**三、研究計畫內容（以中文或英文撰寫）：**

1. 研究計畫之背景。請詳述本研究計畫所要探討或解決的問題、研究原創性、重要性、預期影響性及國內外有關本計畫之研究情況、重要參考文獻之評述等。如為連續性計畫應說明上年度研究進度。
2. 研究方法、進行步驟及執行進度。請分年列述：1.本計畫採用之研究方法與原因及其創新性。2.預計可能遭遇之困難及解決途徑。3.重要儀器之配合使用情形。4.如為須赴國外或大陸地區研究，請詳述其必要性以及預期效益等。

從公司治理角度探討董事會專業對經營團隊專業及其財務後果的影響

The Impact of Board Members’ Profession on Management Profession and Financial Outcomes under the Corporate Governance Framework

1. Introduction

In the modern firm structure, the separation of owner and agency brings out serious agency problem. Many researchers and practitioners concern this problem and try to find the mechanism to alleviate this problem. The concept of corporate governance is to alleviate the agency problem and aim to ensure that a business is running well and that investors receive a fair return[[1]](#footnote-1). Fama and Jensen (1983) treat the board of directors as a company’s highest-level control mechanism with ultimate responsibility for the operation of the firm. The empirical literature indicates that the characteristics and composition of the board stimulus its effectiveness. The characteristics such as board independence, characteristics of outside directors, and CEO dominance of the board are discussed in the literature.

Besides the board structure discussed above, the quality of board members has been paid more attention recently. The literature originating from psychology supports the link between an individual’s cognitive ability, level of educational attainment and decision-making. Jensen (1998) argues that the cognitive ability, or “IQ”, of a person defines several economic and social outcomes. Higher cognitive ability is positively related with speed of reactions, mental capacity and lifetime income. Milliken and Martins (1996) and Carpenter and Fredrickson (2001) both found that a higher and more diverse range of education qualifications among a board of directors led a more productive mix of competencies and capabilities, thus supporting decision making and strengthening its governing role. Hilmer (1993) found that board members with higher qualifications are linked with more effective board.

Different from the above literature, this study would like to investigate another concept of the board member quality; that is, the profession of board members. As we take a look two well-known scandals: XPEC (樂陞) and Yang-Hwa (揚華) in Taiwan, we find that the education degree of board members is relatively high in XPEC，but the degree subject is not related with the core operation of this company. Meanwhile, in Yang-Hwa, the education and experience background in most of board members do not have strong linkage with the core operation of this company.

According the Article 20 of Corporate Governance Best Practice Principles for TWSE/TPEx Listed Companies[[2]](#footnote-2), all members of the board shall have the knowledge, skills, and experience necessary to perform their duties. To achieve the ideal goal of corporate governance, the board of directors shall possess the following abilities:

1. Ability to make operational judgments.
2. Ability to perform accounting and financial analysis.
3. Ability to conduct management administration.
4. Ability to conduct crisis management.
5. Knowledge of the industry.
6. An international market perspective.
7. Ability to lead.
8. Ability to make policy decisions.

Even though most of abilities listed above are not observable and difficult to proxy, the overall concept of these abilities show that the “right” education and experience may be an important indicator for those abilities. In addition, the right education and experience should vary with industries. This is not only the cognitive ability, but also the professional ability on specific industry. And when the board members contain more professional ability and knowledge on the industry they belong, they may perform better governing function on company’s operation. As the cases of XPEC and Yang-Hwa, their board members may not have sufficient profession to governing the operation.

Since “profession” is a quality concept, the profession of board members and CEO/CFO is based on their positions and varied with industries. As we know that there is no database providing this important variable, we have to collect the related data manually. More specifically, we have to transform these variables such as education and experience related for integrating the profession indicator and then can use this profession indicator to analyze the issues we are interested. Since these data collecting, managing and analyzing will need many people and take a long time, we plan to do a two-year research for a more detail and comprehensive study.

**First year: to establish a comprehensive dataset for board and management profession.**

From this sample of board members, CEOs and CFOs, we manually collect their profession information such as education and experience from each firm’s annual report and other related data.

The disclosures about education and experience in annual reports differ across those positions in the sample. Some disclosures include specific information about school, type of degree, major, position and year; others provide just the name of the school and company.

Besides, we also divide the industry using the TSE categories. After that, we compare the degree type and experience with firm’s industry to identify the profession of each position member.

In order to build the dataset we need, we use the methodology of text mining and data warehouse establishing steps from technology information profession to ensure the quality of the dataset.

**Second year: to analyze the research questions using the dataset we collect in first year.**

First, we merge the profession data from our dataset with other financial data from TEJ and public available database and investigate the following three research questions regarding to the profession of board members.

In the first research question, we consider the relationship between the profession of board members and the profession of the management. The management here refers to CEO and CFO since we consider the financial outcomes. One of the duties for board members is to assign their CEO and CFO. CEO is responsible for the operation performance of the whole company. Therefore, the education and experience for the knowledge of the industry should be the priority requirement for CEO to make the right decision. Meanwhile, CFO is responsible for the financial decision of the company, such as financial reporting, capital allocating, etc. Therefore, the profession of accounting and financial background should be proper for this position. According to the above inference, we expect the profession of board members may prefer to assign their CEO and CFO with more profession regarding their positions; that is, the profession of board members and the profession of the management are positively related. If the relationship is hold in the result, we further investigate whether the relationship vary with industries, or firm characteristics.

In the second research question, we consider the relationship between financial reporting transparency and the profession of board members and the management. Since the financial statement is the final report for the company to present company’s performance, the quality of financial statement is important and responsible by the board and the management. Article 2 of Corporate Governance Best Practice Principles for TWSE/TPEx Listed Companies states that the corporate governance system should enhance information transparency. Therefore, we consider the financial reporting transparency may be related with the profession of board members and management. We further investigate the whether the variables we consider can predict the future restatement and financial distress in the third issue.

In the last research question, we consider whether the profession of board members and the management can predict the future restatement or financial distress. If the profession of board members and the management is positively related to the financial reporting transparency, that means that the profession of board members and the management fulfills better governing and better operating and reporting. Based on this inference, we predict that the probability of restatement or financial distress may be lower in the future.

The following is our research framework.

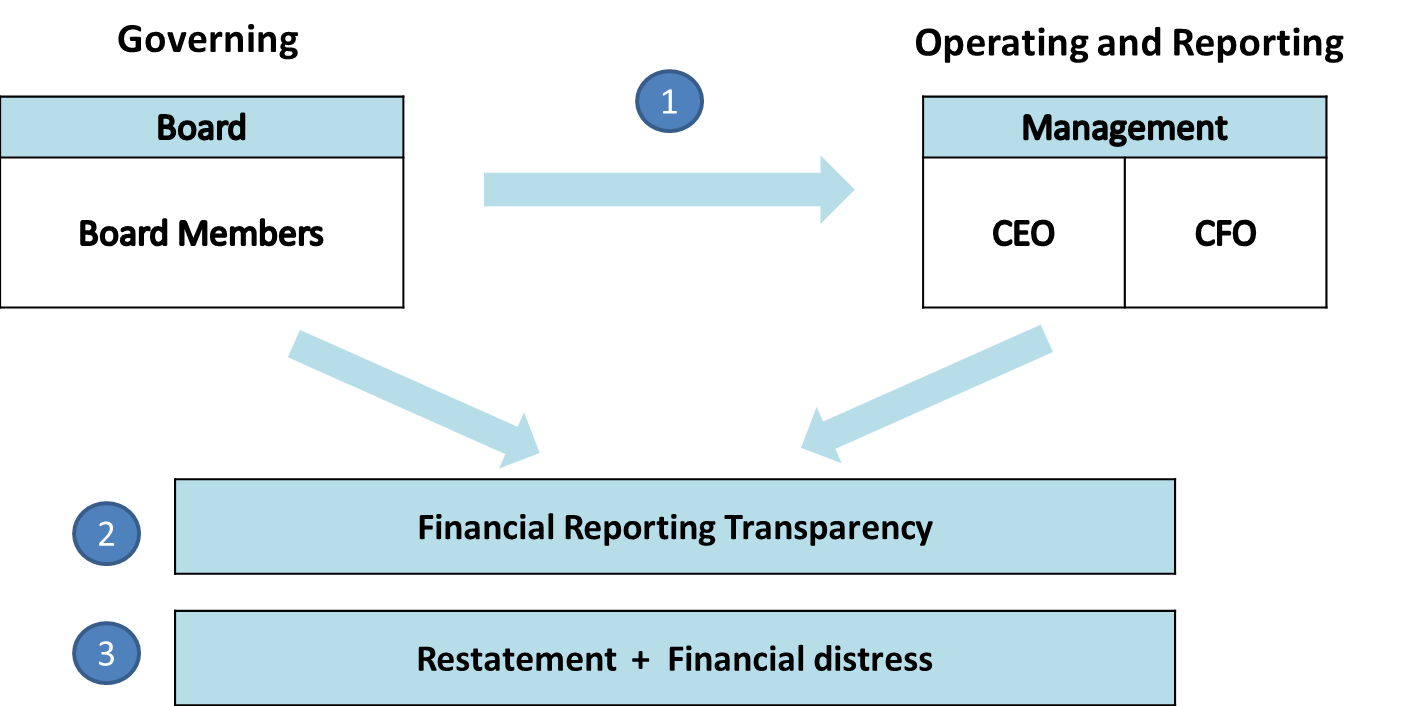


Figure 1 Research Framework

This study makes several contributions.

First, this study adds to corporate governance literature. The empirical literature indicates that the composition and characteristics of the board influence its effectiveness. Several characteristics such as board independence (e.g., Vafeas, 2005; Farber, 2005), characteristics of outside directors (e.g., Beasley, 1996), and CEO dominance of the board (e.g., Dechow et al., 1996) are discussed in the literature. Besides the board structure discussed above, the quality of board members has also been paid more attention recently. Jensen (1998) claims that the cognitive ability, or “IQ”, of a person determines several economic and social outcomes. Previous studies such as Milliken and Martins (1996), Carpenter and Fredrickson (2001), Gottesman and Morey (2006) find that a higher and more diverse range of education qualifications among a board of directors can led a more productive combination of competencies and capabilities, thus aiding decision making and strengthening monitoring role. Different from the above literature, this study further investigates the board members’ quality; that is, the profession of board members. We argue that board members’ profession for governing is very important. Moreover, the concept of profession should be varied with industries and positions and the level of profession on the board and the management will significantly affect the operating quality and reporting quality.

Second, since “profession” is a quality concept, the profession of board members and CEO/CFO is based on their positions and varied with industries, not just education or experience. As we know that there is no database providing this important variable. Therefore, we co-work with researchers with information technology profession and using methodologies such as data warehouse, text mining and machine learning to build the dataset and analyze the issues we are interested.

Third, this study has the practice and policy implication. Since the scandals such as XPEC and Yang-Hwa are prevalent all over the world, an indicator to detect the board quality is a very important for governors and investors. If the results of this study reveals the significant relationship among board member profession, management, and financial outcomes. The findings can provide some implications to governors and investors to tell firms with higher operating and reporting risks.

Besides, if the empirical methodology and results of this research proposal can be generally accepted, the research range of this related issue can be further extended and continued. We consider publishing in one of the top academic journals.

2. Literature Review and Research Questions

2.1 Board monitoring effectiveness

Fama and Jensen (1983) point out that the board of directors as a company’s highest-level control mechanism with ultimate responsibility for the operating of a company. The empirical literature indicates that the composition and characteristics of the board influence its effectiveness. Board independence, characteristics of outside directors, and CEO dominance of the board variables are discussed in this literature.

First, board independence depends on the appointment and active involvement of outside directors. Outside directors are generally believed to be more effective in monitoring management and enhancing financial reporting quality than non-outside board members. Empirical findings are mixed concerning the association between board independence and ex post consequences of low financial reporting quality. Beasley (1996) and Uzun et al. (2004) show that the percentage of outside (or non-executive) directors on the board has a significant negative impact on the probability of fraudulent financial reporting. Farber (2005) examines 87 firms committing fraud and indicates that fraud firms have a significantly lower percentage and number of outside directors the year before a fraud is detected but that these differences are no longer significant five years later. The finding indicates that increasing outside director involvement may be a remediating measure after fraud detection.

In contrast, Agrawal and Chadha (2005) report that the probability of financial statement restatements is unrelated to the proportion of independent directors, based on a matched-pairs logistic regression analysis of 159 US public companies announcing earnings restatements. Abbott et al. (2000) investigate 78 US firms sanctioned by the SEC for aggressive or fraudulent financial reporting. The results show that audit committees have a mitigating effect on low financial reporting quality if certain conditions are met, but they do not find a significant effect with respect to the proportion of outside directors on the board. In a later research, Abbott et al. (2004) find the percentage of outside directors to be insignificant predictors of the probability that a firm will be subject to an SEC enforcement action for fraud or that firms will issue earnings restatements. The percentage of outside directors is also insignificant in the logistic regression based fraud study by Carcello and Nagy (2004a) using 109 pairs of fraud and nonfraud companies during 1990-2001; however, in an ensuing study with a different application, Carcello and Nagy (2004b) report a significant negative association between the probability of fraud and the percentage of outside directors.

Klein (2002) examines whether board characteristics are related to earnings management. Using a cross-sectional variant of Jones’ (1991) model to capture abnormal accruals, the author reports a significantly negative association between the incidence of discretionary accruals (suggesting earnings management) and (a) the percentage of outside directors on the board and (b) the fact that outsiders account for the majority of board members. This link is stronger using the majority-threshold measure than the actual percentage of outside directors, indicating that majority rule efficiently drives board actions to promote financial reporting quality, without precluding strategic input from specialized insiders. However, Xie et al. (2003), find conflicting results. They do not find any significant association between the percentage of outside directors and abnormal working capital accruals. Further, Vafeas (2005) reports that board independence variable is not associated with threshold-induced earnings management, proxies for which are the probabilities of (1) small earning increases or (2) negative earnings-surprise avoidance. Therefore, in summary, US results are inconclusive regarding the ability of board independence to restraint earnings management activities.

Second, characteristics such as the tenure and the number of additional directorships held by outside directors are also discussed. Beasley (1996) claims that board seniority enhances directors’ capacity to monitor top management, since more senior directors hold more secure positions and can therefore better resist group pressure to comply with management’s wishes. Consistent with his view, Beasley finds a negative relationship between the likelihood of financial statement fraud and the average tenure of outside directors, consistent with the notion that tenure increases outside directors’ ability to monitor management effectively. Fama (1980) argues that the market for outside directors provides incentives for them to be good monitors of management. Being directors of well-operated companies signals the directors’ value to the external market, which rewards them with additional directorships. Since the number of additional directorships can signal an outside director’s reputation as a monitor, the mean number of additional directorships is predicted to support financial reporting quality. Inversely, Morck et al. (1988) argue that monitoring top management requires time and effort. As the number of additional directorships increases, higher demands on directors’ time and effort decrease the amount of attention they can dedicate to monitor a single firm. Thus, a higher number of directorships is predicted to be related with lower monitoring quality.

Beasley (1996) reports that the likelihood of fraudulent reporting increases as outside directors holds more directorships in other firms. The finding thus supports the view that additional directorships distract outside directors from effectively achieving their monitoring responsibilities. However, Smaili and Labelle (2009) find insignificant difference in the number of directorships held in other firms in Canada.

Third, since CEO is responsible for the firm’s overall operations, research has tried to gauge the extent of CEO power over the board. CEO domination is generally predicted to decrease the board’s monitoring effectiveness and therefore financial reporting quality. CEO founder status, Inside directors on the board, the fact that the CEO chairs the board and board size are discussed in the literature.

Inside directors are predicted to be lower monitors of CEO decisions because they are under the CEO in the company hierarchy. One can estimate their likely influence using ownership measures (i.e., number of shares owned by inside directors divided by total number of shares held by all board members) or directorship attributes (i.e., proportion of seats held by inside directors). Jensen and Meckling (1976) argue that management equity ownership diminishes agency costs since managers with greater stock ownership have stronger incentives to increase stock value through effective decisions on operating, investing, and financing. However, high equity ownership can motivate managers to try to inflate stock price through fraudulent or misleading reporting.

Dechow et al. (1996) state that inside directors’ estimated degree of influence is significantly higher for AAER firms than for a control sample, using three measurements: proportion of total board stockholdings held by inside directors, percentage of insiders on the board, and likelihood of having insider-dominated boards (i.e., boards with more than 50% of seats held by inside directors). Dechow et al. (1996) find that GAAP violators are more likely than nonviolators to have founding CEOs, who are less responsible to boards. Also, Agrawal and Chadha (2005) evidence that the probability of restatement is higher in firms whose CEO belongs to founding families.

Jensen (1993) argues that it is hard for a board to monitor a CEO who is also the board chair, which we call it as CEO duality. Loebbecke et al. (1989) argue that CEO duality firms are likely to display lower financial reporting quality because the CEOs can manipulate financial reporting to achieve their own interests. Dechow et al. (1996) also find the similar results.

Multivariate studies report mixed results for the link between CEO duality and financial reporting quality. Carcello and Nagy (2004a, 2004b) find that CEO duality is positively linked with the probability of financial statement fraud. Meanwhile, Smaili and Labelle (2009) using a Canadian study also finds CEO duality to be positively associated with the likelihood of companies attracting OSC sanctions. However, Abbott et al. (2000) report a weak positive relationship between CEO duality and the probability of companies attracting SEC sanctions for fraud or aggressive reporting.

Jensen (1993) and Yermack (1996) argue as boards grow, they become less likely to operate effectively and CEOs are easy to control. To support their proposition, they refer to group productivity studies (e.g., Steiner, 1972; Hackman, 1990), which indicate that groups adding members they become less effective because coordination and information-processing costs offset the benefits of drawing on more people’s expertise. Jensen (1993) suggests that “when boards get beyond seven or eight people they are less likely to run effectively”. Yermack (1996) claims that firms with small size boards, consisting of less than ten directors, will perform better. In contrast, Chaganti et al. (1985) believe boards with larger size are better due to the scope of their knowledge.

Empirical studies show inclusive results. Beasley (1996) reports that board size is positively associated with the likelihood of fraud; however, Uzun et al. (2004), Carcello and Nagy (2004a) and Farber (2005) do not confirm Beasley’s US results, nor do Smaili and Labelle (2009) in Canada, or Chen et al. (2006) in China.

Jensen (1993) considers that some of the most important functions of the board are to provide counseling and to set rules regarding hiring, firing, and compensating CEOs. Thus, CEOs can enhance their board influence by sitting on specialized board committees, such as the compensation committee and the nominating committee. The compensation committee intends to align CEOs’ compensation with performance. CEOs do not participate in this activity objectively without at least appearing to promote their own interests. Before 2003, CEOs could sit on compensation committees. Klein (2002) reports greater earnings management by firms with such CEO-friendly boards, consistent with weaker financial reporting monitoring.

Regard to nominating committee’ participation, Shivdasani and Yermack (1999) argue that the CEO has incentives to reduce monitoring pressure by employing influence on director selection. They mention two ways a CEO can join in director selection: one is the board has a separate nominating committee and the CEO serves as a member, and the other is that a committee does not exist but directors are selected by the entire board including the CEO. They report a negative relationship between the CEO’s involvement in director selection and board independence.

As discussed previously, low board independence is generally believed to raise lower quality of financial reporting. However, empirical findings in Klein (2002) and Bryan et al. (2004) do not support the hypothesized negative association between financial reporting quality and whether the CEO sits on a nominating committee.

2.2 Education and financial outcomes

The educational issue regarding financial outcomes has been paid attention recently. This line of research originating from psychology affirms the relationship between an individual’s cognitive ability, level of educational attainment and decision-making. Jensen (1998) argues that the cognitive ability, or “IQ”, of a person determines several social and economic outcomes. Higher cognitive ability is positively related with mental capacity, speed of reactions and lifetime income. Both Milliken and Martins (1996) and Carpenter and Fredrickson (2001) show that a higher and more diverse range of education qualifications among a board of directors result a more productive mix of competencies and capabilities, thus supporting decision making and strengthening its monitoring role. Hilmer (1993) evidences that board members with higher qualifications are related with more effective board, with boards with high levels of experience, intellectual ability, soundness of judgment and integrity. Gottesman and Morey (2006) states that educational qualifications can denote intelligence, with more intelligent CEOs expected to be better than their less educated peer.

Moreover, prior studies examine whether CEO and CFO education impacts financial reporting quality. Hambrick and Mason’s (1984) upper echelons theory expects that cross-sectional differences in managers’ education are likely to form their values and cognitive biases, which in turn will affect their managerial styles. In addition, prior literature launches that managers with a MBA develop different styles involving to conformity, rationality, conventionality, and ethics than do their conterparts without the same educational backgrounds (Chen, 2004; Ghoshal, 2005; Gintis and Khurana, 2008). Consistent with this notion that the education of the management (i.e., CEO and CFO) is linked with reporting outcomes. Call et al. (2017) investigate the association between employee quality and financial reporting outcomes. They use education level as a proxy for employee quality and find that firms with a high-quality employee reveal higher accruals quality, fewer internal control violations and fewer restatements.

2.3 Research questions

Several features of our study distinctly separate it from the literature. First, at a conceptual level, we set up a quality indicator “profession”, which represent the right education and experience in each firm and each position. Second, we examine financial outcomes instead of performance with the board members’ profession. One of the functions of board is to ensure that rights and interests of shareholders have been protected, so the board will govern the management to decrease the operating and reporting related risks. Therefore, we consider the financial outcomes as financial reporting transparency and further restatements and financial distresses. The following three issues are investigated in this study.

In research question 1, we consider the relationship between the profession of board members and the profession of the management. Here, the management refers to CEO and CFO. One of the duties for board members is to assign CEO and CFO. CEO is responsible for the operation performance of the whole company. The education and experience for the knowledge of the industry should be the priority requirement for CEO to make right decision. Some researches discussed the link between the educational backgrounds of executives and firm’s performance; however, the evidence suggests that the effects vary according to the type and quality of education. Chevalier and Ellison (1999) show a positive relationship between managers’ education and mutual fund performance. They find that managers with undergraduate degrees from Ivy league universities generate higher risk-adjusted returns, but managers with Ivy MBA achieve higher returns almost entirely due to a shift towards greater systematic risk. Bhagat et al. (2010) find education is a critical factor in the hiring process of CEOs, but fail to observe any systematic between CEO education and long-term firm performance. This is in contrast to a traditional view of educational attainment as an observable measure of innate talent with better-educated CEO realizing greater impact on performance. Meanwhile, CFO is responsible for the financial decision of the company, such as financial reporting, capital allocating, etc. Therefore, the profession of accounting and financial background should be proper. Therefore, we consider whether the profession of board members and the profession of the management are related and will their relation vary with industries.

In research question 2, we consider the relationship between financial reporting transparency and the profession of board members and the management. Since the financial statements is the final report for the company to show company’s performance, the quality of financial statement is important and responsible by the board and the management. Since Article 2 of Corporate Governance Best Practice Principles for TWSE/TPEx Listed Companies states that the corporate governance system should enhance information transparency, we follow this notion and consider the financial reporting transparency may be related with the profession of board members and management. We further investigate the whether the variables we consider can predict the financial distress companies in research question 3.

In research question 3, we consider whether the profession of board members and the management can predict the future restatement or financial distress. If the profession of board members and the management is related to the financial reporting transparency, we predict that the probability of restatement or financial distress may be higher.

1. Research Design

Since “profession” is a quality concept, the profession of board members and CEO/CFO is based on their positions and varied with industries and difficult to measure. As we know that there is no database providing this important variable, we have to (1) collect the related variables such as education and experience related manually, (2) transform these variables to the profession indicator and then (3) use this profession indicator to analyze the issues we are interested. Therefore, two-years research for this study should be proper.

**First year: to esta****blish a comprehensive dataset for board and management profession.**

From this sample of board members, CEOs and CFOs, we manually collect their profession information such as education and experience from each firm’s annual report and other related information using Taiwan listed companies.

The disclosures about education differ across those positions in the sample. Some disclosures include specific information about school, type of degree, major and year; others provide just the name of the school. We collect the following information for annual reports.

1. We collect as much education information as thoroughly and systematically as possible.
2. We collect information on each educational degree according to degree type (undergraduate, MBA, law, master or doctoral), and we record each school by name, recognizing differences within schools.
3. Most importantly, we collect information on specific individual majors (e.g. engineering, liberal arts, or business).

Besides, we also divide the industry using the TSE categories. After that, we compare the degree type and experience with firm’s industry to identify the profession of every person in each position.

Meanwhile, as we know that the text contains many meanings and different interpretations. it is impossible to distinguish the categories of meaning in a simple way When conducting empirical research in the field,. In this case, it is necessary to judge the qualitative materials in a scientific and systematic way. The text mining can be used for completed unstructured data processing.

According to the above described, we establish a data warehouse for our research for the following four purposes.

1. Data organization of operational databases is oriented to transaction tasks. Data in the data warehouse is organized according to a certain subject area.
2. The data in the data warehouse are processed, aggregated and sorted on the basis of the original distributed database data. The inconsistencies in the source data must be eliminated to ensure that the information in the data warehouse.
3. Data in the data warehouse are for decision-making analysis. The data operations involve data query. Once a data into the data warehouse, under normal circumstances will be long-term retention.
4. The data in the data warehouse usually contain the historical information. The system records the information that the enterprise from some point in the past. Through this information, the development history and future trends can make quantitative analysis and prediction.

According to the purposes, our data warehouse establishing steps is as follows:

1. Choose the appropriate topic and the area to be solved.
2. Clearly define the fact table.
3. Identify and confirm the dimension.
4. Compute and store the derived data segment in the fact table.
5. Rounding out the dimension tables.
6. Choosing the duration of the database.
7. The need for tracks lowly changing dimensions.
8. Determine the query priority and query mode.
9. Collect and analyze research needs.

Besides, the flow of establishing data warehouse is as follows:

1. Define the data source -> Choose a data warehouse technology.
2. Choose a data warehouse technology -> Choose access and reporting tools.
3. Choose access and reporting tools -> Choose data analysis and display softwares.

The next figure shows the above flow.

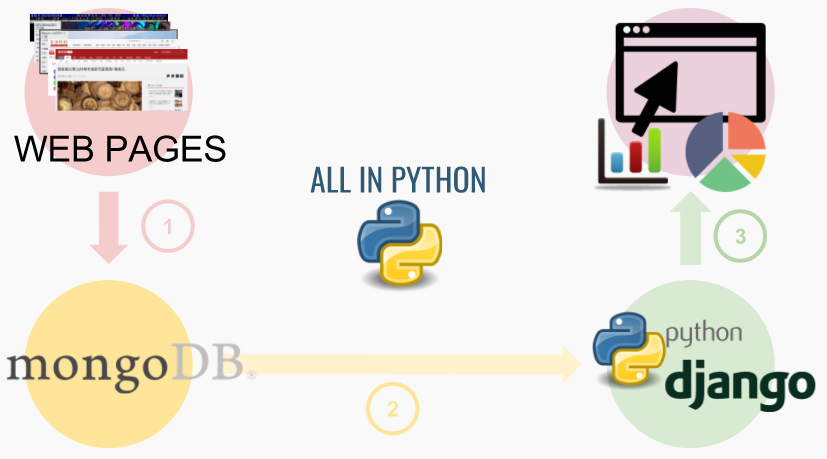


Figure 2 The flow of establishing data warehouse

**Second year: to analyze the research questions using the dataset we collect in the first year.**

We merge data on board member and management profession with firm financial data from TEJ. We exclude both firms in financial services and utilities industries.

Research question 1: investigating the association between profession of board members and profession of management

For investigating our research question 1, our model is constructed as follows:

*Management Profession = f(Board Profession, Control variables, Industry dummy, Year dummy)*.(1)

*Management Profession* and *Board Profession* are obtained from the dataset we collect in the first year. Control variables include board characteristics, firm characteristics, and industry characteristics.

Research question 2: investigating the association between profession of board members and management and financial reporting transparency

Our main model for research question 2 is constructed as follows:

*Reporting Transparency= f(Board Profession, Management Profession, Control variables, Industry dummy, Year dummy)*.(2)

While *Board Profession* and *Management Profession* are obtained from our dataset, we include independent variables containing board characteristics, firm characteristics, and industry characteristics. For the dependent variable *Reporting Transparency*, we will adopt two measures. While the first measure can be considered short-term effect, the second measure is considered long-term effect.

First measure we use follows Cornett et al. (2008) to measure firm performance, true performance and earnings management using accounting data. We measure firm performances using EBIT/Assets; that is profitability relative to total capital by the firm. Because managers can manage EBIT through accruals (e.g., sales and accounts receivable) as well as the accounting policies, for example depreciation and amortization, (EBIT-Discretionary Accruals)/Assets is adopted as the measure of unmanaged performance which implies “true” performance. That is,

*EBIT=real performance + discretionary accruals*. (3)

On the basis of this view, we can infer that the less the transparency of the financial reporting when the percentage of discretionary accruals (*DA*) on EBIT is higher. Therefore, the first measure of financial reporting transparency is resulting from *DA /EBIT*. The higher *DA /EBIT* means lower transparency.

Following Hutton, Marcus and Tehranian (2009), second measure of financial reporting transparency of this study is, *OPAQUE*. The higher value of opaque means lower transparency.

*OPAQUE=AbsV(DAt-1)+AbsV(DAt-2) +AbsV(DAt-3)*, (4)

where *AbsV(DAt-1)*, *AbsV(DAt-2)*, *AbsV(DAt-3)* are the three-year moving sum of the absolute value of discretionary accruals.

Here, *DA* is measured using the following method. We compute total accruals using both balance sheet data and the statement of cash flows. From balance sheet data, we follow Sloan (2005) to compute total accruals, , as the change in working capital accounts reported in the balance sheet for firm *j* at time *t*:

. (5)

In Equation (5), is computed by the difference of the change in current assets and the change in cash. is measured by the change in total current liabilities minus the change in debt in current liabilities and the change in income taxes payable. Lastly,  is measured by depreciation and amortization.

While Hribar and Collins (2002) argue that the cash flow statement is proper in the presence of ‘‘non-articulation’’ events such as mergers and acquisitions which incur changes to the balance sheet, but do not flow through the income statement, we then compute accruals using the cash flow approach expressing as follows:

, (6)

where total accruals is computed by earnings before extraordinary items and discontinued operations minus operating cash flows from continuing operations.

Following Dechow, Sloan and Sweeney (1995) and Bartov, Gul and Tsui (2000), discretionary accruals equal the difference between true and ‘‘normal’’ accruals, using a regression formula to estimate normal accruals. The modified Jones model first estimates normal accruals as a fraction of lagged assets from the following equation (7):

, (7)

here  are total accruals for firm *j* in year *t* from successive balance sheet data or from the statement of cash flows ,  denotes to total assets,  refers the change in net revenue, and is property, plant, and equipment.

The non-discretionary accruals  are measured by the firm’s simultaneous forecast levels of scaled accruals, using the coefficients valued from Equation (8):

. (8)

Here,  is net accounts receivable for firm *j* at time . This variable attempts to detect the amount to which a change in sales is due to aggressive recognition of doubtful sales. Since a criticism of the Jones model is that it may be important to control for the impact of financial performance on accruals, Kothari et al. (2005) stress that matching firms based on operating performance gives the best measure of discretionary accruals. Therefore, we follow Cornett et al. (2008) to estimate Eq. (5) and (6) adopting firms with the same industry as the firms in our sample that have ratio of EBIT/Asset within 75%-125% of the sample firms and that are at least half as large as the sample firms (measured by book value of assets). Following Bartov et al. (2000), Eq. (5) and (6) is estimated as independent cross-sectional regressions for each year during the sample period, allowing for industry fixed effects. Large discretionary accruals are interpreted as indicative of earnings management.

As a result, the discretionary accruals  are computed by the difference between scaled total accruals and the non-discretionary current accruals showing as follows:

. (9)

Research Question 3: Prediction of further restatement and financial distress based on profession of board members and management

We then use machine learning to extending the applicability and predictive power of accounting reports analysis to predict the firm’s risk of big event (restatement and financial distress). For this research question, we put all the variables we concern regarding to restatement and financial distress including profession of board members and management into the machine learning methodology and would like to investigate whether profession will be a critical indicator for the future restatement or financial distress. Restatement and financial distress variables are obtained from TEJ. We may use text mining and Support Vector Machine as our methodology.

As we know, the text contains many meanings and different interpretations. When conducting empirical research in the field, it is impossible to distinguish the categories of meaning in a simple way. In this case, it is necessary to judge the qualitative materials in a scientific and systematic way. The text mining can be used for completed unstructured data processing.

Support Vector Machine (SVM) in machine learning is based on Cortes and Vapnik (1995). Based on statistical learning theory, an algorithm is to solve the classification problem. A number of studies (e.g., Huang et al., 2004; Shin et al., 2005) use SVMs to classify corporate financial ratios to predict the firm’s risk. We then also use SVM for the positive and negative classification of a firm’s risk (restatement and financial distress) to capture the company’s financial viability.

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1. 預期完成之工作項目及成果。請分年列述：1.預期完成之工作項目。2.對於參與之工作人員，預期可獲之訓練。3.預期完成之研究成果（如實務應用績效、期刊論文、研討會論文、專書、技術報告、專利或技術移轉等質與量之預期成果）。4.學術研究、國家發展及其他應用方面預期之貢獻。
2. 預期完成之工作項目。

For Year One:

(a) To define the profession by each industry and each position for the Taiwan listed companies.

(b) To manually collect the profession information such as education and experience from each firm’s annual report and other related information for board members, CEOs and CFOs in each sample firms.

(c) To establish a comprehensive dataset for the profession of board members and management.

For Year Two:

(a) To merge the profession data from our dataset with other financial data from TEJ and public available database and investigate the three research questions regarding to the profession of board members.

(b) To derive the empirical results.

(c) To write down the report and circulate the paper.

1. 對於參與之工作人員，預期可獲之訓練。

For Year One:

(a) Researchers and research assistants can learn how to define the profession and build the profession indicator by different industries and different positions.

(b) Researchers and research assistants can learn text mining and data warehouse methodology.

(c) Researchers and research assistants can learn text collecting and how to transform the quality data to quantity data.

(d) Researchers and research assistants can learn how to setup a comprehensive dataset for board members’ profession and management profession.

For Year Two:

(a) Researchers and research assistants are able to learn how to review the literature and obtain a lot of knowledge on related research issues, especially for the topics of the profession of board members and management, financial reporting transparency, restatement and financial distress.

(b) Researchers and research assistants are able to learn how to collect, merge and organize data from different databases.

(c) Researchers and research assistants are able to learn how to build up the logic of deriving theoretical model for the research questions we are interested.

(d) Researchers and research assistants are able to learn machine learning and do this interdisciplinary research.

3.預期完成之研究成果（如實務應用績效、期刊論文、研討會論文、專書、技術報告、專利或技術移轉等質與量之預期成果）。

For year one, we establish a comprehensive dataset for board and management profession. This dataset can be used for researchers, regulators and investors.

For year two, we complete this research and may write down at least two papers. We will start to attend the conference and then submit them to the high-quality journals.

4.學術研究、國家發展及其他應用方面預期之貢獻。

For Year One:

1. Building a “profession” indicator and dataset for related variables for analyzing, governing and investing use.
2. Incorporating interdisciplinary of accounting and information technology and doing a comprehensive research under corporate governance framework.

For Year Two:

1. The results of investigating the profession related variables contribute to corporate governance literature.
2. Besides the traditional empirical tests, we also use machine learning methodology to predict the financial outcome of profession of board members and management for policy implication.

1. In Article 2, when setting up the corporate governance system, ….a TWSE/TPEx listed company shall follow the following principles: (http://eng.selaw.com.tw/LawArticle.aspx?LawID=FL020553&ModifyDate=1050930)

   1. Protect the rights and interests of shareholders.
   2. Strengthen the powers of the board of directors.
   3. Fulfill the function of supervisors.
   4. Respect the rights and interests of stakeholders.
   5. Enhance information transparency.

   [↑](#footnote-ref-1)
2. http://eng.selaw.com.tw/LawArticle.aspx?LawID=FL020553&ModifyDate=1050930. [↑](#footnote-ref-2)