and the management accountant is better equipped to mitigate the loss and address the issue.

Association analysis could be used to unravel kickback schemes or the use of a shell company and other common fraud schemes in the purchasing function. If a particular vendor's invoices are approved by only one purchasing agent, or if the vendor always requests to speak with a particular purchasing agent, association analysis would reveal these anomalies, perhaps leading to earlier detection of kickback schemes.

In general, the process of using association analysis to uncover fraud is similar to the process of predicting customer behavior or other applications. The difference is that when searching for red flags of fraud, it is not enough to identify the interorganizational associations. Rather, the task is to discover the unexpected or atypical associations that would be present when activities within the business are being conducted in an obscure or possibly deceptive manner.

Cluster Analysis

Cluster analysis groups similar data elements into a set and then categorizes numerous elements of data points into a few clusters. The objective of cluster analysis is to increase homogeneity within a cluster and increase heterogeneity across clusters.[47] The clusters are formed so that the objects within each cluster have high similarity to one another but are highly dissimilar to objects in other clusters. When clusters are formed, rules pertaining to each cluster can be developed that are applicable for one cluster but not applicable for others. In a management accounting context, visualize various costs are plotted in a graph opposite production volume. Many clusters would be formed—one for fixed costs, one for variable costs, and one for step costs. When a large amount of data is fed into the system, the algorithm by itself identifies different cost patterns.

The term "cluster analysis" does not identify a particular statistical method or model. It also does not require any assumptions regarding the underlying distribution of data. While most statistical methods are constrained by the assumption of *normality*, cluster analysis is not limited by any assumption regarding distributional property of data. Cluster analysis is more generalized and could form groups of related variables similar to factor analysis. Standard statistical packages, such as SPSS, have procedures that can be used to cluster data, including hierarchical cluster analysis, k-means cluster, and two-step cluster.

Cluster analysis is notably different than the traditional statistical method of discriminant analysis in that it requires less knowledge on the part of the user to conduct a meaningful cluster analysis. Discriminant analysis requires the user to know group membership for the instances used to derive the classification rule. For example, in distinguishing between several disease groups using discriminant analysis, cases with known diagnoses must be available. Based on the known cases, the system derives rules for classifying undiagnosed patients. In cluster analysis, the user does not need to know what item belongs to which groups or even the number of groups.

---

[47] Saurav K. Dutta, *Statistical Techniques for Forensic Accounting: Understanding the Theory and Application of Data Analysis*, Financial Times Press, Upper Saddle River, N.J., 2013.

This is particularly pertinent for the task of fraud detection. With traditional methods, known fraud cases have to be input into the system, which then finds similar occurrences with the same characteristics. This has limited value in identifying new fraud schemes. Cluster analysis does not demand that level of knowledge. Of course, as with any other decision support aid, universal detection is not guaranteed, but this method is more suitable to detect previously unknown anomalies. It addresses the risk of the "unknown unknown."

For example, cluster analysis has been employed to group insurance claims to identify fraudulent claims.[48] The sample consisted of 40,800 insurance claims filed. Each claim had 208 attributes. From the large data set, cluster analysis identified three dominant characteristics of outlier clusters: large beneficiary payment, large interest payment amounts, and long lag between submission and payment. While this does not necessarily imply fraud, these outliers identify a small subset of claims that perhaps need to be investigated further.

In a management accounting context, consider items sold, profitability, volume of sales, overtime, and so on. At the outset, it is unclear how many groupings are possible or what the membership would be for each of the groups. Cluster analysis would identify the number of groups as well as the membership of each group. The pattern thus generated can then be supported by business reasoning. This does not necessarily mean there is something amiss, but rather it identifies the concern for further examination and investigation. In other words, it makes the task of management accountants more efficient by limiting the number of instances that require investigation.

Outlier Analysis

In some situations, a database may include data that does not conform to the general rule derived for the dataset or the general behavior of other data elements. Such data elements are termed "outliers," a term commonly used in probability and statistics. While most common applications of data analysis tend to disregard and ignore the outliers, they have a special significance in fraud detection. Outliers may be detected using statistical tests that assume a probability distribution for the data and a distance measure, such as standard deviation, that identifies elements that are significantly separate from the cluster. Alternatively, instead of using probability models and statistical concepts of distance, outliers can be identified by examining the differences in the main characteristics of objects in a group.

Outlier analysis is often used to identify fraudulent use of credit cards.[49] If nine transactions on a particular credit card occurred in New York City and a cab fare was charged in Chicago, the cab fare in Chicago does not conform to the general characteristics of the rest of the data and is identified as an outlier that requires further investigation. A statistical method to identify outliers would be to compare the number of transactions of a given period. Mean and standard deviation of the number can be estimated from historical data, and an excessive number of transactions over a given period can be identified quickly.

[48] Sutapat Thiprungsri and Miklos A. Vasarhelyi, "Cluster Analysis for Anomaly Detection in Accounting Data: An Audit Approach," *The International Journal of Digital Accounting Research*, July 2011, pp. 69-84.

[49] Richard J. Bolton and David J. Hand, "Statistical Fraud Detection: A Review," *Statistical Science*, 2002, pp. 235-255.

Outlier analysis could have highlighted the quarter-end usage of Repo 105 transactions at Lehman. In an outlier analysis, the data regarding various transactions and dates would be entered into the system. The unsupervised system would compute the mean and variances of each transaction and would highlight days on which these transactions were unusually excessive, i.e., outliers. At Lehman, the Repo transactions occurred primarily at quarter-end and definitely would have brought attention to the abnormal usage of the transaction.

Regression Analysis: Beneish Model

Without having to dig deep into the data stream, management accountants can obtain some preliminary assessment of the risk of manipulation in the financial statement by using the Beneish Model. Based on logit regression analysis, the Beneish Model is a tool that combines data from financial statements to generate an M-score, which assesses the probability of earnings management.[50] It is a tool that can alert users of financial information to manipulative characteristics within data sets.

The Beneish Model is built on eight separate factors that are all compiled from information within the financial statements:

1. Days Sales in Receivables Index relative to prior years;
2. Gross Margin Index relative to prior years;
3. Asset Quality Index relative to prior years (asset quality is a ratio of noncurrent assets, other than PPE, to total assets);
4. Sales Growth Index;
5. Depreciation Index (rate of depreciation) relative to prior years;
6. Sales, G&A Expenses Index;
7. Leverage Index (ratio of total debt to total asset) relative to prior years; and
8. Total Accrual to Total Asset, which assesses the extent to which managers make discretionary accounting decisions.

These eight factors were believed to be attributes by which manipulated financial statements varied from the norm. The factors are then further weighted using coefficients. For example, the sales growth index has a positive coefficient because as sales growth increases, so does the probability of manipulated financials intended to increase earnings. On the other hand, the selling and administrative expense index has a negative coefficient because the probability of manipulated financials increases as these expenses go down. Of course, some firms that are not manipulating their earnings may exhibit behavior that the model considers questionable. This is known as a Type II error. Costly Type I errors, however, are effectively eliminated because manipulated financials will almost always generate a high probability of manipulation in the Beneish Model.

[50] Messod D. Beneish, "Detecting GAAP Violation: Implications for Assessing Earnings Management Among Firms with Extreme Financial Performance," *Journal of Accounting and Public Policy*, Autumn 1997, pp. 271-309; and Messod D. Beneish, "The Detection of Earnings Manipulation," *Financial Analysts Journal*, September-October 1999, pp. 24-36.

The underlying formula is simple to use in Excel or any other computational tool. The model will first calculate a y value, and then convert the y value into a probability using a standardized normal distribution. If using Excel, this task can be performed using the NORMSDIST function on the y value. Here is the underlying formula:

y = -4.840 + 0.920 (DSRI) + 0.528 (GMI) + 0.404 (AQI) + 0.892 (SGI) + 0.115 (DEPI) – 0.172 (SAI) – 0.327 (LVGI) + 4.670 (TATA)

Conclusion

Forensic accounting is of growing importance to all organizations worldwide. With the increased economic consequences of fraud, organizations need measures to reduce the risk of fraud. Management accountants have much to contribute to the process by adapting commonly used techniques of contribution margin analysis, static and flexible budgeting, and variance analysis to direct attention to anomalies caused by financial misappropriation. Additionally, techniques such as association analysis, cluster analysis, outlier analysis, and regression tools developed in data analytics can be co-opted into forensic analytics.

Additional Resources

Brian Ballou and Dan L. Heitger, "A Building-Block Approach for Implementing COSO's *Enterprise Risk Management—Integrated Framework*," *Management Accounting Quarterly*, Winter 2005.

Thomas A. Buckhoff and Bonita K. Peterson Kramer, "Using Excel to Ferret Out Fraud," *Strategic Finance*, April 2005, pp. 46-49.

Committee of Sponsoring Organizations of the Treadway Commission (COSO), *Enterprise Risk Management—Integrated Framework: Application Techniques*, American Institute of Certified Public Accountants (AICPA), New York, N.Y., 2004.