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Occupational safety and health programs in the Maquiladora industry

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Abstract: Although traditionally the maquiladora industry had succeeded in strengthening the Mexican economic growth, this has been also criticized because their collateral effects not only on environment but also on working conditions of the maquiladora workers. This study has the purpose of deepening the actual understanding of the diverging occupational and safety practices undertaken in the Mexican maquiladora industry by evaluating the Safety and Health Programs in nine Maquiladoras in the cities of Mexicali, Hermosillo, and Nogales. Using the OSHA's Program Evaluation Profile (PEP) form OSHA-195, this study found evidence that the production patterns in this industry are changing toward a more sustainable system. In this context, the maintaining of safety and health programs has been important to improve working conditions on maquiladoras facilities.

Keywords: Sustainable Production, occupational health, Safety and Occupational Health Programs, Maquiladoras

1. Introduction

The term maquiladora is given to any industrial plant, usually transnational, that assembles components for exportation (CEPAL, 1999). Maquiladoras started to locate in Mexico since 1965, mainly along the border with the United States de America, as a way to solve the unemployment problems in those times (Schoepfle, 1991). Along their evolution, maquiladoras have succeeded in the job creation; but generally, they are badly paid jobs (Bergin et al., 2011). For instance; in 2003, an industrial worker at the United States of America used to earn \$15.46 American dollars per hour (US Labor Department, 2004) whereas a maquiladora worker in Mexico used to earn just 1.15 American dollars per hour (Del Rio Chamber of Commerce, 2002).

A collateral effect of the growth of the maquiladora industry has been the affectation to environment since the need for enhancing economic activity and achieving economic growth has exposed Mexico to pollution from transnational companies (Moyers and CIR, 1991; Pizzorusso, 1998). Additionally, jobs in maquiladoras are performed under unsafe occupational conditions (Schatan, 2004); one of the main and more common hazards in maquiladoras is the generated for the use of chemicals and other hazardous materials (Carrillo and García, 2002). Workers also suffer musculoskeletal disorders caused by repetitive motions or awkward position (Contreras et al., 2006), not to mention the generation of stress (Abell, 1999).

Responsibility for preventing, eliminating and/or reducing these risks falls not only on the side of employers but also on the side of other stakeholders; as stated by Chu et al. (2000) “in order to facilitate the development of the health-promoting workplace there is a need for health care providers, decision-makers and researchers, regardless of their disciplinary backgrounds, to build partnerships and co-coordinating bodies to improve links, share information and provide mutual support”.

Sustainable production has the potential to reach this goal because this involves the creation of goods and services using processes and systems that integrate the conservation of the environment, health and safety of workers and community benefits, while driving organization's economic growth into a long-term (Quinn et al., 1998). This has the potential for orienting production processes in maquiladoras to new patterns of production in order to reduce environmental and occupational risks.

The actual evidence suggests that maquiladoras have performed better environmental practices along the last decades (Carrillo and Za, 2009); however, improving working conditions is an issue that must be still addressed in maquiladoras. For reaching this goal it is necessary to study several factors, Cooper (2000) recommend not only study the importance of values, beliefs, aptitudes and perception of workers but also their behaviors. Psychosocial factors are other important aspects can contribute, either positively or negatively, to improve health and well-being at work environment by having the potential to affect physical and mental health as well as organizational outcomes such as work performance and effectiveness (Bond et al., 2007).

Safety and health programs embraced by systems approach may improve progressively decisions on hazards control and risk reduction (ILO, 2011). The prevention approach in these programs should become the leading drive to eliminate unsafe conditions at maquiladoras since

this brings better work environment for employees by addressing occupational health and safety (Hossain et al., 2008; Cerávolo et al., 2009). At the same time, prevention may decrease expensive cost from injuries, business interruption, litigation costs, fines, clean-up costs, waste disposal and others less visible such as the cost of installing "end-of-pipe" solutions (AICE, 1996).

A significant number of maquiladoras have implemented occupational safety and health programs in maquiladoras; yet, there is little empirical evidence of the validity of these programs. This is a follow-up study in the Mexican maquiladoras (Velazquez et al., 2006) with the purpose of deepening understanding of the diverging occupational and safety practices undertaken in the Mexican maquiladora industry.

2. Methodology

Scope. This phase of the study was carried out in three maquiladoras located in the city of Mexicali in the state of Baja California. Three maquiladoras in the city of Hermosillo and three more in the city of Nogales; these two located in the state of Sonora; both states are located in the Northwest of Mexico along the border with the United States of America. The maquiladoras participating in this phase of the study were invited by personal meetings. Data were collected from September 2011 to September 2012.

Data source. The OSHA's Program Evaluation Profile (PEP) form OSHA-195 was used to gather information. This instrument is used to assist in the evaluation of workplace safety and health programs in industry. The questionnaire was conducted according to OSHA instructions found on www.osha.gov

This questionnaire evaluates the following six program elements; management leadership and employee participation, workplace analysis, accident and record analysis, hazard prevention and control, emergency response, and safety and health training. The first five elements are divided by factors which are scored from 1 to 5 where:

- a. 1 means No program or ineffective program
- b. 2 means Developmental program
- c. 3 means Basic program
- d. 4 means Superior program
- e. 5 means Outstanding program

Overall score was the score summary of the six elements. The score of the first element resulted from the lowest value of the first, second or the average score of the four factors. From the second to fifth elements, it was taken their average score. For the sixth element, it was taken the score assigned.

Average scores were rounded to the nearest whole number (1, 2, 3, 4, or 5). Scores were rounded up from one-half (.5) or greater and rounded down from less than one-half (.5).

Option	Answer	Ave. Score
1		
2	2	2
3	1	
4		
5		
Table 1 Example		

Limitation. In this study, the overall score and average scores were calculated under the assumption that the three maquiladoras in each city was the facility. This was done under academic purposes; however, individual analysis must be done in each maquiladora for real situations.

3. Results

3.1 OSHA's Program Evaluation Profile (PEP)

As it is possible to see in Table 2, the overall score reached by the maquiladoras in Mexicali, Hermosillo, and Nogales is 3. This indicates a level of basic program. With the purpose of analyzing each of the elements covered by the PEP, data is disaggregated in the following sections by management leadership and employee participation, workplace analysis, hazard prevention and control, and safety and health training.

Element	Mexicali	Hermosillo	Nogales
Management Leadership and employee participation	3	3	2
Workplace analysis	2	2	2
Accident and record analysis	3	2	2
Hazard prevention and control	3	4	3
Emergency response,	4	4	4
Safety and health training.	3	3	3
Overall Score	3	3	3
Table 2 Overall evaluation			

3.2 Management leadership and employee participation

Management Leadership. As seen in Table 3, the average score for the maquiladoras in Mexicali and Hermosillo was 3; this means that management follows all safety and health rules, and gives visible support to the safety and health efforts of others. The average score in the maquiladoras in Nogales was 2.

Option	Mexicali	Hermosillo	Nogales
1			
2			2
3	2	3	1
4	1		
5			
Ave Score	3	3	2
Table 3 Management Leadership			

Option	Mexicali	Hermosillo	Nogales
1			
2		1	3
3	3	2	
4			
5			
Ave Score	3	3	2
Table 4 Employee Participation			

Employee Participation. This item was given a score of 3 by the coordinators surveyed in the maquiladoras of Mexicali and Hermosillo. This means workers and their representatives are

involved in the safety and health program, involved in inspection of work area and are permitted to observe monitoring and receive results. In Nogales, the average score was 2. See Table 4.

Implementation. This item had an average score of 3 for all the maquiladoras that participated in this study. This means that “Tools to implement a safety and health program are adequate, but are not effectively used”. See Table 5

Option	Mexicali	Hermosillo	Nogales
1			
2		1	1
3	3	2	2
4			
5			
Ave Score	3	3	3
Table 5 Implementation			

Contractor Safety. Answers in this item were 1 in all cases, which means that management makes no provision to include contractors. See Table 6.

Option	Mexicali	Hermosillo	Nogales
1	3	3	3
1			
2			
3			
4			
Ave Score	1	1	1
Table 5 Contractor Safety			

3.3 Work Place Analysis

Survey and Hazard Analysis. According to the opinion of all Health and Safety Coordinator, surveys for violation of standards are conducted by knowledgeable person or persons, but only in response to accidents or complaints. The average score for all maquiladoras was 2. See Table 6.

Inspection. In the maquiladoras located in Hermosillo and Nogales some their competent personnel conduct inspections with appropriated involvement of employees and in the maquiladoras of Mexicali inspection are conducted by specifically trained employees, and all items are corrected promptly and appropriately. See Table 7.

Option	Mexicali	Hermosillo	Nogales
1			
2	2	3	3
3	1		
4			
5			
Ave Score	2	2	2
Table 6 Survey and Hazard Analysis			

Option	Mexicali	Hermosillo	Nogales
1			
2		2	3
3	2	1	
4	1		
5			
Ave Score	3	2	2
Table 7 Inspection			

Hazard Reporting. According to all supervisors, employees are instructed to report hazards to management. See Table 8.

Option	Mexicali	Hermosillo	Nogales
1			
2	2	3	2
3	1		1
4			
5			
Ave Score	2	2	2
Table 8 Hazard Reporting			

3.4 Accident and Record Analysis

Accident Investigation. The average scored for this item was 3 in the maquiladoras in Mexicali and 2 for the rest. In this item, the answer of 2 means that “some investigation of incidents takes places, but root cause may not be identified, and correction may be inconsistent” and the answer of 3 means that reports are generally prepared with cause identification and corrective measures prescribed. See Table 9.

Option	Mexicali	Hermosillo	Nogales
1		1	
2	1	2	3
3	2		
4			
5			
Ave Score	3	2	2
Table 9 Accident Investigation			

Data Analysis. All answers for this item were 2 that means that “data is collected and analyzed, but not widely used for prevention”. See Table 10

Option	Mexicali	Hermosillo	Nogales
1			
2	3	3	3
3			
4			
5			
Ave Score	2	2	2
Table 10 Data Analysis			

3.5 Hazard Prevention and Control

Hazard Control. For this item the average score in the maquiladoras located in Mexicali and Hermosillo was 4; this means that hazards controls are fully in place, and are known and supported by the workforce. In Nogales the average score was 3. See Table 11.

Option	Mexicali	Hermosillo	Nogales
1			
2			
3	1		3
4	2	3	
5			
Ave Score	3	4	3
Table 11 Hazard Control			

Maintenance. All coordinators in the Mexicali maquiladoras scored this item with 3. This means that “a preventive maintenance schedule is implemented for areas where it is most need; it is followed under normal circumstances”. The average score in Hermosillo and Nogales was 4; this means that the employer has effectively implemented a preventive maintenance schedule that applies to all equipment. See Table 12.

Option	Mexicali	Hermosillo	Nogales
1			
2			
3	3		1
4		3	1
5			
Ave Score	3	4	4
Table 12 Maintenance			

Medical Program. The average score for this item in all maquiladoras was 3; this means that “medical surveillance, removal, monitoring, and reporting comply with applicable standards”. See Table 13.

Option	Mexicali	Hermosillo	Nogales
1			
2			
3	3	3	3
4			
5			
Ave Score	3	3	3
Table 13 Medical Program			

3.6 Emergency Response

Emergence Preparedness. According to all supervisors, emergency response plans for fire, chemical, and weather are present. See Table 14

Option	Mexicali	Hermosillo	Nogales
1			
2	3	3	3
3			
4			
5			
Ave Score	2	2	2
Table 14 Emergency Preparedness			

First Aid. The average score for this item in Mexicali, Hermosillo, and Nogales was 5 which indicate that “personnel trained in advanced first aid and/or emergency medical care is always available on-site”. See Table 15.

Option	Mexicali	Hermosillo	Nogales
1			
2			
3			
4		1	1
5	3	2	2
Ave Score	5	5	5
Table 15 First Aid			

3.7 Safety and Health Training

Training. In all maquiladoras training required by applicable standards is provided to all site employees. See Table 16

Option	Mexicali	Hermosillo	Nogales
1			
2			
3	3	3	2
4			1
5			
Ave Score	3	3	3
Table 16 Training			

4. Discussion

The Mexican Constitution, on its article 123, grants the right to Mexicans for engaging in any occupation. The Federal Labor Law (LFT) is derived from the Mexican Constitution; this provides the legislations which are intended to prevent workers from being exposed to unsafe and/or inadequate working conditions.

Despite that maquiladoras have been stereotyped by their inadequate and unsafe working conditions (Kourous, 1998; Gruben, 2001), findings showed that the maquiladoras participating on this study maintain safety and health programs as a responsible strategy for being in compliance with the LFT.

All maquiladoras studied reached an overall score of 3 that falls in the category of basic program; this indicates that the occupational conditions are improving in this industry compared with the working conditions three decades ago when the only benefits from maquiladoras were economical benefits (Cirila, 2002).

It is evident that the production patterns in these maquiladoras are changing towards a more sustainable way; at least in the social dimension where human health concerns are considered (Punnet, 2001). On the other hand, the evaluation conducted revealed areas of opportunity to reach higher scores such as hazard analysis, workplace inspection, and emergency preparedness. Improving these elements should result not only in better working conditions but also in a higher productivity and a better image.

5. Conclusions

Sustainable development is understood as a conceptual framework that takes into account economic, social, and environment aspects; on the social dimension, having better working conditions in the maquiladora industry makes maquiladoras more sustainable. Maquiladoras are very important for the Mexican economy because they alleviate the unemployment problems that face the country; however, it must not be allowed for any reason that workers in this industry accept occupational risks on their workplaces. Evaluating the programs is necessary to reveal elements where is necessary to improve; the Program Evaluation Profile proved to be greatly effective in evaluate the safety and health programs in the maquiladoras that participated in the study.

Since their beginnings, the maquiladoras were accused to exploit workers on the sake of profits; however, this study found evidence that production patterns in this industry are changing toward a more sustainable system. In this context, the maintaining of safety and health programs has been important to improve working conditions on maquiladoras facilities.

Literature

- AICE. (1996). Guidelines For Integrating Process Safety Management, Environment, Safety, Health, and Quality. American Institute of Chemical Engineers. ISBN 0-8169-0683-1. New York.
- Bergin, P.; Feenstra, C.; Gordon, H. (2011). Volatility due to offshoring: theory and evidence. *Journal of International Economics*, Vol. 85, No. 2, pp. 163-173.
- Bond, Meg A.; Kalaja, Alketa; Markkanen, Pia; Cazeca, Dianne; Daniel, Sivan; Tsurikova, Lana; Punnett, Laura. (2007). Expanding Our Understanding of the Psychosocial Work Environment: A Compendium of Measures of Discrimination, Harassment and Work-Family Issues. DHHS (NIOSH) Publication No. 2008-104.
- Carrillo, J. and García, H. (2002). Evolución de las maquiladoras y el rol del Gobierno y del mercado en la seguridad en el trabajo. *Papeles de población*. 33. [Internet]. Online: <http://redalyc.uaemex.mx/src/inicio/ArtPdfRed.jsp?iCve=11203305> [Retrieved January 06, 2013].
- Carrillo, J. and Za, R. (2009). The Evolution of Maquiladora Best Practices: 1965 – 2008. *Journal of Business Ethics*, Vol. 88, No. 2, pp. 335-348.
- CEPAL. (1999). La industria maquiladora y el desarrollo en América Latina y el Caribe (28/04/1999). [Internet]. Online: <http://www.eclac.org/cgi-bin/getProd.asp?xml=/prensa/noticias/comunicados/6/246/P246.xml&xsl=/prensa/tpl/p6f.xsl&base=/prensa/tpl/top-bottom.xsl> [Retrieved January 20, 2013].
- Cerávol, R.; Müller, F.; Castro, M. (2009). The impact of six sigma in the performance of a pollution prevention program. *Journal of cleaner production*. Volume 17, issue 15, pp 1303-1310. October 2009.
- Chu, Cordia; Breucker, Gregor; Harris, Neil; Stitzel, Andrea; Gan, Xingfa; Gu, Xueqi; Dwyer, Sophie. (2000). Health-promoting workplaces – international settings development. *Health Promotion International*, Vol. 15, No. 2. ISSN 0957-4824.
- Cirila, Q. (2002). The North American Free Trade Agreement and Women. *International Feminist Journal of Politics*, Vol. 4, No. 2, pp. 240-259.
- Contreras, O.; Carrillo, J.; Garcia, H.; Olea, M. (2006). Desempeño laboral de las maquiladoras. Una evaluación de la seguridad en el trabajo. [Internet]. *Frontera Norte*, Vol. 18, No. 35. Online: http://aplicaciones.colef.mx:8080/fronteranorte/articulos/FN35/3-f35_Desempeno_laboral_de_las_maquiladoras.pdf [Retrieved January 06, 2013].
- Cooper, M.D. (2000). Towards a model of safety culture. *Safety Science*, Vol. 36, pp. 111-136. ISSN. 0925-7535.
- Del Rio Chamber of Commerce. (2002). Industrial information: the best of the border.
- Gruben, W. (2001). Was NAFTA behind Mexico's high Maquiladora growth?. *Economic & Financial Review* Vol. 3, pp. 11-22.
- Hossain, K.; Khan, F.; Hawboldt, K. (2008). Sustainable development of process facilities: State-of-the-art review of pollution prevention frameworks. *Journal of Cleaner Production*. Volume 150, Issue 1, pp 4-20. January 2008.
- ILO. (2011). OSH management system: a tool for continual improvement. International Labour Organization. ISBN 978-92-2-124739-5. Geneva.
- Kouros, G. (1998). Occupational Health and Safety in the Maquiladoras. *Borderlines* 47, Vol. 6, No. 6.
- Moyers and CIR. (1991). Enforcement Actions Taken against Polluters on U.S.-Mexico Border. *EPA Environmental News*: 41-42.
- Pizzorusso, A. (1998). The Maquiladoras and the Environment. *Environmental Management on North America's Borders*. R. Kiy and J. Wirth, Texas A&M University Press: 208-220.
- Punnet, L. (2001). Economic Costs of Ergonomic Problem: An Obstacle to Sustainable Development; in Forrant, R. et al. (Eds.), *Approaches to Sustainable Development: The public University in the regional Economy*. University of Massachusetts Lowell: Lowell, MA. p. 169.
- Quinn, M.; Kriebel, D.; Geiser, K.; Moure-Eraso, R. (1998). Sustainable Production: A Proposed Strategy for the Work Environment. *American Journal of Industrial Medicine*, vol. 34. pp. 297-304.
- Schatan, C.; Castilleja, L. (2004). La industria maquiladora electrónica en la frontera norte de México y el medio ambiente. [Internet]. CEPAL. Online: <http://www.eclac.cl/cgi-bin/getProd.asp?xml=/publicaciones/xml/9/14649/P14649.xml&xsl=/mexico/tpl/p9f.xsl&base=/mexico/tpl/top-bottom.xsl> [Retrieved January 06, 2013].
- Schoepfle, G. (1991). Implications for U.S. employment of the recent growth in Mexican maquiladoras [Internet]. *Frontera Norte*. 3 (5), Online: http://aplicaciones.colef.mx:8080/fronteranorte/articulos/FN5/2-f5_Implications_US_employment_groth_mexico_maquiladoras.pdf [Retrieved January 10, 2013].
- US Labor Department. (2004). Table B-4. Average hourly earnings of production or non-supervisory workers. News Bureau Statistics, Economics.

- Abell, H. (1999). Endangering women's health for profit: health and safety for Mexico's maquiladoras. *Development in Practice*, Vol. 9, No. 5.
- Velazquez, L.; Munguia, N.; Navarrete, Maria; Zavala, A. (2006). An overview of sustainability practices at the maquiladora industry in Mexico. *Management of Environmental Quality: An International Journal*, Vol. 17, No. 4, pp.478-489.

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