A comparison of owner and expert evaluation of health and safety in small collision repair shops: a pilot study

Anca Bejan[1], David L. Parker[1], Lisa M. Brosseau[2], Min Xi[1], Maryellen Skan[1]

[1]Park Nicollet Institute/Health Research Center, Park Nicollet Blvd., Minneapolis, MN, USA, [2]School of Public Health, University of Minnesota, Minneapolis, MN, USA

Background: Workplace evaluation is one of the first steps in reducing the risk of injuries and illnesses, and is part of several programs that promote a participatory approach to occupational health among small business owners. The usefulness of written safety evaluations is contingent upon non-safety professionals obtaining accurate and reliable results.
Objectives: The purpose of this study was to better understand auto body shop owners' ability to correctly identify occupational health and safety issues within their businesses.
Methods: In this study, 11 auto body shop owners used a 25-question checklist, developed specifically for this industry, to identify key safety and health problems. Owner results were compared with those of an industrial hygienist (IH) experienced in using the assessment form.
Results: The average number of safety problems identified by the IH was twice as large as the number identified by business owners ($P=0.02$). The average percentage agreement of answers between owners and the IH was 81% (SD=21%). Shop owners were more accurate in assessing the presence of written safety programs and records than the presence of unsafe work conditions. Overall, owners' sensitivity (ability to correctly identify a safety-deficient item) was low (0.22).
Conclusions: Collision shop owners had some difficulty correctly identifying many unsafe/non-compliant items or situations in their facility. Naïve users' ability to correctly identify potentially hazardous situations – sensitivity – should be the metric of concern for the validity of safety assessments, and efforts should be directed at bringing this number as close to one as feasible.

Keywords: Auto body shops, Safety self-assessment, Small business, Workplace surveys

Introduction

Globally there are an estimated 89 million (range 80–100) micro, small, and medium-sized enterprises (MSME). While definitions vary between countries, in general a micro enterprise has 1–9 employees, a small enterprise 10–49, and a medium enterprise 50–249. Globally the number of MSMEs grew about 6% per year from 2000 to 2009.[1] While many small enterprises lack safety and health services, the problem may be particularly acute for micro enterprises. Inability to comply with national occupational safety and health standards results in an increased rate of injuries in small enterprises compared to their larger peers.[2] Finding inexpensive ways to assist these enterprises remains problematic, yet achieving this goal will remove a barrier to improving health and safety for a large part of the global workforce.[2]

Correspondence to: Anca Bejan, Park Nicollet Institute/Health Research Center, 3800 Park Nicollet Blvd., Suite 2S, Minneapolis, MN 55416, USA. Email: anca.bejan@parknicollet.com

Workplace evaluation is one of the first steps required for reducing the risk of injuries and illnesses. While large business are likely to have resources to hire safety specialists to conduct hazard assessments, many businesses with 50 or fewer employees may lack resources to do so.[3] The auto body repair industry is comprised predominantly of micro enterprises. These shops use similar processes in repairing vehicles, even though the engineering controls available and the equipment used may vary.[4–8] In 2010, 82% of all collision shops in the US employed fewer than 10 workers, for a total of approximately 85 000 micro enterprise auto body workers.[9] Similarly, in Italy, approximately 50 000 of the 80 000 people employed in this industry were working in shops with 2–5 employees.[5] In the US, the Occupational Safety and Health Administration (OSHA) On-Site Consultation Program offers free assistance with health and safety evaluations. However, many businesses may not be aware of this option or may

DOI 10.1179/2049396713Y.0000000044

be reluctant to access it out of concern regarding regulatory enforcement.[10]

Easy to use self-assessment tools such as checklists could be an effective resource for small business owners and employees for improving worksite safety. Such checklists could be created by adapting previously developed safety assessment instruments used in research studies. However, prior to making those available to users without a safety background, checklists should be tested for ease-of-use and performance characteristics. Performance characteristics are best evaluated through simultaneous but independent assessments performed by trained and untrained (naïve) users. A review of the safety and health literature found no studies of this type of research-to-practice projects. Moreover, in the studies that analyzed the results of paired evaluations,[11–13] the metric used to assess naïve users' ability to accurately use the assessment instrument was the percentage agreement of answers between naïve users and a trained evaluator. This measure does not describe the naïve users' potential for misclassifying items that need correction, which in the case of safety issues are likely to contribute to injury and illness.

This paper presents the results of a pilot study that evaluated the use of a safety assessment tool by collision shop owners. The study was nested within a larger safety study (Collision Auto Repair Safety Study – CARSS) and was initiated to inform changes to the assessment instrument that may be necessary prior to making this form available outside the study setting. We discuss the importance of selecting the appropriate metric of performance and recommend changes to the assessment instrument.

Methods

The CARSS study

The CARSS is a one-year intervention effectiveness study designed to help collision business owners improve workplace safety and health; details of the study are presented elsewhere.[14] Briefly, 49 participating businesses, located within 50 miles of the Minneapolis-St. Paul metropolitan area, were assessed for workplace hazards, safety programs, and hazard controls using a 92-item safety assessment tool developed specifically for this industry. Questions were assigned to one of four severity categories: critical, highly important, important, and other. Businesses were evaluated by an industrial hygienist (IH) trained in the use of this assessment tool. Evaluations were conducted via in-person interviews with owners and employees, observations of workplace conditions, and review of written programs and policies. Owners received a report on business safety assessment findings, and with input from study staff, selected items to remediate during their one-year participation period.

Owners had access to free technical consultations and services, including on-line and in-person employee training, respirator fit testing, and on-line medical evaluation and clearance for respirator users. Business owners also received written safety materials tailored for collision repair businesses, including checklists and detailed information about workplace hazards and personal protective equipment. Study participation ended with a one-year follow-up safety assessment, and a final report was sent to each business. The business safety assessment tool was to be made available to all study website visitors and distributed during outreach activities at the end of the study. However, prior to doing so, it was necessary to determine whether collision shop owners will obtain accurate results using the assessment tool in its existing format. Therefore a pilot study was initiated.

The safety assessment tool

An abbreviated version of the CARSS business safety assessment tool was created by selecting 25 out of the 67 questions concerning safety items rated critical and highly important. These 25 "yes/no" questions represented the broadest cross-section of problems encountered within collision shops. Questions were selected by consensus by three IHs (with 8, 30, and 35 years of experience) and one occupational physician (with 30 years of experience), all of whom participated in the development and testing of the original CARSS assessment form. We selected a relatively small number of questions from the original assessment tool to keep shop owners' time commitment within 15 minutes and thus increase the likelihood of participation. The wording of some questions was modified to make them more easily understood by shop owners. However, the changes made to the original safety assessment tool were kept to a minimum.

The abbreviated assessment tool (checklist) included all question types used in the original instrument:

- evaluation of only one item per question (e.g. "Does the shop have a written Respiratory Protection Program?" (y/n))
- evaluation of all items of a kind (e.g. "Do all the emergency exits in your shop lead to a safe location?" (y/n)), and
- evaluation of a limited number of items of one kind (e.g. "Are any electrical cords in bad repair? (on any shop or employee-owned tools or equipment) – evaluate 5 cords at random" (y/n)).

Recruitment

Shop owners were invited to participate in this pilot study at the time they were contacted to schedule the one-year CARSS follow-up visit. The number of shops enrolled was limited by time and project funding constraints. No calculation of sample size

		Owner: Item requires improvement? Yes	Owner: Item requires improvement? No
Industrial Hygienist	**Yes**	a	b
Item requires improvement?	**No**	c	d

Figure 1 Illustration of 2×2 distribution of owners' and industrial hygienist's answers

was performed, as we considered this an exploratory study.

Study protocol

The abbreviated safety assessment tool was sent to owners who agreed to participate. They were asked to complete it immediately prior to, at the time of, or within 1 week of the follow-up visit. Participants received a $25 gas gift card as compensation. Two IHs from the research group conducted the evaluations. Each IH had used the 92-item assessment form in more than 30 businesses prior to this pilot study. Two of the eleven evaluations were performed simultaneously but independently by the two IHs. Demographic information about the business and the shop owner were collected at the time of the one-year follow-up visit. All materials and methods were approved by the Park Nicollet and University of Minnesota Institutional Review Boards (IRBs).

Data analysis

Data were entered into Microsoft Excel and analyzed using SAS (version 9.2; SAS Institute Inc., Cary, NC, USA). The answers to each question were used to compute agreement between owner and IH responses, as well as owners' sensitivity and specificity (Fig. 1). Agreement of answers between shop owners and study staff was calculated as $((a+d)/(a+b+c+d))$ and expressed as a percentage. Sensitivity $(a/(a+b))$ is the probability that an item in need of improvement was correctly identified, and specificity $(d/(c+d))$ is the probability that an item that did not need improvement was correctly identified by a business owner in comparison to the study IH. McNemar's test was used to evaluate agreement between owners and the IH at the question level. A paired *t*-test was used to compare the results of shop owners with those of the IH at the shop level. Inter-rater variability was assessed using the kappa statistic calculated for the 25 questions used in this study. To determine if shops participating in this study were representative of the businesses participating in CARSS we used *t*-test and chi-square test.

Results

In this pilot study, 13 owners scheduled for the CARSS one-year follow-up visits between 6 June 2011 and 19 January 2012 were invited to participate. Twelve business owners agreed to participate and 11 returned the safety assessment forms. Of the participating owners, 10 returned the self-assessment on the day of the one-year follow-up visit, and one owner mailed the survey within 1 week of the visit. Participating shops had, on average, 7.8 employees (range: 1–17 employees; median=7 employees). The shop owners had been in the collision industry for an average of 26.2 years (SD=13.7 years, range: 1–45 years) and the shops had been in business for an average of 33 years. These figures are similar to the data available from a recent survey that found that collision shops in the US have an average of 8.8 employees, and shops have been in business for an average of 31.6 years.[15,16] *T*-tests and chi-square tests did not identify any statistically significant differences between the 11 shops enrolled in the pilot study and the other 34 business that completed the CARSS study in respect to demographic characteristics or the state of health and safety at enrollment or follow-up. The kappa coefficients between the two IHs were 0.78 and 1. A kappa statistic above 0.75 is considered very good agreement.[17]

As shown in Table 1, of the 25 items surveyed, the IH found only five that were in good condition in all facilities. The most common deficiencies were electrical cords in poor condition (10 businesses), open electrical panels (six businesses) and improper grounding of flammable liquids containers (five businesses). In comparison, business owners found 13 of the 25 items to be in good condition in all shops, with the two most frequently deficient items being: unprotected electrical panel circuitry (six businesses) and lack of medical clearance for respirator users (three businesses). McNemar's test indicates that the agreement between owners and the IH is significantly different ($P<0.05$) for the following items: electrical cords, grounding of flammable liquid containers, and electrical panels.

The average percentage agreement of answers across all items was 81% (SD=21%). Six questions had less than 80% agreement between owners and IHs (range 18–73%). The two questions with the least agreement were: (i) Are any electrical cords in bad repair? (18% agreement); and (ii) Do electrical panels have unguarded openings? (36% agreement). In general, business owners more accurately evaluated the presence or absence of written safety documentation and records (mean agreement=93%; SD=5%) than the state of items concerned with facility and equipment safety (mean agreement=79%; SD=22%). (Table 1)

In all but one business, owners found fewer items in need of correction when compared to the IH. Two of the owners did not find any deficiencies in their shops, even though the IH identified six deficiencies

Table 1 Comparison of survey answers by reviewer: shop owner vs industrial hygienist (IH)

Shop assessment question	Shops in which item needed correction as identified by		Pairs of identical shops, *n*	Pairs of identical answers (% agreement) *n* (%)
	Owners *n* (%)	IH *n* (%)		
Written safety documentation and records				
Does your shop have a written Right-to-Know program?	2 (18)	1 (9)	1	10 (91)
Do you have records to show that Right-to-Know training was completed in the past 12 months?	2 (18)	2 (18)	2	11 (100)
Does your shop have a written respiratory protection program?	2 (18)	1 (9)	1	10 (91)
All respirator users have medical certification	3 (27)	2 (18)	2	10 (91)
Mean (SD) (%)=93 (5) (%)				
Facility and equipment safety				
Containers for flammable liquids are grounded if liquid is transferred into smaller containers	1 (9)	5[a] (45)	1	7 (64)
Fire extinguishers are mounted on the wall	0	3 (27)	–	8 (73)
Fire extinguishers are easy to access	0	1 (9)	–	10 (91)
Fire extinguishers are fully charged	0	0	–	11 (100)
Fire extinguishers have the seal in place	0	1 (9)	–	10 (91)
Fire extinguishers have the tag current (within the last 12 months)	0	2 (18)	–	10 (91)
Emergency exits are not blocked or obstructed	0	2 (18)	–	9 (82)
Emergency exits are not locked from the inside	0	2 (18)	–	9 (82)
Emergency exits lead to a safe location	0[c]	0	–	9[c] (100)
All compressed gas cylinders are chained to prevent falling	1 (9)	2 (18)	1	9 (82)
All compressed gas cylinders are stored with the safety caps screwed on when not in use	0	1 (9)	–	7 (64)
The paint mixing room has a working ventilation system	1 (9)	2 (18)	1	10 (91)
The paint mixing room ventilation has open and unobstructed vents	0[b]	1 (9)	–	9[b] (90)
Doors to the electrical panels are kept closed	1 (9)	6 (55)	0	4 (36)
Electrical panels are easy to access	0	1 (9)	–	10 (91)
Electrical panels have labeled breakers	0	1 (9)	–	10 (91)
Electrical panels have unguarded openings	6 (55)	0[a]	–	5 (45)
Are any electrical cords on shop or employee-owned equipment in bad repair?	1 (9)	10[a] (91)	1	2 (18)
Are any regular electrical outlets present in the paint booth(s)?	0	0	–	11 (100)
Are there explosion proof lights in the paint booth(s)?	1 (9)	1 (9)	0	9 (82)
There is a fire suppression system in the paint booth(s)	1 (9)	0	–	10 (91)
			Mean (SD) (%)=79 (22) (%)	
			Overall Mean (SD) (%)=81 (21) (%)	

[a] Significantly different ($P<0.05$).
[b] Based on 10 shops owners responses.
[c] Based on 9 shop owners responses.

in one business, and three in the other. On average, the IH identified almost twice as many items that needed improvement compared to the owners (mean=4.3, SD=2.5) vs (mean=2.1, SD=1.9), and a paired *t*-test analysis determined that the difference was significant ($P=0.02$) (Table 2).

Individual owners' sensitivity was between 0 and 0.5 (mean=0.22, SD=0.21) and specificity was

between 0.8 and 1 (mean=0.95, SD=0.07) (Table 2). In other words, of the items found deficient by the IH, on average, only 22% (SD=21%, range 0–50%) were found deficient by owners. Among items not found deficient by the IH, an average of 95% (SD=6%, range 81–100%) were identified as such by owners as well.

Discussion

This pilot study indicates that owners who had been previously exposed to safety information had difficulty in accurately assessing the state of safety and health in their businesses. While complete agreement between IHs' and owners' estimates was not anticipated, the nature of the safety items for which differences were observed, and the magnitude of these differences were surprising. Business owners were better able to identify the presence of written programs and policies than deficiencies in facility and equipment safety. This may be due to the fact that owners are often directly involved in creating the safety programs, or in making a business/financial decision to employ a consultant to do so. Our previous research on safety-related attitudes and beliefs of collision shop business owners indicates that owners operate under significant time pressure.[10] As such, they may transfer responsibility of facility and equipment safety to managers and employees and assume that all safety-related items in the shop are without deficiencies.

The most significant hazards for which the agreement between the IH and the shop owner was low were the lack of grounding of flammable liquid containers (agreement 64%) and damaged electrical cords on tools and equipment (agreement 18%), both of which are immediate dangers for employees and facility safety. It is unlikely that shop owners participating in this study would not recognize damaged electrical cords, although it is possible that they would not consider things such as a missing grounding prong as a defect. However, it is possible that shop owners did not have a clear understanding of correct and complete grounding wires set-up. Likewise, it is unlikely that business owners would not correctly identify an electrical panel as "open" (agreement 36%), or whether unguarded electrical circuits were present (agreement 45%). The misclassification of the former may be due to the fact that some owners completed the assessment at their desk, without walking through the facility. For the latter however, it is possible that the manner in which the question was presented was not optimal because it was listed fourth in a series of questions about the condition of electrical panels for which a "yes" answer indicated an item that *did not need improvement*. However, a "yes" to this question indicated a safety related problem.

These findings suggest that shop owners may be able to obtain more accurate results if the assessment instrument is modified to include additional information (explanations of correct answer, pictures of deficiencies) and all questions are phrased such that a "yes" answer indicates that no deficiencies were present. Another means to convey additional information to owners is to provide an explanatory manual or guidebook to accompany the assessment form, as previously done in programs implemented by the United States Environmental Protection Agency (US EPA).[18,19]

No similar studies of side-by-side comparison of safety assessment instruments were identified. A limited number of studies have examined the relationship between worksite or job evaluations conducted by technical experts and employees or owners who were not trained specifically in the use of assessment instruments.[11–13,20–22] Some studies addressed data accuracy concerns related to the use of self-assessment

Table 2 Individual shop survey responses by category: owners vs industrial hygienist (IH)

			Owner/IH				Sensitivity	Specificity
Shop ID	Owner yes[a]	IH yes	Yes/yes (a)	No[b]/yes (b)	Yes/no (c)	No/no (d)	a/(a+b)	d/(c+d)
1	4	4	2	2	2	19	0.5	0.9
2	3	10	3	7	0	15	0.3	1.0
3	0	6	0	6	0	19	0.0	1.0
4	6	4	2	2	4	17	0.5	0.8
5	1	3	1	2	0	22	0.3	1.0
6	0	3	0	3	0	22	0.0	1.0
7	1	1	0	1	1	23	0.0	1.0
8	2	4	0	4	2	19	0.0	0.9
9	1	3	0	3	1	21	0.0	1.0
10	4	2	1	1	3	20	0.5	0.9
11	1	7	1	6	0	18	0.1	1.0
Mean	2.1	4.3*					0.22	0.95
SD	1.9	2.5					0.21	0.07

[a] Indicates that the item examined was deficient.
[b] Indicates that the item examined did not need improvement.
*Significantly different from 2.1 (P=0.02).

data in occupational health surveillance programs[20] or epidemiological studies.[21,22] In a study similar in design and scope with our project, Cai *et al.* (2007) tested the validity of a 21-item computer station ergonomics assessment by calculating percentage agreement between the responses collected from 111 staff members of the World Bank and an ergonomist. The mean agreement for all survey questions was 74% (SD=15%) and the authors conclude that while some of the survey questions needed to be rephrased and the instrument re-tested, the overall the validity of the instrument was acceptable.[11]

Two US EPA reports describe owners' accuracy in evaluating environmental compliance in printing and dry-cleaning businesses in Wisconsin and Massachusetts, respectively.[12,13] For nine printing businesses in Wisconsin, percentage agreement between business owners and an environmental compliance officer ranged from 43 to 100%.[12] In a Massachusetts study of an unspecified number of dry-cleaning businesses, 77% of shop owner and compliance officer answers were in agreement (76% identical *yes* answers, 1% identical *no* answers).[13] Both studies were completed at the time when a state-wide self-certification program using the assessment instrument was already in progress and modifications of the assessment instrument were not possible.

Although agreement of answers in the three studies mentioned above[4–6] appears large, these numbers do not convey any information regarding an owner's ability to correctly identify hazardous situations or work practices. Data from only one study[13] allowed us to calculate owners' specificity (0.94) and sensitivity (0.05). The specificity is almost identical with that in our study (0.95), but the sensitivity is about four times less than in our study (0.05 vs 0.22), even when the percentage agreement between answers was comparable (77 vs 81%).

When assessing the ability of untrained assessors to correctly identify issues that are deficient from a safety standpoint, computing only the percentage agreement of answers is an insufficient measure. An improperly identified safety hazard can translate into serious adverse health effects or property damage. This makes the evaluation of assessor's sensitivity as defined in this paper essential. We strongly recommend that future studies of safety assessment instruments calculate this parameter and strive to bring it as close to 1 as possible.

The main limitations of our study are the small sample size and the fact that owners had participated in a one-year safety intervention program immediately prior to being asked to complete the safety assessment. Our data did not allow identification of the factors that contributed to the variation in owners' ability to recognize unsafe/non-compliant situations in their facilities. Anecdotally, IHs observed that some owners completed the business safety assessment while sitting in their office and did not follow the instructions on the assessment form, which required them to walk through the shop and evaluate the conditions of the facility and equipment. The number of owners who did not follow the instructions is unknown, and at this time the authors are not aware of any means that would minimize this type of non-compliance with user instructions.

Conclusions

Collision shop owners previously exposed to targeted safety information had some difficulty correctly identifying many unsafe/non-compliant items or situations in their facility. Relying only on the overall percentage agreement of answers between shop owners and an IH fails to characterize the owners' ability to correctly identify the items in need of improvement. However, this ability is fundamental to improving workplace health and safety.

This pilot study allowed us to quantify the differences in safety assessments performed by business owners and an IH, and identify safety issues that were not well understood by owners. Several means to improve the assessment instrument – such as using a consistent format of questions/answers and providing additional visual or written explanatory notes – were proposed. The development of easy to use self-assessment tools specific to different industries, in particular those with a large proportion of small businesses, may assist owners and workers with hazard remediation. A robust assessment instrument designed to assess safety and health collision shops in the US can be easily adapted for use in other countries. Even though regulatory requirements for safety programs and records may vary, the facility and equipment safety questions are applicable to collision shops regardless of location.

Finding better ways to assist small business with safety improvements remains a priority both in the US and around the world.[23,24]

Acknowledgements

This study would not have been possible without the cooperation of the participating shop owners. This study was supported by grant 5R01 OH009086 from the National Institute for Occupational Safety and Health.

References

1 Kushnir K, Mirmulstein ML, Ramalho R. Micro, small, and medium enterprises around the world: how many are there and what affects the count? [document on the Internet]. World Bank/IFC; 2010 [Cited 2013 Feb 5]. Available from: http://www1.ifc.org/wps/wcm/connect/9ae1dd80495860d6a482b519583b6d16/MSME-CIAnalysisNote.pdf?MOD=AJPERES&CACHEID=9ae1dd80495860d6a482b519583b6d16

2 International Labour Office. Successful approaches to manage OSH in SMEs. [document on the Internet] Turin, Italy; 2010 [updated August 11, 2010; cited February 5, 2013]. Available

from: http://socialprotection.itcilo.org/en/courses/Open_courses/A904074
3 Jones JH. NIOSH control technology and intervention efforts for small businesses. Am J Ind Med Supplement. 1999;1:93–5.
4 Bejan A, Brosseau LM, Parker DL. Exposure assessment in auto collision repair shops. J Occup Environ Hyg. 2011; 8(7):401–8.
5 Vitali M, Ensabella F, Stella D, Guidotti M. Exposure to organic solvents among handicraft car painter: a pilot study in Italy. Ind Health. 2006;44:310–7.
6 Velazquez L, Bello D, Munguia N, Zavala A, Marin A, Moure-Eraso R. A survey of environmental and occupational work practices in the automotive refinishing industry of a developing country: Sonora, Mexico. Int J Occup Environ Health. 2008;14:104–11.
7 Delgado P, Porcel J, Abril I, Torres N, Teron A, Zugasti A. Potential dermal exposure during the painting process in car body repair shops. Ann Occup Hyg. 2003;48(3):229–36.
8 Moen BE, Hullund BE. Exposure to organic solvents among car painters in Bergen, Norway. Ann Occup Hyg. 2000;44(3):185–9.
9 United States Census Bureau: "Statistics of U.S. Businesses" [document on the Internet] United States of America; 2013 [cited 2013 June 6]. Available from http://www.census.gov/econ/susb/
10 Parker DL, Bejan A, Brosseau LM. A qualitative evaluation of owner and worker health and safety beliefs in small auto collision repair shops. Am J Ind Med. 2012;55(5):474–82.
11 Cai X, Ross S, Dimberg, L. Can we trust the answers? Reliability and validity of ergonomic self-assessment surveys. J Occup Environ Med. 2007;49(10):1055–9.
12 Cooperative Agreement No. PI 965809-01. Printing Sector Environmental Results Program Evaluation [document on the Internet] Wisconsin Department of Natural Resources; 2009 [updated 2009 Sept 28; cited 2012 Nov 6]. Available from: http://dnr.wi.gov/topic/compassist/documents/sb/sb-erp-wisconsin_printer_erp_innova-tion_grant_report.pdf
13 Innes A. (Personal communication). Comparison between MA dry cleaners self-assessment and inspectors assessment (email dated 2012 Sept 21).
14 Brosseau LM, Bejan A, Parker DL, Xi M, Skan M. Workplace safety and health programs, practices and conditions in auto collision repair businesses. J Occup Environ Hyg. 2013 (in review).
15 Body Shop Business: "2013 Industry Profile" [Online] Shop Owner Profile. Available from http://www.bodyshopbusiness.com/Content/Site303/Articles/05_01_2013/11320234IPshopo_00000063587.pdf (accessed 2013 June 3).
16 Body Shop Business: "2013 Industry Profile" [Online] Personnel. Available from http://www.bodyshopbusiness.com/Content/Site303/Articles/05_01_2013/1132025456IPper_00000063592.pdf (accessed 2013 June 3).
17 Fleiss JL. Statistical methods for rates and proportions. 2nd edn. USA: John Wiley & Sons; 1981.
18 Environmental Protection Agency [document on the Internet, citedline]. Available from: http://www.epa.gov/erp/erpsectors.htm (accessed 2013 Jan 8). Available from: http://www.epa.gov/erp/erpsectors.htm
19 Enander RT, Gagnon RN, Hanumara C, Park E, Armstrong T, Gute DM. Environmental health practice: statistically based performance measurement. Am J Public Health. 2007;97(5):819–24.
20 Dane D, Feuerstein M, Huang GD, Dimberg L, Ali D, Lincoln A. Measurement properties of a self-report of ergonomic exposures for use in an office work environment. J Occup Environ Med. 2002;44(1):73–81.
21 Wiktorin C, Karlqvist L, Winkel J. Validity of self-reported exposures to work postures and manual materials handling. Scand J Work Environ Health. 1993;19:208–14.
22 Spielholz P, Silverstein B, Morgan M. Comparison of self-report, video observation and direct measurement methods for upper extremity musculoskeletal disorder physical risk factors. Ergonomics. 2001;44(6):588–613.
23 NORA Manufacturing Sector Council. National Manufacturing Agenda [document on the Internet]. 2010 [modified 2011 Oct 19, cited 2013 Jan 8]. Available from: http://www.cdc.gov/niosh/nora/comment/agendas/manuf/pdfs/ManufJune2010.pdf
24 Nishikido N, Yuasa A, Motoki C, Tanaka M, Arai S, Matsuda K, *et al*. Development of multi-dimensional action checklist for promoting new approaches in participatory occupational safety and health in small and medium-sized enterprises. Ind Health. 2006;44:35–41.