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## A Preliminary Study on Industrial Safety Management in Malaysia: The Viewpoints of Safety Experts and Practitioners

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### ABSTRACT

**Background:** After independent in 1957, Malaysia economy has moved from agricultural based commodity to middle income economy. However, the economy development and industrialization sometimes predominates over workers and societal needs for safer and healthier life. Due to the complexity of industrial process and use of hazardous chemicals, hazards to cause harms in future seem to be unpredictable and frightening. Indeed, the implementation of an effective safety management is of paramount importance. Thus, this article discusses the result of an open-ended interview with safety experts and practitioners on the current practice of safety management in Malaysia. The interview was focused on four factors, namely, organization, institution, legislation, and technology. These factors are selected due to the fact that they are closely relevant to the local condition and local instruments. The group of respondents in this study consists of respective personnel from various organizations such as industry, government agencies, academic institution, and non-governmental organization (NGO's). **Objective:** The purpose of this paper is to provide researchers, government agencies and independent bodies an overview on industrial safety management in Malaysia from the viewpoints of safety experts and practitioners. In addition, this paper will also highlight the respondent's initial opinions towards the establishment of cooperative network for safety management in the context of Malaysia's industrial estate. **Results:** From the overall interview's result, the management commitment and awareness, strengthening the legal mechanism and institutional structure, and encouraging the use and development of safety-embedded technology are among the concerns that need to be focused on. In addition to this, the financial support also plays a vital role in order to assist industry to further improve their safety management practice. Furthermore, the respondents have also responded to the idea of establishing a cooperative relationship to further enhance the safety management at the macro level of industrial estate instead of at the individual firm. Most of them basically agreed with the approach whereby it is an innovative step towards betterment of safety management system. **Conclusion:** These findings are based on experts and practitioner's opinion and their personal's point of views. Therefore, from this result, further exploration is unavoidable and in-depth study ought to be carried out in order to come out with a clearer picture. Besides, in relation to the establishment of cooperative network for safety management, this approach is not straightforward and we need to look at several issues and obstacles which may hinder this movement. This is due to the fact that Malaysia has the uniqueness in term of its multi-ethnic culture, political status quo, legislations, technological strength and readiness of industry to partake in this initiative. Thus, more comprehensive and in-depth study is needed in future to come.

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## INTRODUCTION

After independence from the British colonial in 1957, Malaysia success in diversifying its economy has changed the lifestyle of its people and materialised the nationwide development in the forms of industrialization, techno-agricultural movement and urbanization. Indeed, its movement from agricultural and placid society into an industrial and dynamic society is a visible progress throughout the country. Furthermore, Malaysian government has also introduced the Economic Transformation Programme or ETP in year 2010 with an agenda

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to transform Malaysia into the high income nation by 2020. Its aim is to increase the Gross National Income (GNI) per capita to RM48000, an increment of approximately double of that in 2009. Moreover, Malaysia aims to focus on becoming high-income nation that is based on inclusiveness. This will be done through the sharing of country's wealth with all communities regardless of ethnicity and religion, and sustainability for inter and intra-generational benefits (ETP Handbook, 2010). However, the eager emphasis on economy development sometimes makes us ignore the societal needs for safeness, especially from the technological hazards which caused by industrial activities. In fact, the technological hazards could appear either intentionally or accidentally (Lichterman, 1999) and Granot (1998) argued that the rapid advancement of technology sometimes moves faster than the time required to assess the associated hazards. Indeed, the emerging technology may cause the hazard to be shifted to human (Ashford, 1997; Trevor, 1996). In addition, the technological threats may also cause the tremendous effects in future to come due to the increasing diverse products and processes (Reniers and Amyotte, 2012), dense urbanization, built environment, complexity of human society (Lichterman, 1999) and complexity of an industrial system (Salvi *et al.*, 2005). Meanwhile, every year there are hundreds of new chemicals being used and produced by industry. The failure to control and handling these chemicals or design an appropriate and practical process may result in large-scale accident (Ibrahim *et al.*, 2002). Thus, the consequences will cause a severe damage including to the vulnerable assets (Reniers and Soudan, 2010).

The implementation of safety management system will help industry in minimising the accident's likelihood, mitigating consequences and limiting its adverse consequences (Reniers *et al.*, 2009). In Malaysian context, the proactive role of government is essential to ensure that industry are able to implement at least, the basic elements of safety management system according to national or international standards and guidelines. This is due to the fact that in the developing countries such as Malaysia, the application of safety-health-environment (SHE) principle is still at the beginning stage (Vaflahi *et al.*, 2009). However, the role of government alone will not lead to the ultimate success. Thus, cooperation from all especially industry players is indispensable. It should be, indeed, a dyadic employer-employee cooperation and tripartite agreement of enforcer (government), players (industry), and stakeholders. This tripartite feature will influence the effectiveness of safety management system and all players react inter-dependently. In general, safety issue can be divided into two categories: occupational safety or personal safety and process safety. The safety issue is a concern of both internal and external affairs. The impacts of accidents to workers as well as to the surrounding environment should be reconsidered in order to minimise the consequences. The accident can occur on a small-scale such as an injury to the worker (occupational safety) and it also can occur on a large-scale caused by system failure. Even though the occupational safety issue might not be seen as a critical matter to certain organization but an adequate attention should also be paid towards managing this type of accidents. Rautela (2006) argued that since the cumulative effects of industrial accidents that are not classified under the category of the disaster showed a very high mortality rate, there was an urgent need to give due attention to this matter. Although it was not considered as a threat to cause system failure, but there is still a possibility of imminent risk. Meanwhile, it might also a sign or indicator ("incubated event") of a greater unfavorable incidence. The rationale behind this is that industry community is dealing with escalating development of the complex and advanced manufacturing systems. Due to this fact, even a very small triggering event might lead to a possibility of the occurrence of an extreme and unprecedented accident. Therefore, the culture of taking thing for granted and the way of treating an occupational safety issue should be repacked.

Furthermore, Malaysia has experienced several major industrial accidents which had caused numerous death toll as well as property damage (see Ibrahim and Fakrul-razi, 2006). Moreover, although the rate of the recorded industrial accidents showed a very significant reduction until year 2007, but the mortality rate is still alarming, in the range of 12.8 per 100,000 workers without significant decrement as reported between 2000 and 2007 (OSH-MP 15). This condition is worrisome. Moreover, even though there was an obvious reduction of overall accidents cases but according to the latest recorded figure, the accident rate doesn't show a significant decrease since year 2008. Therefore, industry community should rethink that there is a need to improve our current practice of safety management system which is at this moment, merely emphasize on the level of individual organization. Thus, the existing safety management practice may need to be revisited and new approach should be explored since technologies and hazards characteristic are becoming complex and unpredictable in future to come. For example, the idea to establish the cooperative network for safety management could become a promising alternative (see Reniers, 2010). Through this network, all industries located in the proximity are able to share their expertise, knowledge, and resources through cooperative network and this will help them to further enhance their current safety management practice.

## 2. Methodology:

This preliminary study was carried out in two steps. In the first step, the selection of respondents (industrial experts) was done. The respondents are randomly selected from various organizations. This expert's panel was made up of representatives from industry (multi-national companies, government-linked companies and small and medium industry), government agency, NGO and academic institution. As for the respondents from

industry, they consist of the representatives from petrochemicals, oleo-chemicals (oil-palm based), chemicals, foods, and manufacturing industries. All the interviewed experts were able to contribute with their experience and expertise to a variety aspects of industrial safety management. However, the aim of this interview was not to reach consensus but rather to gain a general views about the current practice of safety management in Malaysia. Moreover, the respondents are also asked on their opinions about the idea to establish the conceptual framework of cooperative safety management model. The interview process was open to respondents with divergent perspective to generate the range of ideas. Once the meeting schedule was mutually agreed, then a set of semi-structured open-ended questionnaire was sent via email. This open-ended questionnaire was translated into English and Malay language. The respondent was asked to look upon the questionnaires in prior to the meeting date. This was done in order to ensure that respondent will understand the purpose of the study and allow them to raise a question if they need further clarification. This was also done with the purpose to provide them with sufficient time to make a preparation prior to interview session. The standardised open-ended questionnaire was divided into two sections and designed as follows:

- (1) Section 1: general open questions about industrial safety management in Malaysia and the possibility of establishing the cooperative safety management model in the context of Malaysia's industrial estate.
- (2) Section 2: specific open questions about four factors which contribute and influence the practice of safety management in Malaysia. These factors are organization, institution, legislation, and technology. The question contents for each of the aforesaid factors were briefed as follows:
  - (a) Organizational factor: factors that contribute to the effectiveness of the safety management, mechanism to evaluate this effectiveness and proposed organizational indicators.
  - (b) Institutional factor: factors to strengthen the institutional structure, an obstacle and proposed institutional indicators.
  - (c) Legislation: factors that influence the effectiveness of legislation system, factors that strengthen this effectiveness, an obstacle and proposed legislative indicators.
  - (d) Technological factor: factors to promote technology development, an obstacle and proposed technological indicators.

In the second step, the face-to-face meeting with experts and practitioners was organised. However, due to a critical arrangement of the meeting date and time, the meeting sometimes need to be rescheduled. The schedule arrangement to suit expert and practitioner's timetable was the main reason that made this process became time-consuming. This is unavoidable since this people always engage with their routine and unforeseen internal organizational affair. The interview process was successfully done within the period of ten months from mid-April 2013 to mid-January 2014 and has involved seventeen safety experts and practitioners in total. The result from this open-ended interview then will be analysed and used for future reference in developing the conceptual framework for safety management model based-on cooperative approach.

### 3. Results:

In general, all respondents agreed that the implementation of occupational safety and health (OSH) management in Malaysia is getting better. However, its implementation in small and medium industries (SMI) is yet to exceed the satisfactory level due to several factors. One of the possible main causes is a financial issue. Implementing safety management somehow needs monetary support. The management commitment and their willingness to invest and allot certain portion of company budget for safety matters into their business plan may help a lot. However, in the past few years the authority (Department of Safety and Health or known by its acronym as DOSH) has introduced the compliance support program to SMI. This initiative is more on educating the industry rather than enforcing or punishing them for the non-compliance. The program was done for free and industry was guided and advised by DOSH on the best practice of safety management. Unlike SMI, the multinational companies (MNC) and government-linked companies (GLC) have more structured OSH management system and their commitment to improve the health and safety matter within their organization is no doubt. This is because of their advantages in financial matter, expertise, experience as well as resources. In addition, the implementation of systematic management system and OSH certified has become a part of their business and marketing strategies (end-user demands, especially the European customers). Besides, the consciousness on OSH in Malaysia accompanies with an increase number of safety officers produced by professional colleges and universities. The certification program, diploma, degree or even master degree courses were offered to fulfil the high demand from industry. This indicates that Malaysia is heading toward the betterment of OSH management practice nationwide. However, there are still many to be done since OSH consciousness in Malaysia is still at its beginning stage if compared to the developed countries such as USA, United Kingdom and Australia. Therefore, industry should give full efforts and first priority to polish safety attitude among employees and inculcate safety culture within own organization. This can be done through twofold strategies: top-down and bottom-up approaches. On the other hand, the government's role in the form of policy-making, enforcement and financial support, to name a few, is imperative too. Thus, the triangulation effort of government-employer-employee should be formulated to achieve an effective mechanism to improve

OSH management. Moreover, the approach also ought to be emphasized on risk and performance based rather than prescriptive. In short, the interview result on four factors of organization, institution, legislations and technology was then summarized as follows;

#### Organizational factor

*Factors contribute to the effectiveness of OSH management.*

- Commitment and direction from the top management/ownership:
  1. Safety policy and ensure the safety compliance via internal inspection and enforcement. Incorporate safety element into business plan.
  2. Provide necessary resources and an attempt to create safety culture environment innovatively and creatively.
  3. Financial mechanism: budget allocation. Safety matter always becomes less priority when organization face financial problem.
  4. Establish independent unit to channel safety issue directly to management
  5. Transparency (employer not to enclose the safety issues;- at the end it will jeopardise the conditions)
- Clarifying the OSH structure and establishment of the designated unit for OSH.
- Level of education among employees and their knowledge. Provide both training and re-training programs
- Considering safety element from the design stage, not at a middle stage or after long operation.
- Aim of organization either want to be proactive or just comply with minimum legal requirement
- Employer and employee involvement & participation (top-down).
- Support from various agencies other stakeholders, especially to SMI.
- Education and innovation (sometimes low cost solution can resolve the problem- housekeeping and 5S).

*Mechanisms to gauge this effectiveness*

- Performance-based approach through periodic evaluation
- Develop a systematic approach (OHSAS, MS1722) or at least comply to minimum legal requirement
- Review staff's KPI (element of safety), group management system (report, frequent audit, accident report)
- Employees satisfaction (e.g complaints, interviews etc)
- Engage with competent person/group to recheck and analyse

*Proposed organizational indicators*

- Leading/proactive indicator: the level of effectiveness (training, enforcement, observation, safety training observation program-STOP, inspection, suggestion)
- Lagging/reactive indicator (no of injury, accident, level of accident, health problem, non-compliance)
- Practice minimum requirement
- BBS index, safety index, Likert rating, near miss, serious injury and fatality (SIF), repeatable injury frequency rate, high-potential severity
- Policy & objective. The objective should have the KPI. Based-on baseline & standard set by business unit
- Staff contribution towards safety improvement (kaizen, 5S)

#### Institutional factor

*Factors to strengthen current institutional structure;*

- Specific planning: DOSH & Local authority should come out with frequent visit schedule
- Knowledge and common understanding on legal requirement
- Need more experienced enforcer (i.e hire people from industry) and more effective promotion
- Still lack of OSH service: industry does need advice from competent person (e.g radiation, nanotechnology)
- Cooperate with related organization (enforcement)
- Increase the number of training providers with reasonable cost and up-to-date modules.
- Need cooperation from all stakeholders as well as with MITI (foreign investors)
- Unified cooperation and not move individually.
- Need to have a reference institution that stands neutrally (not interest in making money)
- Need the involvement of NGO's and not only the existing institutions
- Competent enforcer (e.g prosecution, technical, basic technical on certain process in industry)
- The continuous education to the enforcers especially in the technical knowledge.
- SOCSO should increase the prevention program, education, and consultation.
- Some LA staffs lack of knowledge & competency on safety matter and they should undergo safety training
- Public relationship and promotion.
- All institutions should increase communication and frequent interaction with DOSH
- Establish site office (enforcement and support agency) nearby industrial area
- Government effort: early education to create skilful workers, wider and comprehensive enforcement

*The factors that would become an obstacles to achieve good institutional structure*

- All institutions should understand the legal objective and do adhere to its requirements.
- Conflict of jurisdiction

- Lack of enforcer, follow-up and monitoring, and visit frequency (enforcer vs. no of industry, promotion)
- Not clear about aspects that want to be inculcated (e.g institutions other than DOSH & LA)
- unhealthy political intervention
- Lack of cooperation from small company.
- Sometimes lack of information link between the same institution (between state for example)
- Sometimes enforcers themselves do exhibit difference view about the same guidelines (require uniformity)
- Trainer's competency (lack of experience, lack of technical knowledge & skill)
- Sometimes training provided can't meet the industry requirement.
- Bureaucracy & too many red-tape when complaint being highlighted and the flow not as easier as expected.

#### *Proposed institutional indicators*

- Number of recorded accident (need transparency)
- Set KPI that rely on capability and current situation
- Number of trainers, enforcers and officers
- Number of involvement. Number of penalty, inspection, visit & monitoring
- Minimum training requirement for industry vs. number of participation
- Competency training & promotion hours per enforcer/officer
- Number of activities done, number of seminars conducted (log book)

#### Legislative factor

##### *Are the existing legislations effective in managing OSH.*

- Depend on management will- minimum requirement and self-regulatory.
- Effective, even some industries go beyond the minimum legal requirement especially, the MNC.
- Assist a lot in improving the OSH but still need for an improvement (e.g amendment- UK CIMAH 1986 to COMAH 1999 and still keep on amending follow the SEVESO Directive).
- FMA which is very prescriptive. Should towards performance and risk-based
- The current legal is effective but need to improve the enforcement mechanism (e.g enforcer vs industry)
- Large-scale industry almost follow but small-scale industry always ignore
- Improvement is always in place (FMA is more prescriptive). Need to see quantitatively or qualitatively
- The implementation of legal requirement is still limited (some) -how industry accepts and understands it.
- Some said that number of enforcer is not an issue because of self-regulation

##### *Factors that can influence this effectiveness*

- Understanding & need more promotion
- provide rewards (recognition, incentive, tax etc) for compliance and punishment to non-compliance
- Economic value through periodic inspection and reward to those comply
- How good the legislations are meaningless without commitment from all
- Periodic internal inspection should be done by the top management (not only by safety committee)
- Safety should be seen as important as a quality issue. Everybody works for the same goal.
- 3E's approach (engineering, education & enforcement)
- Emphasize more on the technical aspects (enforcers should be well-equipped with knowledge and skill).
- Practicability & capability vs type of industry
- Enforcement and penalties but need for education because not all industry aware
- Awareness (some take for granted) and commitment (due to cost reduction, company take an alternative)
- Sometimes the enforcer and authority request for improvement that beyond company's capability

##### *Is the existing legislation ought to be strengthened and what are the factors that can contribute to this improvement.*

- Yes, should be taken into consideration because legislation is a living document (compound, penalty)
- Yes, however the process is time-consuming. By the time, some information is becoming outdated
- Yes, for example FMA need to have an amendment following the current situation (technology, process etc)
- Yes, it is good for self-regulation but need to have a clearer focus. There might be an overlapping or new item that need for urgent amendment or review.
- Yes, some provisions are hard to follow.
- Yes, strengthening enforcement mechanism. This act is self-regulation but how to monitor/see that?
- Yes, because there are still many industries don't care about OSH requirement (still many accident happened and less aware by the industry)
- Need inputs from practitioners and engage actively with industry players.
- Put into account the community culture and an increase of foreign workers.
- Strengthening enforcement and regular premise inspection. Need to improve the promotion activities
- Share major accident information (local cases and oversea cases)- input for CIMAH.
- Educate industry especially the SMI. The government should organize the educational activities.

- Apply guidelines from oversea with certain alteration to suit local condition (machine, process etc)
- Safety aspects should become a culture not merely rely on enforcement and legal force.
- Management need to allot certain budget for safety matter and this will encourage the compliance.

*Factors that can be an obstacles towards legal enforcement*

- Time-to-response, issue of confidentiality, and employer awareness
- Shortage of enforcer, skilful and competent enforcer, and monitoring system
- Abuse of power (e.g can cause demotivation)
- Knowledge of enforcer, lack of experienced enforcers
- Unhealthy intervention (e.g integrity, transparency and abuse of power)
- Less experience and less exposure to industrial environment.
- Organization financial status because sometimes company operation is more superior and priority
- Lack of enforcer that specialize in certain area such as chemical and machineries.
- Many have a thinking of “who cares” and even in the developed country also facing the same problem
- Some employers tend to reduce cost by less prioritising the safety matter.
- stringent laws might frighten the investors

*Proposed legislative indicators*

- Legal register (the compliance list)
- Number of notice, number of penalty, number of cases, number of enforcer
- Number of solid case not the simple one (e.g no licence)
- The non-compliance case (leading indicator, before accident occurs)
- Compliance: how many compliance & non-compliance cases that relating to each provision in the act.
- What are the reasons to the non-compliance (e.g resources, cost etc)
- DOSH and PERKESO statistic. Internal accident records relating to legal provisions.
- Intra-net information to spread all info (type and number of items being promoted)
- Increase public awareness (e.g promotion frequency, number of public courses)

**Technological factor**

*What are the technology(s) did you find important to achieve good industrial safety management in Malaysia?*

- System wise, incident reporting
- State-of-the-art, build-in LOTO
- ICT & automated, semi-automated and robotic system
- Engineering controls that suit with Malaysia condition. So as, it should rely on the financial status
- Process safety, active safety devices, design & engineering, asset integrity, and hazardous materials containment
- Hazard analysis during design stage (process or equipment) (e.g simulation, FMEA, HIRARC)
- Fool-proof system (“poka-yoke”)
- equip safety device during design

*How technology can support toward effective safety management?*

- Fast data key-in & investigation
- Workplace inspection: real-time/on-line (CCTV): direct channel to HOD desk
- more reliable and constant compare to administrative control
- assist in identifying the hazards that may exist during design stage (e.g ergonomic)
- can monitor easily their performance in term of its parameter such as temperature, pressure etc
- Provide safer condition of working environment: illumination, vibration etc.
- through technology we are able to minimize the hazard and subsequently will reduce the risk
- Technology able to reduce accident. However, periodic maintenance is mandatory.
- Without technology, operation is at risk. Equipment & technology can reduce the risk
- HIRARC process can compare the performance of previous technology in reducing the risk
- Can minimise the problem of ergonomic

*The factors that need to be taken into consideration in order to promote technology development for industrial safety management*

- Knowledge on safety and involve safety expert during design and development stage.
- Promoting engineering control and technical knowledge
- Training to professional & non-professional.
- Financial mechanism (e.g encourage local manufacturer, can be supplied locally with cheaper price).
- Company capability & commitment

- Financial assistance because normally application of technology is very costly.
- Use of local resources by increase the innovation & creativity.
- Safety policy at the national level (priority and treat as national agenda)
- Tax & import duty (e.g PPE): can buy with reasonable and affordable price
- SMI will be given a tax privilege (tax exemption) if purchase safety-related technology
- Prioritise the most high risk condition in term of financial
- Practical in term of cost and end-users (workers and the level of operators)
- Kaizen/innovation is the criteria in the appraisal & bonus (organizational effort)

*The obstacles that may hinder technology development/application*

- Training will take time & development of technology will take time
- Oversea equipment: when problem need to wait the supplier or expert from oversea (service-after-sale).
- supply issue: order from oversea and will take time if shortage/technical problem
- Financial and current economy status (especially the SMI)
- Commitment and in Malaysia it is still critical when it involve cost.
- Use of technology takes time (i.e sometimes industry do has a limitation to comply)
- Cost and control-to-purchase (instead of buying two, buy one first)
- Prioritise production's needs rather than safety

*Proposed technological indicators*

- compare with sister company from the view of its performance (better/worse)
- hazards type and cost that employer able to spend and commit
- number of improvement via technology
- allocation budget (e.g 1%, 5% fiscal year for safety management)
- number of accident/incident reduce via the application of technology
- number of hazards that able to be minimize/reduce via technology
- profit & loss
- improvement project based on HIRARC (e.g black-belt, six-sigma)
- result from the application of technology (result from evaluation)

The experts and practitioner's opinions towards the establishment of cooperative safety management in Malaysia

Cooperation in environmental issues does exist but for safety matter not yet, and this is a good step and intriguing. The cooperation in safety management is also important for business survival.

Will help industries to learn more and assist each other. For example, financial assistance (through group contribution/funds).

Cooperative emergency response planning in the case of major accidents (e.g formation of cooperative fire-bridged, confined-space rescue team, emergency tools, and other's skill in emergency response).

Hazards information-sharing (e.g same chemical but difference maker or same machine but difference manufacturer) and consultation service.

Sharing of knowledge, idea, resources, technology and can learn from experience of others (e.g mentor-mentee program). Other opinions might offer a better solution because they judge differently.

Getting to know what kind of hazards, facility and infrastructure that other has, and this will allow the sharing of the prevention know-how.

More suitable for the same type of industrial sector (e.g sharing common procedure) or same category ("level") of industry. Very suitable for occupational safety (best-practice and program management).

New approaches are welcome and perhaps through cooperation, the current system and the process efficiency can be improved.

All industries able to share the accident information, the emerging risks and get to know what can be done if accident happens as well as the HIRARC's findings and exchange the control measures,.

Sharing the good-practice with others and can discuss about hazards that exist.

Good but need a body to coordinate and form a committee (e.g accident-sharing, centralization).

Because of the existence of diverse operations and processes, cooperative approach might be needed.

Safety is nothing to do with the trade-secret and through cooperation, competitors can work together.

Investors may think that this kind of network is a valued-added to their business survival.

SMI do have resource constraint and lack of expertise. The cooperative network may offer the solution.

*4. Discussion:*

Gilkey *et al.* (2006) contended that in order to ensure the success of OSH management in an organization, support and commitment from top management is vital. Indeed, all respondents agreed that top management commitment and their effort are a prerequisite and *sine qua non* for the success of OSH implementation. The

management team should come out with a clear safety policy and provide adequate resources including training and education, as well as allocate budget portion for safety matter in their business plan. Providing financial support is unavoidable because making an attempt to establish appropriate planning will require high cost (Kusumasari *et al.*, 2010). On the other hand, organization should also encourage safety consciousness among all level of employees and recognise their contributions in innovation and compliance relating to safety practice. This can be done in the form of monetary rewards and appraisal criteria. Besides top management commitment, the cooperation from employees will also influence the effectiveness of OSH management. The employee empowerment and their involvement in safety strategy (Arocena *et al.*, 2008) as well as the interaction between individual, micro and macro organization (Hofmann *et al.*, 1995) will provide a significant effect to safety performance. However, organizational efforts towards safer working environment should have an appropriate mechanism to gauge the effectiveness of the current OSH management practice. Thus, implementation of systematic approach might be the best option whereby through this approach, the performance-based via periodic evaluation can be done at appropriate manner. In addition, management review on staff performance, employee satisfaction and group safety management system at the micro level are also important. Moreover, the organization might also engage with competent individual or organization to recheck their safety performance and suggest for an improvement.

The approach towards the enhancement of safety management is preceded by institutional care and government agencies, in particular, ought to involve proactively. This is due to the fact that they do have the administrative and enforcement power. Kusumasari *et al.* (2010) added that the role of government agencies is essential because of their strength at administrative enforcement and jurisdictional accountability. Moreover, Eichhorst and Bongardt (2009) argued that industries react to a problem identified in a public discourse and this will result in a mutual contract between industry and a public authority. Because of this vital role, institutional structure should be strengthened in order to allow them to provide maximal service and assistance to industry. The respondents in this study also agreed that this can be done through specific and clearer planning by all institution involved in addition to cooperative network and communication to avoid overlapping jurisdiction. Meanwhile, the promotion on safety management practice should be carried out more frequent and this will help industry to understand better and motivate them to move more proactively. However, there are still many obstacles to be faced in order to improve the role of institutions. Those obstacles are such as conflict of jurisdiction, lack of knowledge and experienced enforcer, unhealthy intervention, cooperation from industries especially SMI, less promotion, and quality of training modules, to name a few. Indeed, Ibrahim *et al.* (2003) contended that amongst the causes that lead to industrial accidents are a failure of inspection authority, lack of knowledge, poor monitoring, inspection deficiency and laxity in enforcement of the regulation.

In Malaysia, the legislations relating to safety and health issues are the Occupational Safety and Health Act (OSHA 1994) and Factory and Machinery Act (FMA 1967). However, beside OSHA 1994 and FMA 1967, there are many other related acts and provisions to govern the issue relating to OSH matter. Those acts are Gas Supply act (1993), Electrical Supply act (1990), Fire Service act (1988), Petroleum act (safety measures) (1983), Atomic Energy Licence act (1984), and Pesticide act (1974) (Ahmad Shamsul, 2006). The success of legal force in improving safety management, however, depends on the will of organization's management. This is because the legal instrument merely sets the requirement at the minimum level. The failure to comply with legal requirement does not necessarily end with a prosecution and in contrast, adherence to the requirements also does not mean that the existing practice meets the "requirements" of safety management. However, it is obvious that the legal force and state's input do contribute significantly in enhancing safety performance (Liu *et al.*, 2005) and industry should consider it as a chance to demonstrate their responsible attitudes (Wettig *et al.*, 1999). The legislation is a living document. Thus, the amendment is unavoidable. For example, in UK, the CIMAH has undergone several amendments followed the SEVESO Directive. This was done due to the fact that the process, system, and control measures are keeping on changing and reliable technique in safety management may evolves time to time. The same movement can be introduced in the context of Malaysia and the tripartite approach of 3Es (engineering, education and enforcement) might be embedded rather than prescriptive approach. This can also be done by referring to the well-established guidelines from overseas and inputs from practitioners. Moreover, the legal mechanism may looks upon both punishment and recognition instead of punishment alone. For the time being, industries incline to fulfil the legal requirement because of their concern on the penalty for the non-compliance and if recognition for the compliance being introduced, more improvement can be achieved.

The modern and advanced technology may offer effective technical mechanism to reduce the mistakes in dyad to the implementation of structured safety management system (Liu *et al.*, 2005). Technology is more reliable and constants over time. The use of ICT, robotic system, automation and implementation of *fool-proof* system, process safety, asset integrity, to name a few, will help industry to faster the data key-in, minimise the mistakes, and ease the monitoring process as well as provide safer working environment. However, safety technology also has a limitation and potential to cause trouble if not being associated with periodic maintenance and frequent inspection. Meanwhile, there are several factors that need to be taken into account in order to



encourage and promote the development of safety-embedded technology. Among the suggested factors are financial supports for R&D, incentive, tax reduction, practicability in term of cost and end-users and recognition to those who use or produce it. Industry also requested to put safety as a priority instead of productivity which is always been treated superiorly in any decision-makings.

### 5. Conclusion:

In conclusion, the aforesaid findings are based on experts and practitioner's opinion and their personal's point of views. Therefore, from this result, further exploration is unavoidable and in-depth study ought to be carried out in order to come out with a clearer picture. Moreover, with an accelerating advanced technology and complexity of industrial processes, not all safety programs can be done at the level of individual organizations. This might be due to financial constraints, knowledge and expertise, resources or administrative tools. Thus, the cooperative relationship among industry players within industrial estate may offer an alternative to cope with such constraints. Of all types of industries should rethink that the *blanket*-practice of OSH management, to certain extend, may need to be further improved that go beyond their respective organization. Accordingly, the initiative for cooperative network could be noteworthy. There is a common practice if industry cooperate each other in traded business but not many of them willing to cooperate for non-traded business, for example, cooperation in industrial safety management. Through cooperation, industry will gain a lot of benefits. The cooperation will allow industry to achieve their organizational goals and create competitive advantages (Lehtonen, 2006; Vangen and Huxham, 2006), and other benefits such as knowledge-sharing (Birru, 2011; Reniers and Amyotte, 2012) and expertise assistance from other industries (Vangen and Huxham, 2006; Reniers and Amyotte, 2012). Therefore, the cooperation for safety management, indeed, could offer a better approach to lessen the risks and at the same time, could assist each other in term of competency, knowledge, and financial. However, even though this approach is noteworthy but it is not straightforward and we need to look at several issues and obstacles which may hinder this movement. Moreover, this initiative might become more complex in Malaysian case due to its uniqueness in term of multi-ethnic culture, political thought, government administrative tools, and legislations. Thus, an extensive and in-depth study on organization, institution, legislation and technology ought to be explored in future to come, especially the readiness among SMI to partake in this initiative.

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