# FRAUD DETERRENCE IN ORGANIZATIONS
## USING FORENSIC ACCOUNTING AND DATA MINING TECHNIQUES

Occupational fraud is a critical issue in businesses around the world, and one that must be dealt with urgently. To address the issue and resolve it quickly, organizations should invest in research to identify the root causes. This research attempts to identify the risk factors causing frauds and develop a fraud deterrence model that identifies potential frauds. This session will use a case study to explore how a fraud deterrence system can help your organization prevent fraud, improve risk management, and minimize losses due to fraud.

You will learn how to:

- Deter or minimize fraudulent activities in an organization.
- Avoid or reduce the potential loss or damage to the firm.
- Improve the efficiency and effectiveness of risk management.

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Fraud has been a critical issue in businesses around the world, including in Thailand, for many years, and fraud cases are increasing year after year. However, it is difficult to measure the real cost of fraud in an organization due to insufficient information, since the victim organization might not report it. The other difficulty in measuring fraud is that perpetrators might have concealed their activities through a series of complex transactions (Digabriele, 2008). It is estimated that the loss due to fraud for businesses is about 5–7 percent of the annual business revenue in the U.S. (Table 1). The amount of loss due to occupational fraud and abuse did not decrease after the Sarbanes-Oxley Act and Statement of Auditing Standards (SAS) No.99 were enacted in 2002. Fraud can take place from within the organization or externally, or both.

(Trillion USD)

| Description | Year | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1995-1996 | 2002 | 2004 | 2006 | 2008 | 2010 | 2011 | 2013 |
| Gross domestic products | 6.67 | 10.00 | 11.00 | 13.04 | 14.20 | 58.00 | 70.00 | 73.87 |
| Loss to occupational fraud and abuse | 0.40 | 0.60 | 0.66 | 0.65 | 0.99 | 2.90 | 3.50 | 3.70 |
| Loss to gross domestic products (%) | 6.00 | 6.00 | 6.00 | 5.00 | 7.00 | 5.00 | 5.00 | 5.00 |

Table 1: Estimated loss due to occupational fraud and abuse in the United States of America
Source: Adapted from Association of Certified Fraud Examiners Report 1996, 2002, 2004, 2006, 2008, 2010, 2012 and 2014

The Forensic Department of KPMG Company in Thailand conducted a fraud survey in 2005 and 2007, and it appeared that fraud risk was a major concern for businesses in Thailand (KPMG, 2007). The estimated financial loss from fraud detected in Thailand from 2005 to 2007 is shown in Table 2 below. While the percentage of fraud less than a million *baht* (Thailand currency) decreased, fraud above a million baht went up. The survey also indicated that the fraud issues faced in Thailand were also faced in other countries. Furthermore, half of the survey respondents

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expected that fraud cases would increase in the next two years (KMPG, 2007).

| Amount | 2005 | 2007 |
|---|---|---|
| Baht 10 million and above | 11% | 16% |
| Baht 5 million to less than 10 million | 5% | 8% |
| Baht 1 million to less than 5 million | 15% | 18% |
| Baht 100,000 to less than 1 million | 31% | 27% |
| Less than Baht 100,000 | 38% | 31% |

Table 2: Estimated financial loss in cases of fraud detected in Thailand

Source: Adapted from KMPG, 2007: 8

After Enron and WorldCom collapsed, many organizations established policies and regulations to detect internal fraud. The Sarbanes-Oxley Act was enacted on January 23, 2002, by the Senate and the House of Representatives of the U.S. to protect investors by improving the accuracy and reliability of corporate disclosures made pursuant to the securities laws, and for other purposes. The Auditing Standards Board (ASB) of the American Institute of Certified Public Accountants (AICPA) issued Statement of Auditing Standards No.99 to consider fraud in a financial statement in October 2002.

In Thailand, Thai Standard on Auditing No.240 states that the auditor should ensure that financial statements audited are free from fraud or error, which is in line with International Standard on Auditing No.240 (Federation of Accounting Professions, 2001; International Federation of Accountants, 2001). The Securities and Exchange Act 1992 of Thailand, section 107, also clearly defines that if the auditor finds any false supporting documents and/or incorrect recording in the accounts of a listed company, the auditor shall disclose the effects on the financial statement

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in the audit report (Securities and Exchange Commission of Thailand, 1992).

Apart from that, the committee of the Thai Stock Exchange announced the code of governance for listed companies to use as guidelines for business operations. Some of the governance scopes are internal control and internal audit to ensure the transparency of financial information of the company (Securities and Exchange Commission of Thailand, 2010).

Most of these regulations are used to detect frauds that have already occurred in a business resulting in loss or damage, as shown in Table 1 and 2. It would be beneficial to the business if there was a system in place where fraud could be detected early so that it could be prevented or loss could be minimized as much as possible.

Deterrence is the best way to stop fraud before it happens, which should reduce the loss or damage to the organization (Wilhelm, 2004; Yue et al., 2007). Fraud prevention activities, on the other hand, occur when the deterrence fails but before the fraud is detected (Wilhelm, 2004). Detection is described as the actions and activities that identify fraud, prior to, during, and subsequent to the completion of the fraudulent activity (Wilhelm, 2004).

Risk management is required to identify and assess the risk, measure the likelihood and the impact for such risk, and determine the treatment strategy to eliminate as well as monitor the risk incident. By doing so, the Guidelines of Enterprise Risk Management Integrated Framework (COSO) and Risk Management—Principles and Guidelines of the International Organization for Standardization (ISO 31000) should be considered, as they are good guidelines for risk assessment (Committee of Sponsoring

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Organizations of the Treadway Commission, 2004; International Organization for Standardization, 2009).

The fraud risk factors were identified in the 2010 *Report to the Nations*, published by the Association of Certified Fraud Examiners. These factors were derived from fraud cases reported by Certified Fraud Examiners around the world. It is important to know if the same fraud risk factors are applicable in Thailand. If they are, the fraud deterrence system that will be developed and implemented can be used not only in Thailand but also in other countries.

**Fraud Classification**

The type of fraud relevant to accountants and auditors is called *occupational fraud* and is classified into the following categories (Association of Certified Fraud Examiners Report, 2008 and 2010):

- ❑ Employee fraud/asset misappropriation
    - The most common type of fraud, it involves theft or misuse of an organization's assets, such as skimming revenues, stealing inventory, and payroll fraud. Asset misappropriation can be divided into cash schemes and noncash schemes. Cash schemes involve the theft of money or other assets in the company.
- ❑ Corruption
    - Corruption occurs when fraudsters wrongfully use their influence in a business transaction in order to procure some benefit for themselves or for other people, contrary to their duty to their employer or the rights of another, such as accepting kickbacks and engaging in conflicts of interest.
- ❑ Fraudulent statements
    - Fraudulent statements generally involve falsification of an organization's financial

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statements, such as overstating revenues and/or understating liabilities or expenses.

**Fraud Triangle**

Donald R. Cressey studied *embezzlement*, which he called a "criminal violation of financial trust," for his doctorate in criminology. He also called embezzlers "trust violators" instead of "white collar criminals," a term that was introduced by Sutherland (Cressey, 1953).

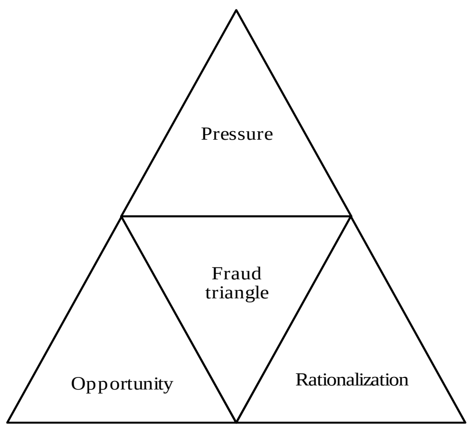


Figure 1: Fraud triangle

Source: Adapted from Singleton et al., 2006: 9

***Pressure***

Pressure (incentive or motivation) refers to something that motivates people to commit fraud. Pressure might come from financial stress, gambling, or personal lifestyle. However, not only poor people commit fraud; wealthy individuals and top management of the company also commit fraud.

***Opportunity***

The management of the firm might know the weaknesses of the internal control process of the organization. Some managers might use such knowledge to commit fraud—as per Cressey's research,

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which stated: *"[A] fraudster always has the knowledge and the opportunity to commit the fraud"* (cited in Singleton et al., 2006: 10).

***Rationalization***

Most fraudsters do not have a criminal record (Albrecht et al., 2009; Association of Certified Fraud Examiners Report 2008). Actually, white collar criminals often have a personal code of ethics. "It is not uncommon for a fraudster to be religious" (Singleton et al., 2006: 10). The fraudster steals money or assets from the company and thinks that he will pay it back. Unfortunately, he never returns the funds; hence, a fraud is committed. According to the conclusions of Donald Cressey, fraudulent activity occurs when three factors combine: pressure, opportunity, and rationalization.

**Fraud Management Lifecycle Theory**

The fraud management lifecycle has eight stages: deterrence, prevention, detection, mitigation, analysis, policy, investigation, and prosecution, as shown in Figure 2 (Wilhelm, 2004). Effective fraud management requires the skills to manage all stages of the fraud management lifecycle.

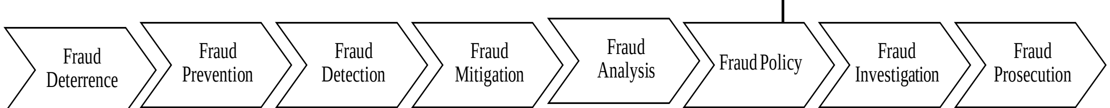


Figure 2 Fraud management lifecycle
Source: Adapted from Wilhelm, 2004

***Risk Factors Causing Fraudulent Activities***

Top management should be alert to any warning signs that might indicate that a fraud is taking place. These warning signs may be:

- Living beyond means
- Financial difficulties

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- Control issues, unwillingness to share duties
- Unusually close association with vendor/customer
- Wheeler-dealer attitude
- Divorce/family problems
- Irritability, suspiciousness, or defensiveness
- Addiction problems
- Refusal to take vacations
- Past employment-related problems
- Complained about inadequate pay
- Excessive pressure from within organization
- Past legal problems
- Instability in life circumstances
- Excessive family/peer pressure for success
- Complained about lack of authority

The research conducted in 2010 on risk factors causing fraudulent activities in organizations in Thailand indicates that "borrowing money from coworker" and "gambling" are additional risk factors for fraudulent activities (Naruedomkul, 2010).

**Forensic Accounting**

The Association of Certified Fraud Examiners defines *forensic accounting* as "the use of professional accounting skills in matters involving potential or actual civil or criminal litigation, including, but not limited to, generally acceptable accounting and audit principles; the determination of lost profits, income, assets, or damages; evaluation of internal controls; fraud; and any other matter involving accounting expertise in the legal system."

***Skills Needed by a Forensic Accountant***

Wallace (2001) listed the minimum qualifications of forensic accountants as follows:

– An ability to review a large volume of documentation ranging from the more usual

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accounting records and management information systems to memos, correspondence, and other less obvious financial data to extract the key issues quickly
- A sound understanding of peculiarity of various business methods
- A sense of urgency and commitment which will ensure prompt response when required, however slow civil litigation may appear to the onlooker or even to the participant in a targeted time
- Adherence to a strict timetable even when needs arise to work for more hours to meet targeted time
- An ability to communicate complex theoretical ideas in a manner that is readily understandable by the layman, supporting with facts and figures when necessary without giving an impression of superiority
- Most essentially, an ability to appear objective and professional even when taking part in the inherently partisan process of a court case

***The Role of a Forensic Accountant in a Fraud Investigation***

"The forensic accountants apply special knowledge in accounting, auditing, finance, quantitative methods, certain areas of law, research, and investigative skills to collect, analyze, and evaluate evidential matter and to interpret and communicate findings" (Hopwood, Leiner, and Young, 2009: 5). A forensic accountant can be called a kind of "Sherlock Holmes" (Hopwood, Leiner and Young, 2009: 4).

Joseph T. Wells, chair of the Association of Certified Fraud Examiners, stated that an auditor cannot uncover all frauds in a firm by performing an audit. Hence, the

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forensic accountant is required to uncover fraud in the organization (Pearson and Singleton, 2008). It is also confirmed by a nationwide study conducted by Kessler International, which stated that 39 percent of organizations need forensic accountants.

## Data Mining

Data mining techniques tend to generate a lot of rules. However, not all the rules generated will be useful. Rules that are easy to understand and have a degree of certainty, with potential usefulness and novelty, that can be confirmed after testing a hypothesis will become "knowledge" (Han and Kamber, 2001).

### *Data Mining Techniques and Fraud*

The association rule was developed to predict and detect the unknown for the association between pairs of elements especially fraud detection (Metwally, Agrawal and Abbadi, 2005). It was used to extract the unlawful transaction credit card database for fraud detection and prevention purposes. The results appeared more intuitive and helped with the fraud analysis (Sanchez et al., 2009). The supervised learning technique was not appropriate to be used with online fraud detection behavior, so the association rule was used to generate the rules for the comparison with customers' behaviors and indicate the anomaly behavior (Rosset et al., 1999; Xu, Sung and Liu, 2007). It appeared that the unsupervised learning technique enabled the system to be more effective in monitoring fraud detection and prevention (Xu, Sung and Liu, 2007).

### *Fraud Risk Behaviors Using Association Rule*

A priori algorithm in association rule of WEKA program was selected to find out the best rules. The

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minimum support and the minimum metric (confidence) were set up in four sets as follows:

| | |
|---|---|
| 1.5.1 | Minimum support = 0.01 and minimum metric (confidence) = 0.90 |
| 1.5.2 | Minimum support = 0.01 and minimum metric (confidence) = 0.95 |
| 1.5.3 | Minimum support = 0.01 and minimum metric (confidence) = 0.99 |
| 1.5.4 | Minimum support = 0.10 and minimum metric (confidence) = 0.90 |

It appeared that seven attributes could not find the best rules (fraud risk behaviors) at minimum support of 0.10 and minimum metric (confidence) of 0.90. Only one attribute could not find the rule at minimum support set up of 0.01 and minimum metric (confidence) set up of 0.95 and 0.99. However, all attributes could find the rules at minimum support set up of 0.01 and minimum metric (confidence) set up of 0.90, and the rules would be used to develop fraud deterrence model.

Occupational fraud and abuse are likely to occur mostly when there are two to six risk behaviors combined. With many risk behaviors combined, a fraudster is more likely to commit fraud. There were only a few cases where an individual committed fraud when having only one risk behavior— e.g., a person had an addiction problem and needed money, or had past employment or legal problems due to a wheeler-dealer attitude. Normally, most people do not become fraudsters unless they face a difficult situation that they are not able to solve in a timely manner. In addition, they need both opportunity and rationalization.

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**Work Flow Process for the Fraud Deterrence System**

The work flow process for the fraud deterrence system is divided into two parts as shown in Figure 3.

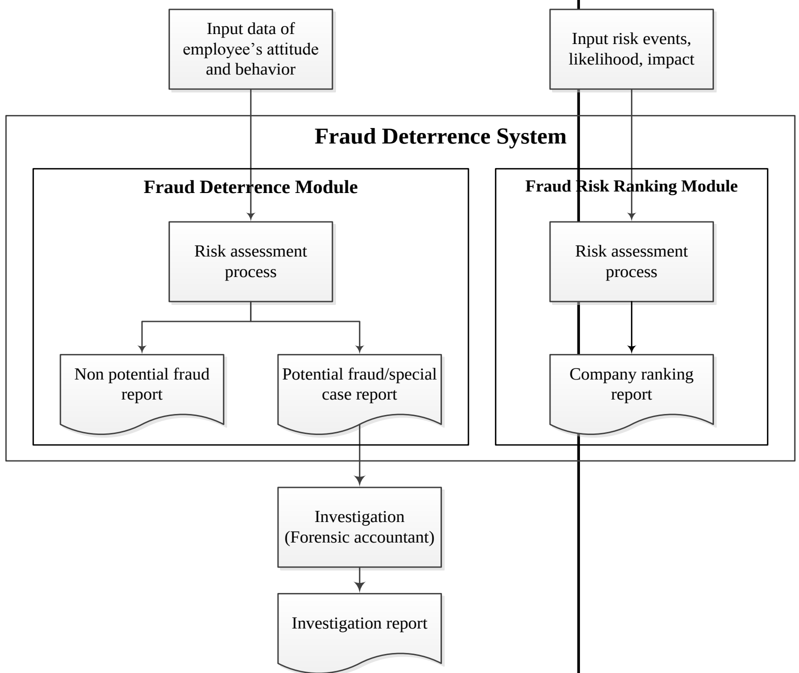


Figure 3: Work flow process for fraud deterrence system

***Fraud Deterrence Module***

This module is used to predict potential fraud in an organization by mapping the data from the employees' attitude and survey form with the criteria set up in the system. The system will generate the non-potential fraud report for those who do not meet the criteria and the potential fraud/special case report for those who meet the criteria or refuse to answer all questions in the form.

***Fraud Risk Ranking Module***

Risk management is a key success factor for business operations; therefore, the analysis of risk and its consequences are necessary so that the management can

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be made aware of it and determine a strategy to minimize or eliminate such risk.

From the research of "Risk Factors for Fraudulence in the Organization in Thailand" (Naruedomkul, 2011), 280 out of 558 companies (50 percent) indicated in the questionnaire that they had experienced corporate fraud in the past three years. Therefore, it would be beneficial for business owners if they could know in advance the fraud risk issues and their impact so that they can minimize or eliminate those risks based on their priority. Hence, a fraud survey was conducted with those companies to examine the frequency and consequences for those fraudulent activities based on Risk Management—Principles and Guidelines of the International Organization for Standardization (ISO 31000). The type and method of corporate fraud used in the questionnaire were compiled with the type and fraud method of the Association of Certified Fraud Examiners.

A fraud risk ranking module is used to assess the level of fraud risk in the company. The frequency of fraud risk issues and their impact on the business are assessed using an estimated or an actual percentage of loss and an estimated amount of loss from those fraudulent activities. The fraudulent activities are then measured based on the fraud risk ranking criteria set up in the system. The system will generate the level of risk report by type of fraud and overall ranking of the firm.

**Summary of Fraud Deterrence System**

It is quite difficult for company staff to fill out the form and accept that they think or behave in the ways indicated in the questionnaire. Therefore, a forensic accountant is needed for

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further investigation of staff who fit the potential fraud or reject all the questions in the form.

The forensic accountant can use the personal financial information filled out by staff to check against those questions in the attitude and behavior form. The accountant can also check the financial information of a staff member with the National Credit Bureau Co. Ltd. to ensure the accuracy and reliability of the information, especially if the employee is at the management level, to prevent white-collar crime. Furthermore, if needed, the forensic accountant may check staff records via the Office of the National Anti-Corruption Commission and/or Crime Suppression Division, Royal Thai Police.

Human resources personnel should check the records of staff with former companies or former bosses by sampling two to three references, to ensure that the person does not have legal or performance issues with his previous employers. The results should then be forwarded on to the forensic accountant as supporting evidence.

Furthermore, a fraud risk ranking module is useful to the management of the firm. Management will be more aware of the priority risk issues and can minimize or eliminate those risks, resulting in the reduction of corporate fraud in the firms.

This fraud deterrence system is a tool to filter and rank a potential fraud based on the opportunity to occur fraud. This helps identify potential fraud and measure the level of fraud risk in the organization. However, it is not a system that can indicate 100 percent of frauds. Further investigation should be performed by a forensic accountant, as mentioned earlier. The purpose of the fraud deterrence system is to alert or provide an early warning of a potential

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fraud to the owner of a business. A fraudster might have the motivation to commit fraud, but without an opportunity fraud cannot be committed. Hence, risk management should be developed and implemented in the firm to minimize opportunity. It will, apart from the fraud deterrence system, assist business owners in deterring fraudulent activities.