The Use of Safety Assessment Approach in Improving Safety: Case Studies

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Abstract

Due to the strict enforcement of the government in safety regulations, the safety issues are risen up among the industries. To prevent the accidental losses, safety assessment is one of the effective tools to ensure that the actions are taken before any disasters occur. This paper aims to evaluate the current safety maturity level of the two studied companies using the developed safety assessment approach. Safety improvement plan, based on the assessment results, is implemented within each company. The plan proved useful in enhancing safety; this is confirmed by higher safety maturity levels of the two studied companies.

Keywords: safety assessment, safety improvement plan, safety maturity level

Introduction

Safety is the condition to which risks are managed to acceptable levels (Brueggmann, 2001). It is the activity that seeks to minimize or eliminate hazardous conditions that can cause bodily injury. According to Weick (1991), safety is defined as a dynamic non-event that tends to be taken for granted, particularly in the face of continuous and compelling productive demands.

To improve safety, organizations need to measure their current status of safety, and plan for safety improvements. Over the past few years, attempts have been made to measure safety. Wright et al. (1999), for example, developed a safety culture improvement matrix to assess the organization's safety culture. Molenaar et al. (2002) identified a total of 31 characteristics of positive safety culture to be used for a snap-shot assessment of organizational safety culture. Chinda (2010) developed a self-assessment approach, using the European Foundation for Quality Management (EFQM) Excellence model as a basic model, to measure and improve safety in the organization. The approach consists of six safety maturity levels to assess the current safety maturity level, so that the organization can plan for its safety improvement to achieve higher maturity levels.

Safety Maturity Levels

The safety maturity levels are used to establish the organization's current level of safety maturity and identify actions required to improve safety (Lardner et al., 2001). According to Tervonen and Pahkala (2008), the model consists of six levels of maturity, in which the score-range for each level is as follows (see Figure 1). These six maturity levels are used, together with the safety assessment form, to assess the organization's safety maturity, and plan for safety improvement.

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- Uncommitted level: This level has the score between 0 – 149 points.

- Drifter level: This level has the score between 150 – 249 points

- Tool pusher level: This level has the score between 250 – 449 points

- Improver level: This level has the score between 450 – 649 points

- Matured level: This level has the score between 650 – 799 points

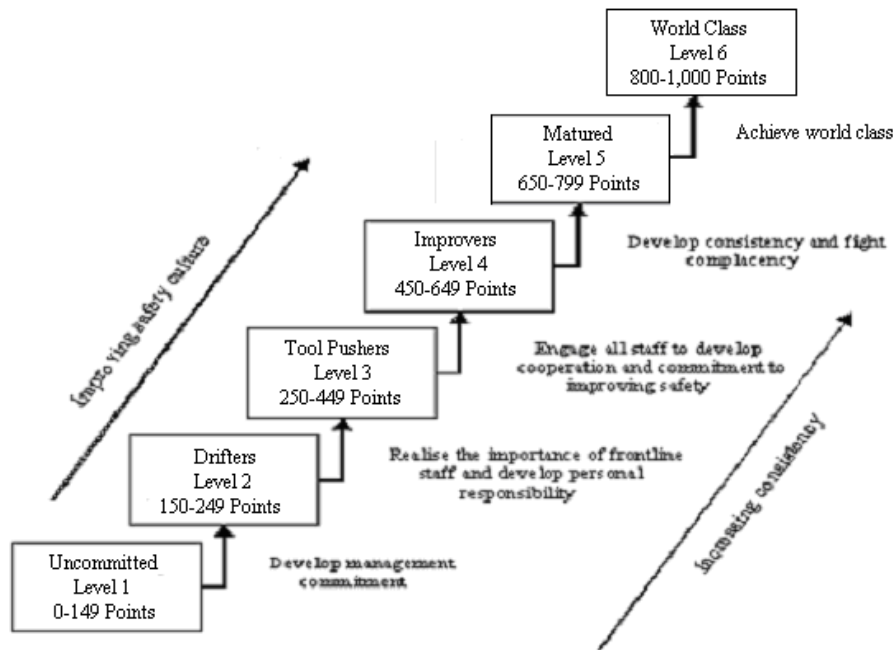- World class level: This level has the score between 800 - 1,000 points.

Figure 1. The Six Safety Maturity Levels

Safety Assessment Approach

The safety assessment approach, as illustrated in Table 1, consists of nine criteria, with a total of their 47 associated attributes (Chinda, 2010). The nine criteria include five 'enablers' (Leadership, Policy and Strategy, People, Partnerships and Resources, and Processes), and four 'results' (People Result, Customer Result, Society Result, and Key Performance Result). Each criterion has its weight, with a total weight of 1,000 points. Based on the EFQM (2000), the weight allocation is as follows: 100 points to Leadership, 80 points to Policy and Strategy, 90 points to People, 90 points to Partnerships and Resources, and 140 points to Processes. On the other hand, the 500 points of 'results' are distributed into 90 points of People Results, 200 points of Customer Results, 60 points of Society Results, and 150 points of Key Performance Results.

To define the maturity level, the score of each criterion is calculated based on the number of its associated attributes, and the points given by the respondents. To illustrate, the Leadership factor consists of six items to operationalise this construct. Thus, the maximum score of this factor becomes 30 points i.e. six items with a maximum point of each item of five based on the 5 – point Likert scale. This maximum score is, however,

needed to be adjusted to match with the weights assigned by the EFQM (2000). Hence, a maximum score of Leadership must be multiplied by 10/3 to make the adjusted score of 100 points (i.e. 30 x 10/3 = 100 points).

Table 1. A Safety Assessment Approach

Factor and Item	Score	Factor and Item	Score
Leadership		*Processes (Cont.)*	
1. Leadership commitment		25. Organizational learning	
2. Consultative style		26. Risk assessment	
3. Role model		27. Safety maintaining program	
4. Safety accountability		28. Safety-related resources	
5. Safety feedback		29. Safety information	
6. Financial resources		30. Benchmarking system	
Total Leadership score		*Total Processes score*	
Policy and Strategy		*People Result*	
7. Reward and recognition		31. Job satisfaction	
8. Updated safety standards		32. Communication enhancement	
9. Safety policy		33. Low turnover	
10. Productivity and safety targets		34. Safe work behaviour	
Total Policy and Strategy score		*Total People Result score*	
People		*Customer Result*	
11. Safety perception		35. Customers' relationship	
12. Compliance of safety rules		36. Loyal customer	
13. Teamwork		37. Customers' expectation	
14. Adequate supervision		38. Customers' satisfaction	
15. Workers' involvement		39. Customers' perception	
16. Safety empowerment		*Total Customer Result score*	
17. Peer review		*Society Result*	
Total People score		40. Social cost reduction	
Partnerships and Resources		41. Public safety	
18. Partnerships' involvement		42. Social image	
19. Partnerships' awareness		43. Social cooperation	
20. Partnerships' selection		*Total Society Result score*	
21. Personal protective equipment		*Key Performance Result*	
Total Partnerships and Resources score		44. Increased competitiveness	
Processes		45. Organizational performance	
22. Safety training		46. Reduced number of accidents	
23. Job clarity		47. Total cost reduction	
24. Safety documentation		*Total Key Performance Result score*	

Safety Assessment Steps

The safety assessment approach consists of five steps in identifying the current safety maturity level of an organization. The details of each step are as the followings.

- Step 1: In each factor, the score of each item (minimum of 1 point and maximum of 5 points) is assessed and filled by the assessment team.

- Step 2: In each factor, all items' scores are summed to achieve the total score.

- Step 3: In each factor, the adjusted total score is calculated by multiplying its total score with its multiple weight.

- Step 4: The final score is calculated by summing the adjusted total scores of the nine factors.

- Step 5: The safety maturity level is assessed based on the final score.

The safety assessment approach is used to assess the current safety maturity level of the two studied companies, and plan for safety improvement.

Safety Assessment Results

The two studied companies supply parts to the automotive industry. Company A manufactures nuts, while company B makes steel bars. Each company sets up a working group to measure the current safety status, and plan for safety improvement. Team members of company A are office manager, purchasing manager, safety officer, planning officer, and human resources officer. Five members of company B, on the other hand, are assistant manager, safety officer, marketing officer, planning officer, and production officer. The working group of each company brainstorms to fill in the scores (minimum of 1 point and maximum of 5 points) in the safety assessment form (see Table 1). The results, as shown in Table 2 and Figure 2, reveal that company A is currently in level 6, the highest level, of safety maturity; while company B is in level 5 of safety maturity.

Table 2. Safety Assessment Results of the Two Studied Companies

| Factor		Score	
		Company A	Company B
Leadership	(maximum of 100 points)	97.50	75.33
Policy and Strategy	(maximum of 80 points)	80.00	63.20
People	(maximum of 90 points)	84.21	69.94
Partnerships and Resources	(maximum of 90 points)	83.25	51.30
Processes	(maximum of 140 points)	138.44	112.00
People Result	(maximum of 90 points)	79.65	65.70
Customer Result	(maximum of 200 points)	174.00	124.80
Society Result	(maximum of 60 points)	50.25	45.00
Key Performance Result	(maximum of 150 points)	129.38	106.50
Total Score	*(maximum of 1,000 points)*	*916.68*	*713.74*
Current Safety Maturity Level	*(levels 1 – 6)*	*6*	*5*
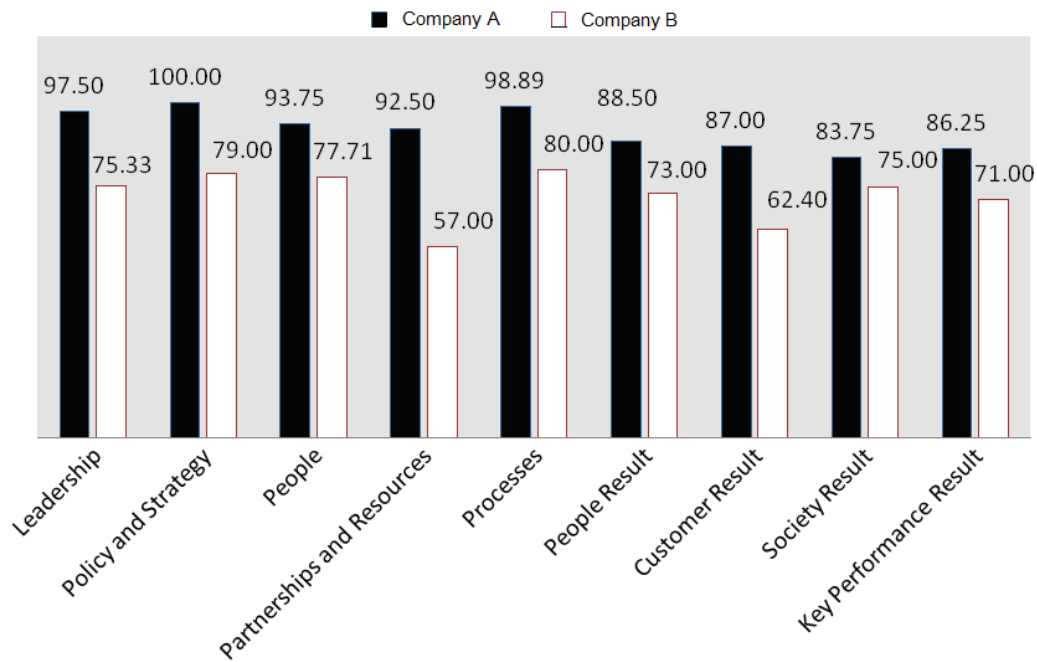
Figure 2. Safety Assessment Results of the Two Studied Companies

Assessment Results of Company A

Company A obtains higher scores in all nine criteria. Further, most of the 'enabler' scores depict higher values than the 'result' scores. Based on the total score (916.68 points), this company scores a 'world class' level or level 6 of safety maturity (see Figure 1), which is already the highest possible outcome. This demonstrates an effective and practical safety policy, which results in successful safety implementation; this could be seen from the high scores of the 'safety training', 'job clarity', and 'safety maintaining program' items in the Processes factor. The results, however, reveals that the Partnerships and Resources factor receives the lowest score among the five enablers, especially in the 'partnerships' involvement', 'partnerships' awareness', and 'partnerships' selection' items. The results also show that the company should concern more on the Society Result factor, since this criterion receives the lowest score among the nine criteria. This might be because the firm does not adequately promote its safety campaign.

Assessment Results of Company B

Company B scores a 'matured' level or level 5 of safety maturity. It is considered a high standard, yet can still be improved to higher level. The company has the highest score on the Processes factor, and the lowest score on the Partnerships and Resources factor. This demonstrates that the company's stakeholders do not participate in safety implementation as much as they are supposed to do. The low score in the Leadership factor also explains the lack of top management commitment to safety. Moreover, the Customer Result factor receives the lowest score among the four 'results', particularly in the 'customers' relationship' and 'loyal customer' items. To improve safety, it is expected that the company works together with its customers and stakeholders to plan for an effective safety program.

Safety Improvement Plan

To improve safety, and progress to higher level of maturity, safety improvement plans are set up for the two studied companies based on the assessment results (see Tables 3 and 4).

Table 3. Safety Improvement Plan for Company A

Item	Safety Improvement Plan
1. Partnerships' involvement	Get suppliers and stakeholders to involve in safety activities, and announce this involvement to workers.
2. Partnerships' awareness	Inform suppliers about safety laws and regulations.
3. Partnerships' selection	Put safety as one of the aspects for partnerships' selection.
4. Safety empowerment	Post an executive committee chart of safety department to lower-level employees. The chart must clearly define the safety empowerment of each working level.
5. Peer review	Set up a morning discussion about safety issues, not only in the organization, but also in general, to raise awareness of safety.
6. Social image	Promote the company's safety awards, and advertise safety activities and events that the firm would like to host through different medias.
7. Social cooperation	Promote company's safety activities to local, and involve them in the activities.

Table 4. Safety Improvement Plan for Company B

Item	Safety Improvement Plan
1. Partnerships' involvement	Get suppliers and stakeholders to involve in safety activities, and announce this involvement to workers.
2. Partnerships' awareness	Inform suppliers about safety laws and regulations.
3. Partnerships' selection	Put safety as one of the aspects for partnerships' selection.
4. Safety accountability	Get management clarify and approve safety responsibilities for each working level.
5. Safety empowerment	Post a chart with clear safety responsibilities of each working level.
6. Peer review	Set up a morning discussion about safety issues, not only in the organization, but also in general, to raise awareness of safety.
7. Adequate supervision	Have safety inspection every morning before starting work.
8. Customers' relationship	Involve customers in the company's safety activities and events.

The improvement plans are implemented in the two studied companies, and the audits are performed twice, two and four months after, to assess the safety maturity level. The audit results are as shown in Tables 5 and 6.

Table 5. Safety Audit of Company A

1st Safety Audit	2nd Safety Audit
Partnerships' involvement	
Safety meeting between the company and its stakeholders is initiated.	Safety meeting is scheduled every three months.
Partnerships' awareness	
The matter has been brought into discussion in the meeting.	The company's safety rules are announced to all stakeholders.
Partnerships' selection	
The matter has been brought into discussion in the meeting.	Safety is considered as a factor in suppliers' selection.
Safety empowerment	
The executive committee chart, with clear safety responsibilities, is posted at every department.	The executive committee chart, with clear safety responsibilities, is posted at every department.
Peer review	
Safety talk is set up every Monday morning.	The first award is given to the best speaker.
Social image	
The company plans to promote its safety awards through banners.	The banners are posted.
Social cooperation	
Upcoming safety activities are posted on the company's website.	The company plans to get the local students involve in the upcoming safety week.

Table 6. Safety Audit of Company B

1st Safety Audit	2nd Safety Audit
Partnerships' involvement	
Safety meeting between the company and its stakeholders is initiated.	Safety meeting is scheduled every six months.
Partnerships' awareness	
The matter has been brought into discussion in the meeting.	The company's safety rules are announced to all stakeholders.
Partnerships' selection	
The matter has been brought into discussion in the meeting.	Safety is considered as a factor in suppliers' selection.
Safety accountability	
The matter has been brought into discussion in the meeting.	Top management approves safety responsibilities for each level.
Safety empowerment	
The matter has been brought into discussion in the meeting.	The chart, with clear safety responsibilities for each working level, is posted at every department.
Peer review	
Safety talk is set up every Monday morning.	The first award is given to the best speaker.
Adequate supervision	
A safety inspector is assigned to inspect safety implementation of a pilot department.	Safety inspector is found effective in improving safety.
Customers' relationship	
The matter has been brought into discussion in the meeting.	Customers are invited to the 'open house' activities.

Final Safety Assessment

After the second audit, the two studied companies are reassessed with safety maturity. Figures 3 and 4 prove the improvement of safety, as well as the higher safety maturity level, of the two studied companies. Company A increases its total score from 916.68 to 953.87 points, and is in level 6 of safety maturity. The score of Partnerships and Resources factor is also found improved.

Company B improves its total score from 713.74 to 806.90 points, and progresses through to level 6 of safety maturity. It is found that the higher score comes from the improvement in the Partnerships and Resources, the People, and the Society Result factors.
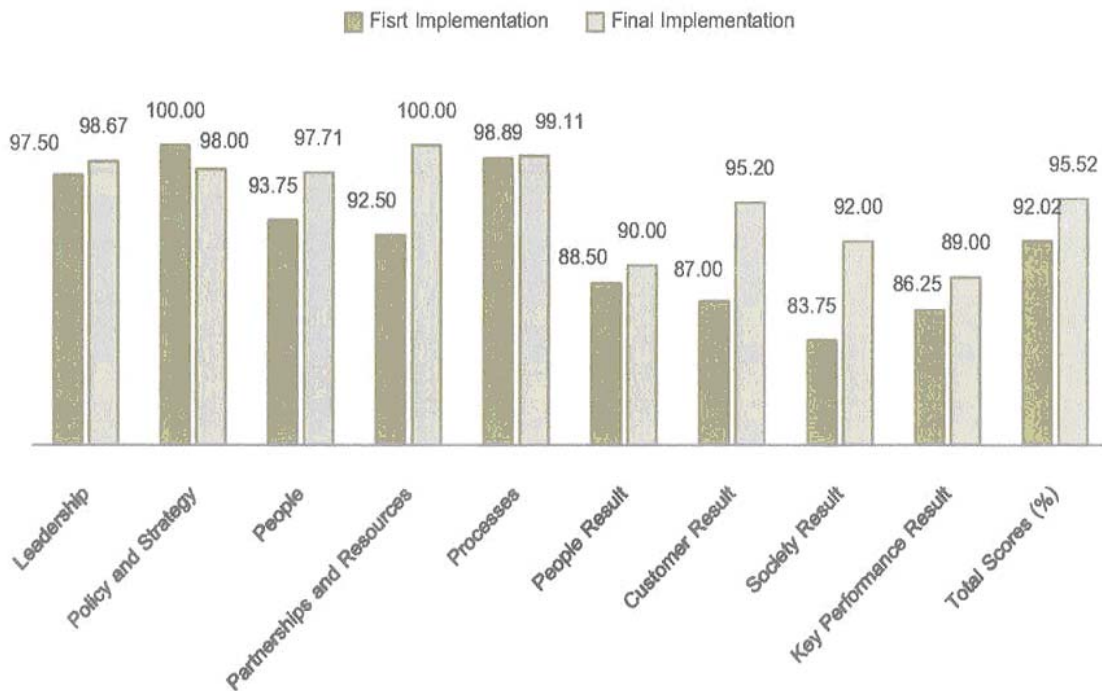

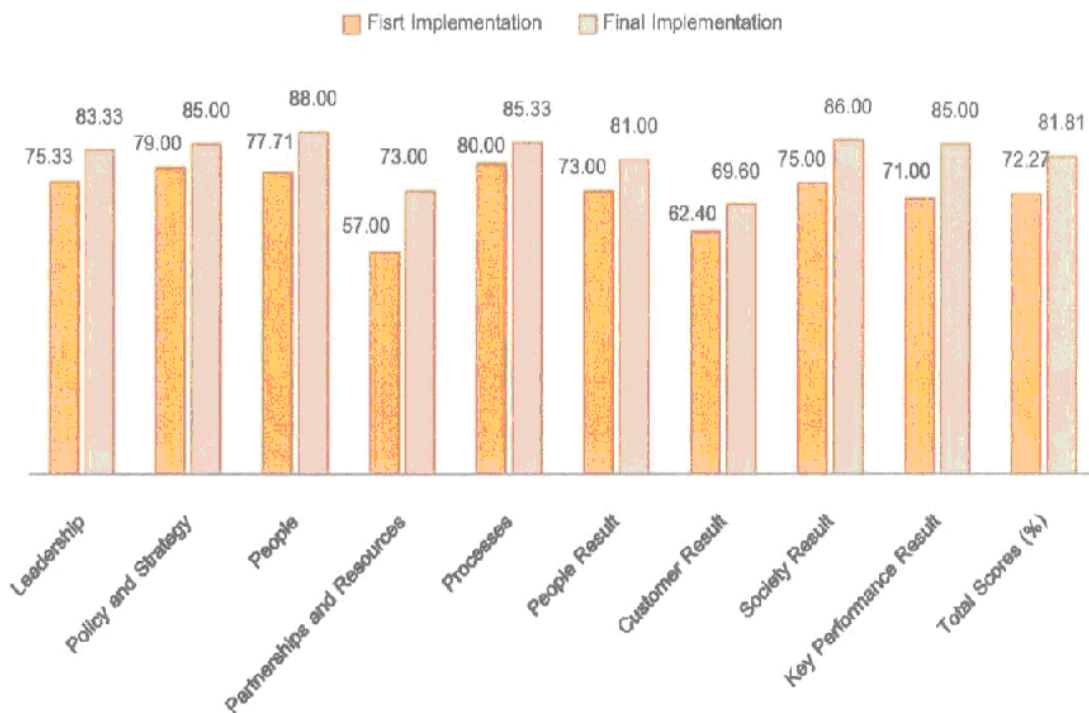Figure 3. The Percentages of the Scores Achieved in Each Criterion (Company A)

Figure 4. The Percentages of the Scores Achieved in Each Criterion (Company B)

Conclusion

Safety is becoming an important issue in many industries around the world. To improve safety performance, it is necessary to have a safety tool to help measuring safety status, and plan for safety improvement. The safety assessment approach developed in this paper proves useful in assessing the organization's current level of safety maturity. The tool also states the weak points that should be enhanced

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