THE IMPACT OF SOCIAL PRESSURE AND ECO-INNOVATION PRACTICES ON CHEMICAL FIRM'S SUSTAINABLE PERFORMANCE

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***ABSTRACT*:** *Chemical sector plays important roles as they have strong linkages with other manufacturing sectors. The rapid development of chemical sectors in Malaysia has triggered the need to strengthen the management of chemicals to prevent incidents involving chemicals that can harm the safety and health of humans and the environment. In such a scenario, chemical firms are facing pressure to be more sustainable. Social pressure could reflect a preference of citizens for environmental protection, and firms criticized for their environmental practices could respond by increasing their firm's sustainable performance. The purpose of this paper is to investigate the impact of social pressure on the firm's sustainable performance as well as the effect of eco-innovation practices by chemical firms in Malaysia. Data were collected based on the quantitative research method using self-administered questionnaires. Only 76 various chemical companies out of 500 selected companies replied their response. This study utilized PLS-SEM using SmartPLS 3.0 to analyze the data collected. The result shows that social pressure and eco-innovation practices positively and significantly affect sustainable performance.*

Index Terms: Cchemical firms, eco-innovation practices, social pressure, sustainable performance

I.

II. INTRODUCTION

The increasing pressure from stakeholders such as environmental regulations and community concern over environmental protection has demonstrated the importance of environmental management in the manufacturing process [1, 2]. The Malaysian government also stresses on environmental issues in the Eleventh Malaysia Plan (11th MP, 2016-2020). Concerning this, green growth will be a fundamental shift in how Malaysia sees the role of natural resources and the environment in its socio-economic development, protecting both development gains and biodiversity simultaneously.

To support this issue, the whole manufacturing sector especially the chemical industry are urged to implement and develop satisfactory products and technologies through eco-innovation. In reality, organizations normally function over the usage of resources and cause the emission of toxic waste and other pollution into the environment during their product manufacturing operation. As in the chemical industry, the whole life of a chemical product (from "cradle to grave") there is a potentially harmful effect on human and the environment [3].

In Malaysia, the problems regarding environmental harmful such as air and water pollutions still unsolved. The industrial revolution and fast development are accountable for major environmental complications; among them disposal of hazardous and communal waste, pollution of air, water and traffic pollutants which are air contaminants generated by cars and trucks particularly by the chemical industry [4]. Besides, lately, some cases involving toxic pollutants by chemical firms have had a detrimental effect on the health of the people in Pasir Gudang, Johor. These incidents have caused anger in the community and forced the authorities to take action against the firms.

Matters relating to sustainability have received great public attention, breaking news about climate change, corporate social responsibilities (CSR) and influences of corporate organizations actions being shown frequently through all broadcasting media channels and social media. Now, modern livings are facing anew emerging trade phenomena which are defined as sustainability performance management, which reports the social, environmental and economic aspects of business management and corporate sustainability supervision [5, 6]. A stable and healthy society is a crucial obligation for companies to function successfully and profitably in the future. If companies' actions disrupt social harmony or affect major harm to the ecological system, human natural life cannot be sustained and commercial activities will be disregarded in the long run [8, 7]. This paper offers a perspective that evaluates the relationship of social pressure with sustainable performance as well as the adoption of eco-innovation practices in the chemical industry.

III. LITERATURE REVIEW

A. Sustainable Performance

The concern over sustainability is greater than ever, especially in the chemical industry. In facing high-pressure competition, chemical manufacturers must increasingly pay attention to renewable resource usage, waste treatment, air emissions, water and air pollution, employee welfare, and so on. Failing to manage these sustainability issues can substantially damage the image of the company and thus affect its performance. Sustainability in the environmental prospect means not placing an intolerable burden on the ecosystem and preserving the natural source for life. OECD Environmental Strategy for the First Decade of the 21st Century [8] defines four specific criteria for environmental sustainability: regeneration (renewable resources shall be used efficiently and their use shall not be permitted to exceed their long-term rates of natural regeneration), substitutability (non-renewable resources shall be used efficiently and their use limited to levels which can be offset by substitution with renewable resources or other forms of capital), assimilation (releases of hazardous or polluting substances into the environment shall not exceed their assimilative capacity) and avoiding irreversibility.

The chemical industry views sustainable development as a big challenge lay before all parts of society. In the advances made in its own operations, its improved performance and in the improvements to the human condition made through its products, the chemical industry sees cause for optimism and believes that sustainable development can be the intellectual framework around which the chemical industry, other

industries and other sectors of society can reach consensus on how to improve standards of living and the environment [9].

Rising awareness about the limitations of measuring organizational success merely with financial metrics has motivated researchers and practitioners to call for more holistic performance management and measurement systems. The balanced scorecard (BSC) as proposed by [10] is maybe the most popular framework which aims at a balance between multiple performance dimensions and objectives. Moreover, the increasing strategic importance of environmental and social aspects have led to the suggestion of a so-called sustainability balanced scorecard (SBSC), which promises the consideration of even further performance dimensions. There is six dimensions of sustainable performance used in this research as proposed by SBSC: Financial, internal process, customer, learning and growing, environmental, and social.

B. Social Pressure

Value creation is the final objective of a company [11]. To achieve this purpose, the firm cannot ignore the context in which it operates. A network of relationships connects the company to a great number of interrelated individuals and constituencies, called stakeholders including the local community [12–17]. The local community gifts the firm the right to build facilities and, in turn, it benefits from the levy base and the economic and social influences of the firm. In return for the running of local services, the firm is expected to be a worthy resident. The firm cannot expose the community to irrational hazards in the form of pollution, toxic waste, toxic substance and so on. Obviously, the firm does not have perfect knowledge, but when it ascertains some danger or turns afoul of new competition, it is expected to notify the public and to work with the community to overwhelm any problem. When the firm mishandles its relationship with the local community, it is in the same position as a resident who commits criminality. It has dishonored the inherent social contract with the community and should expect to be distrusted and disliked [3].

As highlighted in [18], social pressure could come from government in the form of regulation and enforcement or from NGOs and social activists in the form of boycotts, media campaigns, and harm to a firm's reputation or brand equity. Also, several empirical research founds that social pressures drive firm actions [19][20][21]. This study utilizes the stakeholder theory and legitimacy theory to explain the relationship between social pressure, sustainable practices, and the firm's sustainable performance. The measure used for social pressure is environmental interest groups, the community via legal action, the community via other means (e.g; blogger, demonstrator), the media (e.g; official newspapers, broadcast media, and social media). Concerning this, the following proposition is offered: H1: Social pressure will affect the firm's sustainable performance.

C. Eco-innovation Practices

The term "eco-innovation" commonly used to discuss the innovative products and processes that reduce environmental impacts. Firms involved in eco-innovation practices are likely to have a positive impact on their environmental performance such as waste reduction and emission [22, 23]. Similarly, [24] demonstrates the positive influence of eco-innovation practices on the company's financial performance. This may be since the company's superior environmental performance is associated with the solidification of intangible assets (ie quality, brand awareness, and trust, corporate image and reputation). The natural-resource-based-view (NRBV) provides a theoretical basis for discussing the contribution of resources and capabilities to the performance of sustainability. Based on NRBV, the investment in eco-innovation may foster the development of a company's resources and capabilities, which form the basis for its competitive advantage [25]. Besides [26] point out that the activities in proactive eco-innovation practices (i.e., pollution prevention) can contribute to the development of valuable capabilities, such as environmental responsiveness, organizational innovation, and stakeholder integration. As a result, companies that develop these capabilities related to environmental management can achieve greater financial performance.

Facing currently intense customers' green demands and global environmental concerns, sustainable practices have been touted as an effective approach for firms to achieve a win-win status of being green and sustainably competitive [27, 28]. Despite numerous studies on the links between green issues and performance or competitive advantage, the conflicting findings have considerably illustrated a research gap on the links eco-innovation practices, and firm performance [29]. Furthermore [30, 31] suggest that eco-innovations have a positive effect on firms' performance.

Given that this study focuses on the chemical industry, the eco-innovation practices of the chemical firms have been integrated with the ‘responsible care code of practice' to make it more convenient and reliable. Responsible Care is an initiative of the chemical industry and adopted by chemical companies to improve continuously safety, health and environmental performance of their operations and products in a manner responsible to public concerns. Chemical Industries Council of Malaysia (CICM) is the Malaysian steward for the Responsible Care initiative of the global chemical industry. At the heart of Responsible Care, the initiative is the Six Codes of Management Practices, which focus on specific areas of chemical manufacturing, transportation, research, and handling. This study, however, simplified the practices into four categories of eco-innovation practices; pollution prevention, product and process stewardship, distribution, and employee and public health and safety [34]. The following proposition is proposed to investigate the relationship between sustainable practices and sustainable performance: H2: Eco-innovation practices will affect sustainable performance.

IV. RESEARCH METHODOLOGY

This study made use of a quantitative research method by using a cross-sectional survey approach because the data collected covered the period of the study only. The population of this study is chemical firms in Malaysia. A total of 500 chemical firms which registered in the Federation of Malaysian Manufacturers were randomly chosen as a sample of this study. The unit of analysis in this study is the individual chemical firm. To get valid and reliable responses, the targeted respondent in this study is personnel who hold a managerial position in a firm. Adopting a survey approach, a set of questionnaire was mailed to 500 targeted respondents. In total, 76 responses were gathered from various chemical firms

giving a response rate of 15.2%. However, three questionnaires need to discard as incomplete. Thus, this study collected 73 completed data samples from chemical companies, which is larger than 52, the minimum requirement of sample size [35].

Due to this study encountered situations (i) small response and (ii) little available theory, PLS-SEM is the most suitable approach to be used. PLS-SEM is a more robust approach and can be used to analyze data with non-normality distribution. Using PLS-SEM, data normality is not a demanded aspect because PLS uses calibration mechanisms, which transform any non-normal data into data that adheres to the central limit theorem [36–38]. This study utilized PLS-SEM using SmartPLS 3.0 to analyze the data collected.

V. RESULT AND DISCUSSION

A. Descriptive Analysis

Pre-analysis has been done to examine the outliers of the data, the distribution, non-response bias, and common method variance. The result of the descriptive analysis shows that the majority of the firms are large-sized (49.3%), followed by medium-sized (35.6%) and small-sized (15.1%). Table 1 also shows that most of the responded firms have been established within 10 to 20 years (42.5%). About 31.5% of the firms' state that they have been operating since 21 to 30 years, 16.4% have been operating since 10 to 20 years, while the rest 9.6% of the firms are just operating not more than 10 years. The respondents of this study hold a diverse position in the company as we can see, 27.4% of them are manager, 24.7% are Executive and 21.9% are operation manager. Assistant manager, CEO and managing director have equal percentage which is 6.8%, while an engineer is 2.7%. The result also shows an equal percentage for senior manager and quality manager which are 1.4%. The responded firms consist of different status which is the majority of them (54.8%) are multinational corporations (MNC), followed by 21.9% are from national or local firms (NC) and joint ventures (JV). To fulfill the research focus and objective about environmental management systems, the requirement of at least the responded firms have been adopting ISO 9000 is fulfilled. It can be seen in the table that 100% of the respondents have ISO 9000 certification.

The mean and standard deviation of each construct are presented in Table I. The mean ($\bar{x}$) value range from 3.041 to 3.547 out of possible value 5.0 on the scale demonstrates a moderate to a considerable extent of social pressures felt by the respondents to implement sustainable practices. The mean ($\bar{x}$) value range 3.489 to 3.890 out of a possible value 5.0 on the scale, reflect a moderate to a considerable extent of implementation of eco-innovation practices. Furthermore, the mean ($\bar{x}$) value range from 3.589 to 4.03 out of a possible value 5.0 indicates the ability of the respondent firms in showing better sustainable performance.

Table I: **Descriptive statistics of variables**

Construct	Mean ($\bar{x}$)	SD
Social Pressure		
Environmental interest groups	3.493	1.081
The community via legal action	3.493	1.001
The community via other means (e.g; blogger, demonstrator)	3.547	1.067
The media (e.g; official newspapers, broadcast media, and social media).	3.041	1.135
Eco-innovation practices		
Pollution prevention	3.667	.522
Product and process stewardship	3.489	.545
Distribution	3.890	.473
Employee and public health and safety	3.684	.429
Sustainable Performance		
Financial	3.726	.445
Internal process	3.734	.415
Customer	3.750	.455
Learning and growing	3.589	.387
Environmental	3.982	.431
Social	4.030	.521

Table II: Reliability and validity of items

Construct	Item	Loadings	CR	AVE
Social Pressure	Environmental interest groups	0.813	0.859	0.608
	The community via legal action	0.894		
	The community via other means (e.g; blogger, demonstrator)	0.757		
	The media (e.g; official newspapers, broadcast media, and social media).	0.631		
Eco-Innovation Practices	Pollution Prevention	0.847	0.799	0.511
	Product and process Stewardship	0.863		
	Distribution	0.514		
	Employee and public health and safety	0.565		
Sustainable Performance	Financial	0.639	0.856	0.500
	Internal Processes	0.645		
	Customer	0.810		
	Learning and growing	0.674		
	Environmental	0.630		
	Social	0.818		

B. *Measurement Model*

The validation of a reflective measurement model can be established by testing its internal consistency, indicator reliability, convergent validity and discriminant [39]–[42].

Table II shows the various reliability and validity items that we must check and report when conducting a PLS-SEM. Overall, all reliability and validity tests are confirmed and this is an indicator that the measurement model for this study is valid and fit to be used to estimate parameters in the structural model.

C. Structural Model

Once the validity and reliability of the construct measures are confirmed, the next step addressed the assessment of the structural model results. There are four steps of assessment procedure need to be followed as suggested by [38]:

i) Collinearity

High correlations between two indicators are referred to as collinearity [38]. To assess the collinearity, we need to determine the construct's tolerance (VIF) value for each set of predictor variables. Each predictor VIF value should be higher than 0.2 (lower than 5.0). The result of the VIF values for this study shows that the value for both predictors is higher than 0.2 and below than 5.0. The values confirm the issues of collinearity is not a problem.

ii) Path Coefficients (β) In Structural Model

Within the structural model, each path connecting two latent variables represented a hypothesis. Based on the analysis conducted on the structural model, it allows the researcher to confirm or disconfirm each hypothesis as well as understand the strength of the relationship between dependent and independent variables. The results from the path assessment (Table III), shows the value of 0.241 and 0.401 significant at a p-value of 0.017 and 0.000 concluded the acceptance of the proposed hypotheses is determined.

iii) Coefficient of Determination (R^2)

The R^2 value indicates the amount of variance in the dependent variable that is explained by the independent variables. Thus, a larger R^2 value increases the predictive ability of the structural model. In this study, SmartPLS algorithm function is used to obtain the R^2 values, while the SMartPLS bootstrapping function is used to generate the t-statistics values. For this study, the bootstrapping generated 500 samples from 73 cases. Social pressure and sustainable practices jointly explain 28.4% (R^2=0.284) of the variance in sustainable performance. In consumer behavior research discipline, the R^2 value of 0.2 and above are considered high [38]. The problem of low or weak R^2 value normally happens due to the availability of other variables which not been included in the research model.

Table III: Path Coefficients, observed t- statistics, significant level

Relation	(β)	Mean	T Stat	P Values	Sig.
Social Pressure > Sustainable Performance	0.241	0.229	2.400	0.017	Yes
Eco-Innovation practices > Sustainable performance	0.401	0.519	4.042	0.000	Yes

iv) Predictive Relevance

Another assessment of the structural model involves the model's capability to predict. The predominant measure of predictive relevance is the Stone–Geisser's, Q^2 as cited in [38], which postulates that the model must be able to adequately predict each endogenous latent construct's indicators. The Q^2 value is obtained by using a blindfolding procedure. If an endogenous construct's cross-validated redundancy measure value (Q^2) for a certain endogenous latent variable is larger than zero, its explanatory latent constructs exhibit predictive relevance. The value of Q^2 for sustainable performance is 0.046. It can be concluded that the model of this study exhibit a low capability to predict.

VI. CONCLUSION

This study has put an effort to investigate the effect of social pressure and eco-innovation practices in the Malaysian context and its relationship with sustainable performance. The study reveals that social pressure and eco-innovation practices positively and significantly affect sustainable performance. The previous discussion was highlighted that most processes which involve the use of chemicals have the potential to harm the environment. The social pressure pushes chemical firms to implement eco-innovation practices which in turn will improve their sustainability performance. Limitation of this work relates to the cross-sectional data that does not account for the dimension of time, i.e. how long the practices have been implemented. This may be an important consideration as firms who had implemented the practices over a longer period may have realized greater levels of improvement. This is something that future studies should try to incorporate as it may influence the results. Future research should also include other factors which potentially relates to sustainable performance.

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