

Study on the Strategy of GHS System in Taiwan

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Abstract: *The “Globally Harmonized System of Classification and Labeling of Chemicals” (GHS) not only provides a unified system for dealing with the labeling of intrinsic materials and compound chemicals but also furnishes hazard information to the contingency personnel, work site workforce, transportation workforce and consumers for the prevention of acute and chronic health impairments as well as ecological hazards. Since 2008, the GHS has gradually been observed internationally to substitute the classification and labeling of hazardous substances, the Material Safety Data Sheet (MSDS), and relevant regulations on hazardous chemicals which are currently used by many countries; substantial influences have been seen in Taiwan’s chemical manufacturing industry, import/export trades, the recognition of labor safety and protection against chemical hazards, as well as the governmental management over chemicals and national legislation and enforcement of the relevant statutes.*

The study takes safety and health related topics --Management of Chemical Hazards --proposed in the 18th World Congress on Safety and Health at Work convened 2008 at Seoul as the main subject, with questionnaires and interviews carried out against focal groups and experts, for verifying the priority in these safety and health issue.

Keyword: Globally Harmonized System of Chemicals, Labeling, Chemical Hazard

1. Introduction

1.1 GHS Development

The Globally Harmonized System for Classification and Labelling of Chemicals (GHS) which mainly specifies globally unified codes for the classification and labeling of chemicals and for the contents in an MSDS of the same, is an essential basis to the global safety of chemical uses.[1,2] The UN demands all its member nations to implement the GHS by 2008. The Asia Pacific Economic Cooperation, APEC, had made a decision in the 5th Chemical Dialog held in May 2006 at Ho Chi Minh City, Vietnam to implement the GHS in 2008, in a synchronized pace with the UN.

The UN’s Purple Book has accomplished the classification and labeling of 27 hazard categories and the format of MSDS contents. Council of Labor Affairs of Taiwan has established an on-line database to provide classification, labeling and safety data of pure chemicals. Currently the database contains about

1000 entries of chemicals.

Based on the 27 Articles of the ILO C170 Chemical Convention[3], 1990, relevant regulations are provided against the supply and use of chemicals and hazardous materials including labeling, transfer of hazard-related messages, use log, exposure prevention, operation management, training, and responsibilities of the exporting countries. R177 Chemical Recommendation[4], 1990 proposed substantial suggestions for the work site safety of chemicals.

1.2 Establishment of chemicals registration and expert system in Taiwan

The material safety of chemicals has become a major topic in international society. Taiwan has effectively matched the international trend by the following: Article 7 of Labor Safety and Health Act of 1991; Regulations on Communication of Dangerous and Hazardous Materials, 1992, which specified tasks for listing of chemicals, categorized label of hazardous materials, MSDS, and labor communication training; the GHS was adopted in 2008 where dangerous and hazardous materials labeling and communication regulations are promulgated. Currently, Taiwan lacks a complete mechanism to enforce registration and dynamic updating; authorities of target businesses are unable to timely control the chemicals list and their distribution data, therefore it is impossible to carry out necessary management, prohibition and prevention measures against dangerous sources that could lead to a major chemical disaster. Setting up a chemicals registration mechanism is of urgent need in the country, such that a preliminary control of chemicals list can be performed, followed by managing the use of chemicals in the country by measures such as registration, authorization and limitation. The aforementioned chemicals registration management involves the Environment Protection Agency, Council of Agriculture, Ministry of Economic Affairs, National Fire Agency, Council of Labor Affairs (CLA), etc.[5] In order to effectively control the production, importation and use of hazardous chemicals, an inter-agencies platform for managing the registration of chemicals shall be constructed. The CLA officially announced the Direction of Existing Chemical Substance Nomination (ECN) to launch the interagency cooperation program (November 2nd, 2009). The main objectives are to establish chemical inventory as the basic infrastructure for lifecycle chemical management. Furthermore, an expert system for classification and labeling of chemicals

shall also be constructed to collect and build up a database for chemicals. The inter-agencies platform and the expert system sharing of consistent information on physical hazards, health hazards and environmental hazards of chemicals can be made possible for minimizing impacts caused by chemicals. The CLA referenced similar management mechanisms of the EU, USA, Canada, Japan, Korea and China, and collected suggestions from relevant unions, associations and businesses in combination with chemicals-related departments for jointly setting up the “Regulations on Reporting Existing Chemicals”. Su et al.[6] provided basic information regarding GHS implementation and the requirements. However, there are few researches[7-9] regarding the test method and national implementation of GHS, the study on the impact of GHS implementation is rather anemic. Thus, the purpose of present work is to thoroughly analyze influences that GHS strategy implementation in Taiwan.

2. Research Methods

2.1 Statistic Analysis of Structural Questionnaires

In order to understand the promotion of chemicals management policy and the corresponding strategies, this study uses structural questionnaire survey to perform the statistical analysis in combination with interviews carried out against expert groups and focal groups for analyzing the priority for promoting chemicals management. The questionnaire addresses the importance resulting from the promotion of chemicals management and labor inspection in Taiwan, and the feasibility. Scores are rated for Importance and Feasibility respectively by 5 (very important or very feasible), 4 (important, feasible), 3 (moderate important, moderate feasible), 2 (non-important, non-feasible) and 1; with priority of topics sorted out at the same time.

2.2 Research Subjects

a. Interview and survey over focal groups

In-depth questionnaire survey and interview is carried out over focal group. The expected subjects of the survey comprise of worker groups such as the Chinese Federation of Labor, Taiwan Petroleum Worker’s Union; the employer groups mainly consisting of Chinese National Federation of Industries, Chinese National Association of General Contractors (CNAGC) and county and city industrial associations; Labor Safety and Health Groups and inspectors of Labor Inspection Institutes. The present work invited a total of 335 members in the focal groups

b. Questionnaire for professional researchers

This research invited a total of 114 experts and scholars of various realms including industries, authorities, and academic institutes to attend the questionnaire survey of expert validity. The questionnaire contains 16 items including chemicals registration management system, statutory implementation, counseling, sorting and labeling, transport symbols, and strategic emphases of existing regulations regarding chemicals management.

3. Results and Discussion

3.1 Quartile deviation (QD) of consensus

Out of 114 copies of expert validity questionnaire sent to the subjects, a total of 68 questionnaires were recovered, which translates to 59% recovery rate. The results were revised into an official questionnaire, which contains 10 to 20 issues that needed to be prioritized. Among the 16 important analysis items, 15 items read a high degree of consensus, and one item reads a moderate degree of consensus (QD=0.63 - Promoting chemicals management system via media propaganda). Among the 16 feasibility analysis items, 15 items read a high degree of consensus, and one item reads an ultra high degree of consensus (QD=0.00 - Set up labor training system on chemicals management). Results of Reliability Analysis of Experts (Table 1) show that Cronbach α values of both “Importance in promoting the international chemicals management system” and “Feasibility in promoting the international chemicals management system” are within the 0.70 - 0.90 range as Very reliable; the Cronbach α value “as a whole” is 0.97, indicating that the questionnaire is highly reliable.

Table 1. Reliability analysis of experts

Variable	Number of Questions	Cronbach α	Result
Importance in promoting the international chemicals management system	16	0.90	Very reliable
Feasibility in promoting the international chemicals management system	16	0.85	Very reliable
As a whole	96	0.97	Highly reliable

3.2 Importance analysis on international chemicals management system

The importance analysis on promoting international chemicals management system (Table 2) points out that:

- For point-of-view deviations between experts and focal groups, Item 4 reaches significant deviation statistically: “Effective integration of chemicals-related statutes between departments”; the other 15 items do not show significant deviation.
- Two items have an Average score below 4: Item 9: “Promote chemicals classification and labeling by test-methods”, and Item 15: “Increase investment on equipment and research for promoting chemicals management”; the other 14 items all exceed 4.
- The Cohen’s d values of 10 items are below 0.2, which reveal the low effect size between the experts and focal group. The highest Cohen’s d value in this important analysis is 0.50 (medium effect size), presented as the item of “Effective integration of chemicals-related statutes between departments”.

3.3 Feasibility analysis on international chemicals management system

The feasibility analysis on promoting international chemicals management system (Table 3) points out that:

- A. For point-of-view deviations between experts and focal groups, Item 1: “Incorporate EU Chemicals Registration Management System into Labor Safety & Health Act” and Item 8: “Government provided counseling measures for promoting chemicals management system to small and medium enterprises” reach significant deviation statistically; the other 14 items do not show significant deviation.
- B. Average score of 3 topics reach above 4: Item 12: “Comply with chemicals management, promote labor safety education in schools”, Item 13 “Set up labor training system on chemicals management” and Item 16: “Provide MSDS to workers” reach above 4; the other 13 items are below 4 (see Table-3).
- C. There are 9 items’ Cohen’s d values below 0.2 (low effect size), and 6 items’ Cohen’s d values are between 0.2-0.5 (low to medium effect size). The highest Cohen’s d value in this feasibility analysis is 0.71 (medium to high effect size), presented as the item of “Effective integration of chemicals-related statutes between departments”.

4. Conclusion

In the analysis of expert group and focal group consensus on promoting international chemicals management system, both groups of subjects came to a consensus on the following points:

1. Incorporate EU Chemicals Registration Management System into Act.
2. Comply to promote the Unitary Statute for hazardous material management of administrative departments; submittal of hazard and risk assessment report to authorities is necessary before manufacture and import new chemicals; effective integration of Chemical-related statutes between departments; promotion of chemicals management relies on government enforcement; comply with authorities to build up chemicals management database; counsel on promoting chemicals management system to large enterprise in Taiwan; promote chemicals classification and labeling by test methods; unify external and internal symbols of transport labels of goods

3. Set up labor training system on chemicals management; cultivate seed instructors for chemicals management system; increase investment on equipment and research for promoting chemicals management; provide MSDS to workers.

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Table 2. Importance analysis on promoting international chemicals management system

Item	Topic	Experts survey (n ₁ =68)		Focal group survey (n ₂ =113)		P-value	Cohen's d
		Avg.	SD	Avg.	SD		
1	Incorporate EU Chemicals Registration Management System into Labor Safety & Health Act	4.06	0.64	3.97	0.64	0.425	0.14
2	Comply to promote Unitary Statute for hazardous material management of administrative departments	4.12	0.54	4.10	0.54	0.925	0.04
3	Submittal of hazard and risk assessment report to authorities is necessary before manufacture and import new chemicals	4.12	0.72	4.13	0.72	0.933	0.01
4	Effective integration of chemical-related statutes between departments*	4.44	0.50	4.19	0.50	0.014	0.50
5	Promotion of chemicals management relies on government enforcement	4.15	0.89	4.10	0.89	0.346	0.06
6	Comply with authorities to build up chemicals management database	4.26	0.61	4.22	0.61	0.726	0.07
7	Counseling on promoting chemicals management system to large enterprise in Taiwan	4.18	0.52	4.17	0.51	0.899	0.02
8	Government provided counseling measures for promoting chemicals management system to small and medium enterprises	4.00	0.49	4.12	0.49	0.153	0.24
9	Promote chemicals classification and labeling by test methods	3.94	0.55	4.03	0.55	0.361	0.16
10	Unify external and internal symbols of transport labels of goods	4.29	0.62	4.19	0.62	0.378	0.16
11	Promoting chemicals management system via media propaganda	4.21	0.59	4.10	0.59	0.397	0.19
12	Comply with chemicals management, promote labor safety education in schools	4.41	0.60	4.25	0.60	0.123	0.27
13	Set up labor training system on chemicals management	4.41	0.55	4.24	0.55	0.105	0.31
14	Cultivate seed instructors for chemicals management system	4.24	0.55	4.16	0.55	0.632	0.15
15	Increase investment on equipment and research for promoting chemicals management	3.88	0.68	4.03	0.68	0.195	0.22
16	Provide MSDS to workers	4.24	0.60	4.02	0.60	0.977	0.37

Note:*indicates P<0.05 **indicates P<0.01

Table 3. Feasibility analysis on promoting international chemicals management system

Item	Topic	Experts survey (n ₁ =68)		Focal group survey (n ₂ =113)		P-value	Cohen's d
		Avg.	SD	Avg.	SD		
1	Incorporate EU Chemicals Registration Management System into Labor Safety & Health Act*	3.48	0.86	3.78	0.60	0.013	0.17
2	Comply to promote Unitary Statute for hazardous material management of administrative departments	3.66	0.90	3.89	0.63	0.254	0.03
3	Submittal of hazard and risk assessment report to authorities is necessary before manufacture and import new chemicals	3.67	0.92	3.86	0.72	0.200	0.01
4	Effective integration of chemical-related statutes between departments	3.85	0.99	3.87	0.68	0.649	0.71
5	Promotion of chemicals management relies on government enforcement	3.63	0.90	3.84	0.75	0.124	0.07
6	Comply with authorities to build up chemicals management database	3.88	0.85	3.96	0.63	0.640	0.06
7	Counseling on promoting chemicals management system to large enterprise in Taiwan	3.97	0.58	3.95	0.59	0.851	0.01
8	Government provided counseling measures for promoting chemicals management system to small and medium enterprises*	3.58	0.75	3.85	0.71	0.045	0.33
9	Promote chemicals classification and labeling by test methods	3.53	0.76	3.71	0.68	0.229	0.19
10	Unify external and internal symbols of transport labels of goods	4.00	0.93	3.92	0.64	0.168	0.19
11	Promoting chemicals management system via media	4.06	0.78	3.93	0.67	0.175	0.22
12	Comply with chemicals management, promote labor safety education in schools	4.12	0.78	4.08	0.66	0.503	0.37
13	Set up labor training system on chemicals management	4.03	0.80	4.03	0.64	0.817	0.43
14	Cultivate seed instructors for chemicals management system	4.06	0.65	3.97	0.69	0.422	0.14
15	Increase investment on equipment and research for promoting chemicals management	3.64	0.74	3.79	0.73	0.244	0.30
16	Provide MSDS to workers	4.03	0.63	4.08	0.71	0.594	0.27

Note: *indicates P<0.05 **indicates P<0.01