



## **SAFETY CULTURE MATURITY IN UPSTREAM: OIL AND GAS INDUSTRY IN THAILAND**

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### **ABSTRACT**

*The demand of energy in Thailand has significantly increased for the past 10 years. Volunteer company as one of the subsidiary company of Thailand National Oil and Gas Company, has responsible to respond to serve country's energy demand in order to minimize import expense. Upstream Business Company like volunteer company is responsible to find the natural resources and energy to supply the country demand. Company is also in High-risk industry which one major accident may result operation disruption and impact to the country e.g. gas supply shortage to power plant and cause electricity shortage in Thailand. On the other hand, it may cause major reputation damage, multiple fatalities, environment contamination and financial loss to company and society. Hence, safety is one of the most important areas to make sure operation run smooth and prevent those from happening. The evolution and focus of safety have improved from 1980s, 2000s to early 2010s in Technology, System and Culture areas respectively. In Thailand, safety culture is very new and many companies fail to create the effective safety culture. Volunteer company has focused on safety culture (people) from the past 5 years due to root/underlying causes of the incident come from human factor. Volunteer company tailor made safety culture maturity model of 5 levels, Pathological, Reactive, Calculative, Proactive and Generative, from industry best practice along with strengthens safety management system in order to reduce incident and prevent Major accident in operation. Volunteer company launched safety culture questionnaire to identify company status to all employee in 2011 and result come with they are in level 3 (Calculative). Once the safety culture level has been clarify, it is easier to use proper tools and techniques to create a culture change, Volunteer company come up with 5 years roadmap to create a culture change from 2011 – 2015 with aspiration to achieve Generative level. As result of Volunteer company safety culture improvement shown indirectly from reduction in “Lost time injury frequency” (LTIF) and “Total recordable injury rate” (TRIR) from safety statistics, severity of the case has been reduced and operation run smoothly without any major accident.*



## INTRODUCTION

From 2009 – 2011, the overall Thailand energy consumption (Petroleum products, Natural gas, Coal, Lignite and etc) was higher than country production. Hence, Government has to import them and related product to meet the demand which increasing rapidly for instance only one-third of hydrocarbons demand satisfied by domestic resources (Department of Mineral Fuels, 2011) In past decade, Thailand boost production capacity of its already strong manufacturing section particularly heavy industries, including auto manufacturing, metalworking and petrochemicals factories. Those require substantial amounts of energy, which far exceed what country can produce (The report Thailand, 2012). Moreover In 2011, Thailand oil and gas consumption is ranked 19<sup>th</sup> and 25<sup>th</sup> among overall country or 1.2 % and 1.1% respectively of the world consumption which higher than neighbor country (BP, 2011). In 2013, Thai government concerns about energy consumption and promotes energy saving campaign in order to prevent electric shortage on April which is the highest rate of electricity usage in year round. They concern that there might not be enough gas to supply power plant due to annual maintenance of major gas supply sources from international country in the same period of time. There are many national and international companies e.g. Chevron, BG, PTT Group and Total investing Oil and Gas business in Thailand for instance, exploration and production in gulf of Thailand and Andaman sea, Refinery in Rayong province and Marine base in Songkla province. Volunteer company, a national Oil and Gas Exploration and Production Company (Upstream) subsidiary of PTT Group, play an important role and responsible to find energy sources from domestic and international to serve country's energy demand. If there are any major incidents in Volunteer company operation for instance explosion in well head platform, major leak or corrosive in 32" pipeline may cause unplanned shutdown and delay in energy supply to production source. One of those outcomes are electricity shortage which impact many stakeholders in Thailand for example; Automobile industry may need to lower production, higher price of Oil and Gas which cause general product more expensive and cut electricity in some area. As the result of, Oil and Gas industries especially upstream in Thailand are continued to expand to sustain country demand in future.

Table.1. Energy, inputs and consumption from 2009 – 2011 (BOI, 2012)

Energy consumption ('000 bpd)	2009	2010	2011
Production	849.8	989.2	1017.5
Import (net)	922.0	1000.6	1016.5
Consumption	1662.6	1782.9	1845.5

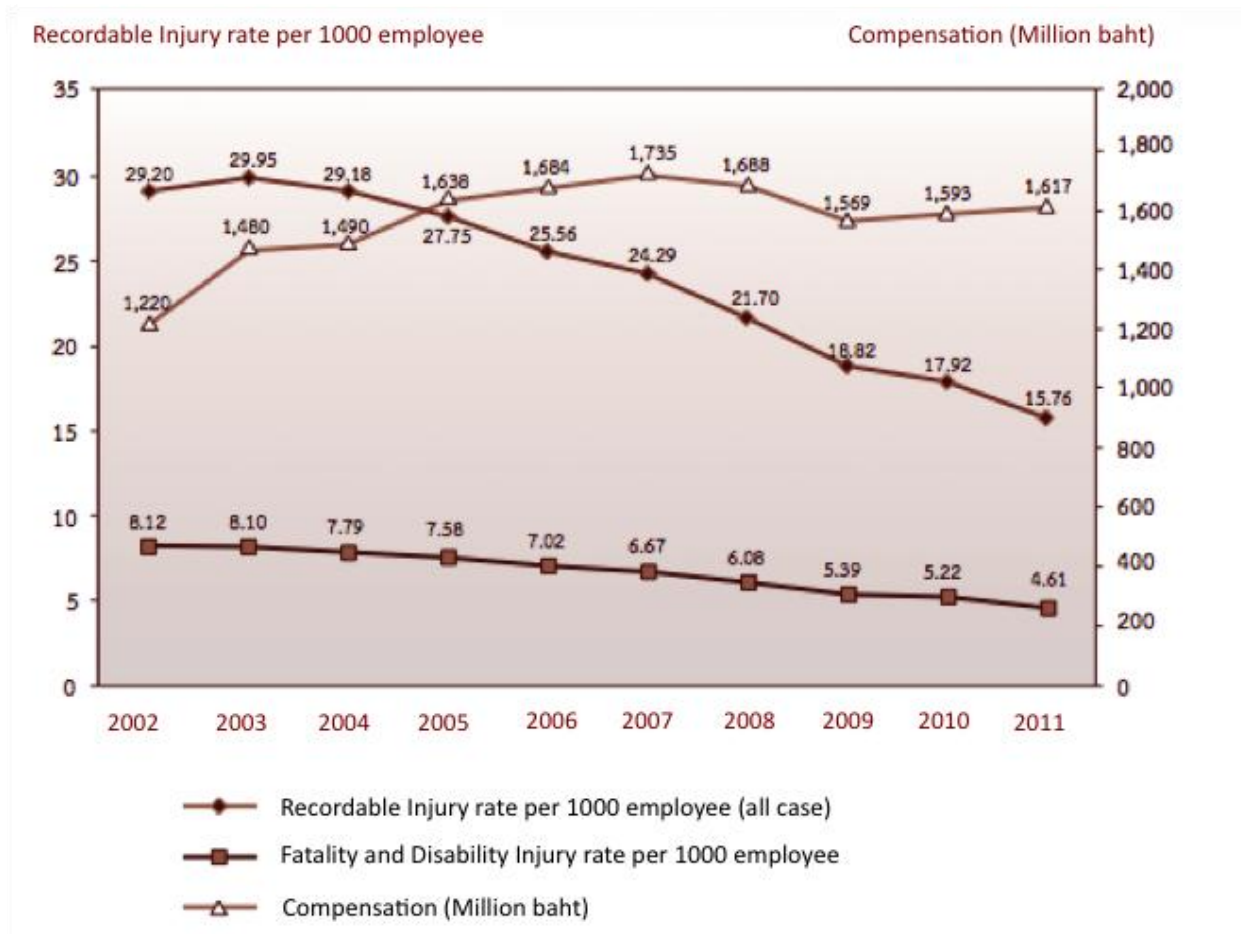


Table.2. Recordable injury rate vs Compensation of Thai Employee (Ministry of Labour, 2012)  
In broad industry, accident injury trend in Thailand has reduced from 29.20 in 2002 to 15.76 in 2011 but the compensation has increased from 1,220 to 1,617 million baht as the severity of the accident increased e.g. fatality, disability and lost work day case. Thus, injured employee can claim the compensation with government agency as one of the law requirement. One of the reasons the compensation is high because government agency cannot control the large scale accident and government management (public sector) responsible area divide into province, district and sub-district level. Moreover, they have overlapping responsible area and office of their own with complicate hierarchy system. When large scale accident happen e.g. Refinery explosion, Major oil and gas leak and terrorism, government (public sector) cannot immediate respond and communication has been complicated. Thus, injury severity has unnecessary increased with higher the injury claim compensation. As the result, public sector cannot respond to medium to large-scale accident on time and making the company to rely on their own safety, risk and crisis management system and coordinate with other organization in their neighborhood in order to mitigate the incident which may be escalated.

There are many study of safety culture for high-risk industry e.g. nuclear, aviator and petrochemical in Europe, America and Middle East. On the other hand in Thailand, There is no theoretical or empirical for safety culture in Oil and Gas Company in Thailand and yet safety

culture still new in this country. In 1980s (table.3), the first approach (technique) for organization to reduce their accident rate by developing technology such as hardware and design to keep hazard away and prevent employee from entering the line of fire. Second is system approach, when technology is well implement in organization, which has been focused in early year of 2000 to improve employee capability using knowledge and training, conduct risk assessment, Plan Do Check Act (PDCA) by Deming and implement management system such as ISO: 9001, ILO-OSH 2001 and OHSAS: 18001. Organization using the standard and certificate as a business competitiveness as the number of certified company is increasing each year as more than 1.2 million certification of ISO 9001 and 14001 worldwide (ISO, 2009). On the contrary accident still happens to organization that improves their technology, hardware, compliance, competency using technology and system approach. Organization can control the safety equipment, engineering design; competency of employee and management system but culture and behavior cannot be controlled. The third is culture approach that focuses on leadership, safety attitudes and people.

Compare to Thailand industry, in 1980-90s, Occupational health and safety were not significant to production and quality since many industries aimed to maintain highest productivity as much as possible and the legislation was not fully enforcement by the government in term of safety management system. On-site improvement of engineering design, operating equipment and personal protective equipment (technology) were adopted in early age of Thailand industry. In 1999, government issued the first safety management system named “Thailand Industrial Standard (TIS:18001)” which referred BS880:1996 and BS OSHAS:18001. As result of Thailand incident trend were downward since 2003 but compensation rate was vice versa shown that only technology and system were not enough. Hence, improvement on safety culture in Thailand industry is needed in order to improve organizational behavior toward safety and accountability to individual work.

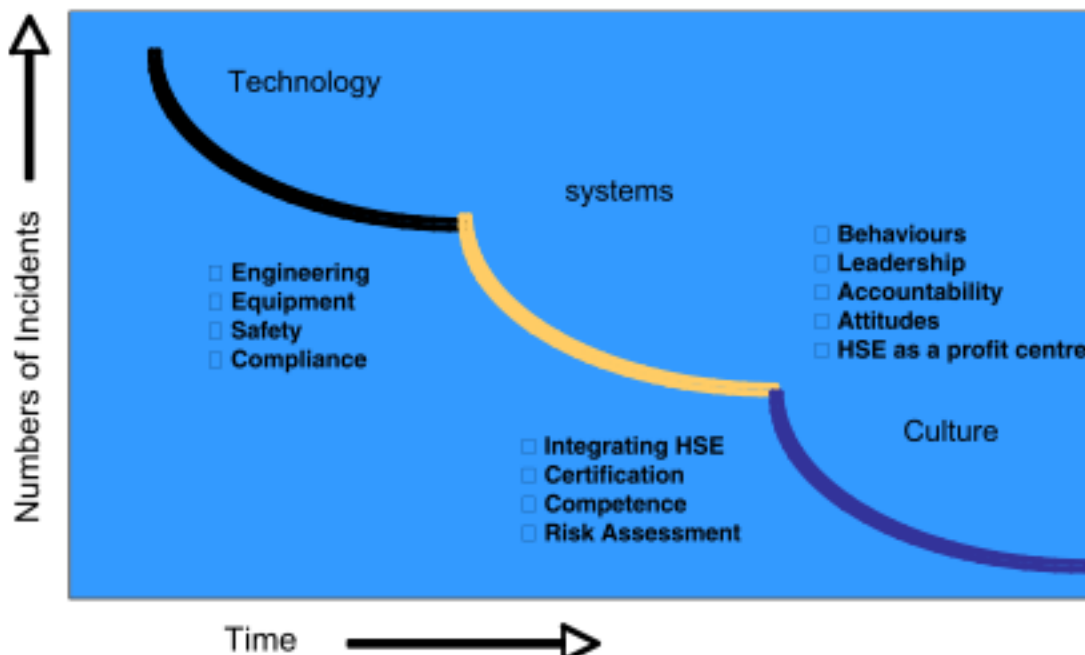


Table.3. Developmental line, culture becomes the next wave after system safety (Hudson, 2007) The word “Safety culture” is originated after the Chernobyl disaster, nuclear industry, in 1986 as the behavior of employee can impact the outcome of safety performance (Flin et al. 2000). Failure to implement and sustain high level of safety performance in high-risk industry can cause disaster to their company, environment, and neighbor. In oil and gas industry, safety culture has been concerned since Piper Alpha disaster, which the consequence of the accident caused; company both reputation and financial damage in long term. In 2009 there were Montara accident, PTTEPAA, caused large contaminate to the environment, marine and wildlife. Moreover in 2010, there were Macondo in the Gulf of Mexico, BP failure from lesson learnt from Texas refinery accident in 2005 (15 fatality and more than 150 employee injured), which failure in process safety and human error can caused major accident event (MAE) as result of 11 men died and 17 injured, one of the largest oil spill in the history to environment, impact to social around the area and more than \$17.7 billion have been spent on many years of response activity (BP, 2010). Those accident root causes come from poor safety culture & human error, cost cutting, integrity and reliability, core competency and wrong decision-making.

There are many definition of safety culture as the following;

- Safety culture has been described as the collective values and attitudes of the people in the organization; “It is the way we do things around here” (Changing mind, 2000).
- Safety culture can be simply defined as the attitudes, values and beliefs that underpin “the way we do things here” (OGP, 2010)
- The safety culture of an organization is the product of individual and group values, attitudes, competencies and patterns of behavior that determined the commitment to, and the style and proficiency of, an organization’s health and safety performance. (ACSNI, 1993)

Reason (1997, 2007) also proposed that an organization with an effective safety culture: has systematic safety information, reporting culture, culture of trust among people, organization flexibility and willingness and competence to draw the right conclusions from its safety system. Reason also identified safety culture characteristics, which are;

- An informed culture-one in which those who manage and operate the system have current knowledge about the human, technical, organizational and environmental factors that determine the safety of the system as a whole,
- A reporting culture; a culture in which people are willing to report errors and near misses,
- A just culture; a culture of “no blame” where an atmosphere of trust is present and people are encouraged or even rewarded for providing essential safety-related information- but where there is also a clear line between acceptable and unacceptable behaviour and,
- A flexible culture which can take different forms but is characterized as shifting from the conventional hierarchical mode to a flatter professional structure.
- A learning culture – the willingness and the competence to draw the right conclusions from its safety information system, and the will to implement major reforms when the need is indicated

To identify and measure safety culture in organization safety climate is one of the tools which Flin (2001) mentions that safety climate can be regarded as a predicator for safety performance.

Safety culture impact both directly and indirectly to improve safety performance for instance, employees concern their safety and others may result in less lost time injury (LTI) and total recordable injury (TRI) in operation, poor quality inspection pass due to “it should be alright” or bad culture will be less as result of better process safety performance e.g. less fire and explosion. There are many researchers and organization implement safety culture model in order to improve safety performance. In this paper, safety culture framework and associate dimension for case study will discuss later part of the paper. In each model, there are dimension and organizational aspect shown in following table;

Table.4 Example of safety culture model, dimension and organizational aspect

Safety culture model by	Safety culture dimension/Organizational Aspect
Kao, C. S. (2008)	Safety Commitment and support, Safety attitude and behavior, Safety communication and involvement, Safety training and Competence, Safety supervision and audit, Safety Management system and organization, Accident investigation and emergency planning, Reward and punishment and benefit
Filho, A.P.G (2010)	Information, Organization learning, Involvement, Communication, Commitment
Lawrie, M (2006)	Commitment to HSE and care for colleagues, Balance between HSE and profitability, Workforce interest in competency and training, Work-site job safety techniques, Purpose of procedures, Repercussion and feedback after accidents, audit and reviews
Jirisuka (TMAP-EM, 2011)	Organizational for S&H management, S&H action plan, Implementation, Two-way communication, Education and training, Emergency action guide, Contractor management, System audit, System review, Document management
IAEA safety culture model*	Policy level commitment: State of policy, management structures, resources, self regulation Managers’ commitment: definition of responsibilities, definition of control of safety practices, qualifications and training, rewards and sanctions, audit, review and comparison Individuals’ commitment: questioning attitude, rigorous and prudent approach, communication
Total safety culture model*	Person: knowledge, skill, ability, intelligence, motives and personality Behavior: complying, coaching, recognizing, communicating, demonstrating Environment: equipment, tools, machines, housekeeping, heat/cold, engineering, standard operating procedure
Business excellence model of	Leadership, Policy and strategy, People Management,



Safety culture model by safety culture*	Safety culture dimension/Organizational Aspect Resources, Processes, Customer satisfaction, People satisfaction, Impact on society, Business results
System model of safety culture*	Leadership and support, Awareness, Responsibility and control, Competence and safe behavior, Reinforcement and support from SM process

\*Remark: data from (KAO, 2008)

Olive (2006) has stated the strong safety culture characterized by several traits as the following;

- Commitment to the improvement of safety behaviors and attitudes at all organizational levels
- Organization structures and atmosphere to promotes open and clear communication
- A propensity for resilience and flexibility to adapt effectively and safely to new situations
- A prevailing attitude of constant vigilance

In order to measure or assess organization safety culture can use three different approach based on time focus, information needed and methods (Guldenmund, 2010). The first approach is academic (anthropological) to focus things from the past by collecting qualitative information based on fieldwork, ethnographical-inspired methods (observation, documentation analysis, personal interview and open discussion in groups). The second approach is analytical (psychological) to measure the present by collecting the qualitative information on the safety climate based on scales and questionnaire. Safety climate can be regarded as a snapshot of organization's safety culture and also a predictor for safety performance (EU-OSHA, 2011). According to NRCWE, it is recommended to conduct a safety culture questionnaire with support from top management, clear direction, all staffs participate and committed during the process, voluntary and transparency. The last approach is pragmatic (experience based) to measure the future by using the safety culture maturity (level) based on behaviourally anchored rating scales (BARS)

Safety Culture is a part of safety management system (SMS) which generate vary safety culture characteristics based on national culture, organization culture, industry type and leadership style (OSHA, 2011). SMS is vitally important for all industries. Without good management system and priority to safety, a safe working environment cannot be achieved in our organization. Hence without SMS in organization, it is impossible to implement systematic system to enhance safety performance in organization e.g. ISO: 14001, OHSAS 18001 and ILO-OSH 2001 to comply with country minimum regulation and for business competitive purpose.

*“Safety management may be defined as the aspect of the overall management function that determines and implements the safety policy. This will involve a whole range of activities, initiatives, programs, etc., focused on technical, human and organizational aspects and referring to all the individual activities within the organization, which tend to be formalized as Safety Management System” (SMS) (Papadakis, 1997)*



SMS may be comprised with many elements and activities such as incident reporting system, investigation system, risk management, safety culture development, process safety and safety organization. Those elements may be law requirement in some country to ensure SMS in organization. There are tools for SMS to determine hazard and prevent the accident and process safety failure from happening for example, Swiss cheese model and Bow-tie analysis. Those tools are used to identify the barriers (e.g. organization, task, environment, equipment and people) and mitigation plan if an accident happens. The consequence of the incident can lead to a major accident. Implementing SMS is the most efficient way of allocating resources for safety since it not only improves working conditions, but also positively influences employees' attitude, behavior and safety culture (Fernández-Muñiz 2007). By improving SMS, it will reflect organizational structure and process which is driven by safety culture to generate safety performance measured by safety indicators (Guldenmund, 2010).

### **Safety Culture Maturity Model**

After the Chernobyl disaster in 1986, safety culture has been highlighted in high risk industry and studied by many researchers. The first stage of study, the type of safety culture has been identified into 3 stages which are pathological, calculative/bureaucratic and generative. Pathological is care less about safety and failure is covered up, bureaucratic/calculative level is the safety is just in place and organization feel comfortable on what they have even they can improve. Generative stage, safety behavior is fully integrated into employee's mind and everything they do. (Westrum & Adamski, 1999; Westrum 1991; Weick, 1987) Later on, safety culture has been extended into 5 levels which reactive and proactive have been added into it. (Reason, 1997) As they aim to broaden the framework, more suitable to classification for better implementation to organization and improve the organization through increasing the safety culture maturity level. In depth research of 5 levels has been defined and conducted to Oil and Gas industry in more detail set of descriptions of different types of different safety culture e.g. communication, organization attitudes and behaviors. The validation has been made with interviews of senior oil and gas company executives. (Hudson, 2001; Parker, 2006). This model has been later successfully implemented to the Royal Dutch/Shell company as "Heart and Mind program" in 2007 and is one of the best practices in oil and gas industry which aims to identify the maturity level of the organization toward safety. Moreover, it has been highlighted in OGP reports and EU-OSHA in 2010 as a recommendation for safety culture improvement.

In this study, the analytical approach has been selected by developing the safety culture questionnaire to provide the surface features of employee's perception and attitude toward safety culture. This approach is to align with company direction to measure safety culture level in order to adjust company strategic short and long-term plans to improve their safety culture and performance in organization level. Once the safety culture has been identified, gap analysis should be conducted to create a plan or roadmap in order to shift culture to proactive or generative level. The survey is designed based on International Association of Oil and Gas Producers report No. 435 (OGP, 2010), which has been used successfully by other oil and gas majors to identify and evaluate particular cultural levels, best practices in E&P industry e.g. Heart and Minds program (Shell, 2007) and also from the academic "A framework for understanding the development of organizational safety culture" (Parker et al., 2006).



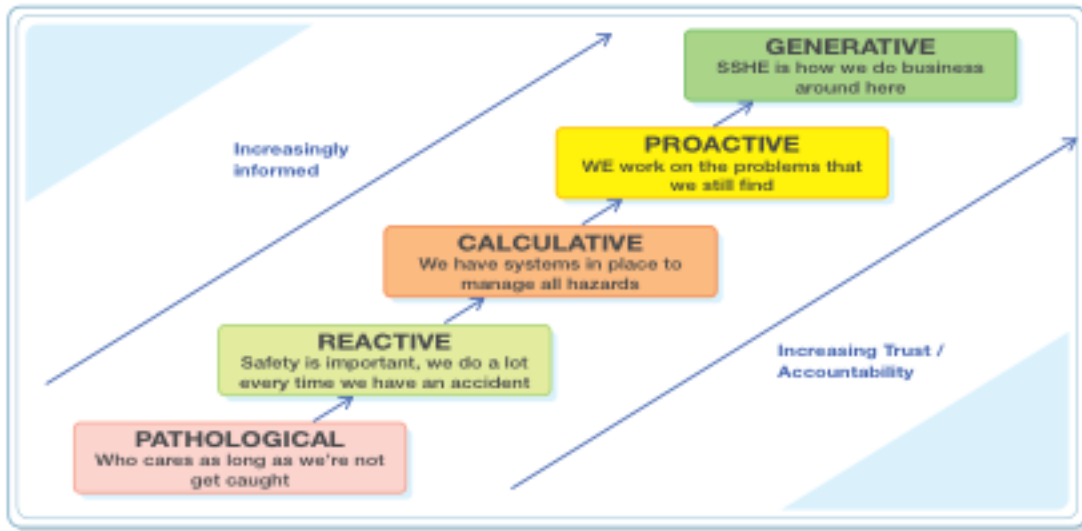


Figure.1. Safety Culture Maturity Model (Hudson, 2001)

The model used is HSE Culture ladder by “International Association of Oil and Gas Producer” (OGP), the concept has supported by Hudson (Fig.1, 2001) that define safety culture maturity model into 5 levels;

- Pathological organizations believe that individuals, typically at lower levels, cause accidents. They implement only what is mandatory, including required checks and audits. Most HSE tools are ineffective at this level, as HSE is considered an obstacle to operations. Pathological organizations respond to clear regulatory requirements, if enforced, and implement HSE programs only as needed to avoid prosecution.
- Reactive organizations consider HSE important but believe that most problems lie within the lower levels of the workforce. Organizational and individual HSE management skills are at a basic level, suggesting that HSE tools should also be simple. Tools appropriate at this level are those that address problems obvious to both management and the workforce. Tools that relate to issues that have not yet caused actual accidents are difficult to justify. Reactive organizations value those tools that bear a clear relationship to a visible issue.
- Calculative organizations believe in the value of systems in managing HSE performance and the use of a large number of tools and training. The focus on the tools is usually through analyzing metrics rather than their effectiveness i.e. number of people trained rather than an assessment of their competence. HSE professionals are seen as the drivers for the use of HSE tools and are primarily responsible for HSE performance.
- Proactive organizations consider HSE a fundamental (“core”) value and leaders at all levels genuinely care for the health and well being of the staff and contractors. Such organizations understand the role of management system failures as primary causes of incidents. Information, including data related to potential consequences (near misses) as well as actual incidents, is used to identify suitable performance targets.
- Generative organizations have a high degree of self-sufficiency and strive to understand their entire operating environment. Tools that are chosen and used by the whole



organization are preferred. Mandatory tools may be counter-productive, suggesting lack of trust. Everyone feels free to highlight both real and potential issues. Workers feel empowered to resolve HSE issues, and leaders provide the support needed.

### **Importance of SMS and safety culture toward Sustainability development in Organization**

Volunteer company received policy from Mother Company in 2011 in order to improve safety culture in organization (as one of the key success to create effective SMS). By improving the safety culture, it can benefit both direct and indirect to organization e.g. preventing major accident, increase employee morale and strengthen safety environment in operation. Moreover, Mother and volunteer company set target of moving into fortune 100 in 2012, by creating sustainable development in organization, which comprised of business, social and environment concern, aims for ISO 26000, to be listed in Down Jones Sustainability Indexes (DJSI) Company and have transparency in Global Reporting Initiative (GRI). To create sustainability and ISO 26000 in organization, company has to put importance into occupational health, safety and safety culture as they have direct impact with social progress, economic and environment e.g. labour standard, human right, revenues, shareholder return and spill prevention. For example, OHSAS 18001 and ILO-OSH: 2001 have focus on Occupational health and safety (OH&S) for manufacturer and producer perspective. They concerns much on how to improve the organization SMS and eliminate the hidden risk in operation based on the “Plan Do Check Action” (PDCA) by Deming. On the other hand, those are sub element in creating an overview of ISO: 26000 which highlighted in clause: 6.4 Labour practices, 6.4.6 Health and Safety at work and 6.4.7. Human development and training in the work place. To create a systematic ISO: 26000, SMS can be viewed as one of the prerequisite to build a solid foundation of OH&S, once it has been strengthen, expanding to consumer side is easier via social contribution as one of the ISO:26000 element.

Moreover, they have to follow each country legal and obligation requirement (clause 4.3.2) for employee who work in the company to have a safety working environment for instance, proper personal protective equipment, known hazard in working area, competency training depend on job and accident prevention. Hence, CSR can provide framework to OHS and other relevant aspect in ISO: 26000 such as clauses 6.3 Human rights, 6.4 Labour practices and 6.5 the environment. Moreover it can remind OH&S of its' importance that are usually forgotten in organization.

To be socially responsible means to think beyond just law requirement, by investing in human capital and managing relationships with the social stakeholders that are affected by consequences of the firm's decision. OH&S can being conceived as an integral, essential part of CSR. In development state of CSR, the more organization wants to improve its social reputation; OH&S can be considered as one of the instrument for CSR development. (Montero, J.M., 2009). The importance of CSR can be seen in 90% of top companies in Fortune 500 have invested in this section. (Kotler & Lee 2004) By having SMS as a prerequisite, it cannot guarantee to achieve creating sustainability development in organization because it comprise with other as well. On the other hand, effective safety culture (Proactive and Generative) can reflect effective SMS which cannot be achieved with only one or two aspect but all together. (table.3)

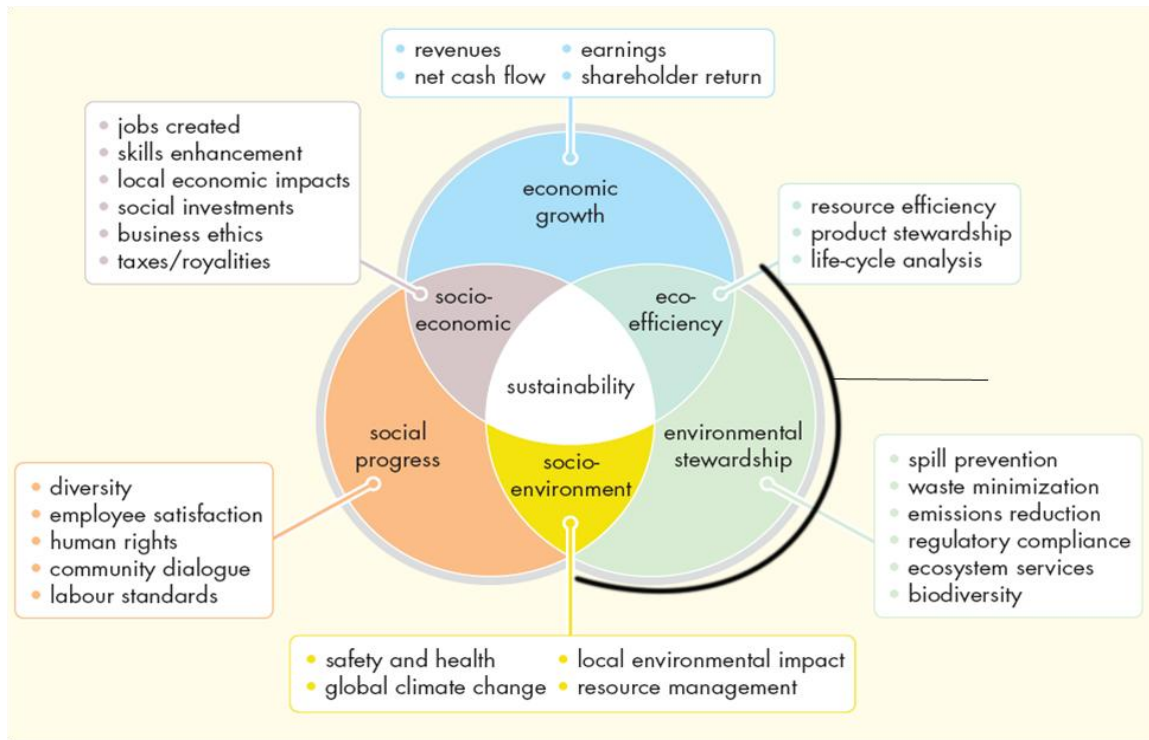


Figure.2. Volunteer company Sustainability framework (Volunteer, 2011)

This study is to confirm if “OGP Report No.435: A guide to selecting appropriate tools to improve HSE culture” are applicable and suitable for Oil and Gas industry for Upstream business in Thailand and others country subsidiary or not. Since developing safety culture in one national level may be fail to apply the same benefit in other countries (Hudson, 2007). One company, headquarter in Thailand, has volunteered for the study. The study has conducted more than 150 sessions of safety culture questionnaire in 10 locations (head office, operation site, drilling rigs, construction and exploration site) in 4 countries (Thailand, Oman, Algeria and Myanmar). Each session has 10-15 minutes of introduction on how to answer the questionnaire (likert scale, 1. pathological to 5. generative), and the explanation on each question. The result of 2,251 employee participated including safety personnel. There was 74% of target group participation across the company. The questionnaires break down into quantitative description of each safety culture maturity state. Those based on 7 elements of company safety management system. The survey collects the age, year of experience, job position and etc. The score for each location are different depending on culture in each country and organizational culture evolution which has three stage; Founding and Early Growth, Midlife and Maturity/Decline (Schein, 2004)

### Chronological SMS implementation of Volunteer Company

Regarding from table.3, trend of accident has been reduced and mitigated from 3 key areas of improvement from past to present of Technology, System and Culture (Hudson,2007). Comparing to volunteer company, it has continuous improved in safety, security, health and environment since 1994 in order to comply with international standard and industry trend.

Improvement can also categorize into 3 specific areas base on table.3 and examples are the following;

Table.5. SMS improvement of volunteer company based on Hudson model (2007)

Technology	System	Culture
1994: Establish HSE and Audit department to make sure compliance in organization	1996: Strengthen HSE internal system via compliance, audit and HSE risk assessment	1996: Developed Internal HSE Awareness survey and continuous promote
1995: Establish HSE management system, policy, committee	1996- present: provide HSE training for corporate level	2003-present: Benchmarking safety performance with OGP and peers to motivate to top quartile E&P company
1995- present: improved operation via new technology investment and hardware improvement e.g. invest new equipment and man-machine separation, close loop system and hazardous material treatment	1997-present: Implemented SSHE Management system to in line with OGP, ISO:14001, ISO 9001, ISRS and OHSAS 18001	2006 – present: Implement Behavior based safety, Felt leadership, Step change in Safety, Safety toward sustainability and life saving campaign, enhance safety leadership and commitment, safety line responsibility
1996- present: Issued corporate HSE standards, procedures, and guideline	2010: Conduct Corporate Risk profile via risk assessment	2011 - present: Introduce and implement safety culture maturity model and safety culture questionnaire with result

As high-risk industry, volunteer company cannot independently improve only one category and wait until it shows an improvement result. As the result of failure in one category implementation can significantly reflect others e.g. failure in audit and compliance in maintenance and inspection safety critical equipment can result in explosion and plant shut down. Therefore incident trend can reduce with good combination of technology, system and culture in organization. Organization safety culture can look deeper in to safety culture maturity level from pathological to generative. High level of organization safety culture require certain level of technology and system e.g. audit with peers assist and benchmarking performance with international organization (OGP, 2011)

### **FRAMEWORK**

OGP report No.435 gives us the HSE culture ladder, which generate into 5 levels e.g. pathological, reactive, calculative, proactive and generative. The report provides the description and tool guide to improve HSE culture in each HSE culture. To identify the organization HSE safety culture or safety culture maturity level, safety culture questionnaire is needed. The survey developed from OGP report, Heart and Mind program, and academic research (Parker et al.,



**Proceedings of 2013 International Conference on  
Technology Innovation and Industrial Management  
29-31 May 2013, Phuket, Thailand**

2006, Hudson, 2001). The 7 dimensions have been chosen to match organization SMS, referred to ISO:18001 and easy to recognize by employee. The description for each dimension (attribute in survey) describe as the following:

- Leadership and Commitment: Top-down commitment and Safety, security, health and environment (SSHE) culture essential to the success of the SSHE management system
- Policy and Strategic Objective: Corporate intentions, principles of action and aspirations with respect to SSHE
- Organization, Resources and Documentation: Organization of people, resources and documentation for sound SSHE performance
- Evaluation and Risk Management: Identification and evaluation of SSHE risks, for activities, products and services and development of risk reduction measures
- Planning and Operational Control: Planning the conduct of work activities, including planning for changes and emergency response
- Implementation and Monitoring: Performance and monitoring of activities, and how corrective action is to be taken when necessary
- Audit and review: Periodic assessments of SSHE management system performance effectiveness and fundamental suitability

In each dimension there are sub element standard to support every hierarchy level e.g., Corporate oversight, roles and responsibility, due diligence, contractor management, risk management, training and competency, permit to work, operational safety and asset integrity management. The framework is based on OGP report, literature review(Parker et al., 2006) and “Heart and Mind” program from Shell and with volunteer company – HSE division validation.

## **METHOD**

### **International Association of Oil and Gas Producers (OGP) report No:435**

The report provides tools which can be used to improve HSE performance in each safety culture maturity level from pathological to generative. 15 HSE tools from OGP report e.g. reporting/recording HSE information, incident investigation, HSE management system (ISO: 9000, ISO: 14000 and OHASA: 18000), questionnaire and survey, were selected to match with company SMS as the starting point for develop safety culture questionnaire.

Table.6. Example of HSE tools in each safety culture maturity level (OGP, 2011)

	Tool type	Description	Pathological	Reactive	Calculative	Proactive	Generative
1	Reporting and recording HSE information (incidents & near misses)	Mandatory reporting	→				
		Anonymous reporting		→			
		Confidential reporting		→			
		Open (non-confidential) reporting			→		
2	Incident investigation and analysis	Incident investigation (mandatory)	→				
		Root cause analysis			→		
		Proactive analysis			→		
3	Auditing	Professional audits	→				
		Benchmarking			→		
		Management system audits			→		
		Management site visits	→				
		Peer assists			→		

Selecting certain tools is likely to be ineffective and given negative feedback to wrong HSE culture. For example, Manager and supervisor HSE training maybe ineffective in low safety culture level comparing prioritize training to workforce level, anonymous reporting HSE information may require for reactive and calculative level rather than open reporting which suitable for proactive and generative organization. The higher of safety culture level in organization, the better and easier of safety improvement it can be as employee and supervisor are positive for improvement. While low level of safety culture level see the same situation as negative auditing their performance and checking their operation.

### Management acceptance

Volunteer company bought Royal Dutch/Shell Group's entire Thailand upstream petroleum assets in 2003. After merged with Shell, company continuously adapts and improves their SMS along with their personnel as the result of current SMS has tailor from both companies. When firstly introduced the safety culture maturity level to HSE personnel, there were no resistance toward the concept and theory as the company SMS of 7 dimensions (elements) are much alike with Hearts and Mind program with long history of Shell implementation and more than 10 years of academic research. Top management understands and supports the concept of improve organization safety culture level by knowing where they stand in safety culture ladder first and create the roadmap toward improvement

### Questionnaire

Questionnaire has been implemented from OGP report No.435, Shell best practice in E&P business of Heart and Mind program and academic researches. 20 questions have been selected



and developed with each information dimension, 1-5 ranking scale from pathological to generative. The survey package not come only the questionnaires but also combines with many items e.g. understanding and developing safety culture in organization to show its importance toward safety and corporate strategic objective, CEO message to show top management support, correlation between safety performance and behavior base safety, objective of safety culture questionnaire and its life cycle how to improve after getting the result.

### **Pilot test**

Pilot test has been conducted and validated with HSE division before the campaign launch. The questionnaire, 20 questions, has been presented in Corporate HSE division monthly meeting and asked to fill up and comment the survey. Members are from many disciplines for instance; Occupational health and safety, Safety engineer, technical safety, environment engineer, operational safety, safety advisor and analyst with experience range between 1 – 35 years in safety field. Few adjustment and comment have been identified to the survey in order to comply with organization. Overall feedbacks from HSE division are positive and results are practical in volunteer E&P organization to find the state of safety culture maturity level. The reliability testing for questionnaire with 20 items had conducted by using cronbanc's alpha and the result shown in Appendix A, Table 11. Attribute 1, 4, 6 and 7 had acceptable reliability coefficients. While attribute 2 and 3 shown the coefficients is below 0.6 but could not be improved by removing any of the items.

### **Respondents**

The safety culture questionnaire has been supported and kicked off from Management Committee level to encourage employee to participate in this survey. The roadmap has been made, follow and continuous promote 1-2 months before the survey conducted in all 10 location for both onshore and offshore operating asset, construction site, drilling rig, exploration and seismic in both domestic and international country. 150 plus session were conducted with 2,251 employee participated as 74% of target group participation across the organization.

## **RESULTS**

### **Organization safety culture maturity level**

The average corporate score of the questionnaire is 3.33 or calculative level that describe in 7 attributes of company safety management system and 20 questions. Volunteer company has improved their safety performance continuously as result shown in lost time injury frequency (LTIF) and total recordable injury rate (TRIR) which better result benchmarking with OGP and other peers. The changing perspective of top management toward to HSE is there was major accident in gulf of Australia, 2008 that caused significantly impact on financial, reputation, and production to company. As organization see the current status of safety culture maturity, in each element and attribute require different methods, actions and time for improvement. The result shown that the 3 lowest score are safety talk, who check SSHE in daily basis and benchmarking with 11%, 10% and 6%. This reflect the organization culture which before the questionnaire



conducted, each location concern about safety that related to their task and tools for knowledge sharing and centralization e.g. tools box talk, hazard reporting campaign, corporate statistics were in place but been put aside and insignificant. In additional, safety talk requires leadership and support from top management to be role model for subordinate to follow; communication and who in charge have to be clear and visible.

Bad example of management in production informal comment toward safety

“When accident happens, it is not a job for front line but corporate safety to investigate and create a countermeasure, conduct a gap analysis and report for us. We have other task to complete not this.”

This shown bad and traditional conflict between safety and production issues as production team has no safety concern and poor knowledge. In multi-national organization, if lines of responsibilities have no safety ownership in their work, it is very hard to maintain safe environment in their operation and priority in safety is insignificant. Safety culture maturity level cannot be improved without solving this problem. Head of safety division of volunteered company stated that for this problem management perspective can be changed by reflecting their safety performance indicator e.g. lagging and leading indicator in corporate level to their KPIs, why still accident happen when all SMS are all in place?, Safety leadership and importance from line of responsibility is needed (HSE Division, 2011).

### **Result comparison: Safety culture questionnaire vs OGP: HSE tools**

From figure1 and table.3 shown the importance of safety culture, which categorized into 5 levels and company cannot improve safety culture independently without good technology and management system in place. To identify safety culture maturity level in organization, safety culture questionnaire is necessary to measure organization safety culture level. Then to move up safety culture level in organization, understanding on each tools to improve culture along with proper SMS and technology are fundamental. Good safety culture in organization can assist implementing sustainability and ISO 26000 easier as it related in figure2 for instance company revenue and stakeholder return increase due to cost reduction in facility report due to explosion accident and recuperation cost to employee decrease. Moreover, OGP provide 15 HSE tools, which effective and accepted for each safety culture maturity level for instance HSE risk management and situation awareness. To validate volunteer company safety culture questionnaire result with OGP tools is necessary to confirm whether company uses the appropriate tools with their safety culture level or not.

From table.5 provide with matching OGP HSE tools with safety culture questionnaire attributes, average safety culture maturity result, volunteer company current tools and comparison result. The results from safety culture questionnaire are applicable to OGP report and can measure safety maturity level of volunteer company in Thailand. Moreover, it shown that volunteer company develops SMS and tools match with their safety culture level.





### **Safety culture maturity stage of each location**

Volunteer company is a large multi-national organization in many countries. The safety culture maturity for corporate level and each operating location has been measured by safety culture questionnaire. Each location's job scope is different and safety management system and culture has developed by management level, safety manager with corporate HSE division assistance. There are old and new locations that have different of safety history and services year from 2-30 years. Those have been tested by pearson correlation to find the relation between safety culture maturity level and location service year and found the result is not correlate ( $n= 10$ ,  $r= 0.19$ , sig 2 tail = 0.58,  $p>0.05$ ). Long length of service with poor safety culture maturity level can reflect in poor management leadership, misdirection of safety culture, insignificant of safety performance, bad safety attitude of supervisor and employee level.

## **DISCUSSION**

### **Different from other safety culture questionnaire**

The survey has been launched with HSE division annual campaign, to identify corporate safety culture maturity level, and strong commitment from CEO. Moreover, it is not just send the survey with description and waiting for respondent rate, it has been explain by engineer e.g. what is the survey for, each element description and way forward, in small group sessions (approx 30 persons) with 150 sessions in 10 different locations. Top management are very positive for this survey and greatly support for this activities for instance top management are the first group completed the survey, employee can use their non-busy working time to attend the survey session, pilot testing with HSE division, can be use as employee safety KPI and promoting the campaign, it is sure not get good participation and result in the survey without their support. This method of surveying all employees are different from Hudson & Willeke (2000) conservative method that only focuses evaluation by manager than operators and supervisor as they better calibrate the result. The conservative method can give us the overview result of safety culture but to drive and create culture shift, result from everyone in organization are needed.

### **Uncertainty**

The survey result found that in some location or division, especially employee in front line level, may bias to this survey as the result was off the group. The discussion has been made with that location management level to verify the data whether there are actually work related issues or not. Result found that there are some sensitive matters with welfares, personal negative attitude toward safety officer. 1% of sample size has been excluded from result analysis due to uncertainty of the answers given.

### **Analysis**

From the result shown the company position of safety culture maturity is in calculative level. Each element categorized into each job position and location shown in percentage. Those can give feedback on how corporate will to tackle this problem to improve employee's mindset to



higher level. HSE division needs to create a visible leadership and support to all employee level in order to show that they are not relying on each location safety management system but also from corporate level. From survey result shown the area they should focus on e.g., procedures corporate oversight in organization level, improve SMS in specific location, create more standard and procedures in each specific job.

Not only the result shown where organization stand in the safety culture maturity level, HSE division can also use results of the survey to adjust their long term plan and roadmap in order to create an effective culture shift in organization. Certain techniques use effectively in one safety culture maturity organization is not guarantee to be successful in other lower culture level as they have not reached certain level of maturity (Flemming, 2001; OGP report, 2011). As company knows where they stand in safety culture ladder, they have to be more focus on contractor management for those safety culture maturity levels lower than the company itself. As contractor cannot meet maintain the safety standard and level as company itself which need more supervision working in company area.

### **First stage: Volunteer company capability develop from Pathological – Calculative**

In founding and early growth stage, volunteer company established in 1992 as National Exploration and Production Company. From safety culture questionnaire reveal the stage of maturity level of volunteer company at level 3 Calculative. We can assume that in total of 19 years since the company has founded, safety culture has been continuously improved and can trace back their performance shown by safety statistics. Each stage of maturity level has different on how employee act and respond to each tool e.g. the quality of incident report and investigation result are based on the maturity level; just to complete the report in low level and more detail and conduct root cause analysis in higher level. In safety culture maturity model; each step is comprise of safety attributes categorized into 3 key areas as indicated in Table.3 and we can confirm the development of safety maturity level of volunteer company from chronological improvement for 3 keys area with EU-OSHA and OGP validation. The higher safety culture maturity in the organization, the more complexity and relationship between each attribute are. From pathological to reactive (capability improvement), safety are in place but not well constructive as organization tends to be in Founding and Early stage of life cycle and importance of SMS is insignificant comparing to production and quality. Moreover, blame culture and hidden report when incident happen are likely to be seen on this stage due to production and profitability are more important than safety and culture themselves. By implementing standardization and essential technology in each industry help establishing SMS into the system in early stage e.g. ISO 18001, TIS 18001 and ILO-OSH: 2001. On the other hand, calculative to generative (maturity improvement) require good combination of technology, system, positive culture and time for organization to recognize the importance of safety together with management. On this stage, even organization invests more into technology and system, culture is not likely to significantly improve as the first 2 stages due to improvement should focus on people interact with technology and system. By lacking one another of key areas, safety culture cannot move to another step. The better safety culture maturity level in organization, the better employees are willing to change to improve safety in operating site and cares for their colleagues.



## **Volunteer company roadmap to create culture shift from Calculative to Generative**

From safety culture questionnaire/climate survey in 2011, the result shown volunteer company is in Calculative level (level.3). To create a culture shift from calculative into proactive and even generative, volunteer company creates 3 years plan roadmap to enhance the safety culture in prior to next survey. It can summarize into 5 actions as the following;

### **1. Safety moment in all meeting**

The result from safety culture questionnaire shown the safety talk is the lowest score among all questionnaire. This reflect poor safety awareness in the organization with mean = 2.93 and standard deviation = 1.11. To change organizational behavior toward safety talk, safety team has to create a safety talk database for everyone usage. Corporate safety encourage before every meeting start, it should begin with safety talk or sharing to all member. It can be information sharing either work or non-work related to build up safety awareness in corporate and operation level. Safety team has taken serious action of being representative of safety talk in early stage of the campaign using Top-down approach in every management committee which led by CEO, conducted twice a month or more. Once management understands and use to the safety talk, implementation in lower level is easier with their support. From this change of employee and management in safety talk in broad organization, it took at least a year to see the improvement for volunteer company. Moreover, safety talk has been indicated as one of the element in annual safety key performance indicator for leading indicator of all management in organization to ensure its effectiveness in top-down approach.

### **2. Safe and Happy workplace**

This action aims to create common understanding of “safety is everybody’s responsibility” via different communication route internally e.g. visualize safety policy and campaign and technical information board in various location in headquarter and operating asset. It also encourage employee to report on “good” and “to be improved” regarding behavior, equipment and process by using “Safety observation card”, “Hazard reporting card” and transparency in incident reporting. The succession of this action depends on how employees see the campaign as encouragement to improve not finding and line of management see this action as positive action not negative. Hidden reports, ignorance to improve and change are likely to happen if employee and line of management have negative feeling and blame culture in organization. Moreover, in this action, corporate safety should develop a campaign to improve safety in organization for incident statistics, increase employee awareness and create a common understanding and also roll out the campaign in corporate level and in each operating location.

### **3. Safety Cares and Safety Share**

Information and Knowledge management has been highlighted in this action. Internal communication has been improved with intranet to be center of information sharing for safety policy, standard, procedure and guideline with highlight activities. In addition, safety has become part key activities in organization e.g. operational excellence, sustainable development, corporate



communication, risk management, project and technical review. This is to put safety into every related campaign as to make it visible to employee and put into the beginning of design phase in every project to make sure it comply with safety requirement. The result of safety culture questionnaire shown employee in the head office has the lowest score among all location. This is a stereotype of office work e.g. human resources, financial, and planning division. Those always have safety awareness lower than operating level due to the nature of working environment are different. To create a culture shift in organization, this area needs to be improved by using safety line partner concept to strengthen safety information sharing and communication between each division in company. The concept is to have a safety representative for each division to summary each month safety performance, way forward, area of improvement and receive feedback as two-way communication to improve safety performance and raise safety awareness in corporate level. Moreover, in high risk division e.g. construction, drilling, and production; corporate safety will provide them with safety advisor to make sure all risky activities are comply with safety requirement.

#### **4. Safety is a license to operate**

Volunteer company is in high-risk industry, they do not tolerate any mistakes because it signifies the future and prosperity of the organization. This is to ensure best practice to comply with corporate safety management standard for instance safety due diligence, competency assessment and safety technical audit. Company's growth has continuously increase not only in domestic but also international since 1992. Employee and contractor tend to exposure with risk in climate change; rush work, tight schedule and unfamiliar atmosphere. To comply with SMS, implement of safety document e.g. standards, procedures and guideline must cover all operation for employee to understand the nature and caution of each work beforehand and following the given instruction. Those aim to minimize the risk as low as possibly e.g. commissioning, decommissioning, drilling and seismic. In low safety culture maturity level, the importance of standards, procedures and guidelines are shown only when incident or unexpected event is occur in the system and clarification is needed. On the other hand, in higher level, employee tends to comply with them and always conduct risk assessment when there are changes in the system. When all documents are in place, safety corporate has to roll out to everyone in the organization in order to have common understanding and create a compliance culture. To confirm whether operating level use standard, procedure, guideline or not, safety expert and line of management have to conduct audit and review periodically. Moreover, corporate safety has introduced leading indicators to all employees as one of the annual safety KPIs as to preventing unexpected event from happening as lagging indicator, e.g. LTIF, TRIR and LOPCR, provide area of improvement in each operating location.

#### **5. Safety mindset**

In this action aims to improve the safety culture in organization and understand the safety target and goal of incident-free organization in the future. To have everyone understand the same safety languages, training course provided by corporate safety is required to all employee in organization. The course is to show importance of safety culture, raise employee safety awareness, and understand the existing tools, safety as prerequisite by the government for each



country and SMS in organization. Company benchmarks safety performance with peer in domestic & international level and comparing to “International Association of Oil and Gas producers” (OGP). Therefore, it is to motivate both employee and management to drive company to achieve top quartile performance in global level. Moreover, corporate safety statistics has been updated to CEO and top management in every management committee meeting to raise awareness and caution in safety situation. If accidents are trending upward, CEO, corporate safety and line of management will send the alert notification to all stakeholders to be aware of the situation and line partner will close monitoring the operation level to prevent incident for reoccurrence.

## **CONCLUSION**

The safety culture maturity has been identified and organization learns its own position for developing future implementation plan. The result from safety culture questionnaire and implementation of “OGP Report No.435: A guide to selecting appropriate tools to improve HSE culture”, best practice from E&P industry and academic research are practical in Volunteered Thailand E&P company and their subsidiary with good positive feedback from top management and HSE personnel. Research team and HSE division agree that top management leadership is very important and to make it visible to front line level require an effective communication e.g. SMS and behavior base safety mini-road show from corporate, safety commitment from line of responsibility, tools box talk and importance of good safety statistics result. When safety is a common thing in everyday operation, employees are easier to say what is wrong their normal routine and willingly to keep safe working environment and behavior. Moreover, line responsibility is important as safety is not only a task for corporate HSE to maintain the good safety performance but line management should take ownership all in their task. Those are included into volunteer company roadmap to create a culture shift to another level which all actions have been tailor made according the gap shown in safety culture questionnaire result. 5 actions in volunteer company roadmap may different in other organization and country due to focus area and culture are different. Roadmap aims to increase safety awareness for employee in different methods and many communication channels under the concept of development technology, system and culture together. Hence, to improve a culture with the same technology and system will take a long journey to complete. There are no prerequisites for each action; it can be implemented at the same time with other action as proper. We can monitor the result of the implementation by looking at the lagging indicator for instance incident rate after kick off the campaign. If the root cause/underlying cause are still human factor/error, it mean we have to trace back on what component we are missing. e.g. “does enforcement in some safety issues are necessary for change?”, “do we need more top management leadership and commitment?” and “why injure person act like that and the motive behind his act?”. By monitoring not only the incident but other area in action plan e.g. participation in safety campaign and compliance to safety standard can act like a small adjustment in order to create an high level of safety culture level in organization. In 2012, the roadmap helps volunteer company to improve their safety performance to be the best in their history of LTIF, TRIR and incident severity has been reduced. There are limitations for this study; the study has conducted to only one volunteered upstream business in Thailand. More company needs to test if framework will practical in other E&P company and broaden into other industry in Thailand or need to revise in any element.



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**Appendix A**

OGP HSE tools	Match with Volunteer company safety culture questionnaire/SMS	Average safety culture questionnaire result	Volunteer company current tools based on OGP report	Comparing tools type with OGP safety culture level (lower/ok/better)*
1. Reporting and recording HSE information	Attribute 6	3.37	-Open (non-confidential) reporting	Ok
2. Incident investigation and analysis	Attribute 6	3.37	-Incident investigation -Root cause and proactive analysis	Ok
3. Auditing	Attribute 7	3.26	- Benchmarking - Management system audits - Management site visit	Ok
4. Human factors in design	Attribute 5	3.58	- HF design standard – voluntary - Operator design review	Ok
5. Work practices and procedures	Attribute 5	3.58	- Mandatory standards - Decision- based practices	Ok
6. HSE risk management	Attribute 4	3.4	- JSA - PTR - MOC	Ok
7. HSE management systems	Overall SMS	3.33**	- ISO, OHSAS, TIS	Ok
8. HSE training and competence	Attribute 3	3.2	- Workforce, supervisory, Manager and Executive HSE training	Better
9. HSE appraisals	Attribute 7	3.26	- Performance appraisals - 360 degree appraisals - HSE leadership assessment	Ok





Proceedings of 2013 International Conference on  
 Technology Innovation and Industrial Management  
 29-31 May 2013, Phuket, Thailand

OGP HSE tools	Match with Volunteer company safety culture questionnaire/SMS	Average safety culture questionnaire result	Volunteer company current tools based on OGP report	Comparing tools type with OGP safety culture level (lower/ok/better)*
10. Situation awareness	Attribute 2	3.3	- Supervisor led task discussion - Self-led task evaluation	Ok
11. Questionnaire and surveys	Attribute 6	3.37	- Safety culture questionnaire	Ok
12. Observation and intervention	Attribute 6	3.37	- Observation by supervisor - Reinforcement of positive actions	Ok
13. Incentive schemes	Attribute 1	3.32	- Performance and behaviour recognition	Ok
14. HSE communication	Attribute 1	3.32	- Toolbox talks - HSE meeting - HSE alerts - HSE newsletters - Handover information	Ok
15 Other HSE tools	Overall SMS	3.33**	- Step change in SSHE - Life saving program	Ok

\*Remark 1. For Tools type with OGP safety culture level – lower mean using the safety tools lower than measured

\*\*Remark 2. For HSE tools number 7 and 15 compare with average of overall safety culture questionnaire result

Table 7: HSE tools comparison with Safety culture maturity result of volunteer company

Table.8. Result of safety culture questionnaire by attribute

Attribute	Mean	Standard Deviation
Attribute 1: Leadership & Commitment	3.32	0.90
1.1 Communicating SSHE issues with the workforce	3.31	0.84
1.2 Commitment level of workforce	3.45	0.92
1.3 Reward for good SSHE performance	3.24	0.93
Attribute 2: Policy & Strategic Objective	3.3	1.02
2.1 Who causes accident in mgmt viewpoint	3.43	1.01
2.2 Balance between SSHE/profit	3.55	0.88
2.3 Safety talk	2.93	1.11
Attribute 3: Organization Resources & Documentation	3.2	0.93
3.1 Contractor Management	3.16	0.91
3.2 Competency/training	3.16	0.97
3.3 Size/Status of SSHE group	3.42	0.75
Attribute 4: Evaluation & Risk Management	3.4	0.86
4.1 Work planning and other	3.45	0.84
4.2 Work-site job SSHE techniques	3.37	0.87
Attribute 5: Implementation & Operational Control	3.58	0.93
5.1 Purpose of SSHE procedures	3.58	0.93
Attribute 6: Monitoring & Measurement	3.37	0.93
6.1 Incident/accident reporting investigation and analysis	3.34	0.93
6.2 Hazard reporting/ Safety observation & communication	3.3	0.86
6.3 What happen after accident feedback lopp being closed?	3.66	1.02
6.4 Who checks SSHE daily basis?	3.18	0.97
6.5 SSHE management perspective	3.41	0.84
6.6 Bahavioural Based Safety	3.36	0.91
Attribute 7: Audit & Review	3.26	0.96
7.1 SSHE Audit & Review	3.27	0.90
7.2 Benchmarking, trends and statistics in SSHE	3.25	1.01

Table.9. Result of each location with location life cycle

	location 1	location 2	location 3	location 4	location 5	location 6	location 7	location 8	location 9	location 10
Score	3.6	3.53	3.29	3.21	3.48	3.62	3.21	3.33	4.37	3.33
Life cycle (year)	19	3	4	27	30	6	9	6	19	2

Table.10. Result of each job position by attribute

	Leadership & Commitment		Policy & Strategic		Organization		Evaluation & Risk Mgmt		Implementation & Operation		Monitoring & Measurement		Audit & Review	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Middle Manager	3.41	0.84	3.44	0.92	3.27	0.75	3.53	0.81	3.70	0.85	3.50	0.94	3.43	0.92
Vice President	3.47	0.87	3.53	0.86	3.52	0.60	0.00	0.00	3.87	0.82	3.56	0.82	3.38	0.78
SSHE Advisory	3.41	0.89	3.36	0.94	3.32	0.85	3.52	0.83	3.55	0.83	3.49	0.84	3.40	0.84
Front Line Supervisor	3.33	0.91	3.29	0.97	3.13	0.89	3.48	0.75	3.61	0.88	3.42	0.87	3.08	0.98
Workforce	3.32	0.92	3.29	1.01	3.17	0.94	3.39	0.92	3.56	0.91	3.36	0.99	0.00	0.00

Table.11. Result of each attribute with Cronbach's Alpha (Likert scale)

Attribute	Mean	Standard Deviation	Cronbach's Alpha	#Item
Attribute 1: Leadership & Commitment	3.32	0.90	0.676	3
Attribute 2: Policy & Strategic Objective	3.3	1.02	0.517	3
Attribute 3: Organization Resources & Documentation	3.2	0.93	0.585	3
Attribute 4: Evaluation & Risk Management	3.4	0.86	0.777	2
Attribute 5: Implementation & Operational Control	3.58	0.93	N/A	1
Attribute 6: Monitoring & Measurement	3.37	0.93	0.791	6
Attribute 7: Audit & Review	3.26	0.96	0.613	2