CORPORATE ENVIRONMENTAL DISCLOSURES: A LONGITUDINAL STUDY OF THAI DISCLOSURES

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ABSTRACT

This study investigated environmental disclosures in annual reports of listed companies in the Stock Exchange of Thailand (SET). A sample of 75 companies was drawn over the decade of 1997-2007. Using content analysis to measure environmental disclosures in annual reports issued by the sampled companies, the findings show that the number of companies making voluntary disclosures and the quantity of disclosures increased over the study period. The provision of environmental disclosures differed significantly between large and small companies as well as between high and low environmentally sensitive companies. A positive relationship between time and size of company with the levels of environmental disclosures in Thai corporate annual reports was also found.

I. INTRODUCTION

The oil spill in Alaska by the Exxon Valdez in 1989 and the oil spill in 2010 by BP in the Gulf of Mexico showed how environmental events can affect the financial results of companies. As well, these events clearly demonstrate how economic development can create problems for the environment. Public opinion suggests that corporations need to take responsibility for their impact on the environment. Social expectations (Jahani et al. 2003) can be linked to a significant increase in the number of companies providing environmental disclosures in their annual reports and other communication media (Deegan and Gordon 1996; Kolk 2003). The increase has been documented by studies about environmental disclosures by companies in developed countries such as USA, UK, Australia, New Zealand, Canada, Japan, and countries in the European Union (Kolk et al. 2001). Developed countries have higher social expectations and stakeholder demands than less developed countries which result in regulation and awareness of environmental issues (Gray et al. 1995). The focus on developed countries means that little is known about whether the findings are mirrored in less developed countries such as Thailand. Thailand is dependent heavily on its environment for its economic well-being, yet only two studies have examined Thai corporate environmental disclosures. Their findings conflict on whether disclosures are increasing (Kasiratikun and Sherer 2004; Ratanaajongkol et al. 2006).

This study investigates environmental disclosures in Thai corporate annual reports to test for possible relationships between the levels of environmental disclosures in those reports and a variety of factors previously identified in the relevant accounting literature. The main questions in this study are: what is the trend of environmental disclosures in Thai corporate annual reports? and what are the factors influencing the levels of environmental disclosures in Thai corporate annual reports? This paper starts with background, followed by theoretical perspective before considering environmental disclosures by companies in Thailand. Finally, the study presents conclusions, limitations and areas for further study.

II. BACKGROUND

Traditionally, the Thai economy was an agricultural, self-sufficient economy. In the early twentieth century, the country became an industrialising nation. The Thai government promoted Thailand as one of the rapidly industrialising nations of Asia (Kasiratikun 2005). In mid-1997, Thailand faced a financial crisis known as "Tom-Yum-Goong". During that time, many domestic companies failed, many labourers lost employment and the Thai government did not have enough money to manage its economy. However, the economy has since recovered with economic growth around seven percent per year (NISDB 2003) before the Global Financial Crisis and an average of three percent since (NISDB 2011). Thailand has been one of fastest growing economies in South and South East Asia (Mukhopadhyay 2006). Economic growth was led by growth in the manufacturing sector (Mukhopadhyay 2006) so that Thailand was directly affected by environmental problems (Warf 2007). Industries have been established as a result of a pro-growth investment incentive policy but some of these industries have created pollution problems.

As a result, Thai listed companies were asked by the Stock Exchange of Thailand (SET) to build corporate governance practices (CG) into their annual reports (Ratanajongkol et al. 2006). These CG practices included social and environmental disclosures, but reporting was voluntary. In 2006, a revised version of the principles (List 2009) suggested that boards of directors should set clear policy on social and environmental issues and firms should disclose their environmental policy as well as its implementation. SET used a comply-or-explain approach with the new principle.

III. THEORETICAL PERSPECTIVES

Different theoretical approaches have been used to explain why corporations would make voluntary environmental disclosures. Political economy theory (Williams 1999) has been used to explain the existence and content of environmental accounting as well as social political theory (Huang and Kung 2010). Media agenda setting theory has been utilised to investigate the influence of media on disclosures (Brown and Deegan 1998). However, the most embraced theoretical perspectives to explain corporate motivations for reporting are legitimacy and stakeholder theories. Legitimacy theory has become one of the most cited theories within the corporate environmental reporting area (Guthrie and Parker 1990). It offers a way to critically unpack corporate disclosures (Campbell 2003; Deegan and Rankin 1994; Islam and Deegan 2010; Mathus 2005; Wilshurst and Frost 2000; Branco et al. 2008; Ahmad and Salimina 2004). Stakeholder theory is aligned closely with legitimacy theory. The two theories often complement each other (Deegan 2002). Stakeholder theory is concerned with the ways companies manage their stakeholders (Roberts 1992; Gray et al. 1999; Llena et al. 2007). Indeed, both Joshi and Gao (2009) and Huang and Kung (2010) mentioned that disclosures are complex phenomena which cannot be explained by a single theory. Thus, some researchers have used multi-theoretical frameworks to explain the extent and content of environmental disclosures (Ratanajongkol et al. 2006; Tagesson et al. 2009; Islam and Deegan 2007; Choi 1999).

Two main theories influence this study: stakeholder theory and legitimacy theory.

Legitimacy theory

Legitimacy is a condition or status which exists when a corporate value system is congruent with the value system of the larger social system of which the company is a part (Lindblom 1994). When a disparity, actual or potential, exists between the two value systems, there is a threat to corporate legitimacy (Lindblom 1994). Legitimacy theory proposes a relationship between corporate social disclosure and community concerns so that management must react to community expectations (Deegan 2001, 2002). Organizations seek to operate within the bounds and norms of their respective societies so they attempt to ensure that their activities are perceived as legitimate by outside parties. When there is a change in social expectations or stakeholders' concerns, corporations seek to ensure that their activities meet social expectation (Deegan 2001). If corporations do not operate in a manner consistent with community expectations, they will be penalised. As a result, corporations will adapt to meet community expectations, if they want to be successful

Legitimacy theory has been tested by many researchers studying reporting practices. They have found that it explains why corporate management reacts to community expectations (Titi 1994; Paton 1992; Guthrie and Parker 1990; Hognor 1982; Deegan et al. 1996). These authors, including Campbell et al. (2003), argue that legitimacy theory explains how social and environmental disclosure can be used to narrow the gap between company actions and social concerns. Annual or environmental reports, therefore, are used to reinforce corporate responsibilities for environmental situations (Patten 1992; Deegan and Rankin 1996).

Many studies (for example, Hognor 1982; Wilshurst and Frost 2000; Deegan 2002; O'Toole 2012) have identified types of corporate social responsibility disclosures that have appeared within annual reports and which have been explained by the respective researchers as being part of the portfolio of strategies undertaken by accountants and managers to bring legitimacy to their respective corporations.

Stakeholder theory

According to Gray et al. (1990), stakeholders are identified by companies so that the interface with each stakeholder group needs to be managed to further the interest of the corporation. Stakeholders are defined as those who can affect or are affected by the achievement of corporate actions, decisions, policies or goals. Stakeholder theory suggests that companies will manage relationships with stakeholders based on different factors such as the
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nature of task environment, the salience of stakeholder groups and the values of decision makers who determine the shareholder ranking process (Donaldson and Preston 1995). Corporate management will tend to satisfy the information demands of those stakeholders important to the corporations’ ongoing survival. Provision of information will depend upon how powerful they are perceived to be.

Studies on environmental disclosures in corporate annual reports utilising stakeholder theory (Roberts 1992) show that companies disclose environmental information in their annual reports following stakeholders’ demands (Raar 2007; Campbell et al. 2003; Campbell 2001). Environmental disclosures are a major element that can be used by companies to negotiate their stakeholder relationship (Roberts 1992). For example, Wilmhursts and Frost (2000) found that companies were influenced by their stakeholders, especially customers, financial institutions, communities, and suppliers, to provide environmental disclosures. Nee et al. (1998) also found that stakeholders could be more effective than others in demanding social responsibility disclosures. Their results indicated that companies were more responsive to demands of financial stakeholders and government regulations than to the concerns of environmentalists and other stakeholder groups.

Even though legitimacy and stakeholder theories overlap, they differ in terms of power of stakeholders, expectation and corporate reactions. Proponents of legitimacy theory relate to society and compliance of corporate performance with social expectations. Stakeholder theory accepts that different stakeholder groups have different views and power on how corporations should act and serve in their operations. These groups have different abilities to affect organizations (Deegan 2002).

IV. Literature review

Prior studies mostly focused on environmental disclosures by companies in developed countries such as USA, UK, Australia, New Zealand, Canada, Japan, and some countries in the European Union (Kolk et al. 2001). Some examined the relationship between disclosures and a variety of determinants such as size, type of company, industry classification, ownership status, sales and profit (Gray et al. 1995; Stray and Ballantyne 2000; Cornier and Gordon 2001; Tilt 2001). Other studies recognized that environmental disclosures differ across countries (Kolk et al. 2001; Jose and Lee 2007). Reasons for environmental disclosures are revealed in some studies (Wilmshurst and Frost 2000). Type of disclosures and kind of news about environmental disclosures in annual reports are explored by others (Deegan and Rankin 1996; Ho and Taylor 2007). There are only six papers referencing disclosures in Thailand. Williams (1999) analysed the annual reports of 28 companies utilizing political economy theory to test the relationships between disclosures and a variety of factors. Culture and the political and civil systems were found to influence the quantity of disclosures. Kaminthakun et al. (2004) investigated environmental disclosures in annual reports of 63 Thai firms in 1993 and 84 firms in 1999, finding a slight increase in disclosures from 44% to 45% and that most disclosures were narrative. Connolly and Limmpaphayon (2004) studied a sample of 120 Thai listed companies’ annual reports using Porter hypothesis to test a relationship between environmental reporting and market valuation and corporate accounting performance. They found a significant positive correlation between market valuation and the reporting but no significant relationship between environmental reporting and Thai corporate accounting performance. Ramayongkol et al. (2006) examined disclosures in the annual reports of the 40 largest firms in 1997, 1999, and 2001, finding that disclosures decreased over the study period. Rahman et al. (2010) studied a sample of 37 Thai listed companies in 2006 to examine the relationship between environmental disclosures and financial performance, finding that financial performance had no relationship with the production of environmental disclosures.

Five of the six studies indicate that Thai listed companies provide environmental disclosures in their annual reports. Whether environmental disclosures increased with time was not conclusive as the findings differed. Amin et al. (2004) found that environmental disclosures slightly increased from 1993 to 1999 while Ratnarajengkol et al.’s (2006) later study found that environmental disclosures decreased over the period from 1997 to 2001. To resolve this anomaly, this study will investigate Thai environmental disclosures using a longer time period than both previous studies. Factors shown to influence disclosures (such as size of companies, type of industry, ownership status, country origin of company, and time) were not examined by the previous Thai studies so these factors will be addressed in this study. The next section will explain the research questions for this study.

V. Research Questions

While many previous studies of developed countries (for example Gamble et al. 1993; Niskala and Prees 1995; Jimeen and et al. 2008) found that numbers of companies providing environmental disclosures in their annual reports were increasing, for Asian based studies, the results are mixed. To settle the issue in relation to Thailand, the hypothesis is:

H1: Over 1997 to 2007, the number of companies providing environmental disclosures in annual reports will increase.

A possible relationship between the levels of environmental disclosures in annual reports and time has been found (Deegan et al. 2000; Gray et al. 1995; Cornier and Gordon 2001; Campbell 2003; Gamble et al. 1995; Jimeen et al. 2008; Stanswick and Stanswick 2006; Raar 2002; Niskala and Prees 1995; Deegan and Gordon 1996). On another hand, Islam and Deegan (2007) found that the levels of environmental disclosures in annual reports of a large export-oriented clothing trade company fluctuated during 1987-2005. Ratnarajengkol et al. (2006) also found that amount of environmental disclosures in Thai corporate annual reports decreased over the period from 1997 to 2001. The hypothesis between amount of environmental disclosures and time is:

H2: There is a positive relationship between the amount of environmental disclosures in annual reports and time.

Legitimacy and stakeholder theories suggest large (categorised by market capitalisation) companies have to respond to social expectations because they have more stakeholders than small companies (Cown et al. 1987). Many studies show a difference between large and small companies in environmental disclosures in their annual reports (Cornier and Gordon 2001; Perry and Sheng 1999; Stanswick and Stanswick 2006), as well as in the amounts of disclosures (Ho and Taylor 2007; Cornier and Gordon 2001; Deegan and Gordon 1996; Stanswick and Stanswick 2006; Raar 2002; Choi and Gordon 1999). Earlier studies did not find such a relationship (Davey 1982; Ng 1988; Roberts 1992). Despite Robert’s (1992) finding of no difference between large and small companies and environmental disclosures in annual reports the hypothesis are:

H3: Larger firms make more environmental disclosures than smaller firms.

Another common classification of companies is by profile (Choi 1999; Hackston and Milne 1996; Patton 1992). High profile companies are those operating in highly environmentally sensitive industries (Perry and Sheng 1999; Stray and Ballantyne 2000; Ho and Taylor 2007). These are more exposed to the political and social environment than low profile companies (Newson and Deegan 2002). Intuitively, the number of high profile companies providing environmental disclosures should be greater than the number of low profile companies. Previous studies have found such a difference (Stray and Ballantyne 2000; Perry and Sheng 1999; Ho and Taylor 2007) although no difference was found between companies in India (Sahay 2004). This raises the question of whether the classification applies in developing countries. The hypothesis is:

H4: There is a difference in the number of high and low profile Thai companies making environmental disclosures in annual reports.

Using the relationship between the levels of disclosures in annual reports and type of industry, many previous studies (Choi 1999; Ho and Taylor 2007; Stray and Ballantyne 2000; Ahmad and Sulaiman 2004; Newson and Deegan 2002) suggest that companies in high environmentally sensitive industries disclose more environmental information than companies in low profile industries. Cown et al. (1987) and Sahay (2004) found no association. The hypothesis is:

H5: There is a positive relationship between the levels of environmental disclosures in annual reports and type of industry.

Another categorisation is according to ownership status, using the percentage of stock held either by government or private companies. For example, if government organizations own more than 51 percent of the common stock of a company, then that firm is classified as a government company; if private organizations hold more than 51 percent of the common stock, these are classified as private companies. A difference in environmental disclosures between government and private companies has been found (Cornier and Gordon 2001; Balal 2000). This is attributed to government companies having to respond more to social expectations, and political regulation than private companies. The hypothesis is:

H6: There is a difference in the numbers of companies making environmental disclosures in annual reports between government and private companies.

In relation to environmental information, government and private companies may differ in both quantity and quality of their disclosures. In Canada, Cornier and Gordon (2001) found that government companies provide more environmental information in corporate annual reports than private companies. In Sweden, Tagen et al. (2009)
nature of task environment, the salience of stakeholder groups and the values of decision makers who determine the shareholder ranking process (Donaldson and Preston 1995). Corporate management will tend to satisfy the information demands of those stakeholders important to the corporation’s ongoing survival. Provision of information will depend upon how powerful they are perceived to be.

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Even though legitimacy and stakeholder theories overlap, they differ in terms of power of stakeholders, expectation and corporate reactions. Proposers of legitimacy theory relate to society and compliance of corporate performance with social expectations. Stakeholder theory accepts that different stakeholder groups have different views with social power on how corporations should act and serve in their operations. These groups have different abilities to affect organizations (Deegan 2002).

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There are only six papers referencing disclosures in Thailand. William (1999) analysed the annual reports of 28 companies utilising political economy theory to test relationships between disclosures and a variety of factors. Culture and the political and civil systems were found to influence the quantity of disclosures. Kamritkum et al. (2004) investigated environmental disclosures in annual reports of 63 Thai firms in 1993 and 84 firms in 1999, finding a slight increase in disclosures from 44% to 45% and that most disclosures were narrative. Connally and Limphasahan (2004) studied a sample of 120 Thai listed companies’ annual reports using the Porter hypothesis to test a relationship between environmental reporting and market valuation and corporate accounting performance. They found a significant positive correlation between market valuation and the reporting, but no significant relationship between environmental reporting and Thai corporate accounting performance. Ranangajongkli et al. (2006) examined disclosures in the annual reports of the 40 largest firms in 1997, 1999, and 2001, finding that disclosures decreased over the study period. Rahman et al. (2010) studied a sample of 37 Thai listed companies in 2006 to examine the relationship between environmental disclosures and financial performance, finding that financial performance had no relationship with the production of environmental disclosures.

Five of the six studies indicate that Thai listed companies provide environmental disclosures in their annual reports. Whether environmental disclosures increased with time was not conclusive as the findings differed. Kamritkum et al. (2004) found that environmental disclosures slightly increased from 1993 to 1999 while Ranangajongkli et al.’s (2006) later study found that environmental disclosures decreased over the period from 1997 to 2001. To resolve this anomaly, this study will investigate Thai environmental disclosures using a longer time period than both previous studies. Factors shown to influence disclosures (such as size of companies, type of industry, ownership status, country origin of company, and time) were not examined by the previous Thai studies so these factors will be addressed in this study. The next section will explain the research questions for this study.

V. RESEARCH QUESTIONS

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H2: There is a positive relationship between the amount of environmental disclosures in annual reports and time.

Legitimacy and stakeholder theories suggest large (categorised by market capitalization) companies have to respond to social expectations because they have more stakeholders than small companies (Crowe et al. 1987). Many studies show a difference between large and small companies in environmental disclosures in their annual reports (Cormier and Gordon 2001; Perry and Sheng 1999; Stanwick and Stanwick 2006), as well as in the amounts of disclosures (Ho and Taylor 2007; Cormier and Gordon 2001; Deegan and Gordon 1996; Stanwick and Stanwick 2006; Raar 2002; Chai 1999). Earlier studies did not find such a relationship (Dovey 1982; Ng 1985; Roberts 1993). Despite Roberts’ (1992) finding of no difference between large and small companies and environmental disclosures in annual reports the hypotheses are:

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found that government companies disclosed more environmental information than private companies because of the scrutiny of state-owned companies, and pressure from the mass media. In Bangladesh, Balal (2000) argued that private companies disclose more environmental information in annual reports than government companies while in Italy, Secci (2005) found that Italian government controlled companies disclosed less environmental information than other corporations. Because of expected differences in environmental disclosures between government and private companies, the hypothesis is:

H7: Government companies will provide more environmental disclosures in corporate annual reports than private companies.

A further categorisation of Thai listed companies is into international and domestic companies because previous studies have shown that international companies provide more environmental disclosures in their annual reports than domestic companies (Ho et al. 1994; Choi 1999; Ahmad et al. 2002; Balal 2000; Jahamani 2002; Larnsagga et al. 2002; FTIR 1999; Niskala and Pretes 1995; Newson and Deegam 2002; Stanwick and Stanwick 2006; Ratanaajongkol et al. 2000; Hackston and Milne 1996; Gray et al. 1995; Guthrie and Parker 1990). The hypothesis is:

H8: There is a difference in the percentages of companies making environmental disclosures in annual reports between international and domestic companies.

Similarly, country of origin can influence the quantity and quality of corporate environmental disclosures (Kolk et al. 2001; Adams et al. 1998). A positive association between country of origin of the company making the disclosures and the levels of environmental disclosures in corporate annual reports has been found (Jahamani 2002; Niskala and Pretes 1995; Stanwick and Stanwick 2006; Hackston and Milne 1996). The hypothesis is:

H9: There is a positive relationship between the levels of environmental disclosures in annual reports and country origin of company.

VI. RESEARCH DESIGN AND METHOD

The study is a longitudinal one investigating environmental disclosures in corporate annual reports of Thai companies listed on the Stock Exchange of Thailand (SET). The reports are examined over the decade of 1997-2007 with six periods of measurement (1997, 1999, 2001, 2003, 2005, and 2007). Thai text version of the reports are sampled rather than English language versions because Thai reports are commonly written in the Thai language. From stakeholder theory, Thai listed companies have to serve their Thai stakeholders who cannot understand the English language well. Two papers have examined environmental disclosures using a non-English text version: Choi (1999) investigated environmental disclosures in Korean corporate semi-annual reports by using Korean text version; Balal (2000) used Bangladeshi language version to examine disclosures in Bangladeshi corporate annual reports.

While the population for the study is all companies (500) listed on the SET, 100 companies were sampled for analysis. Ten percent of the largest and smallest companies in each industry group (eight groups in SET) were selected by market capitalization as at 13 October 2008. After screening, only 75 of the 100 initially targeted companies had been operation for the critical dates during the period being studied.

The data were collected from the annual reports for each sampled company. Corporate annual reports are used because as statutory reports incorporating both mandatory and voluntary disclosures, they can be accessed more easily than other media; and they are recognised widely as the principal means of corporate communication of activities and intentions (Wissner 1982). There were 450 Thai corporate annual reports in the sample.

Content analysis (word count) was used to measure the amounts of environmental disclosures in the Thai annual reports. Numbers of words provide more detailed analysis than other measurement tools (Deegam and Gordon 1996; Gray et al. 1998). Word count also allows measurement in Thai language versions of reports because the Thai language does not use a full stop to mark its sentences. Alternatives such as page-pair disclosure do not account for font sizes, page sizes and grammar (Ratanaajongkol et al. 2006). Completed data were analysed using SPSS (version 17). To test for significance, this study used descriptive statistics, McNemar's test, Paired T-test, and Repeated Measures Model.

VII. FINDINGS

All 75 Thai listed companies provided environmental disclosures in their annual reports during the study period (1997-2007). The number of companies providing environmental disclosures in their annual reports rose from 20 (26.7%) companies in 1997 to 62 (82.7%) companies in 2007. The number of words used in these disclosures also increased (see Figure 1) from 40.56 average words in 1999 to 333.89 average words in the last year of study. The number of words dropped in the year 2001. This may be due to the voluntary nature of corporate environmental disclosures at that time. The change to a comply-or-explain approach for corporate governance practices appears responsible for the increase in the amount of words to nearly 340 words in 2007. This amount was double the average amount of words used in 2005.

To test whether these results are statistically significant, a nonparametric test by McNemar was used for the hypothesis that the numbers of companies making environmental disclosures in annual reports will increase over the period studied. The finding is 38.21 (p<.05). Therefore, the hypothesis is supported. To examine the association between the number of words used in environmental disclosures and time, the General Linear Model by Repeated Measures Model was used. A positive relationship between them, significant at 0.05 was found, thus, supporting the hypothesis. This finding is consistent with the previous study by Komitirika and Sierz (2004) who found increasing environmental disclosures in Thai corporate annual reports, but the result contradicts the Ratanaajongkol (2006) study.
found that government companies disclosed more environmental information than private companies because of the scrutiny of state-owned companies, and pressure from the mass media. In Bangladesh, Halal (2000) argued that private companies disclose more environmental information in annual reports than government companies while in Italy, Secci (2005) found that Italian government controlled companies disclosed less environmental information than other corporations. Because of expected differences in environmental disclosures between government and private companies, the hypothesis is:

H7: Government companies will provide more environmental disclosures in corporate annual reports than private companies.

A further categorisation of Thai listed companies is into international and domestic companies because previous studies have shown that international companies provide more environmental disclosures in their annual reports than domestic companies (Ho et al. 1996; Choi 1999; Ahmad et al. 2003; Halal 2000; Jahannan 2003; Larrinaga et al. 2002; PIRC 1995; Nikiskala and Pietsch 1995; Newson and Deegan 2002; Stanwick and Stanwick 2006; Ratanamongkol et al. 2006; Hackston and Milne 1996; Gray et al. 1995; Guthrie and Parlor 1990). The hypothesis is:

H8: There is a difference in the percentages of companies making environmental disclosures in annual reports between international and domestic companies.

Similarly, country of origin can influence the quantity and quality of corporate environmental disclosures (Kolk et al. 2001; Adams et al. 1998). A positive association between country of origin of the company making the disclosures and the levels of environmental disclosures in corporate annual reports has been found (Jahannan 2003; Nikiskala and Pietsch 1995; Stanwick and Stanwick 2006; Hackston and Milne 1996). The hypothesis is:

H9: There is a positive relationship between the levels of environmental disclosures in annual reports and country of origin of company.

VI. RESEARCH DESIGN AND METHOD

The study is a longitudinal one investigating environmental disclosures in corporate annual reports of Thai companies listed on the Stock Exchange of Thailand (SET). The reports are examined over the decade of 1997-2007 with six periods of measurement (1997, 1999, 2001, 2003, 2005, and 2007). Thai text versions of the reports are sampled rather than English language versions because Thai reports are commonly written in the Thai language. From stakeholder theory, Thai listed companies have to serve their Thai stakeholders who cannot understand the English language well. Two papers have examined environmental disclosures using a non-English text version: Choi (1999) investigated environmental disclosures in Korean corporate semi-annual reports by using Korean text version; Halal (2000) used Bangladeshi language version to examine disclosures in Bangladeshi corporate annual reports.

While the population for the study is all companies (500) listed on the SET, 100 companies were sampled for analysis. Ten percent of the largest and smallest companies in each industry group (eight groups in SET) were selected by market capitalization as at 13 October 2008. After screening, only 75 of the 100 initially targeted companies had been operation for the critical dates during the period being studied.

The data were collected from the annual reports for each sampled company. Corporate annual reports are used because as statutory reports incorporating both mandatory and voluntary disclosures, they can be accessed more easily than other media; and they are recognised widely as the principal means of corporate communication of activities and intentions (Wiseman 1982). There were 450 Thai corporate annual reports in the sample.

Content analysis (word count) was used to measure the amounts of environmental disclosures in the Thai annual reports. Numbers of words provide more detailed analysis than other measurement tools (Deegan and Gordon 1994; Gray et al. 1998). Word count also allows measurement in Thai language versions of reports because the Thai language does not use a full stop to mark its sentences. Alternatives such as part-page disclosure do not account for font sizes, page sizes and grammar (Ratanamongkol et al. 2006). Compiled data were analysed using SPSS (version 17). To test for significance, this study used descriptive statistics, McNemar’s test, paired T-test, and repeated measures Model.

VII. FINDINGS

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To test whether these results are statistically significant, a nonparametric test by McNemar was used for the hypothesis that the numbers of companies making environmental disclosures in annual reports will increase over the period studied. The finding is 38.21 (x^2 =79), P = 0.01, therefore, the hypothesis is supported. To examine the association between the number of words used in environmental disclosures and time, the General Linear Model by Repeated Measures Model was used. A positive relationship between them, significant at 0.05 was found, thus, supporting the hypothesis. This finding is consistent with the previous study by Kumitikun and Sirer (2004) who found increasing environmental disclosures in Thai corporate annual reports, but the result contradicts the Ratanamongkol (2006) study.

Figure 1: The number of words in environmental disclosures in annual reports

Within the sampled companies, 33 are classified as large companies and 42 as small companies. Differences between each variable group (see Table 1) were tested. Table 1 reports the percentages of companies making environmental disclosures in their annual reports. To test H3, that larger firms make more environmental disclosures than smaller firms, compare mean by paired T-test was used. The result shows a significant difference between sizes of company, significant at 0.05 so that the hypothesis is supported.
Table 1: Findings

<table>
<thead>
<tr>
<th>Size of company</th>
<th>Average Number of words</th>
<th>Std Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large companies</td>
<td>12.6617</td>
<td>8.7038</td>
</tr>
<tr>
<td>Small companies</td>
<td>10.1733</td>
<td>5.24139</td>
</tr>
<tr>
<td><strong>T-test: Significance level 0.001 (0.006</strong>)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High profile companies</td>
<td>11.9667</td>
<td>6.41918</td>
</tr>
<tr>
<td>Low profile companies</td>
<td>10.5883</td>
<td>7.11918</td>
</tr>
<tr>
<td><strong>T-test: Significance level 0.01 (0.007</strong>)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ownership status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government companies</td>
<td>6.3900</td>
<td>10.14382</td>
</tr>
<tr>
<td>Private companies</td>
<td>11.4717</td>
<td>6.94645</td>
</tr>
<tr>
<td><strong>T-test: No significance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country origin of company</td>
<td></td>
<td></td>
</tr>
<tr>
<td>International companies</td>
<td>17.000</td>
<td>8.90639</td>
</tr>
<tr>
<td>Domestic companies</td>
<td>34.1933</td>
<td>62.67564</td>
</tr>
<tr>
<td><strong>T-test: No significance</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at the 0.05 level
** Significant at the 0.01 level

To ascertain whether there is a positive relationship between the number of words used in environmental disclosures in annual reports and size of company (H3), Repeated Measures Model was used. The result (see Table 2) shows a positive relationship between the levels of environmental disclosures in Thai corporate annual reports and size of company, significant at 0.05. Thus, H3 is supported.

Table 2: Repeated Measure Model with content SIZIES, TIME and interaction between content SIZIES and TIME

<table>
<thead>
<tr>
<th></th>
<th>F ratio</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZIES (between subjects)</td>
<td>8.853</td>
<td>0.001**</td>
</tr>
<tr>
<td>TIME (within subjects)</td>
<td>24.187</td>
<td>0.000**</td>
</tr>
<tr>
<td>TIME*SIZIES (interaction)</td>
<td>5.928</td>
<td>0.017*</td>
</tr>
</tbody>
</table>

* Significant at the 0.05 level
** Significant at the 0.01 level

Classification of the companies into high or low profile resulted in 37 high profile companies and 38 low profile companies. A Paired T-test was performed to find whether there is a statistically significant difference in the number of high and low profile Thai companies making environmental disclosures in annual reports (see Table 1). The result shows that the difference between industry types is significant at 0.01, thus, supporting the hypothesis (H4). However, when using Repeated Measures Model to test an association between the levels of environmental disclosures in Thai corporate annual reports and type of industry (H5), the finding indicated that there is no relationship between them, significant at 0.05. The hypothesis (H5) is not supported.

In regard to ownership status, 72 companies were found to be private companies and the remainder (three) government companies. To test the difference between government and private companies in terms of the percentages of companies making environmental disclosures in annual reports (H7), Paired T-test was used (see Table 1). The result indicates that there is no difference between government and private companies because p value is over 0.05, so the hypothesis is not supported. To investigate the relationship between the level of environmental disclosures with ownership status, Repeated Measures Model was used (H8). This analysis found no association between them.

There were 14 international companies and 61 domestic companies in the sample. This categorisation was used to test whether there was a difference between their environmental disclosures and country of origin. Similarly with

VIII. CONCLUSIONS AND LIMITATIONS

This study investigated environmental disclosures in a sample of annual reports of companies listed on the Stock Exchange of Thailand (SET) over the decade 1997-2007. This research extends the knowledge about environmental disclosures by Thai companies, providing insights into the environmental disclosure practices of listed companies within a developing country, an area of limited published studies (Islam & Degan 2007). There are four main findings. Similar to previous studies focusing on developed countries, environmental disclosures in Thai corporate annual reports increased over time, both in the number of companies making disclosures and in amount of disclosures. Disclosures increased after the financial crisis and after the tsunami crisis, crises which would be expected to increase community concerns about corporate activities. Corporate management will tend to satisfy the information demands of those stakeholders important to the corporations' ongoing survival. Provision of information will depend upon how powerful stakeholders are perceived to be. The increase in disclosures after SET introduced its comply-or-explain approach reflects the need to manage the relationship with a powerful stakeholder, SET. The provision of environmental information differs between large and small companies as well as between high and low profile companies. Large companies and environmentally sensitive companies provided more disclosures than smaller companies and less environmentally sensitive companies. These results reflect the visibility of larger companies compared to smaller companies. Larger, more visible companies have been shown to disclose more information than smaller, less visible companies. The study also provides practical benefits. The development of a comply-or-explain approach increased disclosures which generated greater transparency about the Thai environment, bridging the gap between community actions or activities and social expectations and stakeholder concerns.

Because little is known about environmental disclosures by firms in Thailand, this study draws on previous studies that used content analysis and statistical associations with certain factors such as size, industry, and ownership, to enable comparisons with studies of firms in developed countries. As such the study does not say anything about a disclosing firm’s commitment to the environment and to sustainability. Stakeholder theory and legitimacy theory present voluntary disclosures by firms as reactions to external pressures such as media coverage. This study did not investigate whether the disclosures were a response to pressure such as that from the media or government. However, the SET's change in approach towards disclosures suggests it may have been reacting to community pressure about pollution generated by Thailand’s industrialisation.

Other limitations include the sole use of the annual reports as the source of data, the subjectivity of the data collection methods used, and time period chosen. Firstly, the sole use of corporate annual reports to collect data about what environmental information is being disclosed is debated because of other communication media which companies can use to reveal their environmental information. However, those media including corporate websites or stand-alone environmental reports do not have the credibility that is attached to an annual report. Secondly, because content analysis is a method to quantify disclosures, the quality of the disclosures and the underlying motives for them remain unknown. Although the period being studied was a decade, because of time limitations, five periods of disclosure were used to represent what was happening over that decade.

Further study is needed to ascertain whether environmental disclosures by Thai listed companies are made in other communication media as well as the reasons why these companies voluntarily provide environmental information to their stakeholders.
Table 1: Findings

<table>
<thead>
<tr>
<th>Size of company</th>
<th>Average Number of words</th>
<th>Std Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large companies</td>
<td>12,661.7</td>
<td>8,702.81</td>
</tr>
<tr>
<td>Small companies</td>
<td>10,171.3</td>
<td>5,241.39</td>
</tr>
<tr>
<td>T-test: Significance level 0.001 (0.005)**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of industry</th>
<th>Average Number of words</th>
<th>Std Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>High profile companies</td>
<td>11,966.7</td>
<td>6,419.18</td>
</tr>
<tr>
<td>Low profile companies</td>
<td>10,588.3</td>
<td>7,119.38</td>
</tr>
<tr>
<td>T-test: Significance level 0.01 (0.007)**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ownership status</th>
<th>Average Number of words</th>
<th>Std Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government companies</td>
<td>6,390</td>
<td>10,143.32</td>
</tr>
<tr>
<td>Private companies</td>
<td>11,471.7</td>
<td>6,946.45</td>
</tr>
<tr>
<td>T-test: No significance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country of origin of company</th>
<th>Average Number of words</th>
<th>Std Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>International companies</td>
<td>17,000</td>
<td>8,906.39</td>
</tr>
<tr>
<td>Domestic companies</td>
<td>34,193.3</td>
<td>62,675.64</td>
</tr>
<tr>
<td>T-test: No significance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Significant at the 0.05 level
** Significant at the 0.01 level

To ascertain whether there is a positive relationship between the number of words used in environmental disclosures in annual reports and the size of company and the industry type, the result (see Table 2) shows a positive relationship between the levels of environmental disclosures in Thai corporate annual reports and size of company, significant at 0.05. Thus, H3 is supported.

Table 2: Repeated Measure Model with content SIZES, TIME and interaction between content SIZES and TIME

<table>
<thead>
<tr>
<th></th>
<th>F ratio</th>
<th>Sig</th>
</tr>
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<tbody>
<tr>
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<td>0.004**</td>
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<tr>
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</tr>
</tbody>
</table>

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There were 14 international companies and 61 domestic companies in the sample. This categorization was used to test whether there was a difference between their environmental disclosures and country of origin. Similarly with ownership status, the hypothesis (H8) was not supported (see Table 3). There is no relationship between the amounts of environmental disclosures in Thai corporate annual reports with country origin of company as well.

Table 3: Repeated Measure Model with content COUNTRIES, TIME and interaction between content COUNTRIES and TIME

<table>
<thead>
<tr>
<th></th>
<th>F ratio</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>COUNTRIES (between subjects)</td>
<td>0.236</td>
<td>0.628</td>
</tr>
<tr>
<td>TIME (within subjects)</td>
<td>9.798</td>
<td>0.000**</td>
</tr>
<tr>
<td>TIME*COUNTRIES (interaction)</td>
<td>1.017</td>
<td>0.316</td>
</tr>
</tbody>
</table>

** Significant at the 0.05 level
* Significant at the 0.01 level

VIII. CONCLUSIONS AND LIMITATIONS

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REFERENCES


Ratanajongkol, S., H. Davey, and M. Low. 2006. Corporate social reporting in Thailand, the news is all good and increasing. Qualitative Research in Accounting & Management 3 (1):67-83.


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**RECONFIGURABLE PRODUCTION CONTROL**

Sebastian Bertsch & Peter Nyhuis
Institute of Production Systems and Logistics, Leibniz University of Hannover, Germany

**ABSTRACT**

The external environment for manufacturers is continuously changing. Ongoing developments like globalization, market segmentation and market saturation lead to an increased dynamic in customer demand. Both the changing environment and changing customer expectations require manufacturers to continually adapt to these new conditions. Changeable manufacturers, which adapt quickly to new conditions, employ resources more effectively and more efficiently. For this reason, changeability has become an important capability and design aspect for a production system in order to maintain a competitive edge. In the course of achieving high changeability, different design principles are discussed in literature, e.g. compatibility, modularity or reconfigurability. While research in the area of changeability is centered on changeable plants or manufacturing systems, organizational aspects like production scheduling and control are still out of focus. To overcome this deficit, we will discuss the following paper whether reconfigurability as a design aspect can be applied to manufacturing control. We will use a well-known model developed by Lüding as a basis for describing manufacturing control and will illustrate how it can be used to integrate reconfigurability aspects into manufacturing control.

1. **CHANGABLE PRODUCTION SYSTEMS AS A REACTION TO TURBULENT ENVIRONMENTS**

Nowadays, productions in high-wage countries are exposed to changes more than ever. The globalization and saturation of numerous markets has led not only to an increase in demand fluctuation but also to a surge in the number of variants. Moreover, the decision of enterprises to concentrate on so-called "key competencies" has led to a growth in developing networks and as a result to a world-wide interweaving of companies. Local crises thus quickly lead to consequences felt around the globe (1). Figure 1 clarifies this increasing dynamic based on the example of the German automobile industry in which it was determined that, during the last 20 years, the demand could fluctuate by 25% within a brief timespan and the product lifecycle was almost halved (2).

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![Figure 1: Volume Fluctuations and Number of Variants Based on the example of the German Automobile Industry](image-url)