Field Study

An Integrated Approach for Improving Occupational Health and Safety Management: The Voluntary Protection Program in Taiwan

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Abstract: An Integrated Approach for Improving Occupational Health and Safety Management: The Voluntary Protection Program in Taiwan: Teh-Sheng Su, et al. Department of Safety Health and Environmental Engineering, Chungtai Institute of Health Sciences and Technology, Taiwan, R. O. C.—A voluntary compliance program for occupational health and safety management, Voluntary Protection Programs (VPP), was implemented with a strategy of cooperation and encouragement in Taiwan. Due to limitations on increasing the human forces of inspection, a regulatory-based guideline addressing the essence of Occupational Health and Safety Management Systems (OHSMS) was promulgated, which combined the resources of third parties and insurance providers to accredit a self-improving worksite with the benefits of waived general inspection and a merit contributing to insurance premium payment reduction. A designated institute accepts enterprise’s applications, performs document review and organizes the onsite inspection. A final review committee of Council of Labor Affairs (CLA) confers a two-year certificate on an approved site. After ten years, the efforts have shown a dramatic reduction of occupational injuries and illness in the total number of 724 worksites granted certification. VPP worksites, in comparison with all industries, had 49% lower frequency rate in the past three years. The severity rate reduction was 80% in the same period. The characteristics of Taiwan VPP program and international occupational safety and health management programs are provided. A Plan-Do-Check-Act management cycle was employed for pursuing continual improvements to the culture fostered. The use of a quantitative measurement for assessing the performance of enterprises’ occupational safety and health management showed the efficiency of the rating. The results demonstrate that an employer voluntary protection program is a promising strategy for a developing country.

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Key words: Voluntary protection programs, Occupational health and safety management systems

With the progress of technology and changes in manufacturing processes, workers are facing even more complex workplaces than ever. There are many international organizations and countries trying to take practical measures to reduce occupational accidents and diseases in the workplace. At the XIII World Congress on Occupational Safety and Health held by the International Labour Organization (ILO) in New Delhi, 1993, a consensus was reached that the issue of human rights, environmental protection and occupational safety and health should be considered in negotiation of international trade agreements¹. For international enterprises, it emphasizes not only their business benefits but also environmental protection and workers’ right in the workplace. It’s a warning for the global community to urge enterprises in developing countries not to increase trading profit by ignoring investment in environmental protection and sacrificing the workers’ occupational safety and health rights.

The current national policies of developed countries, such as the United States², United Kingdom³, and Australia⁴, are to develop effective methods to protect workers from work-related injuries or illness. Labor affairs related governmental agencies and international organizations throughout the world have made efforts to develop national Occupational Health and Safety Management Systems (OHSMS) standards or guidelines. The International Occupational Hygiene Association (IOHA) and ILO reviewed the international and national OHSMS⁵ in 1998, and proposed a new international

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document which was adopted by ILO in 2001, known as the Guidelines on Occupational Safety and Health Management Systems\(^6\). In their report, the Voluntary Protection Programs of United States (USVPP) were recognized as a government system that was highly compatible with the concept of the new OHSMS, although it lacks an audit guidance; that is, a team of specialists visiting the applicable site, doing a comprehensive survey according to national guidelines with management issues, and then preparing an audit report including a detailed correction plan.

The International Organization for Standardization (ISO) developed the ISO 9000 series on Quality Management\(^7\) and ISO 14000 series on Environmental Management\(^8\), even though the development of an OHSMS standard was suspended in 1996. In the United Kingdom, the British Standards Institute (BSI) developed a standard known as BS 8800\(^9\), to give guidance on OHSMS for assisting with compliance with HSE national interests to minimize risk to employees, to improve business performance, and assist organizations to establish a responsible image. In 1999, BSI proposed the well-known series of occupational health and safety management systems, OHSAS 18001\(^10\). In Australia, a guidance standard AS/NZS 4804:1997 named as “Occupational Health and Safety Management Systems—General Guidelines on Principles, Systems and Supporting Techniques” has been prepared but it is not intended for certification purposes\(^11\). In the governmental activities of Victoria state, Australia, a voluntary regulation “Safety Management Achievement Program (SafetyMap)” has presented the OHSMS characteristics for improving the health and safety performance of enterprises and uses audit criteria methods\(^12\). The Japan Industrial Safety & Health Association has drawn up OHSMS Guidelines to ensure the health and safety of workers\(^13\). The American Industrial Hygiene Association proposed the “Occupational Health and Management System: An AIHA Guidance Document” with 27 elements\(^14\), in 1996, to provide a basis for designing, implementing and evaluating OHSMS. The United States Occupational Safety and Health Administration (OSHA) carried out USVPP in 1982. It highlighted requirements centered on comprehensive management systems with employees’ active involvement in controlling hazards at worksites. With comparison of industry benchmarks, injuries and illness rates, OSHA determined the qualification of applicants in the Star, Merit or Demonstration program\(^15\). The documentation for a USVPP worksite focuses on the following topics: (1) management leadership and employee involvement, (2) worksite analysis, (3) hazard prevention & control, and (4) safety and health training. In the 2003–2008 Strategic Management Plan of OSHA, the USVPP is one of the important co-operative programs for achieving the strategic goal of effective safety and health management and leverage for the agency’s resources\(^16\).

In Taiwan, the government has sought to change the way of enforcement of occupational health and to cooperate with enterprises voluntarily establishing the OHSMS based on risk assessments of their workplaces. In Taiwan, the Labor Safety and Health Law regulates 281,000 business firms and 4.82 million workers. The statistics of incidence rates, frequency rate (lost workday cases per million work hours, (FR)) and severity rate (total days lost per million work hours, (SR)), from compensation shows a decline in the long term trend\(^17\). The workplace fatality rate has declined 51.4% after the strict enforcement of labour laws by the government in 1987. However, the rates have fluctuated during 1990s. There were only 272 compliance officers conducting labor inspections due to the limited expansion of government personnel resources, and the annual governmental inspection rate of the business firms was only 10%. To improve this situation, the Council of Labor Affairs (CLA), a Cabinet agency of Taiwan, has implemented a mandatory regulation entitled the “Voluntary Protection Programs Guidelines” since 1994 to encourage industries to establish and carry out their own voluntary occupational health and safety management programs. It refers to various health and safety management systems and the International Safety Rating System for Loss Control. After six years of VPP implementation, the stakeholders demanded the government extend the compatibility to other management systems to reduce the cost of carrying out this program and OHSAS 18001 at the same time. The integration of occupational safety and health into a core management issue for enterprises is the key point of the expert review of OHSMS in Taiwan\(^18\). In response to these demands, CLA amended the regulation in order to share the basic common elements of BS 8800 and OHSAS 18001 in the new VPP in 2001. Elements of OHSAS 18000 series\(^19\), ILO-OHSMS and the VPP program are given in the Table 1. The new VPP provides a ready and compatible way to transfer easily from an approved VPP to the certified OHSAS 18001 with global competence enhanced.

In the new VPP, there were seven main elements with 102 items, which have a rating system to help the fairly quantitative assessment for the auditors from various sources as indicated in Table 2. The scale was designed to satisfy the one hundred percentage rating score in the range 0 to 100. The flow chart of the application procedures is shown in Fig. 1. Due to limited government resources, the government designated a non-profit third party to promote the VPP, and utilized personnel resources from non-government organizations including temporarily appointed professionals from industries to help the applicants by furnishing all the application documentation, training the VPP auditors, conducting
initial on-site review, filing the management commitments and reporting to the VPP review committee. For the enterprises applying for the certification or re-certification of VPP, all application materials were submitted to the authorized non-profit organization. Currently, the Industrial Technology Research Institute (ITRI) is designated to carry out this program.

All audit results are discussed in the VPP review committee comprising 11 to 21 specialists in the local enforcement authorities, and scholars in university management or safety & health departments. In every fiscal year, the committee has convened quarterly, chaired by the government agency, to decide the VPP certification of all renewals and new applicants. Enterprises with a score over 70 points accredited by the review committee are certified with the honorable sign of VPP Merit worksite. Those enterprises awarded the VPP Star are scored over 85 and are eligible for competency grants in the competition for honor of national excellence award in the following two years. The VPP worksites were given priority to acquire compliance assistance and access to activities held by the government. In addition to the

Table 1. The characteristics of VPP Taiwan, OHSAS 18001 and ILO-OSHMS guidelines

<table>
<thead>
<tr>
<th>New VPP items, Taiwan</th>
<th>OHSAS 18001 clauses</th>
<th>ILO-OSHMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>OH &amp; S policy</td>
<td>OH &amp; S Policy</td>
<td>Policy</td>
</tr>
<tr>
<td>Planning and management program</td>
<td>Planning</td>
<td>Planning and implementation</td>
</tr>
<tr>
<td>Organization</td>
<td>Implementation and operation</td>
<td>Organizing</td>
</tr>
<tr>
<td>Operational Control</td>
<td>Operational Control</td>
<td>Hazard prevention</td>
</tr>
<tr>
<td>Emergency response and incidents preventive action</td>
<td>Emergency preparedness and response</td>
<td>Emergency prevention, preparedness and response</td>
</tr>
<tr>
<td>Performance measurement and audit</td>
<td>Performance measurement and monitoring</td>
<td>Performance monitoring and measure Audit</td>
</tr>
<tr>
<td>Management Review</td>
<td>Management review</td>
<td>Management review Action for improvement</td>
</tr>
</tbody>
</table>

Table 2. The rating scales for the internal audit by enterprises and the external audit from review committee

<table>
<thead>
<tr>
<th>Main elements</th>
<th>Items</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. OH&amp;S policy</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>2. Planning and management program</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>3. Organization</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>4. Operational Control</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>5. Emergency response and incidents preventive action</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>6. Performance measurement and audit</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>7. Management Review</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>102</td>
<td>100</td>
</tr>
</tbody>
</table>

Fig. 1. The VPP schematic framework in Taiwan. CLA: Council of Labor Affairs; VPP: Voluntary Protection Programs.
strategic benefits in enforcement, the VPP worksites gain
the merit of insurance premium reduction through
cooperation with the Ministry of Finance and the
Association of Property Insurance Providers as an
economic incentive. These benefits of VPP worksites
are valid for a period of two years. In order to assess
how effective the VPP worksites are at pursuing continual
improvement, the VPP worksites are asked to submit their
self-evaluation report annually within the valid period.
The VPP review committee has the right to revoke the
certification if worksites fail an annual audit.

The third party certification approaches of conformity
assessment for OHSMS provoked extensive discussion
in view of OSHA reform by academics and needs to be
monitored. The characteristic of Taiwan’s VPP is
extensive use of external auditing expertise. In this study,
the achievement of the voluntary OHSMS in Taiwan was
demonstrated by the incidence rates of occupational
injuries and illness of accredited enterprises, then the
efficiency of internal and external audits were analyzed.
In addition, the challenging demands of global
harmonization are discussed.

Materials and Methods

A list of VPP sites was obtained from local authorities.
The basic characteristics of employment were extracted
from the audit report. For the comparison, the different
sizes of enterprises were grouped by the criteria of the
need of human power in OHSMS as described in the
regulations. The industrial classification is based on the
Article 4 of the Labor Safety and Health Law 2002, and
the definition of industries was according to the Standard
Industry Code issued by the Taiwanese government.

In order to evaluate the efficacy of Taiwan VPP,
iccidence rate comparable criteria of frequency rate and
severity rate of VPP worksites were collected, analyzed
and compared with the average values of all industries.
These two traditional and national performance indicators
were obtained from the national statistics yearbook.

The statistical period was managed to be the same
between the two groups.

An spreadsheet with the scores from internal audits
and external auditors was constructed. The characters of
expert metrical methodology for third parties were
evaluated by the statistical ANOVA method with SPSS
software.

Results and Discussion

In the first year, 1994, 53 worksites were granted VPP
awards, and at the end of 2003, 724 worksites had been
granted VPP awards. The industrial distribution of VPP
worksites in 2001–2003 is listed in Table 3. The main
industries for VPP worksites fall in the categories of
“manufacturing industry including chemicals, electronics,
refinery, primary metal, pulp and paper, and foods”
(67.9%) and “transportation, warehousing and
communications” (17.7%). The construction industry was
0.5%. The size of employer of VPP worksites is generally
large, with more than 100 employees, (92.3%), in contrast,
there were only 7.7% of VPP worksites with a staff of
less than 100 employees as indicated in Table 4. The
distributions of VPP worksites classified by number of
employees or industry code in Taiwan are similar to those
in the USA. From the evaluation reports of the United
States General Accounting Office, the number of VPP
worksites in the United States had increased to 1,053
worksites among 1.4 million enterprises as of February,
2004. Manufacturing industry comprised approximately
74% of these recognized worksites. The construction
industry comprised 5%. The majority (74%) of VPP
worksites had more than 100 employees based on the
statistics of OSHA. The VPP efforts of Taiwan and
United States show that large enterprises have taken
advantage of governmental actions. The main reason is
that large employers have more staff to implement a
comprehensive management program. However, the
small and medium sized enterprises still have
opportunities to join with the assistance of the workforce.

<table>
<thead>
<tr>
<th>Industrial classification</th>
<th>01</th>
<th>02</th>
<th>03</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>46</td>
<td>41</td>
<td>55</td>
<td>142</td>
<td>67.9</td>
</tr>
<tr>
<td>Transportation, warehousing and communications</td>
<td>1</td>
<td>13</td>
<td>23</td>
<td>37</td>
<td>17.7</td>
</tr>
<tr>
<td>Water, electricity, and fuel gas</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>21</td>
<td>10.0</td>
</tr>
<tr>
<td>Medical, health care and social welfare service</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Hotel and restaurant service</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Construction</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Education Service</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>2.4</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>62</td>
<td>89</td>
<td>209</td>
<td>100</td>
</tr>
</tbody>
</table>
The classification of VPP worksites of Taiwan was prepared and compared with that of USA by industry. The chemical industry and manufacturing sectors including microelectronics occupy the largest percentage due to the nature of well-prepared risk management subjects and the Process Safety Management regulatory requirements for highly hazardous chemicals and specialty gases.

At certified VPP worksites, FR and SR lower than the national averages is a necessary requirement in United States, and it has proved to be an effective management system in reducing injury rates\(^24\). The implementation procedures of the VPP programs of Taiwan and the United States are similar as shown in Table 5. However, the results of performance indicators, FR and SR, are slightly different in Taiwan. As indicated in Table 6, the general average frequency rate of VPP worksites is 0.98 which is 49% lower in comparison with the figure for the whole of industry, 1.93, achieved in the past three years. The severity rate reduction was 80% lower in the same period. The declining trends at VPP worksites were steeper than those of all industries, and indicates the effectiveness of continual improvement. According to the 2003 annual report of OSHA, the incidence rates of injury and illness at USVPP worksites are more than 55 percent below the average for their industry.

The results of quantitative metrical ranking by experts showed the bias from the enterprises’ internal audits as indicated in Table 7. The scores comparison between the internal audit and external audits were analyzed for 89 VPP sites in 2003. The average score of internal audits (88.91 ± 5.27) was higher than that of external audits (80.56 ± 6.12) by 8.31. A significant difference was found by Student’s t test with \(p < 0.001\). The situation is the same in both the Merit group and the Star group. The internal auditors’ training and the quality assurances of assessment should be emphasized. A review team with safety or health specialists taking charge of the review procedure is necessary. It is better to achieve voluntary compliance by providing more incentives, promoting more systematic approaches, focusing more on highly hazardous workplaces and using third-party approaches.

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### Table 4. The sizes of enterprises in VPP worksites from 2001 to 2003

<table>
<thead>
<tr>
<th>Sizes of enterprises</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;30</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>30–100</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>15</td>
<td>7.2</td>
</tr>
<tr>
<td>100–300</td>
<td>21</td>
<td>13</td>
<td>26</td>
<td>60</td>
<td>28.7</td>
</tr>
<tr>
<td>300–1,000</td>
<td>22</td>
<td>31</td>
<td>44</td>
<td>97</td>
<td>46.4</td>
</tr>
<tr>
<td>&gt;1,000</td>
<td>11</td>
<td>10</td>
<td>15</td>
<td>36</td>
<td>17.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>58</td>
<td>62</td>
<td>89</td>
<td>209</td>
<td>100</td>
</tr>
</tbody>
</table>

### Table 5. Comparison of implemented procedures of Voluntary Protection Programs of Taiwan, United States, and the OHSAS 18001

<table>
<thead>
<tr>
<th>Steps</th>
<th>Taiwan, CLA-VPP</th>
<th>The US, OSHA-VPP</th>
<th>OHSAS 18001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial review</td>
<td>Designated institute</td>
<td>OSHA review team</td>
<td>Private certification consultants</td>
</tr>
<tr>
<td>Onsite Review team</td>
<td>2–3 experts</td>
<td>OSHA officer as team leader with a safety specialist and industrial hygienist</td>
<td>Evaluation experts trained with guidelines</td>
</tr>
<tr>
<td>Review process</td>
<td>1. Initial document review</td>
<td>Initial meeting, Walk-through, Document review, Interview, Daily close-out meeting, Closing meeting</td>
<td>Follow the implemented guideline</td>
</tr>
<tr>
<td></td>
<td>2. Onsite review</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Review committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final review</td>
<td>Council of Labor Affairs Review committee</td>
<td>Dept. of Labor, Assistant secretary</td>
<td>Certification association or organization</td>
</tr>
<tr>
<td>Qualification</td>
<td>Quantitative scores (0–100)</td>
<td>Injury and illness rate</td>
<td>Improvement and management commitment</td>
</tr>
<tr>
<td></td>
<td>Merit: 75, Star: 85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valid period</td>
<td>2 yr</td>
<td>1 to 5 yr</td>
<td>Depends on performance</td>
</tr>
<tr>
<td>Application Fee</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Insurance company</td>
<td>Ask for participation</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Continual Audit</td>
<td>Every year</td>
<td>Star: 3 yr, Merit: 1 yr</td>
<td>Half year</td>
</tr>
</tbody>
</table>

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It is the basic principle that the compliance enforcement program conducted by the governmental regulatory agencies should be clearly independent of the consultation services or cooperative programs supported by the government. The implementation of Taiwan VPP shows the success of cross adoption and integrated approaches of the essence of US VPP and the international leading OHSAS management system with the assistance of outstanding third-party professionals.

**Conclusion**

In Taiwan, by creating incentives to improve safety and health to reduce the incidence of occupational injuries and illness, the VPP has been highly beneficial for both the government and enterprises. The VPP in Taiwan is similar to the ILO guideline and uses non-profit third parties to help enterprises implement the OHSMS system instead of involving commercial accreditation companies. The Taiwan VPP has been a success in manufacturing industries, but temporary operations with high injuries rate, such as construction or agriculture industry might have been overlooked.

With limited government resources, the promotion of occupational safety and health management systems for enterprises provides a framework for developing and implementing corrective actions with risk concern. It’s also a compatible solution for a service-oriented government policy and allows the government to leverage limited resources. The integrated Voluntary Protection Programs developed by the Council of Labor Affairs in Taiwan, which were partly revised in 2001, have established a feasible cooperative model among government, enterprises and labor to reduce work-related injuries and illness. With the financial incentives of premium merits and awards, for enterprises, VPP help to reduce the cost of labor workday losses and influence insurance rates directly. Moreover, it also improves enterprises’ public image and involves them in annual competition for VPP awards and honors. Although the trends of performance indicators are not entirely due to the voluntary protection programs, the cooperative and voluntary compliance strategies show promise for national competency agencies. Employers, workers and government have benefited greatly from global harmonization of occupational health and safety management systems.

**References**


